MARCUS GARVEY APARTMENTS
KINGS COUNTY
BROOKLYN, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C224198

USEPA ID # NYD981186745

Prepared for:

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Larchmont, New York 10538

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

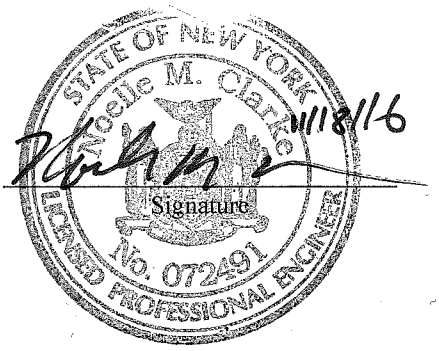
NOVEMBER 2016

CERTIFICATION STATEMENT

I, Noelle M. Clarke, P.E., certify that I am currently a NYS registered professional engineer 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).

Noelle M. Clarke, P. E.
NYS Professional Engineer #072491

4/18/16
Date



4/18/16
Signature

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LIST OF ACRONYMS

µg/kg .....Micrograms per Kilogram
µg/L.....Micrograms per Liter
µg/m^3.....Micrograms per Cubic Meter
mg/kg .....Milligrams per Kilogram
4,4'-DDE.....4,4'-Dichlorodiphenyldichloroethylene
4,4'-DDD 4,4-Dichlorodiphenyldichloroethane
4,4'-DDT.....4,4-Dichlorodiphenyltrichloroethane
AGC .....Annual Guidance Concentration
AOCs.....Areas of Concern
ARARs.....Applicable or Relevant and Appropriate Requirements
ASP .....Analytical Services Protocol
AWQSGVs .....Ambient Water Quality Standards and Guidance Values
bbs.....Below Basement Slab
BCA .....Brownfield Cleanup Agreement
BCP.....Brownfield Cleanup Program
BEEI.....Bureau of Environmental Exposure Investigation
bls.....Below Land Surface
BOA .....Brownfield Opportunity Areas
CAMP .....Community Air Monitoring Plan
C/D.....Construction and Demolition
CEH.....Center for Environmental Health
CFR.....Code of Federal Regulations
COC .....Certificate of Completion
CP-51 .....Commissioner Policy-51
CPP .....Citizen Participation Plan
CQAP.....Construction Quality Assurance Plan
CSM .....Conceptual Site Model
CVOCs.....Chlorinated Volatile Organic Compounds
cy.....Cubic Yards
DAR .....Division of Air Resources
DCE.....cis-1,2-dichloroethene
DEC.....Department of Environmental Conservation

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

DMM.....Division of Materials Management

DO.....Dissolved Oxygen

DUSR.....Data Usability Summary Report

EC .....Engineering Control

ECL.....Environmental Conservation Law

EDD .....Electronic Data Deliverable

EJ.....Environmental Justice

ELAP.....Environmental Laboratory Approval Program

ESA.....Environmental Site Assessment

FER .....Final Engineering Report

Ft .....Feet/Foot

HASP .....Health and Safety Plan

HAZWOPER .....Hazardous Waste Operations and Emergency Response

Hp.....Horsepower

HVAC .....Heating, Ventilation, and Air Conditioning

IC.....Institutional Control

$KMnO_4$.....Potassium Permanganate

L+M .....L+M Builders Group

MEK.....Methyl Ethyl Ketone; 2-butanone

MS/MSD.....Matrix Spike/Matrix Spike Duplicate

MW .....Monitoring Well

NYCDEP.....New York City Department of Environmental Protection

NYCDOT.....New York City Department of Traffic

NYCRR.....New York Codes, Rules, and Regulations

NYSDEC.....New York State Department of Environmental Conservation

NYSDOH.....New York State Department of Health

NYSDOT .....New York State Department of Transportation

O&M.....Operation and Maintenance

ORP.....Oxidation-Reduction Potential

OSHA.....Occupational Safety and Health Administration

PAHs .....Polycyclic Aromatic Hydrocarbons

PCBs .....Polychlorinated Biphenyls

PCE .....Tetrachloroethene (Perchloroethene)

PEJA .....Potential Environmental Justice Area
PDF .....Portable Document Format
PID .....Photo Ionization Detector
PPE.....Personal Protective Equipment
PVC.....Polyvinyl Chloride
QAPP .....Quality Assurance Project Plan
QA/QC .....Quality Assurance/Quality Control
RAOs.....Remedial Action Objectives
RAWP .....Remedial Action Work Plan
RI.....Remedial Investigation
RIR.....Remedial Investigation Report
RIR/RAWP .....Remedial Investigation Report/Remedial Action Work Plan
SCG.....Standards, Criteria, and Guidance
SCOs .....Soil Cleanup Objectives
SEQRA .....State Environmental Quality Review Act
SGC.....Short-term Guidance Concentration
SMP.....Site Management Plan
SoMP.....Soil Management Plan
SOP .....Site Operations Plan
SSDS .....Sub-Slab Depressurization System
SSO .....Site Safety Officer
SVE.....Soil Vapor Extraction
SVOCs .....Semivolatile Organic Compounds
SWPPP.....Stormwater Pollution Prevention Plan
TAGM.....Technical and Administrative Memorandum
TAL.....Target Analyte List
TBCs .....To Be Considered
TCE.....Trichloroethene
TCL.....Target Compound List
TOGS .....Technical and Operational Guidance Series
USEPA.....United States Environmental Protection Agency
USGS .....United States Geological Survey
VOCs.....Volatile Organic Compounds

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:	Site Number: C224198 Tax Lot: 11 (Block 3575)	Marcus Garvey Apartments 650 Rockaway Avenue, Brooklyn, New York
Institutional Controls:	1. The property may be used for restricted residential; commercial, etc. 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 Environmental Protection 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 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:	Site Number: C224198 Tax Lot: 11 (Block 3575)	Marcus Garvey Apartments 650 Rockaway Avenue, Brooklyn, New York
	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 the survey attached to the Environmental Easement (Appendix A), and any potential impacts that are identified must be monitored or mitigated; and	
	12. Vegetable gardens and farming on the site are prohibited, with the exception of raised planters.	
Engineering Controls:	1. Cover system	
	2. In Situ Groundwater Treatment	
	3. Sub-Slab Depressurization System (SSDS) and Soil Vapor Extraction (SVE) Wells	

Inspections:	Frequency
1. Site Cover System Inspection	Annually
2. SSDS and SVE Wells	Monthly
Monitoring:	
1. SSDS and SVE Wells	Monthly
2. Groundwater Sampling (MW-1, MW-2, MW-3, MW-5S, MW-6S, MW-8, and MW-9)	Quarterly
Maintenance:	
1. Routine SSDS Maintenance	Monthly
2. Non-Routine SSDS Maintenance	As Needed

Site Identification:	Site Number: C224198 Tax Lot: 11 (Block 3575)	Marcus Garvey Apartments 650 Rockaway Avenue, Brooklyn, New York
Reporting:		
1. SSDS and SVE Wells Inspection		Inspection will occur monthly, but reports will be provided Annually in the Periodic Review Report
2. Groundwater Sampling Data		Quarterly, 45 days after each event
3. Periodic Review Report		First report 16 months after COC is issued, then annually, or as otherwise determined by the Department.

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 Marcus Garvey Apartments located in Brooklyn, 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. C224198, which is administered by New York State Department of Environmental Conservation (NYSDEC).

Marcus Garvey Preservation LLC entered into a Brownfield Cleanup Agreement (BCA), on March 25, 2015 with the NYSDEC to remediate the site. A drawing showing the site location and boundaries of this site is provided on Plate 1. 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 A.

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 Kings County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

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

It is important to note that:

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

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA (Index #C224198-02-15; Site #C224198) 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 B of this SMP.

This SMP was prepared by Roux Associates, Inc./ Remedial Engineering, P.C. (Roux Associates) on behalf of Marcus Garvey Preservation LLC, 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

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

1.3 Notifications

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

- 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.

- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

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

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

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

Table 1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1: Notifications*

Name	**Contact Information**
Stephen Malsan NYSDEC Project Manager	(518) 402-9646 stephen.malsan@dec.ny.gov
Paul John NYSDEC Regional HW Engineer	(718) 482-4995 paul.john@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov

Table 1: Notifications*

Name	Contact Information
Josh Weisstuch Site Owner, Marcus Garvey Preservation LLC	212-233-0495 X 217 jweisstuch@lmdevpartners.com
Noelle Clarke, P.E. Certifying Professional Engineer Remedial Engineering, P.C.	631-232-2600 nclarke@rouxinc.com
David Bligh, P.E. Consultant Project Manager Roux Associates/Remedial Engineering	631-232-2600 dbligh@rouxinc.com

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

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Brooklyn, Kings County, New York and is identified as Block 3575 and Lot 11 on the New York City Tax Map (see Plate 1). The site is an approximately 0.31-acre area and is bounded by Dumont Avenue to the north, residential/commercial buildings to the south, Rockaway Avenue to the east, and a courtyard beyond which is a multifamily residential building with security, administrative and maintenance facilities to the west (see Plate 1) – Site Layout Map). The boundaries of the site are more fully described in Appendix A –Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is/are:

Marcus Garvey Preservation LLC
1865 Palmer Avenue
Larchmont, New York 10538

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: one mixed-use commercial/residential building. The first story of the building is divided into two separate parts (a north part and a south part) by an east/west passageway that leads from the sidewalk to the courtyard behind the building. The Site is zoned C2-5, which is a commercial overlay within a residential zone. The building includes a six unit, one-story commercial (i.e., retail) component located along Rockaway Avenue and a 55-unit, four-story residential component located immediately behind (west) of the commercial component. Three of the commercial units to the north of the passageway are currently vacant; the remaining three units to the south of the passageway are currently occupied by a grocer, a deli and a meat market. Some of the units in the commercial portion of the building are located over a subgrade basement, while others are slab-on-grade construction. All residential units are currently occupied.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and residential properties. The properties immediately south of the Site include mixed use commercial and residential properties; the properties immediately

north of the Site include mixed use commercial and residential properties; the properties immediately east of the Site include residential housing projects owned and managed by the New York City Housing Authority; and the properties to the west of the Site include residential properties.

2.2.2 Geology

The Site is shown on the 1995 USGS Topographic Map of Brooklyn, New York Quadrangle. The Site is relatively flat and has a surface elevation of approximately 30 feet above mean sea level. The area surrounding the Site is gently sloped to the south towards Jamaica Bay. A review of the Geologic Map of New York and the Surficial Geologic Map of New York (Lower Hudson Sheet) indicates that the soils on the Site are likely to be derived from sand and gravel outwash deposits which overlie clays, sands and gravel. Sources indicate that the Gardiner's Clay is approximately 180 feet (ft) below land surface (bls) and bedrock could be as deep as 400 ft bls. According to the USGS soils on the Site are mapped as Urban Land. Based upon Roux Associates' investigation, Site soils consist of a five to 25-foot-thick layer of urban fill above predominantly of fine to coarse grained sand. Generalized hydrogeologic cross sections are shown in Plate 2. Site specific boring logs are provided in Appendix C.

2.2.3 Hydrogeology

Based upon Roux Associates' investigation, the depth to groundwater is approximately 21 feet below land surface (ft bls) with a groundwater flow direction generally to the south. A groundwater contour map is shown in Figure 2. Groundwater elevation data is provided in Table 2. Groundwater monitoring well construction logs are provided in Appendix C.

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.

2.3.1 Past Uses and Site History

According to the Phase I Environmental Site Assessment (ESA) conducted in 2013 by Ecosystems Strategies, Inc. (Ecosystems), the Site was developed sometime before 1907 with mixed residential/commercial use building(s).

Prior to 1974, the Site was owned by the New York State Urban Development Corporation, which acquired the Site from the City of New York after the City condemned the Site and various other properties in the area prior to 1973. Available historical records indicate that the former use of the Site included mixed-use commercial/residential buildings. Marcus Garvey Brownstone Houses, Inc. was the owner from 1974 until Marcus Garvey Preservation LLC took ownership in December 2014. The current Site building was constructed circa 1974. Current Site usage remains mixed commercial and residential.

A former dry cleaner, Johnny's Cleaners, reportedly operated in the northeastern portion of the Site at 650 Rockaway Avenue from 1995 through 2011 based on the Phase I ESA conducted in 2013. However, based upon a NYSDEC Manifest Search, waste was disposed from Lordner's Dry Cleaner located at the same address as Johnny's Cleaners between 1986 and 2002, and waste was disposed from Johnny's Cleaners from 2002 through 2010.

Further evaluation of the Site area based on a new set of Sanborn Maps obtained in March 2015 during preparation of this RIR/RAWP has indicated the presence of two potential dry cleaners on-Site on the 1966 Sanborn map, one at 652-654 Rockaway Avenue (north of the passageway, within the footprint of the former Johnny's Cleaners) and one at 672 Rockaway Avenue (south of the passageway). It is not possible to determine how long these potential former dry cleaners operated, as they were not present on the preceding or following Sanborn maps.

2.3.2 Environmental Investigations

2.3.2.1 Phase I and Phase II ESAs Prepared by Ecosystems

A Phase I ESA was completed at the Site by Ecosystems in December of 2013. The scope of the Phase I ESA included the Site and several surrounding properties. Pertinent findings of the Phase I ESA relevant to the Site include that the Site was developed sometime before 1907 with mixed residential/commercial use building(s). The Current Site building was constructed circa 1974. Additionally, an oil burner application was first received by the New York City Department of Buildings in 1909 and a permit to install a new boiler and fuel oil tank was issued in 1994. A 275-gallon fuel oil aboveground storage tank was identified in the basement of the building.

The 2013 Phase I ESA identified Johnny's Cleaners located at 650 Rockaway Avenue as a recognized environmental concern with respect to the Site (the location of the former Johnny's Cleaners is presented in Plate 1). According to the Phase I ESA, the former Johnny's Cleaners reportedly operated from 1995 to 2011. A NYSDEC Spill Number (9805405) was generated when approximately 20 gallons dry cleaning solvent was spilled in the basement of the former Johnny's Cleaners. NYSDEC closed the Spill on July 31, 1998.

A Phase II ESA consisting of the collection of soil and groundwater samples was completed to assess impacts from Johnny's Cleaners. The Phase II was completed by Ecosystems in April of 2014. As noted in the Phase II Report, a total of five soil borings were installed in the basement of the building (four were installed in the basement of the former Johnny's Cleaners and one was installed in the basement of a former restaurant approximately 65 feet to the south). Three of the five borings were converted to permanent groundwater monitoring wells. A total of seven soil samples and three groundwater samples were collected and submitted for laboratory analysis of volatile organic compounds (VOCs). Depths for the on-Site samples collected during the Ecosystems Phase II represent the depth of the sample interval below the basement floor slab.

Results of the soil sampling activities indicated that the subsurface has been impacted by historic Site use. Tetrachloroethylene (PCE) and trichloroethylene (TCE) were detected in both shallow soil samples (i.e., 0 to 2 ft below basement slab [bbs]) and deep soil samples and were also spatially widespread beneath the basement. PCE is a common dry cleaning chemical and was known to be used in the on-Site machine; TCE is a common breakdown product of PCE.

Results of the groundwater samples indicate that PCE, TCE and cis-1,2-dichloroethylene (DCE), a breakdown product of PCE and TCE, were each detected at concentrations above their respective Ambient Water Quality Standard and Guidance Value (AWQSGV) for Class GA groundwater of 5 micrograms per liter (µg/L) in each of the three groundwater samples analyzed.

Monitoring wells MW 2 and MW 3 are located in the basement of the former Johnny's Cleaners; MW 1 is located in the basement of the former restaurant south of the Johnny's Cleaners.

2.3.2.2 Remedial Investigation by Roux Associates

During the site investigation, soil and groundwater samples were collected and analyzed for VOCs, semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), pesticides, and herbicides. Soil vapor samples were analyzed for VOCs. There were detections of the non-VOC parameters; however, the primary contaminant of concern is PCE and its associated degradation products TCE and cis-1,2-dichloroethene (cis-1,2-DCE). Past site operations as a drycleaner have contaminated soil, soil vapor and groundwater beneath the building with these contaminants.

Soil

PCE was detected in 39 soil samples, ranging in concentration from 0.002 ppm (estimated) to 200 ppm. PCE exceeded the unrestricted use and protection of groundwater soil cleanup objectives soil cleanup objectives (SCOs) (1.3 ppm) in eight samples, and exceeded the restricted residential SCO (19 ppm) in one sample RSB-12/0-2 (200 ppm). TCE was detected in 21 soil samples, ranging in concentration from

0.00057 ppm (estimated) to 0.51 ppm. TCE exceeded the unrestricted use and protection of groundwater SCOs (0.47 ppm) at only one location, RSB-12/0- 2, at a concentration of 0.51 ppm. These samples were all collected in the basement of the former drycleaner.

SVOCs in soil, exceeded the restricted residential SCOs in four of the on-site samples analyzed and all were at the two-foot interval taken from just under the basement slab. The SVOC exceedances are limited to polycyclic aromatic hydrocarbons (PAHs).

For metals in soils, unrestricted use SCOs were exceeded in four of the samples analyzed for four metals. Only one was detected above the Protection of Groundwater or Restricted Residential SCOs (barium 550 ppm).

For pesticides/herbicides, the unrestricted use SCOs were exceeded in five of the samples analyzed for pesticides/herbicides. None were detected above the Protection of Groundwater or Restricted Residential SCOs

Groundwater

PCE and its associated degradation products are found in groundwater at the site exceeding groundwater standards (typically 5 ppb). The highest detections of these contaminates in groundwater is directly under the former drycleaner at MW-2 (PCE at 7,700 ppb, TCE at 110 ppb and cis-1,2-DCE at 190 ppb). The highest off-site detection in groundwater was MW-7 (PCE at 2,600 ppb) located southeast of the site across Rockaway Avenue.

Soil Vapor

Five on-site sub-slab soil vapor samples were collected and analyzed for VOCs. These sample locations are below the former dry cleaner space, as well as beneath other retail and residential spaces in the building structure. PCE and TCE were detected in several sample locations at concentrations that indicate actions are warranted to minimize current or potential exposures associated with soil vapor intrusion. The highest detections were from under the two basement areas (PCE in sample SS-5 and SS-5R (111,000

micrograms per cubic meter [$\mu g/m^3$] and 47,600 $\mu g/m^3$, respectively) and TCE in samples SS-5 (1,840 $\mu g/m^3$), SS-5R (618 $\mu g/m^3$) and SS-6 (688 $\mu g/m^3$).

Additionally, elevated concentrations of VOCs were identified in two soil vapor samples collected off-site between the site and the adjacent off-site residential building to the west that fronts on Dumont Street. Significantly lower to non-detect levels of VOCs were observed in sub-slab soil vapor samples collected beneath the residential building to the west of the site that fronts on Dumont Street and in soil vapor samples collected in the courtyard to the west, adjacent to the residential portion of the off-site building that fronts on Chester Street.

2.3.2.3 Additional Sub-Slab, Soil Vapor, and Indoor Air Investigation Findings

As described in the RIR/RAWP, additional sub-slab, soil vapor and indoor air sampling was performed based on the results obtained during the RI. The results were reported in a letter entitled "Additional Sub-Slab, Soil Vapor, and Indoor Air Investigation Findings", dated May 17, 2016. Sampling was initiated on March 22 and concluded on March 23. However, sample IA-3 was not collected at that time due to the sampling team being unable to access the apartment. Sample IA-3 and a concurrent ambient air sample were instead collected between March 25 and March 26. The sub-slab depressurization system (SSDS), which was installed in the Site building as an Interim Remedial Measure in 2015, was operating properly during the sampling. Samples included the following;

- One 2-hour indoor sub-slab (SS-10) and two 2-hour outdoor soil vapor samples (SV-4 and SV-5) within or immediately adjacent to the footprint of the potential second former dry cleaner;
- One 2-hour indoor air sample (IA-1) in the Rockaway Deli Food Corp;
- One 24-hour indoor air sample (IA-2) in a ground floor apartment near the former Johnny's Cleaners;
- One 24-hour indoor air sample (IA-3) in a ground floor apartment of the Dumont Avenue building near SV-1 and SV-1R; and
- One 24-hour outdoor ambient air sample.

The analytical findings are summarized below:

- The indoor air (IA-1), sub-slab (SS-10) and outdoor soil vapor (SV-4 and SV-5) results collected to evaluate the potential second former dry cleaner show non-detect concentrations of trichloroethene (TCE) and both cis-1,2-dichloroethene and trans-1,2-dichloroethene (hereafter collectively named 1,2-DCE), and low levels of tetrachloroethene (PCE);

- The indoor air sample from the vacant apartment adjacent to the former Johnny's Cleaners (IA-2) shows non-detect concentrations of TCE and 1,2-DCE and relatively low levels of PCE; and

- The indoor air sample (IA-3) from the occupied apartment in the Dumont Avenue building does not indicate the presence of constituents of concern for the Site (e.g., the dry cleaning chemical PCE or its breakdown products TCE and 1,2-DCE).

When the indoor air results are entered into the NYSDOH Soil Vapor/Indoor Air matrices with either the current sub-slab data in the southern part of the Site building (south of the passageway), or the previous sub-slab results for the northern portion of the Site building and the Dumont Avenue building, the results are as follows for PCE and TCE (which are the only constituents of concern for the Site that have matrix values available):

- For the southern part of the Site building, the results indicate no further action is required;

- For the northern part of the Site building, the results indicate that mitigation is required due to the concentrations of PCE in sub-slab sample SS-5 and SS-5R and TCE in samples SS-5, SS-5R and SS-6, regardless of indoor air sample concentrations; and

- For the Dumont Avenue building, the results indicate that no further action is required.

The data does not indicate environmental impacts from the potential second former dry cleaner, confirms the assertion in the RIR/RAWP that "vapor intrusion is not considered a concern" at the Dumont Avenue building, and supports the continued operation of the SSDS in the Site building.

2.3.2.4 Exposure Assessment

As described in the Decision Document, this human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching, or swallowing). This is referred to as *exposure.*

People may contact contaminants in the soil if they dig below the existing cover materials (buildings and pavement). People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. A Sub-slab depressurization system (a system that ventilates/removes the air beneath the building) has been installed in the on-site building to prevent the indoor air quality from being affected by the contamination in soil vapor beneath the building. Environmental sampling is needed to determine whether soil vapor intrusion is a concern for off-site buildings.

2.3.2.5 Significant Threat

The NYSDEC and NYSDOH determined that this Site poses a significant threat to human health and the environment prior to remediation.

2.3.2.6 Contained-In Determination

In a letter dated February 10, 2016, Roux Associates requested a Contained-In determination from NYSDEC so that a portion of the waste proposed to be excavated as part of the remediation could be handled as non-hazardous waste instead of F listed hazardous waste. The request was based on total concentrations of VOCs observed during the RI. NYSDEC responded in a letter dated February 11, 2016, indicating that one toxicity characteristic leaching procedure (TCLP) sample for VOCs from the portion of waste proposed to be considered non-hazardous would need to be collected and submitted before the Contained-In determination could be processed. The requested

TCLP VOC sample (WC-1) was collected on May 6, 2016 and was submitted to NYSDEC on May 13, 2016 via email. The results indicated that PCE was the only TCLP VOC detected at 0.098 mg/L, which is less than the hazardous limit of 0.7 mg/L. Based on all of the data submitted, NYSDEC approved the Contained-in request in a letter dated May 16, 2016, allowing approximately 21 cubic yards of soil from a defined portion of the excavation area and 6.5 cubic yards of concrete (over the entire excavation area) to be managed as non-hazardous waste. Plate 3 shows the limits of the hazardous and non-hazardous soil based on the Contained-In determination.

2.3.3 Remedial Actions Completed

The site was remediated in accordance with the remedy selected by the NYSDEC in the Decision Document dated April 2016. The remedy was selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy was a Track 4: Restricted Residential use with site-specific soil cleanup objectives remedy. The selected remedy is referred to as the Excavation and *In Situ* Treatment remedy.

The elements of the selected remedy completed at the Site, as shown in Plates 3 and 4, are as follows:

1. Remedial Design

   A remedial design program was implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques were implemented to the extent feasible in the design, implementation, and 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;

- Maximizing habitat value and creating habitat when possible;

- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and

- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation

   Soils that were acting as a source of continued groundwater contamination were excavated and disposed of off-site. These soils, which exceeded the protection of groundwater SCOs for VOCs as defined by 6 NYCRR Part 375-6.8, have been identified as the Hot Spot and were excavated to the extent feasible without undermining the existing building. 73.08 tons of contaminated soil and concrete was removed, as follows:

   - 40.19 tons of soil were considered hazardous waste and were disposed of at Biogenie Corp., (a division of En Globe, Corp.) located at 8365 Broadway North, Montreal-East, Quebec, Canada H1B 5X7; and

   - 32.89 tons of soil and concrete (from the floor slab and former dry cleaning machine supports) were considered non-hazardous and were disposed of at Western Berks Community Landfill and Recycling Center, LLC located at 455 Poplar Neck Road, Birdsboro, Pennsylvania 19508.

   This Hot Spot was located below the basement floor of the former dry cleaners. Some concentrations of non-dry cleaner, historic fill related contaminants remain on-site above the Restricted Residential Use SCOs, and were addressed by the cover system as described in remedy element 3 and the Soil Vapor Extraction system as described in remedy element 4.

   Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) was brought in to replace the excavated soil. The basement slab was restored above the former Hot Spot area and functions as part of the cover system as described in remedy element 3.

   In addition, two drums of groundwater from monitoring well purge and development were considered hazardous and were disposed of at Republic Environmental Systems, LLC located at 2869 Sandstone Drive, Hatfield, Pennsylvania 19440.

3. Cover System

   A Site cover existed prior to and was repaired in the basement of the former dry cleaner as part of the remediation. The Site cover system will be maintained to allow for restricted residential use of the site. Any site redevelopment will

maintain the existing Site cover, which consists either of the structures such as buildings, pavement, sidewalks or soil where the upper two feet of exposed surface soil meets the applicable SCOs for restricted residential use. Any fill material brought to the Site will meet the requirements for the identified site use as set forth in 6NYCRR part 375-6.7(d).

4. Soil Vapor Extraction (SVE)

   Soil excavation occurred along the western and southern walls of the basement area under the former dry cleaners. Endpoint samples confirm that contamination has seeped under the footings for these walls and remains at the base of the excavation along the southern foundation wall. The end-point samples indicate that VOCs in the soil remaining under these walls have not yet achieved the Protection of Groundwater SCOs.

   SVE is continuing to be implemented to remove VOCs from the subsurface. VOCs will be physically removed from the soil by applying a vacuum to two SVE wells that have been installed into the vadose zone (the area below the ground but above the water table) as shown in Plates 3 and 4. The two SVE wells are connected to the blower of SSDS B, which was designed with additional capacity to allow for the installation of several additional SVE wells. The SVE wells were installed below the basement floor of the former dry cleaners using eight-foot-long screens from two to ten feet bbs, and were connected to the existing SSDS piping using four-inch PVC piping. Each SVE well was provided with a shutoff valve. The vacuum draws air through the soil matrix that carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells will continue to be discharged through the existing SSDS discharge stack on the roof.

   The SSDS currently operates without treatment based upon discharge samples collected as part of the SSDS startup and testing program (Appendix D). As part of the startup of the two new SVE wells, a discharge sample from SSDS B (northern part of the building) was collected on October 18, 2016 and analyzed for VOCs via USEPA method TO-15. A Division of Air Resources (DAR-1) (formerly Air Guide-1) analysis was performed for parameters identified in the extracted vapor. The emission impacts were compared to the annual guidance concentration (AGC) values and the short-term guidance concentration (SGC) values from the August 10, 2016 DAR-1 AGC/SGC Tables. As reported in Progress Report No. 6, the DAR-1 analysis concluded that the estimated contaminant emission rates are below the AGC values and the SGS values, and therefore the extracted vapor effluent can be discharged to the atmosphere through the existing SSDS effluent stack without treatment.

5. *In Situ* Groundwater Treatment

   In situ treatment was implemented to treat site-related contamination in the groundwater beneath the basement of the former dry cleaners and former restaurant areas of the site. RemOx®-S, a treatment agent of potassium permanganate ($KMnO_4$) from the Carus Corporation, was applied using 12

injection points (seven in the former dry cleaner and five in the former restaurant spaces) screened from 10 to 20 feet below the basement slab. Periodic groundwater monitoring (eight total quarterly rounds after injections are completed), as defined in this SMP, will be performed to determine the effectiveness of the treatment and the number of additional injections to be performed, if any.

Based on the average stoichiometry for chlorinated VOCs (CVOCs) such as PCE, approximately 4 pounds of potassium permanganate /pound of CVOC were required to oxidize the CVOCs. To calculate the amount of potassium permanganate to inject, the amount of CVOCs in the areas of the former dry cleaner basement and restaurant areas were estimated, and natural organic demand (2.5 pounds per cubic yard of soil) was assumed. Using these values and the stoichiometric requirement of 4.2 pounds, the estimated quantity of potassium permanganate required for complete oxidation of the CVOCs in groundwater was approximately 880 pounds for the former basement area and 825 pounds for the former restaurant area. An approximately 4.4 percent by weight potassium permanganate solution was used for the injections. One round of injections was completed between July 28 and August 2, 2016. Due to refusal encountered in the former restaurant area and injecting more of the oxidant at the apparent source area in the basement of the former dry cleaners, the actual injected amounts of potassium permanganate were an estimated 687.5 pounds in the former restaurant area, and an estimated 990 pounds in the former dry cleaners. If post-remediation results indicate that additional rounds are required, the Volunteer will notify NYSDEC and provide a work plan.

Potassium Permanganate Solution Injection Procedure

The RemOx®-S was injected using 10 temporary points installed by a Geoprobe™ unit, and through the drill rods at IP-2 and IP-4 due to drill rig refusals that precluded the installation of screened injection points at those locations. The injection points were constructed of one-inch polyvinyl chloride (PVC) slotted screen with solid PVC pipe to the surface. The screened interval was from 10 to 20 ft bbs. Due to the estimated amount of potassium permanganate to be injected at the Site, the potassium permanganate solution was prepared in batches by mixing the crystalline potassium permanganate with potable water in a 250-gallon polyethylene tank. Approximately 2,700 gallons of water were needed for the former basement area and 1,912.5 gallons of water were needed for the former restaurant area. A total of approximately 92 55-gallon drums were required to mix and inject the total potassium permanganate needed for the Site.

The locations of the completed injection points are shown on Plate 3. A daily log was kept to record the potassium permanganate solution strength, potassium permanganate and water volumes used, and the volume of potassium permanganate solution injected into each temporary injection point. The wellhead pressure during injections was also monitored.

Potassium permanganate is an oxidant and care was taken to ensure that the injection program was carried out in a safe manner. Safety goggles or a face shield were the most important piece of protective gear worn at all times that potassium permanganate was being handled. Protective clothing was worn to prevent skin contact. Respiratory protection was worn when the crystalline potassium permanganate is handled to prevent inhalation of potassium permanganate dust.

Potassium permanganate has a characteristic deep purple color, which will stain most materials. Care was taken to prevent the potassium permanganate solution from splashing or spilling. Sodium bisulfite solution was used to neutralize potassium permanganate, as needed. A spill kit containing adsorbent material and sodium bisulfite was available whenever potassium permanganate solution was being handled.

Baseline Sampling

Prior to the injections, a baseline round of samples were collected from the monitoring well network on July 14, 2016. Samples were analyzed for Target Compound List (TCL) VOCs using USEPA SW846 Method 8260.

Performance Monitoring

Approximately two weeks after the oxidant injection event, performance monitoring samples were collected from the monitoring network on August 18, 2016. The monitoring wells were sampled for TCL VOCs using USEPA SW846 Method 8260. In addition, the groundwater samples collected were also examined for presence of aqueous potassium permanganate (observation for purple color), and field parameters for oxidation-reduction potential (ORP) and dissolved oxygen (DO) were recorded. Seven additional quarterly rounds of post-injection sampling will be performed after the Certificate of Completion (COC) is issued.

6. Vapor Mitigation

   The Volunteer, upon acquisition of the Site, installed and began operation of a SSDS system to address this potential exposure pathway. This system covers the entire foot print of the building and consists of a series of suction points and PVC piping, with two blowers (one for the southern part of the building [SSDS A] and one for the northern part of the building [SSDS B]).

   Monitoring of the SSDS has confirmed that it is effective. The SSDS startup and testing report is provided as Appendix D. This system will be operated and maintained pursuant to this Site Management Plan.

7. Institutional Control

   An institutional control in the form of an environmental easement for the controlled property was executed on August 15, 2016 and recorded with Kings County on August 31, 2016. The environmental easement:

– requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

– allows the use and development of the controlled property for restricted residential, commercial or industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

– restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and

– requires compliance with the Department approved Site Management Plan.

8. Site Management Plan

A Site Management Plan (this document) was prepared and implemented and includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

♦ Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.

♦ Engineering Controls: The site cover discussed in Paragraph 3; the SVE system discussed in Paragraph 4 above; and the sub-slab depressurization system discussed in Paragraph 6 above.

This plan includes:

– an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;

– descriptions of the provisions of the environmental easement including any land use, and/or groundwater water use restrictions;

– a provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

– provisions for the management and inspection of the identified engineering controls;

– maintaining site access controls and Department notification; and

– the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;
- monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s). The plan includes:

- procedures for operating and maintaining the system(s); and
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.

The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in Decision Document dated April 22, 2016 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

The following sections describe the contamination remaining on the Site after remediation was completed.

2.5.1 Soil

Soils exceeding the Part 375 Unrestricted Use, Restricted residential and Protection of Groundwater SCOs are present onsite. Exposure to remaining contamination at the site is prevented by a cover system over the site. This cover system is comprised of a minimum of asphalt pavement, concrete-covered sidewalks, and concrete building slabs. The demarcation layer, consisting of orange snow fencing material in the excavated portion of the basement of the former dry cleaner and the underside of the asphalt or concrete in all other areas, provides a visual reference to the top of the remaining contamination zone.

Tables 3 through 7 and Plate 5 summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs, Protection of Groundwater SCOs (for VOCs only) and the restricted residential Use SCOs at the site after completion of remedial action.

2.5.2 Groundwater

Table 8 and Plate 6 summarize the results of all samples of groundwater 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.

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 E) 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.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted residential uses only. 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 the survey attached to the Environmental Easement (Appendix A). These ICs are:

- The property may be used for: restricted residential 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 Environmental Protection 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 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 the survey attached to the Environmental Easement (Appendix A), and any potential impacts that are identified must be monitored or mitigated; and
- Vegetable gardens and farming on the site are prohibited, with the exception of raised planters.

3.3 Engineering Controls

3.3.1 Engineering Control Systems

3.3.1.1 Site Cover

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 asphalt pavement, concrete-covered sidewalks, and concrete building slabs. The demarcation layer, consisting of orange snow fencing material in the excavated portion of the basement of the former dry cleaner and the underside of the asphalt or concrete in all other areas,

provides a visual reference to the top of the remaining contamination zone. Plates 2 and 3 present the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix E outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix F.

3.3.1.2 In Situ Groundwater Treatment

As described in more detail in Section 2.3.3, implementation of potassium permanganate (trade name Remox S as manufactured by Carus Corporation) injections were completed in July and August, 2016 and included injection of 1,677.5 pounds of potassium permanganate in 10 temporary injection points and two locations where the potassium permanganate was directly injected through the Geoprobe rods.

Between July 22 and August 2, 2016, Cascade Drilling and GWTT installed and injected chemical oxidant (i.e., potassium permanganate) into 10 one-inch diameter PVC injection points (screened from 10 to 20 feet bbs), and direct injected potassium permanganate through the drill rods at two injection locations (IP-2 and IP-4) due to refusal that prevented the installation of screened PVC injection points. With the NYSDEC's July 19, 2016 approval (Appendix D of the FER), three (3) of the potassium permanganate injection points were moved from the proposed locations, including one from the basement of the former restaurant to the basement of the former dry cleaners, proximate to the area of remaining soil impacts. The other injection points were installed at the approximate proposed locations but modified as necessary due to overhead obstructions and drill rig refusal. Locations of the completed injection points are presented on Plate 3.

GWTT injected potassium permanganate from July 28 to August 2, 2016. Unless otherwise indicated below, each injection point received approximately 137.5 pounds of potassium permanganate. High back pressure ranging from 40 to 50 pounds per square inch limited the mass of potassium permanganate injected into IP-4 to approximately 114.5 pounds. The remaining 23 pounds of potassium permanganate was injected into IP-1 (for a total of 160.5 pounds). IP-6 and IP-7 received approximately 165 pounds of potassium permanganate for the purpose of administering additional treatment to the area of highest remaining contamination. IP-11 and IP-12 both received approximately 123.7 pounds of potassium permanganate. Injection points were flushed with approximately 10 gallons of fresh water immediately following the conclusion of the potassium permanganate injections at each respective point. The injection logs are provided in Appendix L of the FER.

3.3.1.3 Sub-Slab Depressurization System and SVE Wells

Procedures for operating and maintaining the SSDS and SVE wells are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings, signed and sealed by a professional engineer, are included in Appendix D– SSDS Startup Report and Operations and Maintenance Manual. Plates 3 and 4 show the location of the ECs for the site.

3.3.2 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.

3.3.2.1 Site Cover System

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

3.3.2.2 In Situ Groundwater Treatment

One round of post-injection groundwater samples was collected approximately two weeks after injections were completed on August 18, 2016. In addition, well gauging occurred during both events and the groundwater contour map based on the August 18 gauging event is shown on Figure 2. Table 8 and Plate 6 compare the July 14 and August 18, 2016 analytical data for monitoring wells MW-1, MW-2, MW-3, MW-5S, MW-6S, MW-8, and MW-9 to the Ambient Water Quality Standards and Guidance Values.

A reduction in the number of monitoring wells that exhibited PCE exceedances from five to three (MW-2 and MW-3 exhibited concentrations below the regulatory criteria after treatment), and a trend of decreasing PCE concentrations (up to a 50 percent reduction in MW-1) in onsite Site groundwater were observed. Post-injection concentrations in offsite monitoring wells MW-8, MW-9 and MW-5S, which are approximately 35, 135, and 156 feet away from the nearest potassium permanganate injection point, respectively, remained unchanged or slightly increased (but within variations typical of multiple sampling events) two weeks after the injections were completed. Significant changes in theses offsite wells would not be expected after only two weeks due to their distance from the injections. The data indicate that the positive effects of the remedial actions performed (source removal and potassium permanganate injections) were beginning to be observed. Exceedances of the following parameters were detected:

- Acetone exceedances were detected in the August sample from MW-2 at 200 micrograms per liter (µg/L) and from MW-3 at 58 µg/L.
- Chloroform exceedances were detected in the July sample from MW-5S at 9.8 µg/L and from MW-8 at 12 µg/L. An exceedance was detected in the August sample from MW-8 at 19 µg/L.
- PCE exceedances were detected in the July sample from MW-1 at 220 µg/L, from MW-2 at 49 µg/L, from MW-3 at 32 µg/L, from MW-8 at 140 µg/L, and from MW-9 at 20 µg/L. Exceedances were detected in the August sample from MW-1 at 110 µg/L, from MW-8 at 140 µg/L, and from MW-9 at 24 µg/L.

The groundwater sampling forms are provided in Appendix N of the FER.

Groundwater monitoring activities to assess the performance of the in situ groundwater treatment injections will continue for seven quarters after the COC is issued. The goal is for residual groundwater concentrations to be consistently below ambient water quality standards or be asymptotic at an acceptable level over an extended period. At the completion of the eight rounds of post-injection monitoring, 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. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

3.3.3.3 Sub-Slab Depressurization System and SVE Wells

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSDS may no longer be required, a proposal to discontinue the SSD system will be submitted by the remedial party to the NYSDEC and NYSDOH.

Operation of the SVE wells will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the SVE wells may no longer be required, a proposal to discontinue SVE will be submitted by the remedial party. Conditions that may warrant discontinuing SVE include contaminant concentrations in groundwater and/or soil that: (1) reach levels that are consistently below ambient water quality standards, 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 SVE has reached the limit of its effectiveness. SVE wells will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

4.0 MONITORING AND SAMPLING PLAN

The following sections describe monitoring and sampling required as part of the remedy.

4.1 General

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

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

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards; 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 once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

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

Inspections of 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;
- If site records are complete and up to date; and
- 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 must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs

implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the SSDS and SVE Wells will be performed on a routine basis, as identified in Table 9 Remedial System Monitoring Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS and SVE Wells has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SSDS and SVE Wells components to be monitored include, but are not limited to, the components included in Table 9 below.

Table 9 – Remedial System Monitoring Requirements and Schedule

System Components	Monitoring Parameter	Operating Range	Monitoring Schedule
SSDS A (Southern Side of the Building)	Vacuum/pressure readings at the blower	-5 to -25 in. w.c. / 10 to 30 in.w.c.	Monthly
	Vacuum readings at the Soil Vapor Monitoring Points (SVMP): SVMP-A1 and SVMP-A2	Equal to or greater than -0.004 in. w.c.	Monthly
	Visual inspections of the SSDS mechanical and above grade piping components	N/A	Monthly

Table 9 – Remedial System Monitoring Requirements and Schedule

System Components	Monitoring Parameter	Operating Range	Monitoring Schedule
SSDS B and SVE Wells (Northern Side of the Building)	Vacuum/pressure readings at the blower	-5 to -40 in. w.c. / 10 to 30 in.w.c.	Monthly
	Vacuum readings at the Soil Vapor Monitoring Points (SVMP): SVMP-B1 and SVMP-B2	Equal to or greater than -0.004 in. w.c.	Monthly
	Visual inspections of the SSDS mechanical and above grade piping components	N/A	Monthly
	Vacuum at SVE Wells SVE-1 and SVE-2	>5 inches of water	Monthly

A complete list of components to be inspected is provided in the sub-slab depressurization system and SVE wells operations and maintenance forms for SSDS A and SSDS B and Site Inspection Checklist provided in Appendix H – 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

During startup and testing of SSDS A (southern part of the building) and SSDS B (northern part of the building), in August 2015, sampling of the effluent vapor stream from each of the blowers for VOCs confirmed that treatment was unnecessary prior to discharge. However, due to the addition of the two new SVE wells in the basement of the former dry cleaner to SSDS B (northern part of the building), a sample of the extracted vapor effluent from SSDS B was collected on October 18, 2016 to evaluate the need for treatment. The sample was analyzed for VOCs via USEPA method TO-15. A DAR-1 analysis was performed for parameters identified in the extracted vapor. The emission impacts were compared to the AGC values and the SGC values from the August

10, 2016 DAR-1 AGC/SGC Tables. As reported in Progress Report No. 6, the DAR-1 analysis concluded that the estimated contaminant emission rates are below the AGC values and the SGC values, and therefore the extracted vapor effluent can be discharged to the atmosphere through the existing SSDS effluent stack without treatment. The SVE wells were temporarily closed before and after the sample was collected pending evaluation of the results. Since the sample results indicated that treatment is not required, the SVE wells were re-opened on November 8, 2016.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the three on-site and four off-site monitoring wells on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 10 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Performance Monitoring

Approximately two weeks after the oxidant injection event, performance monitoring samples were collected from the monitoring network on August 18, 2016. The monitoring wells were sampled for TCL VOCs using USEPA SW846 Method 8260. In addition, the groundwater samples collected were also examined for presence of aqueous potassium permanganate (observation for purple color), and field parameters for ORP and DO were recorded. Seven additional quarterly rounds of post-injection sampling will be performed after the COC is issued.

Table 10 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 624)				
MW-1, MW-2, MW-3, MW-5S, MW-6S, MW-8, MW-9	X				Seven quarterly rounds after COC

Detailed sample collection and analytical procedures and protocols are provided in Appendix G – Quality Assurance Project Plan.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed for a total of eight rounds. The first round was collected two weeks after injections were completed and the remaining seven rounds will be collected quarterly for seven quarters after issuance of the COC to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to monitor 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:

Table 11 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, three on-site wells and four downgradient and side gradient off-Site wells are sampled to evaluate the effectiveness of the remedial system.

Table 11 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/ latitude)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-1	Onsite in former Johnny's Dry Cleaner	40°39'49.34484"/ 73°54'33.68522"	1	19.29	19.00	9.49	-0.51
MW-2	Onsite in former Johnny's Dry Cleaner	40°39'49.98256"/ 73°54'33.88660"	1	19.37	18.91	9.37	-0.63
MW-3	Onsite in former restaurant	40°39'50.07212"/ 73°54'34.08543"	1	19.26	18.93	8.93	-1.07
MW-5S	Offsite and downgradient to West	40°39'47.79451"/ 73°54'34.29052"	2	28.8	29.04	9.04	-0.96
MW-6S	Offsite and Upgradient	40°39'50.80051"/ 73°54'34.46255"	2	28.19	28.42	8.42	-1.58
MW-8	Offsite and downgradient to East	40°39'49.06063"/ 73°54'33.51003"	2	28.01	28.51	8.51	-1.49
MW-9	Offsite and downgradient to East	40°39'48.07579"/ 73°54'33.24267"	2	28.75	29.98	9.98	-0.02

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

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 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. 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.

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

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

4.4.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated groundwater sampling log as provided in Appendix H - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) 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 Quality Assurance Project Plan provided as Appendix G 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 SSDS and SVE systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSDS and SVE systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the SSDS and SVE wells is provided in Appendix D – SSDS Startup Report and 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 Engineering Controls Performance Criteria

Table 12 – SSDS and SVE Well Performance Criteria

System Components	Monitoring Parameter	Operating Range
SSDS A (Southern Side of the Building)	Vacuum/pressure readings at the blower	-5 to -25 in. w.c. / 10 to 30 in.w.c.
	Vacuum readings at the Soil Vapor Monitoring Points (SVMP): SVMP-A1 and SVMP-A2	Equal to or greater than -0.004 in. w.c.
	Visual inspections of the SSDS mechanical and above grade piping components	N/A
SSDS B and SVE Wells (Northern Side of the Building)	Vacuum/pressure readings at the blower	-5 to -40 in. w.c. / 10 to 30 in.w.c.
	Vacuum readings at the Soil Vapor Monitoring Points (SVMP): SVMP-B1 and SVMP-B2	Equal to or greater than -0.004 in. w.c.
	Visual inspections of the SSDS mechanical and above grade piping components	N/A

Table 12 – SSDS and SVE Well Performance Criteria

System Components	Monitoring Parameter	Operating Range
	Vacuum at SVE Wells SVE-1 and SVE-2	>5 inches of water

5.3 Operation and Maintenance of Sub-Slab Depressurization System and SVE Wells

The following sections provide a description of the operations and maintenance of the SSDS and SVE Wells. Cut-sheets and as-built drawings for the SSDS and SVE Wells are provided in Appendix D - SSDS Startup Report and Operation and Maintenance Manual.

5.3.1 SSDS and SVE Well Start-Up and Testing

The SSDS was started up and tested in August 2015. Results of the startup and testing are presented in Appendix D.

Performance monitoring was performed as part of the initial SSDS startup in August 2015 to verify that each system is operating properly and consisted of the following:

- Confirm operation of each alarm warning light;
- Confirm acceptable air flow rate (300 to 500 cfm) from each of the SSDS blowers by a visual inspection of gauges affixed to each blower;
- Confirm acceptable vacuum readings (20 to 50 inches of water column) from each SSDS by a visual inspection of gauges to each blower;
- Confirm acceptable negative pressure (a minimum of 0.004 inches of water column) beneath the treatment area from four monitoring points by using an appropriate manometer or portable vacuum gauging device;
- Collect PID readings; and
- Collect confirmation effluent air samples.

Vacuum measurements were collected from the soil vapor monitoring points (SVMP-A1 through SVMP-B2) shown on SSDS drawings Appendix D. The vacuum measurements were collected using a micro-manometer capable of monitoring a minimum of 0.001 inches of water column. Adequate vacuum was observed during the testing. However, if

adequate depressurization (e.g., vacuum influence of at least 0.004 inches of water column) was not occurring, the cause for the lack of depressurization would have been investigated and repaired and measurements collected again.

In addition, as described in Section 2.3.3, during start-up of the SSDS in August 2015, an effluent air sample was collected from the discharge of each system using a Summa canister and analyzed using USEPA TO-15 to verify whether vapor treatment was needed. The effluent air sample results were compared to the DAR-1 Air Guide guidance values and confirmed that treatment was not necessary. As discussed in Section 4.3.2, a sample from the effluent of SSDS B (northern part of the building) was collected on October 18, 2016 to evaluate if the addition of the SVE wells to the system required treatment of the effluent stream. The SVE wells were temporarily closed before and after the sample was collected pending evaluation of the results. Since the sample results indicated that treatment is not required, the SVE wells were re-opened on November 8, 2016.

The system testing described above (excluding effluent air sampling) will be conducted if, in the course of the SSDS and SVE wells lifetime, the system goes down for more than 3 days or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

The routine maintenance activities include visual inspections, operating data collection and general maintenance. Visual inspection is the routine part of the SSDS and SVE well operator's activities. The system operator will note any conditions which present a potential hazard or could cause future system shutdown. In the field, special attention will be paid to the condition of the blowers and appurtenances, and the above slab discharge piping and supports. Special attention should be given to any unusual or excessive noise or vibrations from the piping and blower. The piping and valves will be inspected for leaks.

All equipment maintenance and inspections will be performed in accordance with manufacturer's instructions (see Appendix D for specifications). Specific routine maintenance tasks are outlined below:

- Inspect control panel and warning lights/alarms;
- Inspect blower piping to confirm operation of appropriate valves (i.e., dilution valve, pressure relief valve);
- Inspect vacuum/pressure gauges for proper operation;
- Check and clean air filter on each moisture knockout tank; and
- Check for the presence of and remove water in each knockout tank.

In the event that a condition warranting system component maintenance is identified, the appropriate reporting and maintenance should be conducted immediately. Manufacturer's recommendations for system component maintenance are included in the component manuals in Appendix D. Any maintenance completed for the SSDS and SVE well should be documented in the Maintenance Log included in Appendix H.

5.3.3 Non-Routine Operation and Maintenance

Non-routine equipment maintenance consists of maintenance activities that will be performed with less frequency than the routine maintenance (i.e., semi-annually) on several system components. Non-routine equipment maintenance and inspections. Specific non-routine maintenance tasks are outlined below:

- Inspect and test alarm;
- Check float switch in each knockout tank for proper operation;
- Replacement of vacuum/pressure gauges; and
- Change bearings on blowers after 15,000 hours of operation.

Most damage or problems associated with SSDS components will trigger one of the alarms. Damage to any SSDS components will be noted in the routine and detailed system inspections and remedied upon identification.

Accumulated condensate will be discharged to the sanitary sewer system based on the results of a sample of condensate collected in 2015 which confirmed the concentrations of target analytes were below New York City Department of Environmental Protection sewer discharge limits. Manufacturer's recommendations for system component maintenance are included in the component manuals in Appendix D. Any maintenance completed for the SSDS should be documented in the SSDS and SVE Wells Operations and Maintenance Form in Appendix H.

In the event that low SSDS air flow rates or vacuum are observed anywhere in the system, further system balancing may be necessary following moisture removal, to ensure that the combined air flow rates and vacuum in a given area of the site achieve the minimum design requirements.

5.3.4 System Monitoring Devices and Alarms

The SSDS and SVE wells have warning devices to indicate that the system is not operating properly. The blowers each have a float switch for the moisture knockout tank to indicate a high liquid level in the knock out tank that will shut down the system. Each blower has an overload relay that will shut down the blower for too high voltage or current.

The warning device currently consists of a local alarm light on the control panel of each system. The volunteer is in the process of installing a wireless alarm that will send a text message/email to the building managers. 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.

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 summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

- **Flood Plain:** The Site is not located in a flood plain. The Site elevation is approximately 30 feet above mean sea level. Therefore, flooding of the Site in the event of a storm is unlikely.

- **Site Drainage and Storm Water Management:** A building encompasses the entire site. Drainage from the roof of the building is managed by roof drains that direct stormwater to the New York City sewer system. Stormwater in the surrounding area is drained to the New York City sewer system through catch basins near the Site.

- **Erosion:** A building encompasses the entire site, therefore soil erosion is not an issue.

- **High Wind:** High wind is unlikely to damage the SSDS components located on the roof of the Site building.

- **Electricity:** The SSDS 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 is not susceptible to a spill or other contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

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 of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

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 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. 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 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 and 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. Monthly system checks are conducted by building management personnel responsible for the overall Marcus Garvey Apartments complex. This saves fuel from transportation because they are already onsite to conduct building maintenance activities.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC 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.

The RSO study will focuses on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

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 H. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 13 and summarized in the Periodic Review Report.

Table 13: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
SSDS Inspection Report	Inspection will occur monthly, but reports will be provided Annually in the Periodic Review Report
Groundwater Sampling Report	Quarterly, 45 days after each event
Periodic Review Report	First report 16 months after COC is issued, then annually, or as otherwise determined by the Department

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

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., groundwater);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of 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 Department 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 Department or at another frequency as may be required by the Department. 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 A -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 and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period

will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP and Decision Document;
  - The operation and the effectiveness of 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;
  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document; 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;
  - 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.

7.2.1 Certification of Institutional and Engineering Controls

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

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

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *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, Noelle M. Clarke of Remedial Engineering, P.C. am certifying as Owner's Designated Site Representative for the site."

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

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

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, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix I. 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 Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

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

DER-10 – "Technical Guidance for Site Investigation and Remediation", NYSDEC, May 2010.

Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. February 28, 2014 June 1998 (April 2000 addendum).

Division of Air Resources Policy DAR-1: Guidelines for the Control of Toxic Ambient Air Contaminants, NYSDEC, November 1997 (AGC/SGC Tables revised February 28, 2014).

Phase I Environmental Site Assessment, Ecosystems Strategies, Inc,. December 2013

Phase II Environmental Site Assessment, Ecosystems Strategies, Inc,. April 2014

Remedial Investigation Report/Remedial Action Work Plan, Remedial Engineering, P.C. and Roux Associates, Inc., January 2016

Additional Sub-Slab, Soil Vapor, and Indoor Air Investigation Findings, Roux Associates, May 2016

TABLES

1. Notifications (Embedded in Text)
2. Summary of Groundwater Elevation Measurements
3. Summary of Volatile Organic Compounds in End Point Samples
4. Summary of Semivolatile Organic Compounds in End Point Samples
5. Summary of Metals in End Point Samples
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Table 2. Summary of Groundwater Elevation Measurements, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

Parameter	MW-1	MW-2	MW-3	MW-5S	MW-6S	MW-8	MW-9
MPE	19.29	19.37	19.26	28.80	28.19	28.01	28.75
DTW (ft)	12.70	12.75	12.57	22.01	21.42	21.32	22.19
GWE (ft)	6.59	6.62	6.69	6.79	6.77	6.69	6.56

Notes:
MPE - Measuring Point Elevation (feet above mean sea level)
DTW - Depth to water
GWE - Groundwater elevation (feet above mean sea level)
DTW gauging data listed above were collected on August 18, 2016 just prior to well purging activities.

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1
			Sample Date:	7/1/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5
			Normal or Field Duplicate:	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units			
1,1,1,2-Tetrachloroethane	--	--	UG/KG	320 U	1.1 U	1.1 U
1,1,1-Trichloroethane	680	680	UG/KG	320 U	1.1 U	1.1 U
1,1,2,2-Tetrachloroethane	--	--	UG/KG	320 U	1.1 U	1.1 U
1,1,2-Trichloroethane	--	--	UG/KG	480 U	1.6 U	1.7 U
1,1-Dichloroethane	270	270	UG/KG	480 U	1.6 U	1.7 U
1,1-Dichloroethene	330	330	UG/KG	320 U	1.1 U	1.1 U
1,1-Dichloropropene	--	--	UG/KG	1600 U	5.4 U	5.7 U
1,2,3-Trichlorobenzene	--	--	UG/KG	1600 U	5.4 U	5.7 U
1,2,3-Trichloropropane	--	--	UG/KG	3200 U	11 U	11 U
1,2,4,5-Tetramethylbenzene	--	--	UG/KG	1300 U	4.3 U	4.6 U
1,2,4-Trichlorobenzene	--	--	UG/KG	1600 U	5.4 U	5.7 U
1,2,4-Trimethylbenzene	3600	3600	UG/KG	1600 U	5.4 U	5.7 U
1,2-Dibromo-3-Chloropropane	--	--	UG/KG	1600 U	5.4 U	5.7 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	UG/KG	1300 U	4.3 U	4.6 U
1,2-Dichlorobenzene	1100	1100	UG/KG	1600 U	5.4 U	5.7 U
1,2-Dichloroethane	20	20	UG/KG	320 U	1.1 U	1.1 U
1,2-Dichloropropane	--	--	UG/KG	1100 U	3.8 U	4 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	8400	UG/KG	1600 U	5.4 U	5.7 U
1,3-Dichlorobenzene	2400	2400	UG/KG	1600 U	5.4 U	5.7 U
1,3-Dichloropropane	--	--	UG/KG	1600 U	5.4 U	5.7 U
1,4-Dichlorobenzene	1800	1800	UG/KG	1600 U	5.4 U	5.7 U
1,4-Diethyl Benzene	--	--	UG/KG	1300 U	4.3 U	4.6 U
1,4-Dioxane (P-Dioxane)	100	100	UG/KG	32000 U	110 U	110 U
2,2-Dichloropropane	--	--	UG/KG	1600 U	5.4 U	5.7 U
2-Chlorotoluene	--	--	UG/KG	1600 U	5.4 U	5.7 U
2-Hexanone	--	--	UG/KG	3200 U	11 U	11 U
4-Chlorotoluene	--	--	UG/KG	1600 U	5.4 U	5.7 U
4-Ethyltoluene	--	--	UG/KG	1300 U	4.3 U	4.6 U
Acetone	**50**	50	UG/KG	3200 U	17	32

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1
			Sample Date:	7/1/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5
			Normal or Field Duplicate:	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units			
1,1,1,2-Tetrachloroethane	--	--	UG/KG	320 U	1.1 U	1.1 U
Acrylonitrile	--	--	UG/KG	3200 U	11 U	11 U
Benzene	60	60	UG/KG	320 U	1.1 U	1.1 U
Bromobenzene	--	--	UG/KG	1600 U	5.4 U	5.7 U
Bromochloromethane	--	--	UG/KG	1600 U	5.4 U	5.7 U
Bromodichloromethane	--	--	UG/KG	320 U	1.1 U	1.1 U
Bromoform	--	--	UG/KG	1300 U	4.3 U	4.6 U
Bromomethane	--	--	UG/KG	640 U	2.2 U	2.3 U
Carbon Disulfide	--	--	UG/KG	3200 U	11 U	11 U
Carbon Tetrachloride	760	760	UG/KG	320 U	1.1 U	1.1 U
Chlorobenzene	1100	1100	UG/KG	320 U	1.1 U	1.1 U
Chloroethane	--	--	UG/KG	640 U	2.2 U	2.3 U
Chloroform	370	370	UG/KG	480 U	1.6 U	1.7 U
Chloromethane	--	--	UG/KG	350 J	5.4 U	5.7 U
Cis-1,2-Dichloroethylene	**250**	250	UG/KG	**2500**	1.1 U	1.1 U
Cis-1,3-Dichloropropene	--	--	UG/KG	320 U	1.1 U	1.1 U
Cymene	--	--	UG/KG	320 U	1.1 U	1.1 U
Dibromochloromethane	--	--	UG/KG	320 U	1.1 U	1.1 U
Dibromomethane	--	--	UG/KG	3200 U	11 U	11 U
Dichlorodifluoromethane	--	--	UG/KG	3200 U	11 U	11 U
Dichloroethylenes	--	--	UG/KG	2500	1.1 U	1.1 U
Diethyl Ether (Ethyl Ether)	--	--	UG/KG	1600 U	5.4 U	5.7 U
Ethylbenzene	1000	1000	UG/KG	320 U	1.1 U	1.1 U
Hexachlorobutadiene	--	--	UG/KG	1600 U	5.4 U	5.7 U
Isopropylbenzene (Cumene)	--	--	UG/KG	320 U	1.1 U	1.1 U
m,p-Xylene	--	--	UG/KG	640 U	2.2 U	2.3 U
Methyl Ethyl Ketone (2-Butanone)	**120**	120	UG/KG	3200 U	11 U	11 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	UG/KG	3200 U	11 U	11 U
Methylene Chloride	50	50	UG/KG	3200 U	11 U	11 U

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1
			Sample Date:	7/1/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5
			Normal or Field Duplicate:	N	N	FD
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units			
1,1,1,2-Tetrachloroethane	--	--	UG/KG	320 U	1.1 U	1.1 U
Naphthalene	12000	12000	UG/KG	260 J	5.4 U	5.7 U
N-Butylbenzene	12000	12000	UG/KG	320 U	1.1 U	1.1 U
N-Propylbenzene	3900	3900	UG/KG	320 U	1.1 U	1.1 U
O-Xylene (1,2-Dimethylbenzene)	--	--	UG/KG	640 U	2.2 U	2.3 U
Sec-Butylbenzene	11000	11000	UG/KG	320 U	1.1 U	1.1 U
Styrene	--	--	UG/KG	640 U	2.2 U	2.3 U
T-Butylbenzene	5900	5900	UG/KG	1600 U	5.4 U	5.7 U
Tert-Butyl Methyl Ether	930	930	UG/KG	640 U	2.2 U	2.3 U
Tetrachloroethylene (PCE)	**1300**	1300	UG/KG	**27000**	46	71
Toluene	700	700	UG/KG	480 U	1.1 J	1.7
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	UG/KG	320 U	1.1 U	1.1 U
Trans-1,2-Dichloroethene	190	190	UG/KG	480 U	1.6 U	1.7 U
Trans-1,3-Dichloropropene	--	--	UG/KG	320 U	1.1 U	1.1 U
Trans-1,4-Dichloro-2-Butene	--	--	UG/KG	1600 U	5.4 U	5.7 U
Trichloroethylene (TCE)	**470**	470	UG/KG	**1700**	0.2 J	0.26 J
Trichlorofluoromethane	--	--	UG/KG	1600 U	5.4 U	5.7 U
Vinyl Acetate	--	--	UG/KG	3200 U	11 U	11 U
Vinyl Chloride	20	20	UG/KG	640 U	2.2 U	2.3 U
Xylenes	260	1600	UG/KG	640 U	2.2 U	2.3 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-2	SEP-3
			Sample Date:	7/5/2016	6/28/2016
			Sample Depth (ft bls):	3 - 3.5	2 - 2.5
			Normal or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units		
1,1,1,2-Tetrachloroethane	--	--	UG/KG	340 U	590 U
1,1,1-Trichloroethane	680	680	UG/KG	340 U	590 U
1,1,2,2-Tetrachloroethane	--	--	UG/KG	340 U	590 U
1,1,2-Trichloroethane	--	--	UG/KG	510 U	880 U
1,1-Dichloroethane	270	270	UG/KG	510 U	880 U
1,1-Dichloroethene	330	330	UG/KG	340 U	590 U
1,1-Dichloropropene	--	--	UG/KG	1700 U	2900 U
1,2,3-Trichlorobenzene	--	--	UG/KG	1700 U	2900 U
1,2,3-Trichloropropane	--	--	UG/KG	3400 U	5900 U
1,2,4,5-Tetramethylbenzene	--	--	UG/KG	1400 U	2300 U
1,2,4-Trichlorobenzene	--	--	UG/KG	1700 U	2900 U
1,2,4-Trimethylbenzene	3600	3600	UG/KG	1700 U	2900 U
1,2-Dibromo-3-Chloropropane	--	--	UG/KG	1700 U	2900 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	UG/KG	1400 U	2300 U
1,2-Dichlorobenzene	1100	1100	UG/KG	1700 U	2900 U
1,2-Dichloroethane	20	20	UG/KG	340 U	590 U
1,2-Dichloropropane	--	--	UG/KG	1200 U	2000 U
1,3,5-Trimethylbenzene (Mesitylene)	8400	8400	UG/KG	1700 U	2900 U
1,3-Dichlorobenzene	2400	2400	UG/KG	1700 U	2900 U
1,3-Dichloropropane	--	--	UG/KG	1700 U	2900 U
1,4-Dichlorobenzene	1800	1800	UG/KG	1700 U	2900 U
1,4-Diethyl Benzene	--	--	UG/KG	1400 U	2300 U
1,4-Dioxane (P-Dioxane)	100	100	UG/KG	34000 U	59000 U
2,2-Dichloropropane	--	--	UG/KG	1700 U	2900 U
2-Chlorotoluene	--	--	UG/KG	1700 U	2900 U
2-Hexanone	--	--	UG/KG	3400 U	5900 U
4-Chlorotoluene	--	--	UG/KG	1700 U	2900 U
4-Ethyltoluene	--	--	UG/KG	1400 U	2300 U
Acetone	**50**	50	UG/KG	**460 J**	**3100 J**

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-2	SEP-3
			Sample Date:	7/5/2016	6/28/2016
			Sample Depth (ft bls):	3 - 3.5	2 - 2.5
			Normal or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units		
1,1,1,2-Tetrachloroethane	--	--	UG/KG	340 U	590 U
Acrylonitrile	--	--	UG/KG	3400 U	5900 U
Benzene	60	60	UG/KG	340 U	590 U
Bromobenzene	--	--	UG/KG	1700 U	2900 U
Bromochloromethane	--	--	UG/KG	1700 U	2900 U
Bromodichloromethane	--	--	UG/KG	340 U	590 U
Bromoform	--	--	UG/KG	1400 U	2300 U
Bromomethane	--	--	UG/KG	680 U	1200 U
Carbon Disulfide	--	--	UG/KG	3400 U	5900 U
Carbon Tetrachloride	760	760	UG/KG	340 U	590 U
Chlorobenzene	1100	1100	UG/KG	340 U	590 U
Chloroethane	--	--	UG/KG	680 U	1200 U
Chloroform	370	370	UG/KG	510 U	880 U
Chloromethane	--	--	UG/KG	1700 U	2900 U
Cis-1,2-Dichloroethylene	**250**	250	UG/KG	340 U	130 J
Cis-1,3-Dichloropropene	--	--	UG/KG	340 U	590 U
Cymene	--	--	UG/KG	340 U	590 U
Dibromochloromethane	--	--	UG/KG	340 U	590 U
Dibromomethane	--	--	UG/KG	3400 U	5900 U
Dichlorodifluoromethane	--	--	UG/KG	3400 U	5900 U
Dichloroethylenes	--	--	UG/KG	340 U	130 J
Diethyl Ether (Ethyl Ether)	--	--	UG/KG	1700 U	2900 U
Ethylbenzene	1000	1000	UG/KG	340 U	590 U
Hexachlorobutadiene	--	--	UG/KG	1700 U	2900 U
Isopropylbenzene (Cumene)	--	--	UG/KG	340 U	590 U
m,p-Xylene	--	--	UG/KG	680 U	1200 U
Methyl Ethyl Ketone (2-Butanone)	**120**	120	UG/KG	3400 U	**3100 J**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	UG/KG	3400 U	5900 U
Methylene Chloride	50	50	UG/KG	3400 U	5900 U

Table 3. Summary of Volatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-2	SEP-3
			Sample Date:	7/5/2016	6/28/2016
			Sample Depth (ft bls):	3 - 3.5	2 - 2.5
			Normal or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units		
1,1,1,2-Tetrachloroethane	--	--	UG/KG	340 U	590 U
Naphthalene	12000	12000	UG/KG	1700 U	2900 U
N-Butylbenzene	12000	12000	UG/KG	340 U	590 U
N-Propylbenzene	3900	3900	UG/KG	340 U	590 U
O-Xylene (1,2-Dimethylbenzene)	--	--	UG/KG	680 U	1200 U
Sec-Butylbenzene	11000	11000	UG/KG	340 U	590 U
Styrene	--	--	UG/KG	680 U	1200 U
T-Butylbenzene	5900	5900	UG/KG	1700 U	2900 U
Tert-Butyl Methyl Ether	930	930	UG/KG	680 U	1200 U
Tetrachloroethylene (PCE)	**1300**	1300	UG/KG	**83000**	**60000**
Toluene	700	700	UG/KG	510 U	880 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	--	UG/KG	340 U	590 U
Trans-1,2-Dichloroethene	190	190	UG/KG	510 U	880 U
Trans-1,3-Dichloropropene	--	--	UG/KG	340 U	590 U
Trans-1,4-Dichloro-2-Butene	--	--	UG/KG	1700 U	2900 U
Trichloroethylene (TCE)	**470**	470	UG/KG	340 U	430 J
Trichlorofluoromethane	--	--	UG/KG	1700 U	2900 U
Vinyl Acetate	--	--	UG/KG	3400 U	5900 U
Vinyl Chloride	20	20	UG/KG	680 U	1200 U
Xylenes	260	1600	UG/KG	680 U	1200 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5
			Normal or Field Duplicate:	N	N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units				
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	170 U	180 U	180 U
1,2,4-Trichlorobenzene	--	--	UG/KG	180 U	170 U	180 U	180 U
1,2-Dichlorobenzene	1100	100000	UG/KG	180 U	170 U	180 U	180 U
1,3-Dichlorobenzene	2400	49000	UG/KG	180 U	170 U	180 U	180 U
1,4-Dichlorobenzene	1800	13000	UG/KG	180 U	170 U	180 U	180 U
2,4,5-Trichlorophenol	--	--	UG/KG	180 U	170 U	180 U	180 U
2,4,6-Trichlorophenol	--	--	UG/KG	110 U	100 U	110 U	110 U
2,4-Dichlorophenol	--	--	UG/KG	160 U	150 U	160 U	160 U
2,4-Dimethylphenol	--	--	UG/KG	180 U	170 U	180 U	180 U
2,4-Dinitrophenol	--	--	UG/KG	860 U	820 U	870 U	870 U
2,4-Dinitrotoluene	--	--	UG/KG	180 U	170 U	180 U	180 U
2,6-Dinitrotoluene	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Chloronaphthalene	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Chlorophenol	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Methylnaphthalene	--	--	UG/KG	210 U	200 U	220 U	22 J
2-Methylphenol (O-Cresol)	330	100000	UG/KG	180 U	170 U	180 U	180 U
2-Nitroaniline	--	--	UG/KG	180 U	170 U	180 U	180 U
2-Nitrophenol	--	--	UG/KG	390 U	370 U	390 U	390 U
3- And 4- Methylphenol (Total)	330	100000	UG/KG	260 U	240 U	260 U	260 U
3,3'-Dichlorobenzidine	--	--	UG/KG	180 U	170 U	180 U	180 U
3-Nitroaniline	--	--	UG/KG	180 U	170 U	180 U	180 U
4,6-Dinitro-2-Methylphenol	--	--	UG/KG	460 U	440 U	470 U	470 U
4-Bromophenyl Phenyl Ether	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chloro-3-Methylphenol	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chloroaniline	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Chlorophenyl Phenyl Ether	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Nitroaniline	--	--	UG/KG	180 U	170 U	180 U	180 U
4-Nitrophenol	--	--	UG/KG	250 U	240 U	260 U	250 U
Acenaphthene	20000	100000	UG/KG	27 J	140 U	140 U	140 U

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5
			Normal or Field Duplicate:	N	N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units				
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	170 U	180 U	180 U
Acenaphthylene	100000	100000	UG/KG	140 U	140 U	140 U	140 U
Acetophenone	--	--	UG/KG	180 U	170 U	180 U	23 J
Anthracene	100000	100000	UG/KG	41 J	100 U	110 U	110 U
Benzo(A)Anthracene	1000	1000	UG/KG	100 J	100 U	110 U	110 U
Benzo(A)Pyrene	1000	1000	UG/KG	93 J	140 U	140 U	140 U
Benzo(B)Fluoranthene	1000	1000	UG/KG	120	100 U	110 U	56 J
Benzo(G,H,I)Perylene	100000	100000	UG/KG	59 J	140 U	140 U	25 J
Benzo(K)Fluoranthene	800	3900	UG/KG	38 J	100 U	110 U	110 U
Benzoic Acid	--	--	UG/KG	580 U	550 U	590 U	590 U
Benzyl Alcohol	--	--	UG/KG	180 U	170 U	180 U	180 U
Benzyl Butyl Phthalate	--	--	UG/KG	180 U	170 U	180 U	420
Biphenyl (Diphenyl)	--	--	UG/KG	410 U	390 U	420 U	410 U
Bis(2-Chloroethoxy) Methane	--	--	UG/KG	190 U	180 U	200 U	200 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	UG/KG	160 U	150 U	160 U	160 U
Bis(2-Chloroisopropyl) Ether	--	--	UG/KG	210 U	200 U	220 U	220 U
Bis(2-Ethylhexyl) Phthalate	--	--	UG/KG	240	170 U	77 J	5200
Carbazole	--	--	UG/KG	180 U	170 U	180 U	180 U
Chrysene	1000	3900	UG/KG	100 J	100 U	110 U	110 U
Dibenz(A,H)Anthracene	330	330	UG/KG	110 U	100 U	110 U	110 U
Dibenzofuran	7000	59000	UG/KG	180 U	170 U	180 U	180 U
Diethyl Phthalate	--	--	UG/KG	180 U	170 U	180 U	180 U
Dimethyl Phthalate	--	--	UG/KG	180 U	170 U	180 U	180 U
Di-N-Butyl Phthalate	--	--	UG/KG	180 U	170 U	180 U	180 U
Di-N-Octylphthalate	--	--	UG/KG	180 U	170 U	180 U	180 U
Fluoranthene	100000	100000	UG/KG	210	100 U	110 U	32 J
Fluorene	30000	100000	UG/KG	32 J	170 U	180 U	180 U
Hexachlorobenzene	330	1200	UG/KG	110 U	100 U	110 U	110 U
Hexachlorobutadiene	--	--	UG/KG	180 U	170 U	180 U	180 U

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5
			Normal or Field Duplicate:	N	N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units				
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	170 U	180 U	180 U
Hexachlorocyclopentadiene	--	--	UG/KG	510 U	490 U	520 U	520 U
Hexachloroethane	--	--	UG/KG	140 U	140 U	140 U	140 U
Indeno(1,2,3-C,D)Pyrene	500	500	UG/KG	64 J	140 U	140 U	28 J
Isophorone	--	--	UG/KG	160 U	150 U	160 U	160 U
Naphthalene	12000	100000	UG/KG	180 U	80 J	120 J	180
Nitrobenzene	--	--	UG/KG	160 U	150 U	160 U	160 U
N-Nitrosodi-N-Propylamine	--	--	UG/KG	180 U	170 U	180 U	180 U
N-Nitrosodiphenylamine	--	--	UG/KG	140 U	140 U	140 U	140 U
Pentachlorophenol	800	6700	UG/KG	140 U	140 U	140 U	140 U
Phenanthrene	100000	100000	UG/KG	220	100 U	110 U	110 U
Phenol	330	100000	UG/KG	180 U	170 U	180 U	180 U
Pyrene	100000	100000	UG/KG	220	100 U	110 U	40 J

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-3	SEP-4	SEP-5
			Sample Date:	6/28/2016	6/28/2016	6/28/2016
			Sample Depth (ft bls):	2 - 2.5	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units			
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	180 U	180 U
1,2,4-Trichlorobenzene	--	--	UG/KG	180 U	180 U	180 U
1,2-Dichlorobenzene	1100	100000	UG/KG	180 U	180 U	180 U
1,3-Dichlorobenzene	2400	49000	UG/KG	180 U	180 U	180 U
1,4-Dichlorobenzene	1800	13000	UG/KG	180 U	180 U	180 U
2,4,5-Trichlorophenol	--	--	UG/KG	180 U	180 U	180 U
2,4,6-Trichlorophenol	--	--	UG/KG	110 U	110 U	110 U
2,4-Dichlorophenol	--	--	UG/KG	160 U	160 U	160 U
2,4-Dimethylphenol	--	--	UG/KG	180 U	180 U	180 U
2,4-Dinitrophenol	--	--	UG/KG	880 U	880 U	860 U
2,4-Dinitrotoluene	--	--	UG/KG	180 U	180 U	180 U
2,6-Dinitrotoluene	--	--	UG/KG	180 U	180 U	180 U
2-Chloronaphthalene	--	--	UG/KG	180 U	180 U	180 U
2-Chlorophenol	--	--	UG/KG	180 U	180 U	180 U
2-Methylnaphthalene	--	--	UG/KG	220 U	220 U	220 U
2-Methylphenol (O-Cresol)	330	100000	UG/KG	180 U	180 U	180 U
2-Nitroaniline	--	--	UG/KG	180 U	180 U	180 U
2-Nitrophenol	--	--	UG/KG	400 U	400 U	390 U
3- And 4- Methylphenol (Total)	330	100000	UG/KG	260 U	260 U	260 U
3,3'-Dichlorobenzidine	--	--	UG/KG	180 U	180 U	180 U
3-Nitroaniline	--	--	UG/KG	180 U	180 U	180 U
4,6-Dinitro-2-Methylphenol	--	--	UG/KG	480 U	480 U	470 U
4-Bromophenyl Phenyl Ether	--	--	UG/KG	180 U	180 U	180 U
4-Chloro-3-Methylphenol	--	--	UG/KG	180 U	180 U	180 U
4-Chloroaniline	--	--	UG/KG	180 U	180 U	180 U
4-Chlorophenyl Phenyl Ether	--	--	UG/KG	180 U	180 U	180 U
4-Nitroaniline	--	--	UG/KG	180 U	180 U	180 U
4-Nitrophenol	--	--	UG/KG	260 U	260 U	250 U
Acenaphthene	20000	100000	UG/KG	150 U	150 U	140 U

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-3	SEP-4	SEP-5
			Sample Date:	6/28/2016	6/28/2016	6/28/2016
			Sample Depth (ft bls):	2 - 2.5	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units			
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	180 U	180 U
Acenaphthylene	100000	100000	UG/KG	150 U	150 U	140 U
Acetophenone	--	--	UG/KG	180 U	180 U	180 U
Anthracene	100000	100000	UG/KG	110 U	110 U	110 U
Benzo(A)Anthracene	1000	1000	UG/KG	59 J	110 U	110 U
Benzo(A)Pyrene	1000	1000	UG/KG	86 J	150 U	140 U
Benzo(B)Fluoranthene	1000	1000	UG/KG	120	110 U	110 U
Benzo(G,H,I)Perylene	100000	100000	UG/KG	91 J	150 U	140 U
Benzo(K)Fluoranthene	800	3900	UG/KG	47 J	110 U	110 U
Benzoic Acid	--	--	UG/KG	590 U	590 U	580 U
Benzyl Alcohol	--	--	UG/KG	180 U	180 U	180 U
Benzyl Butyl Phthalate	--	--	UG/KG	180 U	180 U	180 U
Biphenyl (Diphenyl)	--	--	UG/KG	420 U	420 U	410 U
Bis(2-Chloroethoxy) Methane	--	--	UG/KG	200 U	200 U	190 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	--	UG/KG	160 U	160 U	160 U
Bis(2-Chloroisopropyl) Ether	--	--	UG/KG	220 U	220 U	220 U
Bis(2-Ethylhexyl) Phthalate	--	--	UG/KG	210	78 J	180 U
Carbazole	--	--	UG/KG	180 U	180 U	180 U
Chrysene	1000	3900	UG/KG	62 J	110 U	110 U
Dibenz(A,H)Anthracene	330	330	UG/KG	24 J	110 U	110 U
Dibenzofuran	7000	59000	UG/KG	180 U	180 U	180 U
Diethyl Phthalate	--	--	UG/KG	180 U	180 U	180 U
Dimethyl Phthalate	--	--	UG/KG	180 U	180 U	180 U
Di-N-Butyl Phthalate	--	--	UG/KG	180 U	180 U	180 U
Di-N-Octylphthalate	--	--	UG/KG	180 U	180 U	180 U
Fluoranthene	100000	100000	UG/KG	120	110 U	110 U
Fluorene	30000	100000	UG/KG	180 U	180 U	180 U
Hexachlorobenzene	330	1200	UG/KG	110 U	110 U	110 U
Hexachlorobutadiene	--	--	UG/KG	180 U	180 U	180 U

Table 4. Summary of Semivolatile Organic Compounds in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-3	SEP-4	SEP-5
			Sample Date:	6/28/2016	6/28/2016	6/28/2016
			Sample Depth (ft bls):	2 - 2.5	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units			
1,2,4,5-Tetrachlorobenzene	--	--	UG/KG	180 U	180 U	180 U
Hexachlorocyclopentadiene	--	--	UG/KG	520 U	520 U	510 U
Hexachloroethane	--	--	UG/KG	150 U	150 U	140 U
Indeno(1,2,3-C,D)Pyrene	500	500	UG/KG	98 J	150 U	140 U
Isophorone	--	--	UG/KG	160 U	160 U	160 U
Naphthalene	12000	100000	UG/KG	180 U	180 U	180 U
Nitrobenzene	--	--	UG/KG	160 U	160 U	160 U
N-Nitrosodi-N-Propylamine	--	--	UG/KG	180 U	180 U	180 U
N-Nitrosodiphenylamine	--	--	UG/KG	150 U	150 U	140 U
Pentachlorophenol	800	6700	UG/KG	150 U	150 U	140 U
Phenanthrene	100000	100000	UG/KG	36 J	110 U	110 U
Phenol	330	100000	UG/KG	180 U	180 U	180 U
Pyrene	100000	100000	UG/KG	120	110 U	110 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 5. Summary of Metals in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2	SEP-3
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016	6/28/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5	2 - 2.5
			Normal or Field Duplicate:	N	N	FD	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units					
Arsenic	13	16	MG/KG	2	3	2.3	3.3	3.4
Barium	350	400	MG/KG	44	19	17	27	48
Beryllium	7.2	72	MG/KG	0.212 J	0.14 J	0.14 J	0.17 J	0.196 J
Cadmium	2.5	4.3	MG/KG	0.44 U	0.4 U	0.42 U	0.43 U	0.45 U
Chromium III	30	180	MG/KG	13 J	6.7 J	6.6 J	8.5 J	14
Chromium, Hexavalent	1	110	MG/KG	0.19 J	0.23 J	0.19 J	0.31 J	0.9 U
Chromium, Total	30	180	MG/KG	13	6.9	6.8	8.8	14
Copper	50	270	MG/KG	6.6	6.3	6.2	21	13
Cyanide	27	27	MG/KG	1.1 U	1 U	1 U	1.1 U	0.37 J
Lead	**63**	400	MG/KG	9	1.6 J	2.5	14	**580**
Manganese	1600	2000	MG/KG	300	110	100	130	210
Mercury	**0.18**	0.81	MG/KG	0.04 J	0.04 J	0.03 J	0.1	**0.21**
Nickel	30	310	MG/KG	7.5	8.1	8	6.5	6.7
Selenium	3.9	180	MG/KG	0.88 U	0.12 J	0.14 J	0.15 J	0.89 U
Silver	2	180	MG/KG	0.44 U	0.4 U	0.42 U	0.43 U	0.45 U
Zinc	109	10000	MG/KG	20	18	16	36	40

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 5. Summary of Metals in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-4	SEP-5
			Sample Date:	6/28/2016	6/28/2016
			Sample Depth (ft bls):	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units		
Arsenic	13	16	MG/KG	2.7	1.9
Barium	350	400	MG/KG	33	33
Beryllium	7.2	72	MG/KG	0.27	0.24
Cadmium	2.5	4.3	MG/KG	0.43 U	0.43 U
Chromium III	30	180	MG/KG	15	11
Chromium, Hexavalent	1	110	MG/KG	0.89 U	0.88 U
Chromium, Total	30	180	MG/KG	15	11
Copper	50	270	MG/KG	9.6	6.8
Cyanide	27	27	MG/KG	1 U	1 U
Lead	**63**	400	MG/KG	6.8	7.1
Manganese	1600	2000	MG/KG	480	320
Mercury	**0.18**	0.81	MG/KG	0.04 J	0.06 J
Nickel	30	310	MG/KG	9.2	5.6
Selenium	3.9	180	MG/KG	0.86 U	0.86 U
Silver	2	180	MG/KG	0.43 U	0.43 U
Zinc	109	10000	MG/KG	24	17

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 6. Summary of Polychlorinated Biphenyls in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2	SEP-3
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016	6/28/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5	2 - 2.5
			Normal or Field Duplicate:	N	N	FD	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units					
PCB-1016 (Aroclor 1016)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1221 (Aroclor 1221)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1232 (Aroclor 1232)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1242 (Aroclor 1242)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1248 (Aroclor 1248)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1254 (Aroclor 1254)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1260 (Aroclor 1260)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1262 (Aroclor 1262)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
PCB-1268 (Aroclor 1268)	--	--	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U
Polychlorinated Biphenyl (PCBs)	100	1000	UG/KG	36 U	33 U	36.4 U	35.1 U	37.3 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 6. Summary of Polychlorinated Biphenyls in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	SEP-4	SEP-5
			Sample Date:	6/28/2016	6/28/2016
			Sample Depth (ft bls):	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units		
PCB-1016 (Aroclor 1016)	--	--	UG/KG	36 U	35.8 U
PCB-1221 (Aroclor 1221)	--	--	UG/KG	36 U	35.8 U
PCB-1232 (Aroclor 1232)	--	--	UG/KG	36 U	35.8 U
PCB-1242 (Aroclor 1242)	--	--	UG/KG	36 U	35.8 U
PCB-1248 (Aroclor 1248)	--	--	UG/KG	36 U	35.8 U
PCB-1254 (Aroclor 1254)	--	--	UG/KG	36 U	35.8 U
PCB-1260 (Aroclor 1260)	--	--	UG/KG	36 U	35.8 U
PCB-1262 (Aroclor 1262)	--	--	UG/KG	36 U	35.8 U
PCB-1268 (Aroclor 1268)	--	--	UG/KG	36 U	35.8 U
Polychlorinated Biphenyl (PCBs)	100	1000	UG/KG	36 U	35.8 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Table 7. Summary of Pesticides and Herbicides in End Point Samples, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	BEP-1	SEP-1	SEP-1	SEP-2	SEP-3	SEP-4	SEP-5
			Sample Date:	7/1/2016	7/5/2016	7/5/2016	7/5/2016	6/28/2016	6/28/2016	6/28/2016
			Sample Depth (ft bls):	4 - 4.5	2 - 2.5	2 - 2.5	3 - 3.5	2 - 2.5	3.5 - 4	3.5 - 4
			Normal or Field Duplicate:	N	N	FD	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Residential SCO	Units							
2,4-D (Dichlorophenoxyacetic Acid)	--	--	UG/KG	183 U	171 U	182 U	179 U	186 U	185 U	184 U
Acetic acid, (2,4,5-trichlorophenoxy)-	--	--	UG/KG	183 U	171 U	182 U	179 U	186 U	185 U	184 U
Aldrin	5	97	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	20	480	UG/KG	0.718 U	0.682 U	0.723 U	0.709 U	0.736 U	0.727 U	0.71 U
Alpha Endosulfan	2400	24000	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Beta Bhc (Beta Hexachlorocyclohexane)	36	360	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Beta Endosulfan	2400	24000	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Chlordane	--	--	UG/KG	14 U	13.3 U	14.1 U	13.8 U	14.3 U	14.2 U	13.8 U
cis-Chlordane	94	4200	UG/KG	2.15 U	2.04 U	2.17 U	2.13 U	2.21 U	2.18 U	2.13 U
Delta BHC (Delta Hexachlorocyclohexane)	40	100000	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Dieldrin	5	200	UG/KG	1.08 U	1.02 U	0.917 J	0.864 J	1.1 U	1.09 U	1.06 U
Endosulfan Sulfate	2400	24000	UG/KG	0.718 U	0.682 U	0.723 U	0.709 U	0.736 U	0.727 U	0.71 U
Endrin	14	11000	UG/KG	0.718 U	0.682 U	0.723 U	1.2 PI	0.736 U	0.727 U	0.71 U
Endrin Aldehyde	--	--	UG/KG	2.15 U	2.04 U	2.17 U	2.13 U	2.21 U	2.18 U	2.13 U
Endrin Ketone	--	--	UG/KG	1.72 U	1.64 U	1.74 U	1.7 U	1.76 U	1.74 U	1.7 U
Gamma Bhc (Lindane)	100	1300	UG/KG	0.718 U	0.682 U	0.723 U	0.709 U	0.736 U	0.727 U	0.71 U
Heptachlor	42	2100	UG/KG	0.862 U	0.818 U	0.868 U	0.85 U	0.883 U	0.872 U	0.852 U
Heptachlor Epoxide	--	--	UG/KG	3.23 U	3.07 U	3.26 U	3.19 U	3.31 U	3.27 U	3.19 U
Methoxychlor	--	--	UG/KG	3.23 U	2.35 J	1.59 J	2.39 J	3.31 U	3.27 U	3.19 U
P,P'-DDD	3.3	13000	UG/KG	1.72 U	1.64 U	1.74 U	0.964 JPI	1.76 U	1.74 U	1.7 U
P,P'-DDE	3.3	8900	UG/KG	1.72 U	1.64 U	1.74 U	1.89	1.76 U	1.74 U	1.7 U
P,P'-DDT	3.3	7900	UG/KG	3.23 U	1.86 J	2.31 J	2.45 J	3.31 U	3.27 U	3.19 U
Silvex (2,4,5-TP)	3800	100000	UG/KG	183 U	171 U	182 U	179 U	186 U	185 U	184 U
Toxaphene	--	--	UG/KG	32.3 U	30.7 U	32.6 U	31.9 U	33.1 U	32.7 U	31.9 U
trans-Chlordane	--	--	UG/KG	2.15 U	2.04 U	2.17 U	2.13 U	2.21 U	2.18 U	2.13 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
P - The RPD between the results for the two columns exceeds the method-specified criteria
I - The lower value for the two columns has been reported due to obvious interference

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-1	MW-1	MW-1	MW-2	MW-2	MW-3
			Sample Date:	7/14/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
			Normal or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
1,1,1,2-Tetrachloroethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,1-Trichloroethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1	--	UG/L	3.8 U	3 U	1.5 U	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4,5-Tetramethylbenzene	5	--	UG/L	5 U	4 U	2 U	2 U	2 U	2 U
1,2,4-Trichlorobenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromo-3-Chloropropane	0.04	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	UG/L	5 U	4 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	3	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1	--	UG/L	2.5 U	2 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichlorobenzene	3	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichloropropane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	3	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Diethyl Benzene	--	--	UG/L	5 U	4 U	2 U	2 U	2 U	2 U
1,4-Dioxane (P-Dioxane)	--	--	UG/L	620 U	500 U	250 U	250 U	250 U	250 U
2,2-Dichloropropane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Chlorotoluene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	--	50	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
4-Chlorotoluene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Ethyltoluene	--	--	UG/L	5 U	4 U	2 U	2 U	2 U	2 U
Acetone	--	**50**	UG/L	12 U	10 U	4.2 J	5 U	**200**	5 U
Acrylonitrile	5	--	UG/L	12 U	10 U	5 U	5 U	5 U	5 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-1	MW-1	MW-1	MW-2	MW-2	MW-3
			Sample Date:	7/14/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
			Normal or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
Benzene	1	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromochloromethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromodichloromethane	--	50	UG/L	0.56 J	0.57 J	0.48 J	0.5 U	0.5 U	0.5 U
Bromoform	--	50	UG/L	5 U	4 U	2 U	2 U	2.1	2 U
Bromomethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Carbon Disulfide	--	60	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroform	**7**	--	UG/L	6.4	6.8	4.7	2.5 U	2.1 J	2.5 U
Chloromethane	--	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cis-1,2-Dichloroethylene	5	--	UG/L	2.2 J	2.3 J	2.5 U	2.5 U	2.5 U	2.5 U
Cis-1,3-Dichloropropene	--	5	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Cymene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dibromochloromethane	--	50	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromomethane	5	--	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
Dichlorodifluoromethane	5	--	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
Dichloroethylenes	5	--	UG/L	2.2 J	2.3 J	2.5 U	2.5 U	2.5 U	2.5 U
Diethyl Ether (Ethyl Ether)	--	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Hexachlorobutadiene	0.5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene (Cumene)	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
m,p-Xylene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (2-Butanone)	--	50	UG/L	12 U	10 U	5 U	5 U	8.7	5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
Methylene Chloride	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Naphthalene	--	10	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
N-Butylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
N-Propylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-1	MW-1	MW-1	MW-2	MW-2	MW-3
			Sample Date:	7/14/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
			Normal or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
O-Xylene (1,2-Dimethylbenzene)	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Sec-Butylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Styrene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
T-Butylbenzene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Tert-Butyl Methyl Ether	--	10	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Tetrachloroethylene (PCE)	**5**	--	UG/L	**220**	**240**	**110**	**49**	0.23 J	**32**
Toluene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Trans-1,3-Dichloropropene	--	--	UG/L	1.2 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,4-Dichloro-2-Butene	--	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Trichloroethylene (TCE)	5	--	UG/L	2.6	2.8	0.5 U	0.49 J	0.5 U	0.5 U
Trichlorofluoromethane	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl Acetate	--	--	UG/L	12 U	10 U	5 U	5 U	5 U	5 U
Vinyl Chloride	2	--	UG/L	2.5 U	2 U	1 U	1 U	1 U	1 U
Xylenes	5	--	UG/L	6.2 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U

NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
µg/L -Micrograms per liter
J - Estimated Value
U - Compound was analyzed for but not detected
FD - Duplicate
- - No NYSDEC AWQSGV available
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-3	MW-5S	MW-5S	MW-6S	MW-6S	MW-8
			Sample Date:	8/18/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
			Normal or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
1,1,1,2-Tetrachloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,1,1-Trichloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,1,2,2-Tetrachloroethane	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
1,1,2-Trichloroethane	1	--	UG/L	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	3 U
1,1-Dichloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,1-Dichloroethene	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
1,1-Dichloropropene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2,3-Trichlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2,3-Trichloropropane	0.04	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2,4,5-Tetramethylbenzene	5	--	UG/L	2 U	2 U	2 U	2 U	2 U	4 U
1,2,4-Trichlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2,4-Trimethylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2-Dibromo-3-Chloropropane	0.04	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	UG/L	2 U	2 U	2 U	2 U	2 U	4 U
1,2-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,2-Dichloroethane	0.6	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
1,2-Dichloropropane	1	--	UG/L	1 U	1 U	1 U	1 U	1 U	2 U
1,3,5-Trimethylbenzene (Mesitylene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,3-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,3-Dichloropropane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,4-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
1,4-Diethyl Benzene	--	--	UG/L	2 U	2 U	2 U	2 U	2 U	4 U
1,4-Dioxane (P-Dioxane)	--	--	UG/L	250 U	250 U	250 U	250 U	250 U	500 U
2,2-Dichloropropane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
2-Chlorotoluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
2-Hexanone	--	50	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
4-Chlorotoluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
4-Ethyltoluene	--	--	UG/L	2 U	2 U	2 U	2 U	2 U	4 U
Acetone	--	**50**	UG/L	**58**	1.6 J	5 U	5 U	5 U	10 U
Acrylonitrile	5	--	UG/L	5 U	5 U	5 U	5 U	5 U	10 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

		Sample Designation:	MW-3	MW-5S	MW-5S	MW-6S	MW-6S	MW-8
		Sample Date:	8/18/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
		Normal or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
Benzene	1	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Bromobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Bromochloromethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Bromodichloromethane	--	50	UG/L	0.5 U	0.77	0.5 U	0.5 U	0.5 U	1
Bromoform	--	50	UG/L	1.6 J	2 U	2 U	2 U	2 U	4 U
Bromomethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Carbon Disulfide	--	60	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
Carbon Tetrachloride	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Chlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Chloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Chloroform	**7**	--	UG/L	1.5 J	**9.8**	2.6	2.5 U	2.5 U	**12**
Chloromethane	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Cis-1,2-Dichloroethylene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.4 J
Cis-1,3-Dichloropropene	--	5	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Cymene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Dibromochloromethane	--	50	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Dibromomethane	5	--	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
Dichlorodifluoromethane	5	--	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
Dichloroethylenes	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.4 J
Diethyl Ether (Ethyl Ether)	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Ethylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Hexachlorobutadiene	0.5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Isopropylbenzene (Cumene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
m,p-Xylene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Methyl Ethyl Ketone (2-Butanone)	--	50	UG/L	3.9 J	5 U	5 U	5 U	5 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
Methylene Chloride	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Naphthalene	--	10	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
N-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
N-Propylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-3	MW-5S	MW-5S	MW-6S	MW-6S	MW-8
			Sample Date:	8/18/2016	7/14/2016	8/18/2016	7/14/2016	8/18/2016	7/14/2016
			Normal or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units						
O-Xylene (1,2-Dimethylbenzene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Sec-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Styrene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
T-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Tert-Butyl Methyl Ether	--	10	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Tetrachloroethylene (PCE)	**5**	--	UG/L	0.5 U	1	0.82	3.4	1.8	**140**
Toluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Trans-1,2-Dichloroethene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Trans-1,3-Dichloropropene	--	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Trans-1,4-Dichloro-2-Butene	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Trichloroethylene (TCE)	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.9
Trichlorofluoromethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U
Vinyl Acetate	--	--	UG/L	5 U	5 U	5 U	5 U	5 U	10 U
Vinyl Chloride	2	--	UG/L	1 U	1 U	1 U	1 U	1 U	2 U
Xylenes	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5 U

NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
µg/L -Micrograms per liter
J - Estimated Value
U - Compound was analyzed for but not detected
FD - Duplicate
- - No NYSDEC AWQSGV available
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-8	MW-8	MW-9	MW-9
			Sample Date:	8/18/2016	8/18/2016	7/14/2016	8/18/2016
			Normal or Field Duplicate:	N	FD	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units				
1,1,1,2-Tetrachloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,1,1-Trichloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1	--	UG/L	1.5 U	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4,5-Tetramethylbenzene	5	--	UG/L	2 U	2 U	2 U	2 U
1,2,4-Trichlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromo-3-Chloropropane	0.04	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	--	--	UG/L	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1	--	UG/L	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichloropropane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	3	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Diethyl Benzene	--	--	UG/L	2 U	2 U	2 U	2 U
1,4-Dioxane (P-Dioxane)	--	--	UG/L	250 U	250 U	250 U	250 U
2,2-Dichloropropane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
2-Chlorotoluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	--	50	UG/L	5 U	5 U	5 U	5 U
4-Chlorotoluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
4-Ethyltoluene	--	--	UG/L	2 U	2 U	2 U	2 U
Acetone	--	**50**	UG/L	5 U	5 U	5 U	5 U
Acrylonitrile	5	--	UG/L	5 U	5 U	5 U	5 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-8	MW-8	MW-9	MW-9
			Sample Date:	8/18/2016	8/18/2016	7/14/2016	8/18/2016
			Normal or Field Duplicate:	N	FD	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units				
Benzene	1	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Bromochloromethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Bromodichloromethane	--	50	UG/L	1.9	1.9	0.5 U	0.5 U
Bromoform	--	50	UG/L	2 U	2 U	2 U	2 U
Bromomethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	0.71 J
Carbon Disulfide	--	60	UG/L	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Chloroethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Chloroform	**7**	--	UG/L	**19**	**19**	2.5 U	2.5 U
Chloromethane	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Cis-1,2-Dichloroethylene	5	--	UG/L	2 J	2 J	2.5 U	2.5 U
Cis-1,3-Dichloropropene	--	5	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Cymene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Dibromochloromethane	--	50	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Dibromomethane	5	--	UG/L	5 U	5 U	5 U	5 U
Dichlorodifluoromethane	5	--	UG/L	5 U	5 U	5 U	5 U
Dichloroethylenes	5	--	UG/L	2 J	2 J	2.5 U	2.5 U
Diethyl Ether (Ethyl Ether)	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Hexachlorobutadiene	0.5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene (Cumene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
m,p-Xylene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (2-Butanone)	--	50	UG/L	5 U	5 U	5 U	5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	UG/L	5 U	5 U	5 U	5 U
Methylene Chloride	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Naphthalene	--	10	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
N-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
N-Propylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U

Table 8. Summary of Volatile Organic Compounds in Groundwater, Marcus Garvey Preservation LLC
Marcus Garvey Apartments, 650 Rockaway Ave, Brooklyn, New York

			Sample Designation:	MW-8	MW-8	MW-9	MW-9
			Sample Date:	8/18/2016	8/18/2016	7/14/2016	8/18/2016
			Normal or Field Duplicate:	N	FD	N	N
Parameter	NYSDEC Ambient Water-Quality Standards	NYSDEC Ambient Water-Quality Guidance Values	Units				
O-Xylene (1,2-Dimethylbenzene)	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Sec-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Styrene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
T-Butylbenzene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Tert-Butyl Methyl Ether	--	10	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Tetrachloroethylene (PCE)	**5**	--	UG/L	**140**	**140**	**20**	**24**
Toluene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Trans-1,3-Dichloropropene	--	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,4-Dichloro-2-Butene	--	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Trichloroethylene (TCE)	5	--	UG/L	2.8	2.8	0.61	0.79
Trichlorofluoromethane	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl Acetate	--	--	UG/L	5 U	5 U	5 U	5 U
Vinyl Chloride	2	--	UG/L	1 U	1 U	1 U	1 U
Xylenes	5	--	UG/L	2.5 U	2.5 U	2.5 U	2.5 U

NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
µg/L -Micrograms per liter
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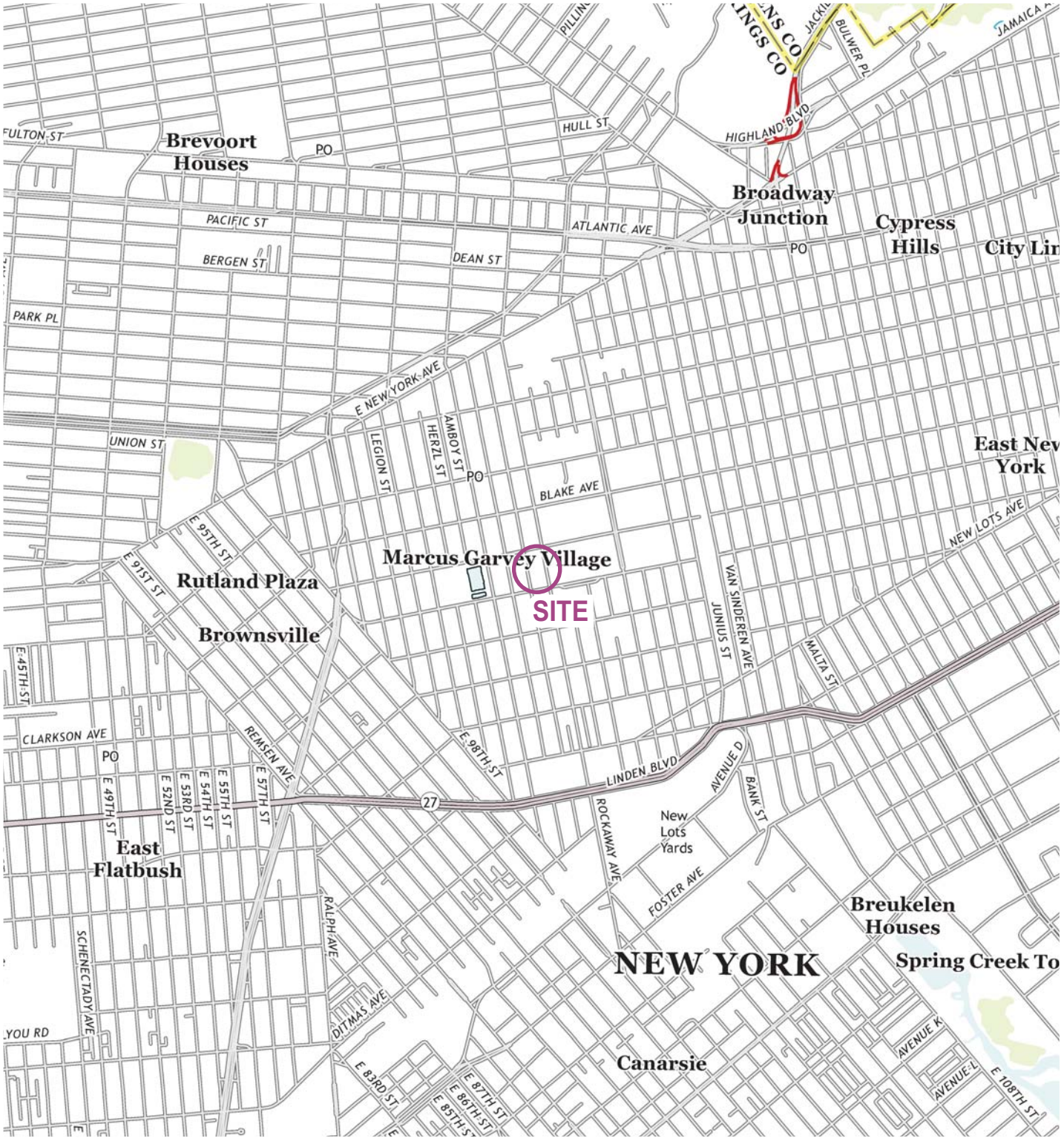
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

FIGURES

1. Site Location Map
2. Groundwater Contour Map



QUADRANGLE LOCATION

SOURCE:
USGS; 2013, Brooklyn, NY
7.5 Minute Topographic Quadrangle

N

0 2000'

Title:

SITE LOCATION MAP

MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVENUE, BROOKLYN, NEW YORK

Prepared for:
MARCUS GARVEY PRESERVATION LLC

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: L.C.	Date: 28OCT16	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	1
Project Mgr.: N.C.	Project No.: 2158.0002Y003	
File: 2158.0002Y142.02.CDR		

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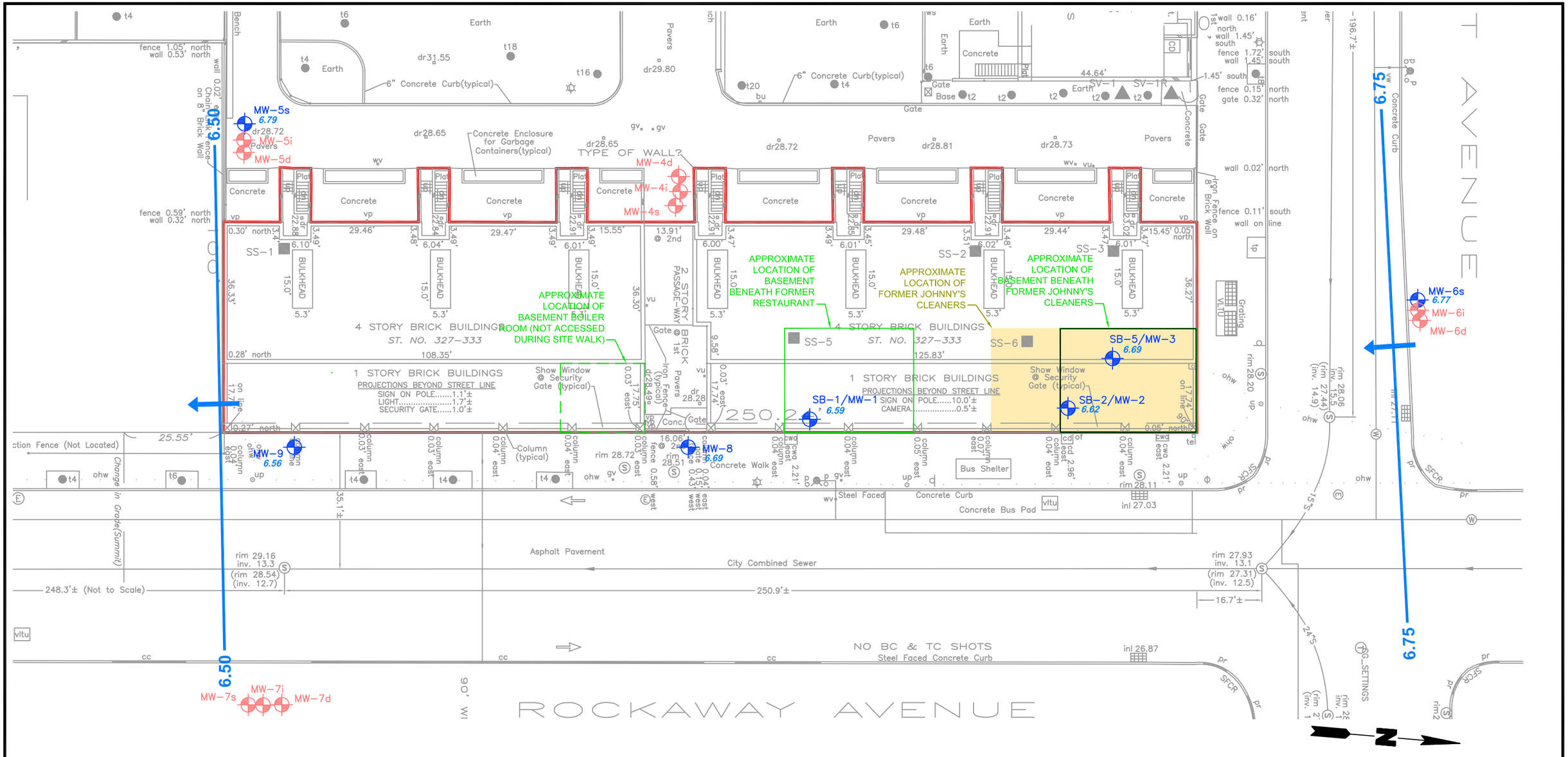


LEGEND

- MW-4 — LOCATION AND DESIGNATION OF MONITORING WELL IN LONG-TERM MONITORING SITE NETWORK
- MW-1 — LOCATION AND DESIGNATION OF MONITORING WELL NO LONGER IN USE
- 6.59 — GROUNDWATER ELEVATION (NAVD 1988)
- 6.75 — LINE OF EQUAL GROUNDWATER ELEVATION (NAVD 1988)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- APPROXIMATE FOOTPRINT OF FORMER JOHNNY'S CLEANERS
- BCP SITE/ENVIRONMENTAL EASEMENT BOUNDARY
- APPROXIMATE LOCATION OF BASEMENT (DASHED LINE INDICATES BASEMENT NOT ACCESSED DURING SITE WALK)

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991-1D)
2. GROUNDWATER ELEVATIONS BASED ON GAUGING DATA COLLECTED ON AUGUST 18, 2016.
3. NAVD – NORTH AMERICAN VERTICAL DATUM.
4. MONITORING WELL MW-5S GROUNDWATER ELEVATION DATA NOT USED FOR CONTOURING DUE TO ANOMALOUS READING.
5. WELLS THAT ARE IN THE LONG-TERM SITE MONITORING NETWORK ARE MW-1, MW-2, MW-3, MW-5S, MW-6S, MW-8 AND MW-9.

Title:

GROUNDWATER CONTOUR MAP

MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

Prepared For:
MARCUS GARVEY PRESERVATION LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.C.	Date: 28OCT16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	2
Project Mgr: N.C.	Project: 2158.0002Y002	
File: 2158.0002Y142.03.DWG		

V:\CAD\PROJECTS\2158Y\0002Y\142\2158.0002Y142.03.DWG

APPENDICES

A. Environmental Easement
B. List of Site Contacts
C. Soil Boring and Monitoring Well Construction Logs
D. SSDS Startup Report and Operation and Maintenance Information
E. Excavation Work Plan
F. Health and Safety Plan
G. Quality Assurance Project Plan
H. Site Management Forms
I. Remedial System Optimization Table of Contents

APPENDIX A

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.

2016082500291001001EE9F9

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

Document ID: 2016082500291001 Document Date: 08-15-2016 Preparation Date: 08-25-2016
Document Type: EASEMENT
Document Page Count: 11

PRESENTER:
FIRST AMERICAN TITLE INSURANCE COMPANY
666 THIRD AVENUE-5TH FLOOR
3020-810074-CQ
NEW YORK, NY 10017
212-850-0670
CQUARTARARO@FIRSTAM.COM

RETURN TO:
SIVE PAGET & RIESEL, P.C.
460 PARK AVENUE
10TH FLOOR
NEW YORK, NY 10022
KARY TORRES

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BROOKLYN	3575	11	Entire Lot	650 ROCKAWAY AVENUE

Property Type: APARTMENT BUILDING

CROSS REFERENCE DATA

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

PARTIES

GRANTOR/SELLER:
MARCUS GARVEY PRESERVATION LLC
1865 PALMER AVENUE , SUITE 203
LARCHMONT, NY 10538

GRANTEE/BUYER:
PEOPLE OF STATE OF NEW YORK BY COMMISSIONER.
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:	$	92.00
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 08-31-2016 12:09
City Register File No.(CRFN): **2016000301496**

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 15th day of August, 2016 between Owner(s) HP Marcus Garvey Preservation Housing Company Inc., (the "Grantor Fee Owner") having an office at 242 West 36th Street, 3rd Floor, New York, New York 10018, County of New York, State of New York, and Marcus Garvey Preservation LLC, (the "Grantor Beneficial Owner), having an office at 1865 Palmer Avenue, Suite 203, Larchmont, New York 10538, County of Westchester, State of New York (collectively, 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 650 Rockaway Avenue in the City of New York, County of Kings and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 3575 Lot 11, being a portion of the property conveyed to Grantor by deed dated December 16, 2014 and recorded in the City Register of the City of New York as CFRN # 2014000427445. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.32842 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 11, 2016 prepared by Saeid Jalilvand, LLS of Montrose Surveying Co., LLP, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A;

WHEREAS, Grantor Beneficial Owner, is the owner of the beneficial interest in the

Controlled Property being the same as a portion of that beneficial interest conveyed to Grantor Beneficial Owner by means of a Declaration of Interest and Nominee Agreement dated December 16, 2014 and recorded in the City Register of the City of New York as CFRN # 2014000427446.; 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: C224198-02-15, 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:

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

(2) 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 purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

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 b 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: C224198
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.

Remainder of Page Intentionally Left Blank

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

HP Garvey Preservation Housing Company Inc.:

By: _____

Print Name: Daniel Marks Cohen

Title: Vice President Date: 8/1/2016

Grantor Fee Owner's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF New York)

On the 1 day of August, in the year 20 16, before me, the undersigned, personally appeared Daniel Marks Cohen, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of ~~which~~ the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

HIRSCH L. NEUSTEIN
Notary Public - State of New York
No. 02NE6319827
County of New York
Commission Expires 2/23/2019

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

Marcus Garvey Preservation LLC:

By: _____

Print Name: Lisa Gomez

Title: Authorized Signatory Date: 8/2/16

Grantor Beneficial Owner's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF New York)

On the 2nd day of August, in the year 20 16, before me, the undersigned, personally appeared Lisa Gomez, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

BIANCA BANNISTER
Notary Public, State of New York
Registration #01BA6343555
Qualified In New York County
Commission Expires June 13, 2020

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

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 15th day of August, in the year 2016 before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

PATRICK EUGENE FOSTER
NOTARY PUBLIC, STATE OF NEW YORK
QUALIFIED IN KINGS COUNTY
NO. 02FO6278032
COMMISSION EXPIRES 03/18/2017

SCHEDULE "A" PROPERTY DESCRIPTION

Metes and Bounds Description - BCP Site C224198

Tax Block 3575 Part of Tax Lot 11

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

BEGINNING of the corner formed by the intersection on the southerly side of Dumont Avenue (70.06 feet wide) with the westerly side of Rockaway Avenue (90 feet wide);

RUNNING THENCE southerly, along the westerly side of Rockaway Avenue, 250.24 feet to a point;

RUNNING THENCE westerly, parallel with the southerly side of Dumont Avenue, 54.00 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 14.90 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 1.3.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.20 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles lo the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.30 feet to a point:

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a. point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.30 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feel to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles lo the last mentioned course, 27.40 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feel to a point:

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, of right angles to the last mentioned course, 13.90 feet to a point:

RUNNING THENCE northerly, at right angles lo the last mentioned course, 27.40 feet to a point;

RUNNING THENCE westerly, at right angles lo the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.30 feet lo a point;

RUNNING THENCE westerly, at right angles lo the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, of right angles to the last mentioned course, 13.90 feel to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 14.54 feel to the southerly side of Dumont Avenue;

RUNNING THENCE easterly, along the southerly side of Dumont Avenue, 54.00 feet to the corner, the point or place of BEGINNING.

The area of above described track is 14,306 sq. ft. or 0.32842 acre.

TITLE NO. 905372

SURVEY NO. 64991–6

64991–6.DWG
64991–6.CRD
64991001.CRD
64988001.CRD

VICINITY MAP
NOT TO SCALE

LEGAL DESCRIPTION

Parcel 5 – (Block 3575 Lot 11):

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

BEGINNING at the corner formed by the intersection of the southerly side of Dumont Avenue with the easterly side of Chester Street, as those streets are shown on the Final Maps of the City of New York;

RUNNING THENCE easterly along the southerly side of Dumont Avenue a distance of 200.00 feet to the corner formed by the intersection of the southerly side of Dumont Avenue with the westerly side of Rockaway Avenue;

THENCE southerly along the westerly side of Rockaway Avenue a distance of 250.24 feet to a point;

THENCE westerly and parallel to the southerly side of Dumont Avenue a distance of 100.00 feet to a point;

THENCE southerly and parallel to the easterly side of Chester Street a distance of 149.99 feet to a point;

THENCE westerly and parallel to the southerly side of Dumont Avenue a distance of 100.00 feet to a point on the easterly side of Chester Street;

THENCE northerly along the easterly side of Chester Street a distance of 400.23 feet to the corner formed by the intersection of the easterly side of Chester Street with the southerly side of Dumont Avenue, the point or place of BEGINNING.

The Area of above described track is 65,047 sq. ft. or 1.493284 acres.

Metes and Bounds Description – BCP Site C 224198

Tax Block 3575 Part of Tax Lot 11

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

BEGINNING at the corner formed by the intersection on the southerly side of Dumont Avenue (70.06 feet wide) with the westerly side of Rockaway Avenue (90 feet wide);

RUNNING THENCE southerly, along the westerly side of Rockaway Avenue, 250.24 feet to a point;

RUNNING THENCE westerly, parallel with the southerly side of Dumont Avenue, 54.00 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 14.90 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.20 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.30 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.40 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 27.40 feet to a point;

RUNNING THENCE westerly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 8.15 feet to a point;

RUNNING THENCE easterly, at right angles to the last mentioned course, 13.90 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 14.54 feet to the southerly side of Dumont Avenue;

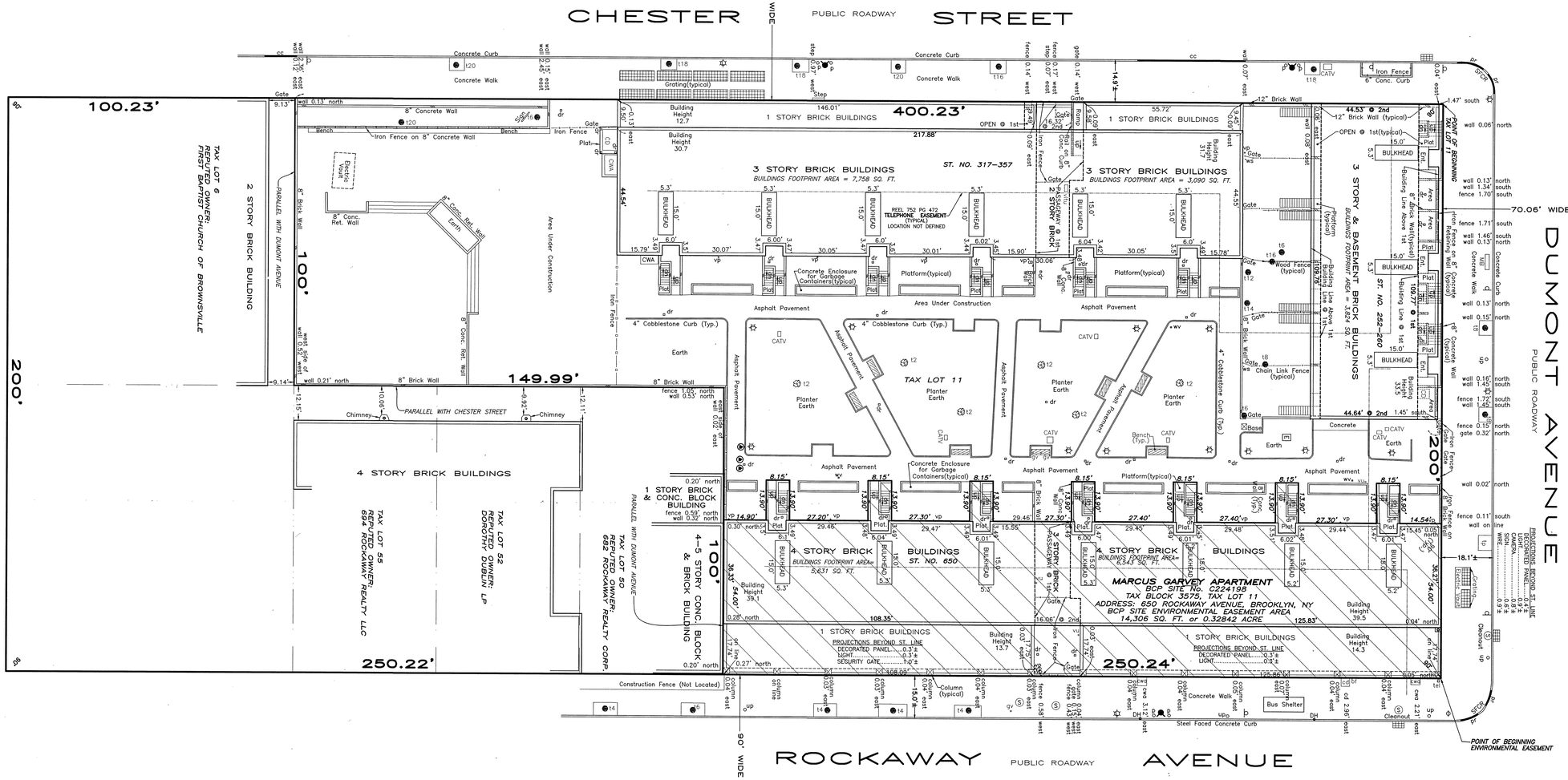
RUNNING THENCE easterly, along the southerly side of Dumont Avenue, 54.00 feet to the corner, the point or place of BEGINNING.

The area of above described track is 14,306 sq. ft. or 0.32842 acre.

SCHEDULE B ITEMS

13. Telephone Easement made between Marcus Garvey Brownstone Houses, Inc. and New York Telephone Company dated 12/4/74 and recorded 12/10/74 in Reel 752 page 472. (affects Block 3575 Lot 11) (plotted)

20. Revocable Consent Agreement (Owner) made between New York City Department of Transportation, acting through the Commissioner of Transportation and Dubor Associates dated 7/25/11 and recorded 10/13/11 as CRFN 2011000361627. (affects all parcels) (not plottable)



LEGEND

ASPH.....ASPHALT
BK.....BRICK
BSMT.....BASEMENT
CC.....CURB CUT
CCR.....CONCRETE CURB ROUND
CD.....CELLAR DOOR
CLF.....CHAIN LINK FENCE
CO.....CATCH BASIN CLEAN OUT
CONC.....CONCRETE
CRF.....CHAIN ROPE FENCE
CWA.....CELLAR WINDOW AREA
DR.....DRAIN
EL.....ELEVATION
FAB.....FIRE ALARM BOX
FC.....FILL CAP
FL EL.....FLOOR ELEVATION
GP.....GUARD POLE
GV.....GAS VALVE
IF.....IRON FENCE
INL.....CATCH BASIN INLET ELEVATION
INV.....SEWER INVERT ELEVATION

LIGHT POLE
MB.....MAIL BOX
MHU.....UNKNOWN MANHOLE
OF.....OIL FILL
OHW.....OVERHEAD WIRES
P.....POLE
PAVT.....PAVEMENT
PM.....PARKING METER
PMULT.....POLE, MULTIPLE USAGE
SPRINKLER
PR.....PEDESTRIAN RAMP
RET.....RETAINING
RIM.....RIM ELEVATION SEWER MANHOLE
SFCR.....STEEL FACED CURB ROUND
STY.....STORY
TB.....TOP OF BANK ELEVATION
TRAFFIC LIGHT
TEL.....TELEPHONE
TP.....TREE PIT
TRAFFIC SIGN
TW.....ELEVATION AT TOP OF WALL

UP.....UTILITY POLE
VU.....VALVE UNKNOWN
VLTU.....VAULT UNKNOWN
VP.....VENT PIPE
WV.....WATER VALVE
12"G.....GAS MAIN WITH SIZE
12"S.....SEWER MAIN WITH SIZE
12"W.....WATER MAIN WITH SIZE
.....CATCH BASIN
E.....ELECTRIC MANHOLE / VAULT
F.....FIRE MANHOLE
G.....GAS MANHOLE
S.....SEWER MANHOLE
T.....TELEPHONE MANHOLE
W.....WATER MANHOLE
TR.....TRAFFIC VAULT
.....HYDRANT
TB.....TREE WITH SIZE
17.0.....ESTABLISHED/LEGAL GRADE
.....TRAFFIC FLOW
.....MONITORING WELL

CERTIFIED TO:

The People of the State of New York acting through its Commissioner of the Department of Environmental Conservation, Marcus Garvey Preservation LLC, HP Marcus Garvey Preservation Housing Company, Royal Abstract of New York LLC and Stewart Title Insurance Company.

Date: 7/06/2016

Saeid Jalilvand L.S., C.S.
License No. 050236

GRAPHIC SCALE – FEET
0 20 40 60

GRAPHIC SCALE – METER
2.40 0 2.40 4.80 7.20
1CM=2.40M

PARCEL AREA = 65,047 SQ. FT. or 1.493284 ACRES

TOTAL BUILDINGS FOOTPRINT AREA = 26,846 SQ. FT.

FLOOD HAZARD NOTE

THE PARCEL SURVEYED IS COMPRISED OF AREAS DESIGNATED AS ZONE X (LESS THAN 0.2% CHANCE OF FLOODING)
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
COMMUNITY PANEL NUMBER 360497 0216 F
EFFECTIVE DATE SEPTEMBER 5, 2007

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 the 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 the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov

ENVIRONMENTAL EASEMENT BOUNDARY

DRAWN: AD/O.A.

ESTABLISHED 1876 * SUCCESSOR TO:

B.G. MEINKHEIM C.S.*C.U. POWELL C.E.,C.S.*L.C.L. SMITH C.S.*NATHAN CAMPBELL C.E.,C.S.*A.U. WHITSON C.E.,C.S.* WILLIAM L. SAVACOOL C.E.,L.S.,C.S.*A.U. WHITSON INC. C.E.,C.S.*G. WEBER L.S.,C.S.*C. STIDOLPH R.A.,L.S.*WHITSON & POWELL INC. P.E.,L.S.,C.S.*KELLER & POWELL P.E.,L.S.,C.S.*LOUIS MONTROSE C.E.,L.S.,C.S.*FRED J. POWELL P.E.,L.S.,C.S.*

PARCEL 5
MARCUS GARVEY VILLAGE

REV	DATE	DESCRIPTION	ck

REV	DATE	DESCRIPTION	ck
	05-11-16	ENVIRONMENTAL EASEMENT SURVEY	
A			

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW

ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL OF THE LAND SURVEYOR'S INKED SEAL OR HIS EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID TRUE COPIES

CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION, CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS

© ALL RIGHTS RESERVED 2016

MONTROSE
SURVEYING CO., LLP.
CITY & LAND SURVEYORS
116 20 METROPOLITAN AVE • RICHMOND HILL NY 11418–1099 • (718) 849–0600

STATE OF NEW YORK SAEID JALILVAND 050236 LICENSED LAND SURVEYOR

CITY OF NEW YORK
COUNTY: KINGS
TAX BLOCK 3575
TAX LOT 11

SCALE: 1" = 20'

APPENDIX B

List of Site Contacts

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Josh Weisstuch, Site Owner, Marcus Garvey Preservation LLC	212-233-0495 X 217, jweisstuch@lmdevpartners.com
Tracey Wright/Joseph Ramlall, Property Manager	718-342-2600, twright@ccmanagers.com/ jramlall@ccmanagers.com
Remedial Engineering, P.C./Roux Associates, Inc., Environmental Consultant	631-232-2600
Noelle Clarke, P.E., Certifying Professional Engineer, Remedial Engineering, P.C.	631-232-2600, nclarke@rouxinc.com
David Bligh, P.E., Consultant Project Manager, Roux Associates/Remedial Engineering	631-232-2600, dbligh@rouxinc.com
Steven Malsan, NYSDEC Project Manager	518-402-9646, stephen.malsan@dec.ny.gov
Daniel Evans, NYSDEC	518-402-9622, daniel.evans@dec.ny.gov
Paul John, NYSDEC Regional Remediation Engineer	718-482-4995, paul.john@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	518-402-9553, kelly.lewandowski@dec.ny.gov
Wendy Kuehner, NYSDOH	(518) 402-7860, beei@health.ny.gov

APPENDIX C

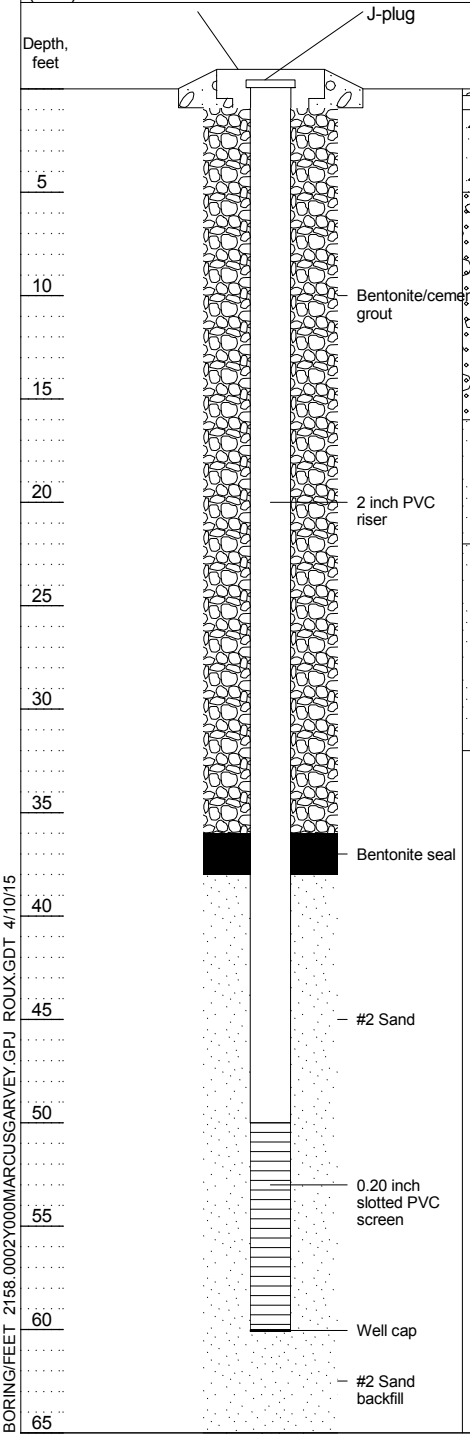
Soil Boring and Monitoring Well Construction Logs

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

WELL CONSTRUCTION LOG

WELL NO. **MW-4D/RSB-8**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Geoprobe 7720 / HSA**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **7/24/14-7/29/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING **28.88**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0		Concrete.		0.0	Hand cleared to 5 ft bls
		Light yellowish brown, fine to medium SAND (fill); moist.	G	0.0	
		Brown, fine to medium SAND, some Gravel and Brick (fill); moist.		0.0	
5		Brown, fine to coarse SAND, some fine to medium Gravel, trace silt; moist.		0.0	20 inch recovery
				0.0	
10				0.0	
				0.0	60 inch recovery
15				0.0	50 inch recovery
		Brown, fine to medium SAND, trace gravel; moist.		0.0	
				0.0	
20				0.7	Collect RSB-8/20-22; 60 inch recovery
		Brown, fine to medium SAND, trace coarse sand, trace gravel; wet.		0.0	
25				0.0	
				0.0	60 inch recovery
				0.2	
30				0.0	
				0.0	Collect RSB-8/30-32; 48 inch recovery
		No characterization		0.0	
35					
40					
45					
50					
55					
60					
65					Bottom of boring at 65 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

WELL CONSTRUCTION LOG

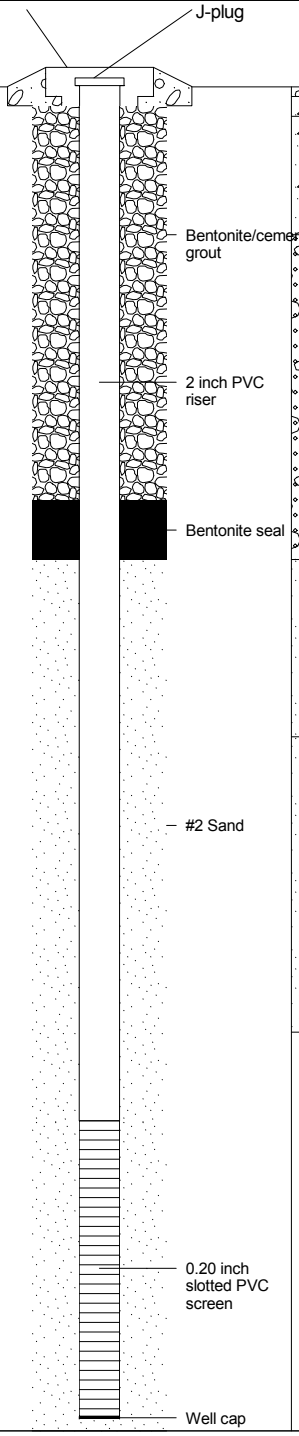
WELL NO.	NORTHING	EASTING
MW-4I	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/24/14-7/25/14**

CASING MAT./DIA.: **PVC / 2-inch** — SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.86	**/**	**#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.		0.0	Hand cleared to 5 ft bls
		Light yellowish brown, fine to medium SAND (fill); moist.		0.0	Encountered metal debris; removed from hole
		Brown, fine to medium SAND, some Gravel and Brick (fill); moist.	G	0.0	
5		Brown, fine to coarse SAND, some fine to medium Gravel, trace silt; moist.			
					Lithology taken from MW-4D/RSB-8
10					
15		Brown, fine to medium SAND, trace gravel; moist.			
20					
		Brown, fine to medium SAND, trace coarse sand, trace gravel; wet.			
25					
30					
		No characterization			
35					
40					
45					

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

WELL CONSTRUCTION LOG

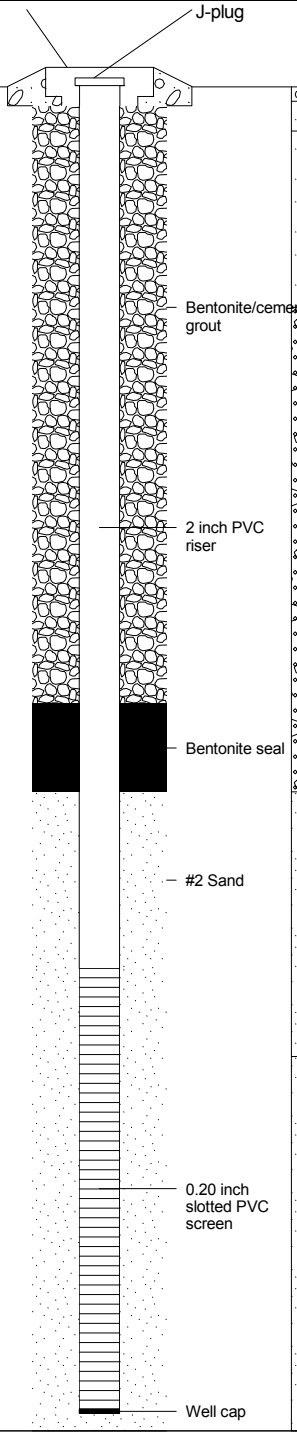
WELL NO.	NORTHING	EASTING
MW-4S	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/24/14-7/25/14**

CASING MAT./DIA.: **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.81	**/**	**#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.		0.0	Hand cleared to 5 ft bls
		Light yellowish brown, fine to medium SAND (fill); moist.		0.0	
		Brown, fine to medium SAND, some Gravel and Brick (fill); moist.	G	0.0	
5		Brown, fine to coarse SAND, some fine to medium Gravel, trace silt; moist.			
					Lithology taken from MW-4D/RSB-8
10					
15		Brown, fine to medium SAND, trace gravel; moist.			
20					
		Brown, fine to medium SAND, trace coarse sand, trace gravel; wet.			
25					
30					

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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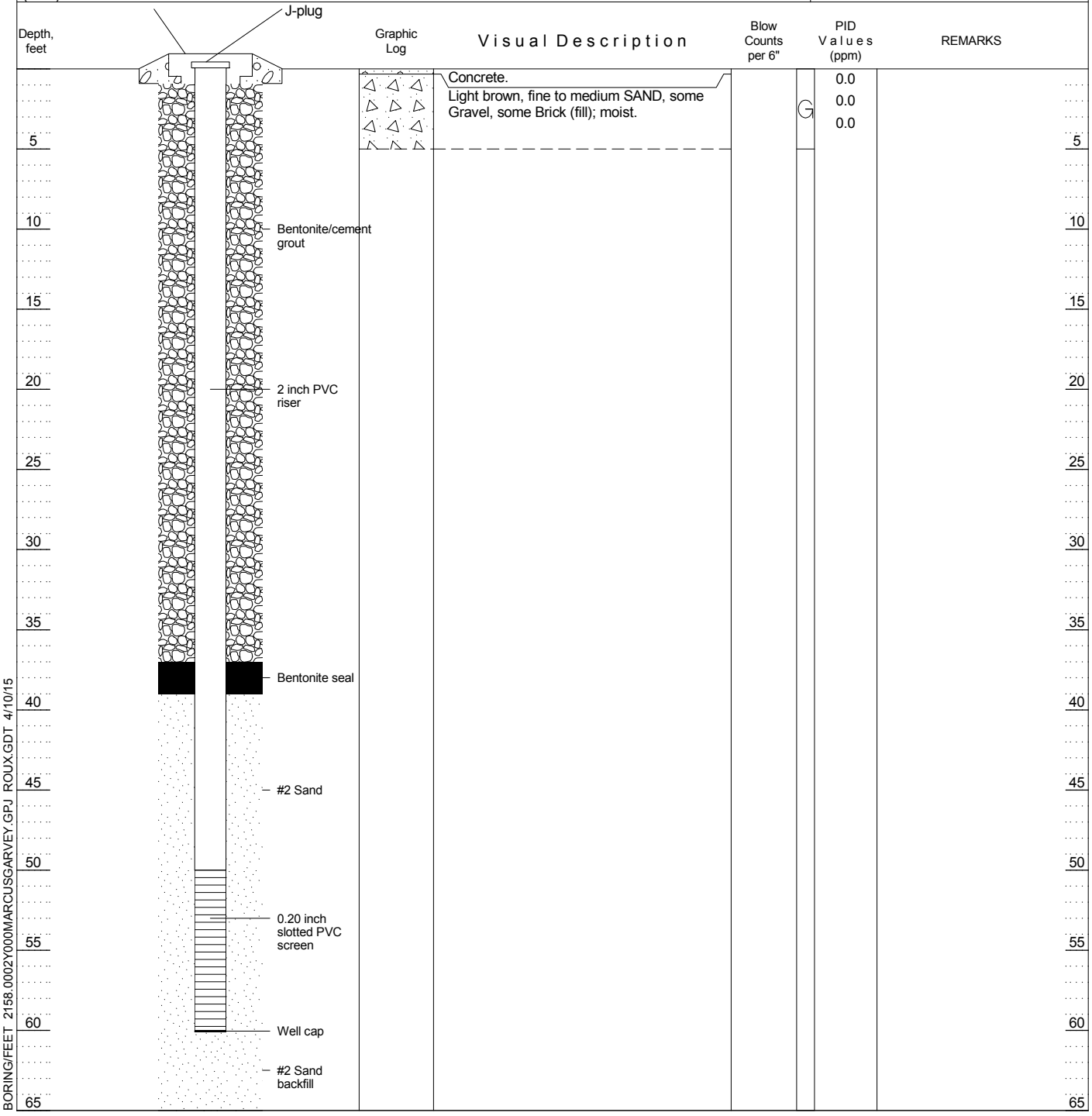
WELL CONSTRUCTION LOG

WELL NO. **MW-5D**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/25/14-7/29/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING **28.66**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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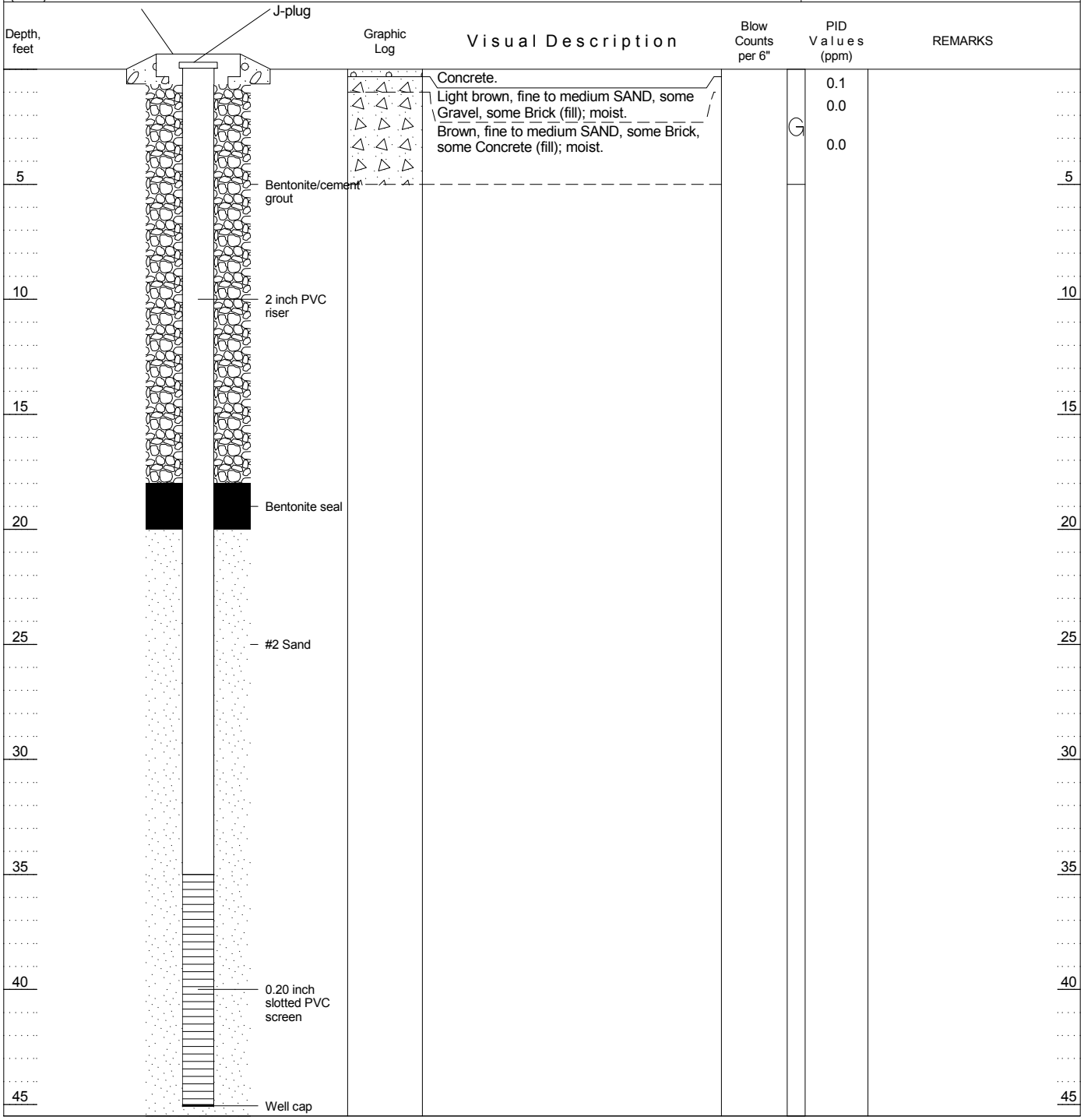
WELL CONSTRUCTION LOG

WELL NO. **MW-5I**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/25/14-7/30/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: GROUND SURFACE (Feet)	TOP OF WELL CASING **28.78**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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WELL CONSTRUCTION LOG

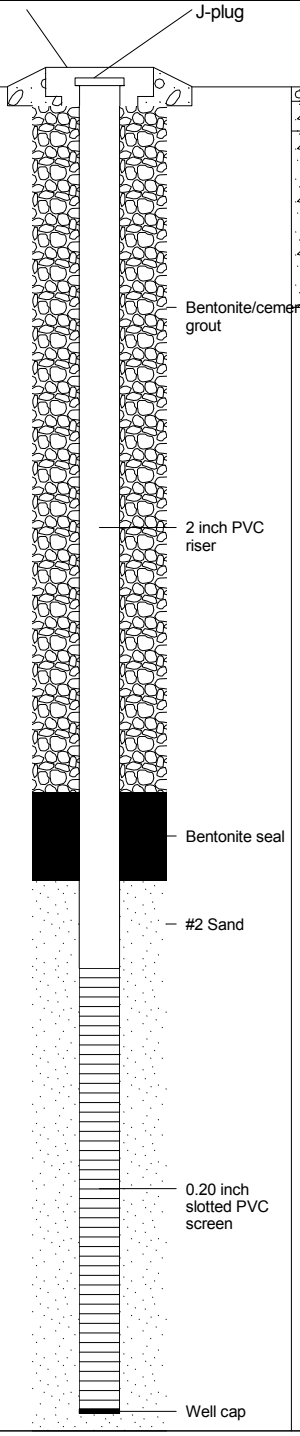
WELL NO.	NORTHING	EASTING
MW-5S	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/25/14-7/25/14**

CASING MAT./DIA.: **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.80	**/**	**#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.		0.0	
		Light brown, fine to medium SAND, little concrete (fill); moist.		0.0	
		Light brown to brown, fine to medium SAND, some coarse Sand, some Gravel, little brick (fill); moist.	G	0.0	
				0.0	
5					5
10					10
15					15
20					20
25					25
30					30

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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WELL CONSTRUCTION LOG

WELL NO.	NORTHING	EASTING
MW-6D	**Not Measured**	**Not Measured**

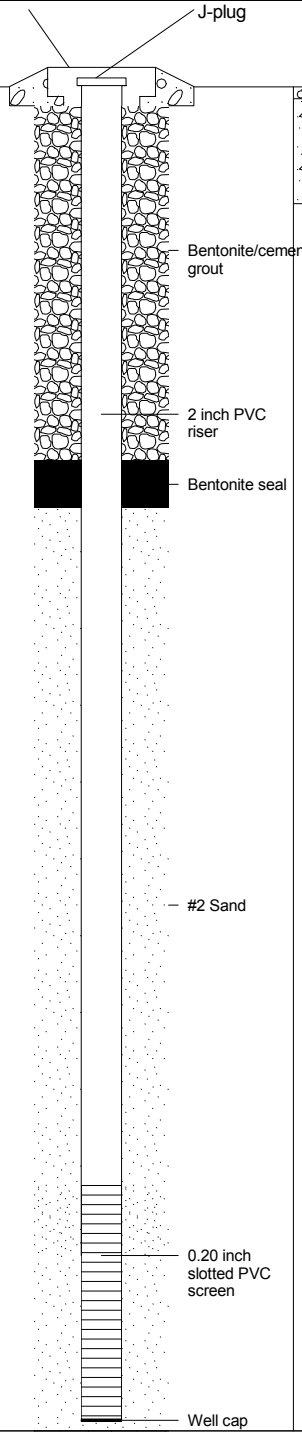
PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY / LOGGED BY	**Brooklyn, NY**
R. Kovacs / **J. Collins**	

DRILLING CONTRACTOR/DRILLER	GEOGRAPHIC AREA
Trinity / J. Sakellis	

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/30/14-8/5/14**

CASING MAT./DIA.	SCREEN: TYPE	MAT.	TOTAL LENGTH	DIA.	SLOT SIZE
PVC / 2-inch	**Slotted**	**PVC**	**10.0**ft	**2-inch**	**20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.08	**/**	**#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0		Concrete.		0.0	
		Brown, fine to coarse SAND, some Gravel, some Brick, some Concrete (fill); moist.	G	0.0	
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
55					

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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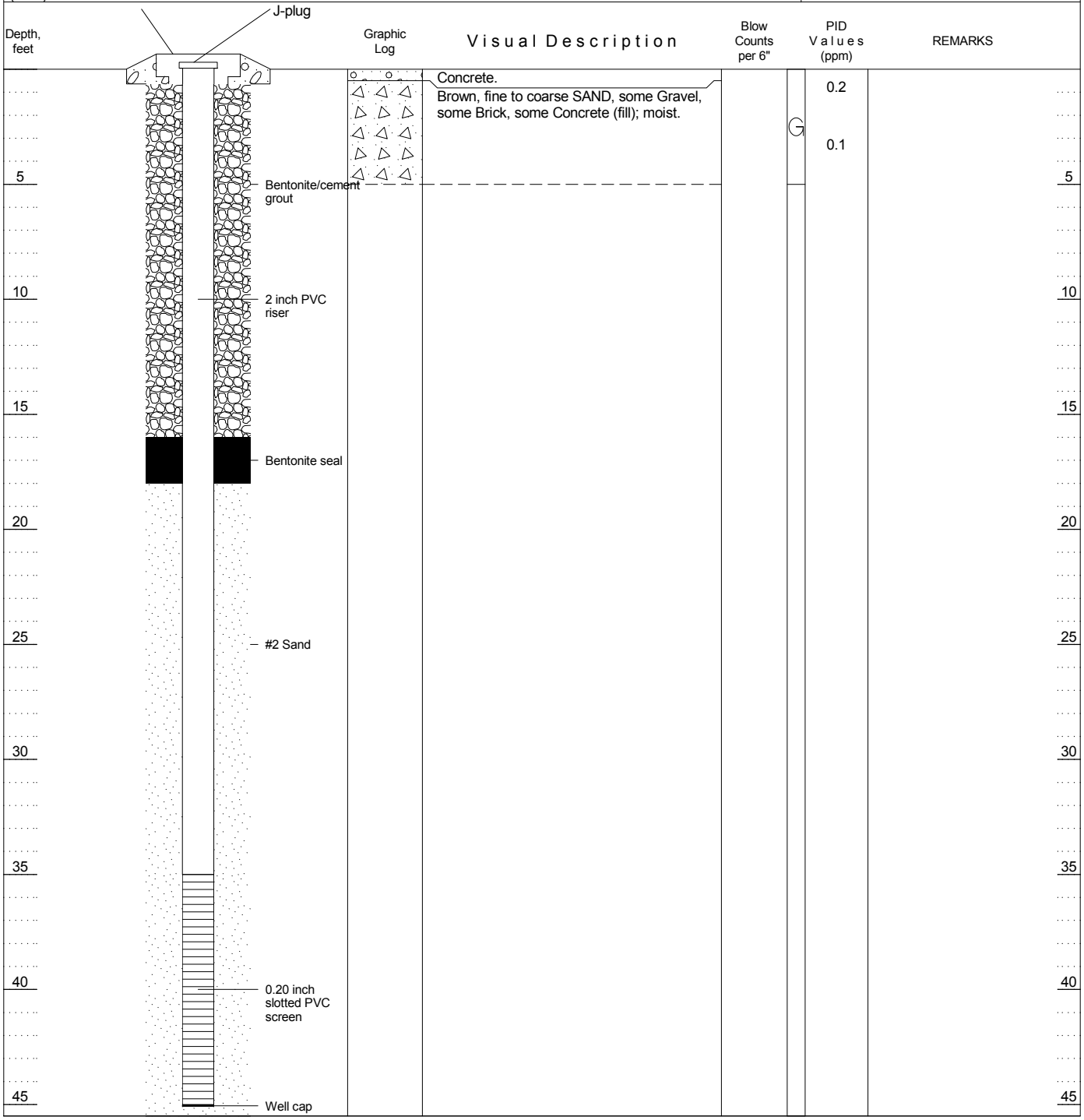
WELL CONSTRUCTION LOG

WELL NO. **MW-6I**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/30/14-8/5/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: GROUND SURFACE (Feet)	TOP OF WELL CASING **28.14**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



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WELL CONSTRUCTION LOG

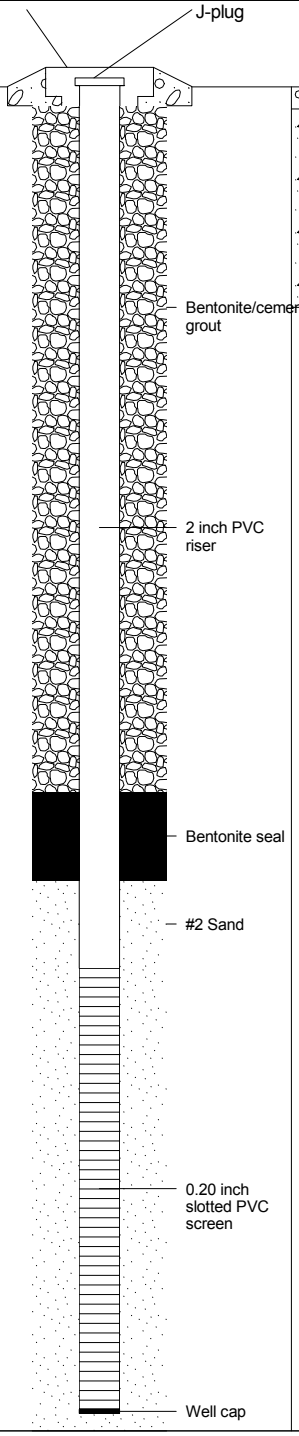
WELL NO.	NORTHING	EASTING
MW-6S	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/30/14-8/4/14**

CASING MAT./DIA.: **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.19	**/**	**#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			
		Brown, fine to coarse SAND, some Gravel, some Brick, some Concrete (fill); moist.		0.2	
			G	0.1	
5					5
10					10
15					15
20					20
25					25
30					30

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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WELL CONSTRUCTION LOG

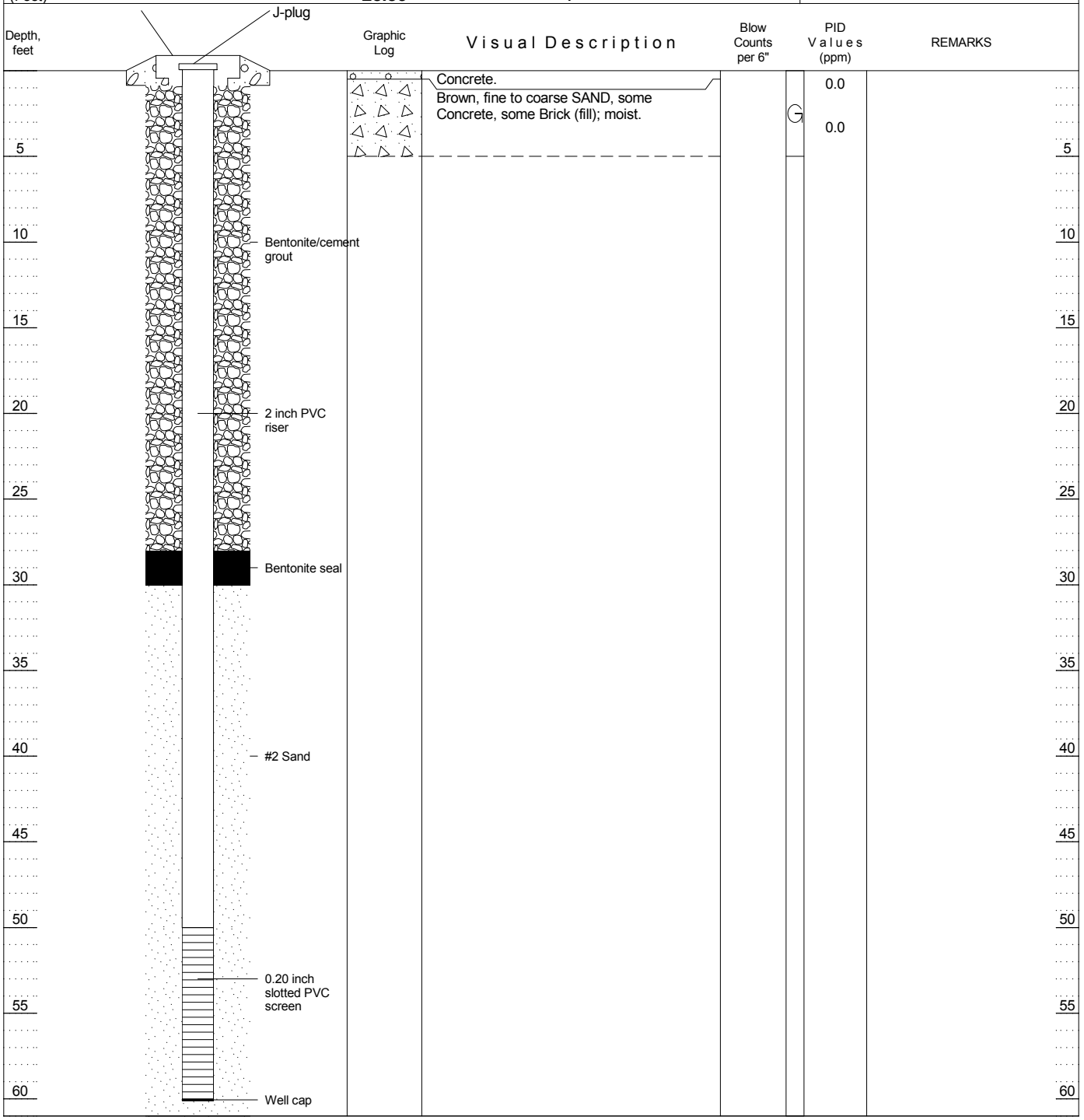
WELL NO.	NORTHING	EASTING
MW-7D	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
6.25-in. / Auger	**10-inches**	**/ HSA**		**7/31/14-8/1/14**

CASING MAT./DIA.: **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
		28.85	**/**	**#2**



BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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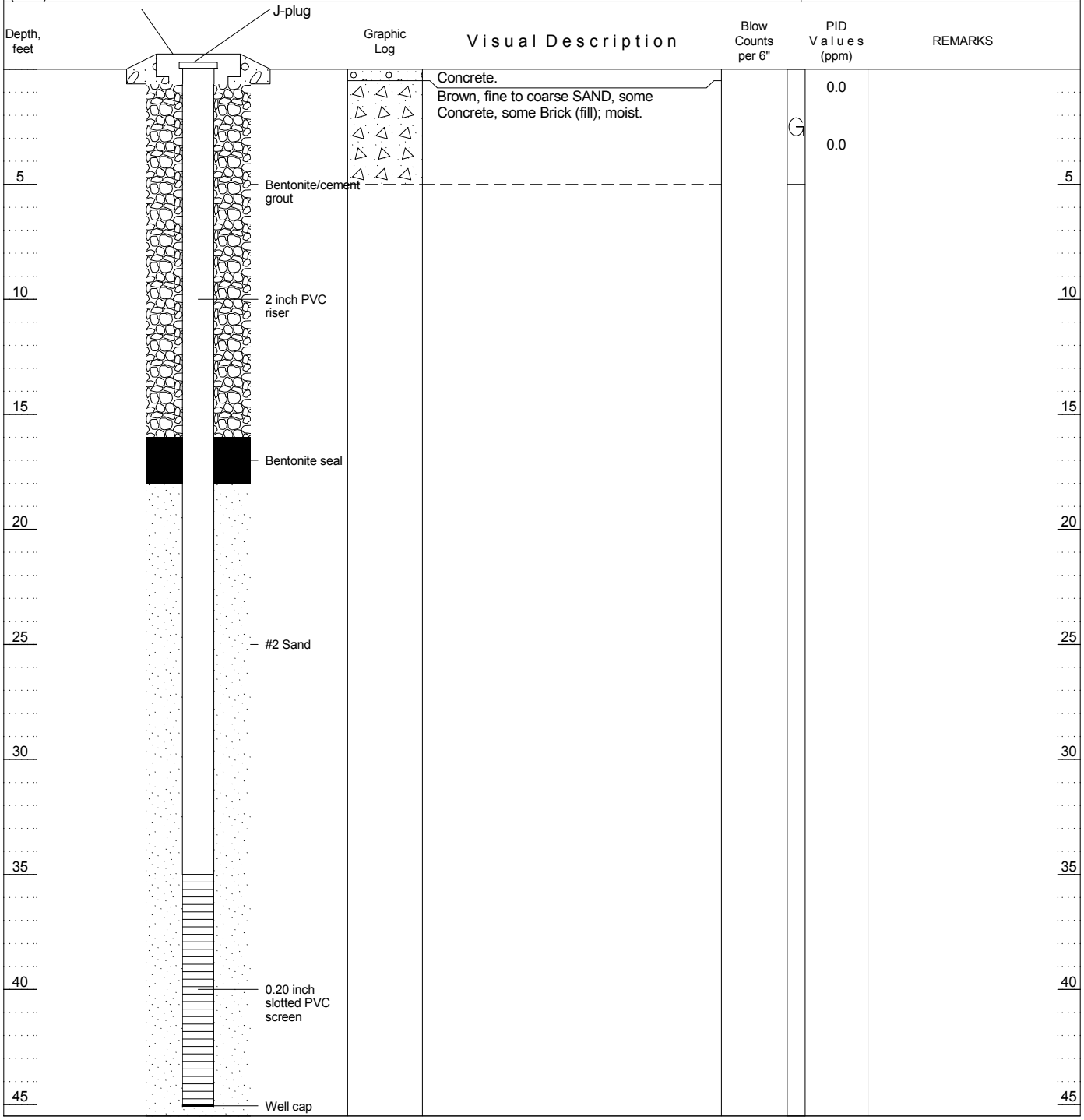
WELL CONSTRUCTION LOG

WELL NO. **MW-7I**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/31/14-8/4/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING **28.86**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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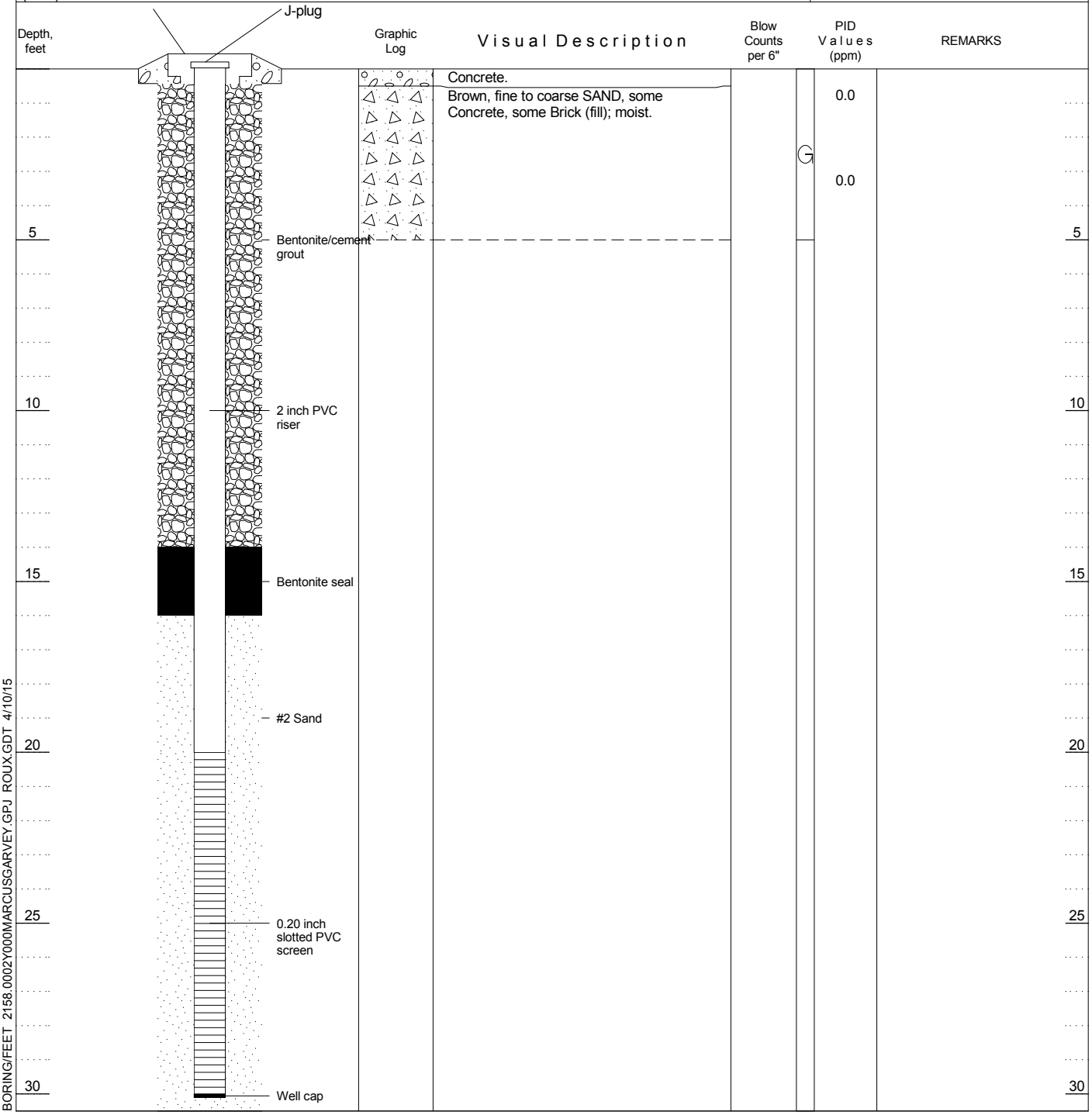
WELL CONSTRUCTION LOG

WELL NO. **MW-7S**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY **R. Kovacs**	LOGGED BY **J. Collins**			
DRILLING CONTRACTOR/DRILLER **Trinity / J. Sakellis**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/31/14-7/31/14**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: GROUND SURFACE (Feet)	TOP OF WELL CASING **28.81**	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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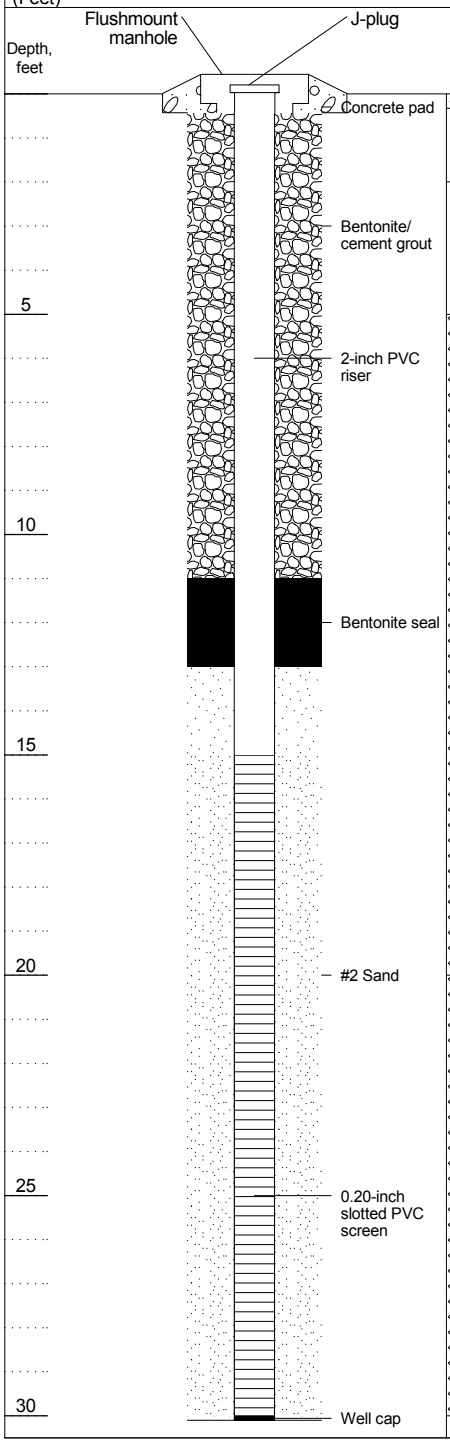
WELL CONSTRUCTION LOG

WELL NO. **MW-8**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville Brooklyn, NY**		
APPROVED BY	LOGGED BY **D. Ferraiolo**			
DRILLING CONTRACTOR/DRILLER **ADT / A. Palomeque**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/6/16-7/7/16**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC**	TOTAL LENGTH **15.0**ft	DIA. **2-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete		0.0	Hand cleared to 5 ft bls
		Brown well-sorted SAND, some Gravel and Concrete, trace silt and metal (fill); moist.		0.0	
		Brown well-sorted SAND, some Gravel, little Silt, trace crushed rock and metal (fill); moist.	G	0.2	
				0.2	
5				0.2	5
		Light brown to brown fine to medium SAND, some coarse Sand, some Silt, little Gravel; dry.		0.0	
10				0.0	10
15				0.0	15
20		Brown well-sorted SAND, trace SILT; wet.		0.0	20
					Groundwater observed at 23 ft bls.
25				0.0	25
30					30

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 8/1/16

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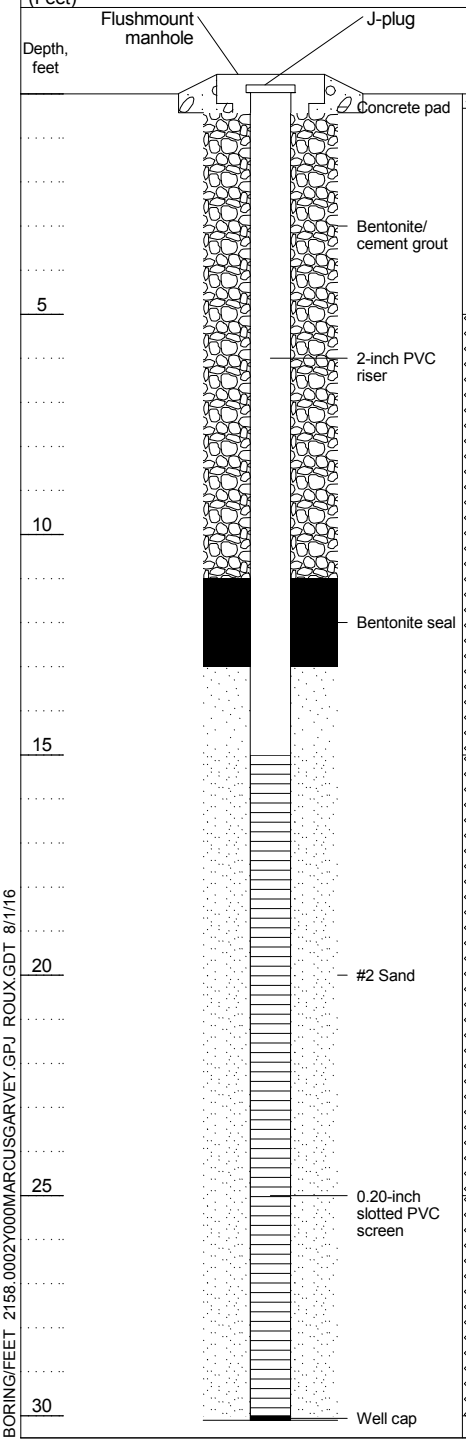
WELL CONSTRUCTION LOG

WELL NO. **MW-9**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2158.0002Y000 / Marcus Garvey Village**		LOCATION **Brownsville** **Brooklyn, NY**		
APPROVED BY	LOGGED BY **D. Ferraiolo**			
DRILLING CONTRACTOR/DRILLER **ADT / A. Palomeque**		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **/ HSA**	SAMPLING METHOD	START-FINISH DATE **7/6/16-7/7/16**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (Feet) GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GRAVEL PACK SIZES **#2**	



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0		Concrete.		0.0	Hand cleared to 5 ft bls.
		Brown well-sorted SAND, some Gravel, little Concrete, trace brick and metal (fill); moist.		0.0	
				0.0	
			G	0.0	
				0.0	
5		Brown well-sorted SAND, some Gravel, trace silt; moist.		0.0	5
10				0.0	10
15		Brown to dark brown well-sorted SAND, some Silt, trace clay; moist.		0.0	15
20				0.0	20
					Groundwater observed at 22.5 ft bls.
25		Brown medium to fine SAND; wet.		0.0	25
30					30

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 8/1/16

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-1	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
R. Kovacs	**G. Lozefski**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/14/14-8/14/14**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete		0.3	Hand cleared to 5 ft bls
		Dark brown, fine to coarse SAND, little gravel; moist.			Collect RSB-1/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
				2.7	
5		Dark brown, fine to coarse SAND, some Gravel; moist.		0.0	
				0.1	34 inch recovery
		Dark brown, fine to medium SAND, some Gravel; moist.			
		Dark brown, fine to coarse SAND, some Gravel; moist.			
		Brown, fine to coarse SAND, some Gravel; moist.		3.2	Collect RSB-1/9-11.5 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
10		Brown, fine to coarse SAND, some Gravel, some Cobbles; moist.			
		Brown, fine to coarse SAND, some Gravel; moist.			
		Brown, fine to coarse SAND, some Gravel; wet.			
		Dark brown, fine to coarse SAND, little gravel; wet.		16.9	36 inch recovery
15				21.6	36 inch recovery
		Dark brown, fine to medium SAND; wet.		0.9	Collect RSB-1/18-19 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 12 inch recovery Refusal, bottom of boring at 19 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-2	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **G. Lozefski**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/12/14-8/13/14**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Silt, little brick, little concrete, (fill); moist.		32.0	Collect RSB-2/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
		Brown, fine to coarse SAND, some Silt, trace gravel; moist.			
				15.5	
5		Light brown, fine to coarse SAND, little gravel; moist.			5
				8.7	28 inch recovery
		Brown, fine to coarse SAND, little gravel; moist.		28.8	Collect RSB-2/9-11 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
10					10
		Brown, fine to coarse SAND, little gravel; wet.			
		Brown, fine to coarse SAND; wet.		37.9	36 inch recovery
15					15
		Brown, fine to medium SAND; wet.		23.2	36 inch recovery
					Collect RSB-2/16-18 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
					Refusal, bottom of boring at 18 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-2R	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
W. Kwan	**J. Gavin**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Gravel (Fill); moist.		8.2	Collect RSB-2R/0-2 for TCL VOCs
1					
2			G	10.7	Collect RSB-2R/2-4 for TCL VOCs
3					
4		Brown, fine to coarse SAND, trace gravel; moist.		14.5	Collect RSB-2R/4-6 for TCL VOCs
5					
6				17	
7					
8					
9					Bottom of boring at 9 ft bls

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-3	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
R. Kovacs	**G. Lozefski**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/12/14-8/13/14**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, little silt, little brick, little concrete (fill); moist.		62.2	Collect RSB-3/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
		Brown, fine to coarse SAND, some Silt, little gravel (fill); moist.		G 19.0	
5		Light brown, fine to coarse SAND, some Gravel, some Brick, some Concrete (fill); moist to wet.		58.9	32 inch recovery
10		Light brown, fine to coarse SAND, little gravel; moist.		201.3	Collect RSB-3/9-11 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
		Light brown, fine to coarse SAND, little gravel; wet.			
		Brown, fine to coarse SAND, little gravel; wet.		115.6	36 inch recovery
15		Brown, fine to medium SAND, little coarse sand; wet.		17.4	Collect RSB-3/15-17.5 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 30 inch recovery
					Refusal, bottom of boring at 17.5 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-3R	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **W. Kwan** / LOGGED BY: **J. Gavin**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Gravel (Fill); moist.		29	Collect RSB-3R/0-2 for TCL VOCs
			G	110	Collect RSB-3R/2-4 for TCL VOCs
		Brown, fine to coarse SAND, some Gravel; little silt, moist.		163	Collect RSB-3R/4-6 for TCL VOCs
5					5
		Brown, fine to coarse SAND, some Gravel; moist.		298	Collect RSB-3R/6-8 for TCL VOCs
				59.1	
				111	
10				68	10
				34.1	
				73	
15					15
				16	Refusal, bottom of boring at 17 ft bls

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-4	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **G. Lozefski**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/12/14-8/13/14**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, little silt, little brick, little concrete (fill); moist.		3.7	Collect RSB-4/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
		Brown, fine to coarse SAND, some Silt, little gravel; moist.		2.0	
5		Dark brown, medium to coarse SAND and GRAVEL, some reddish brown Cobbles; moist.		0.4	30 inch recovery
		Brown, fine to coarse SAND, little gravel; moist.			
		Dark brown, fine to coarse SAND and GRAVEL; moist.		2.8	Collect RSB-3/9-11 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
10		Brown, fine to coarse SAND, little gravel; moist.			
		Brown, fine to coarse SAND, little gravel; wet.			
		White, chalky consolidated material; dry.		0.6	Collect RSB-3/12-14 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
		Brown, fine to coarse SAND and GRAVEL; moist to wet.			
		Brown, fine to coarse SAND; wet.			Refusal, bottom of boring at 15 ft bls
15					

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-5	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **G. Lozefski**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/12/14-8/13/14**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, little silt, little brick, little concrete (fill); moist.		2.6	Collect RSB-5/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
		Brown, fine to coarse SAND, some Silt, little gravel; moist.		3.1	
5		Light brown, fine to coarse SAND, some Gravel; moist.		6.5	30 inch recovery
		Brown, fine to coarse SAND; moist.		5.4	Collect RSB-5/9-11 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
10		Brown, fine to coarse SAND; wet.			
		Brown, fine to coarse SAND, little gravel; wet.		5.0	36 inch recovery
15				4.8	Collect RSB-5/15-18 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals, 34 inch recovery
					Refusal, bottom of boring at 17 ft 10 in bls

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-6	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
R. Kovacs	**G. Lozefski**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/12/14-8/13/14**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, little silt, little brick, little concrete (fill); moist.		4.1	Collect RSB-6/0-2 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
		Brown, fine SAND, some coarse Sand; moist.	G	0.4	
5		Brown, fine to coarse SAND, trace gravel; moist.		0.0	36 inch recovery
10		Brown, fine to coarse SAND, trace gravel; wet.		0.0	Collect RSB-6/9-11 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals; 36 inch recovery
				7.6	36 inch recovery
15		Brown, fine to medium SAND; wet.		3.3	Encountered 0.5 inch thick layer of blackish brown, fine-grained material 36 inch recovery
		Brown, fine to coarse SAND; wet.			
		Brown, fine to medium SAND; wet.		0.1	Collect RSB-5/18-19.5 for TCL VOCs, SVOCs, Pesticides, Herbicides, PCB, Metals
					Refusal, bottom of boring at 19.5 ft bls

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-7	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **R. Kovacs** / LOGGED BY: **J. Collins**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**8/6/14-8/6/14**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Gravel, some Concrete, some Brick (fill); moist.		0.0	
				0.1	
				0.1	
5		Brown, fine to coarse SAND, some Brick, some Gravel (fill); moist.		6.2	18 inch recovery
				9.8	
10				8.9	36 inch recovery
		Brown, fine to medium SAND, some Silt, little gravel; moist.		4.8	
15				4.9	36 inch recovery
		Brown, fine to coarse SAND, trace gravel; moist.		7.0	
				5.8	
20		Brown, fine to coarse SAND, trace gravel; moist to wet.		1.2	60 inch recovery
					Collect RSB-7/21-23 for TCL VOCs, SVOCs, Pesticides, Herbicides, Metals
		Brown, fine to medium SAND; wet.		9.2	
25				2.4	36 inch recovery
		Brown, fine SAND, little medium sand, trace coarse sand; wet.		2.1	
30				0.0	36 inch recovery
					Collect RSB-7/31-33 for TCL VOCs, SVOCs, Pesticides, Herbicides, Metals
		Brown, fine to coarse SAND; wet.			
35				0.0	48 inch recovery
40					Bottom of boring at 40 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-9	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
W. Kwan	**J. Gavin**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/24/15-2/24/15**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"		PID Values (ppm)	REMARKS
		Concrete.				Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, and Silt (Fill); moist.			18.2	Collect RSB-9/0-2 for TCL VOCs
1						
2		Brown, fine to coarse SAND, and Silt, some Gravel; moist.			44	Collect RSB-9/2-4 for TCL VOCs
3				G		
4					18	
5						
6					16	
7						Bottom of boring at 7 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-10	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **W. Kwan** / LOGGED BY: **J. Gavin**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
1		Brown, fine to coarse SAND, some Gravel (Fill); moist to wet at 11' bls.		12.1	Collect RSB-10/0-2 for TCL VOCs
2			G	28.4	Collect RSB-10/2-4 for TCL VOCs
3					
4				27.8	Collect RSB-10/4-6 for TCL VOCs
5					
6				27.8	
7					
8				32	
9					
10				59	
11					
12					Bottom of boring at 12 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-11	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **W. Kwan** / LOGGED BY: **J. Gavin**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
1		Brown, fine to coarse SAND, some Gravel (Fill); moist.		14.3	Collect RSB-11/0-2 for TCL VOCs
2			G	27.1	Collect RSB-11/2-4 for TCL VOCs
3					
4					
		Brown, fine SAND, some Silt, trace medium to coarse sand (Fill); moist.		96	
5					
6					
		Brown, fine to coarse SAND, some Gravel (Fill); moist to wet at 11' bls.		17	
7					
8				21	
9					
10				15	
11					
					Bottom of boring at 12 ft bls
12					

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-12	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville Brooklyn, NY**		
APPROVED BY	LOGGED BY			
W. Kwan	**J. Gavin**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Gravel (Fill); moist.		118	Collect RSB-12/0-2 for TCL VOCs
			G	340	Collect RSB-12/2-4 for TCL VOCs
		Brown, fine to coarse SAND, some Silt, little gravel (Fill); moist.		94	Collect RSB-12/4-6 for TCL VOCs
5					5
		Brown, fine to coarse SAND, trace gravel (Fill); moist to wet at 11' bls.		32.7	
				32.2	
10				265	10
		Brown, fine to coarse SAND; moist.		52.2	
				23.6	
15				11	15
				6.1	Bottom of boring at 17 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

SOIL BORING LOG

WELL NO.	NORTHING	EASTING
RSB-13	**Not Measured**	**Not Measured**

PROJECT NO./NAME	LOCATION
2158.0002Y000 / Marcus Garvey Village	**Brownsville**
APPROVED BY: **W. Kwan** / LOGGED BY: **J. Gavin**	**Brooklyn, NY**
DRILLING CONTRACTOR/DRILLER: **Trinity / J. Sakellis**	GEOGRAPHIC AREA

DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**

LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL
Not Measured	**Not Measured**	

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
		Brown, fine to coarse SAND, some Gravel (Fill); moist.		9.5	Collect RSB-13/0-2 for TCL VOCs
1					
2			G	10.1	Collect RSB-13/2-4 for TCL VOCs
3					
4					
		Brown, fine SAND and Silt, little medium to coarse Sand (Fill); moist.		63.3	
5					
6					
		Brown, fine to coarse SAND, some Gravel (Fill); moist to wet at 11' bls.		26.5	
7					
8				20.2	
9				12.1	
10				51	
11					
					Bottom of boring at 12 ft bls
12					

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
RSB-14	**Not Measured**	**Not Measured**		
PROJECT NO./NAME		LOCATION		
2158.0002Y000 / Marcus Garvey Village		**Brownsville**		
APPROVED BY	LOGGED BY	**Brooklyn, NY**		
W. Kwan	**J. Gavin**			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Trinity / J. Sakellis				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	**2-inches**	**/ Geoprobe**	**2" Macro-Core**	**2/23/15-2/24/15**
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
Not Measured	**Not Measured**			

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete.			Hand cleared to 5 ft bls
1		Brown, fine to coarse SAND, some Gravel (Fill); moist.		31	Collect RSB-14/0-2 for TCL VOCs
2				26.7	Collect RSB-14/2-4 for TCL VOCs
3		Brick.			
4		Brown, fine to coarse SAND, some Gravel, trace brick (Fill); moist.		61.5	Collect RSB-14/4-6 for TCL VOCs
5					
6				26.6	
7					
8		Brown, fine to coarse SAND, trace gravel (Fill); moist to wet at 11' bls.		17	
9					
10				21.1	
11				77	
12					Bottom of boring at 12 ft bls

BORING/FEET 2158.0002Y000MARCUSGARVEY.GPJ ROUX.GDT 4/10/15

APPENDIX D

SSDS Startup Report and Operation and Maintenance Information

REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

209 SHAFTER STREET
ISLANDIA, NEW YORK 11749
TEL: 631-232-2600
FAX: 631 232-9898

August 28, 2015

Mr. Joshua Weisstuch
Marcus Garvey Preservation LLC
1865 Palmer Avenue
Larchmont, New York 10538

Re: Sub-Slab Depressurization System Installation Completion Report
Marcus Garvey Apartments Project, Brooklyn, New York

Dear Mr. Weisstuch:

Roux Associates, Inc. (Roux Associates) and our associated engineering firm, Remedial Engineering, P.C. (collectively referred to herein as Roux Associates) has prepared this letter to document the findings of the startup performance monitoring for the sub-slab depressurization system (SSDS) installed at 650 Rockaway Avenue (a.k.a. 654, 658, 666, 670, 674 Rockaway Avenue and 327, 329, 331, 333, 335, 337, 339 Chester Avenue) in the Brownsville Section of Brooklyn, Kings County, City and State of New York (Site). The 650 Rockaway Avenue property is part of the larger redevelopment project known as Marcus Garvey Apartments, and is being remediated in accordance with the requirements of the New York State Department of Environmental Conservation's (NYSDEC's) Brownfield Cleanup Program (BCP Site #C224198; Figure 1).

SSDS Description
The SSDS is one element of the Site remedy as described in the June 2015 Remedial Investigation Report/Remedial Action Work Plan (RIR/RAWP), and is designed as an interim remedial measure to address potential exposure pathways of soil vapors from beneath the Site. The major components of the SSDS consist of:

- A 7.5 horsepower (Hp) explosion proof blower (Blower A) installed on the building roof that provides vacuum for the suction points located south of the passageway (the passageway is just south of the building center);

- A 15 Hp explosion proof blower (Blower B) installed on the building roof that provides vacuum for the suction points located to the north of the passageway;

- 21 horizontal suction points: 13 located along the west side of the building (MG-A1 through MG-A6, and MG-B1 through MG-B7), two located within the boiler room (MG-A11 and MG-A12), three located within the basement area beneath the former restaurant (MG-B9, MG-B11, and MG-B12), and three located within the basement area

beneath the former dry cleaner, Johnny's Cleaners, formerly located at 650 Rockaway Avenue (MG-B13, MG-B14, and MG-B17);

- Nine vertical suction points: four located in the south side of the building (MG-A7 through MG-A10), one located within the boiler room (MG-A13); two located within the basement area beneath the former restaurant (MG-B8 and MG-B10), and two located within the basement area beneath the former Johnny's Cleaners (MG-B15 and MG-B16); and

- Four sub-slab soil vapor monitoring points (SVMP-A1, SVMP-A2, SVMP-B1, and SVMP-B2) installed along the east side of the building.

The attached figure shows the SSDS floor plan design and the locations of the horizontal suction points, vertical suction points, and sub-slab soil vapor monitoring points.

SSDS Startup Performance Monitoring Activities

Startup performance monitoring activities were conducted on August 13, 2015. Roux Associates personnel confirmed operation of the blowers and then collected vacuum and photo-ionization detector (PID) readings at each horizontal suction point, vertical suction point, and two (2) sub-slab soil vapor monitoring points. Vacuum and PID readings were not collected at SVMP-A1 because it was inaccessible. Vacuum and PID readings were not collected at SVMP-A2 because it could not be located. After approximately seven hours of continuous operation, a PID reading and 1-liter Summa canister air sample were collected from the discharge of each blower prior to shut down. The air sample was submitted to Alpha Analytical of Westborough, Massachusetts for volatile organic compounds (VOCs) analysis via United States Environmental Protection Agency Method TO-15.

SSDS Startup Performance Monitoring Findings

The vacuum and PID readings for Blower A and Blower B are provided as Tables 1 and 2, respectively. Vacuum readings at Blower A suction points ranged from 0.119 to 6.424 inches water column (in. w.c.), and at Blower B suction points ranged from 7.605 to 15.65 in. w.c., all of which were greater than the acceptable minimum vacuum of 0.004 in. w.c. Adequate vacuum was also detected at SVMP-B1 and SVMP-B2. PID readings at Blower A suction points ranged from 0 to 3 parts per million (ppm), and at Blower B suction points ranged from 0 to 1,118 ppm. These findings indicate the most impacted soil vapors are present in the area of the former Johnny's Cleaners, consistent with the findings of the remedial investigation. The data also suggest that the previously unidentified potential former dry cleaner at 672 Rockaway Avenue, in the southern portion of the building, is not a significant concern (to be confirmed with the additional sampling proposed in the RIR/RAWP).

Table 3 presents the air sampling data. Consistent with the PID readings, Blower B's effluent air sample exhibited higher concentrations of VOCs than Blower A's. Tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE) were detected in Blower B's effluent air sample at concentrations of 252,000 micrograms per cubic meter ($\mu g/m^3$), 2,430 $\mu g/m^3$, and

2,260 µg/m^3, respectively. The laboratory report is provided as an attachment to this report. Using Blower B's VOC data, a Division of Air Resources (DAR-1) (formerly Air Guide-1) analysis was performed on PCE, TCE, and DCE (Table 4). The emission impacts were compared to the annual guidance concentration (AGC) values and the short-term guidance concentration (SGC) values from the February 28, 2014 DAR-1 AGC/SGC Tables. Per the DAR-1 analysis, the estimated contaminant emission rates are below the AGC and SGC values for PCE, TCE, and DCE, so vapor treatment is not required prior to discharge.

Based upon the results of the startup testing and the DAR-1 analysis, the SSDS is operating properly, is creating adequate vacuum beneath both portions of the building, is extracting impacted soil vapors as designed, and does not require extracted vapor treatment. Thus, notice to restart the SSDS was provided on August 28, 2015.

Sincerely,

ROUX ASSOCIATES, INC.

Wai Kwan, Ph.D., P.E.
Senior Engineer/
Project Manager

REMEDIAL ENGINEERING, P.C.

Noelle M. Clarke, P.E.
Principal Engineer

Attachment

cc: Rick Gropper, L+M Development Partners Inc.
Debra Kenyon, L+M Development Partners Inc.
Michael Bogin, Sive, Paget & Riesel P.C.
Joseph Duminuco, Roux Associates

Table 1. Blower A Startup Performance Monitoring Log

Site:	Marcus Garvey Apartments		DATE:	8/13/2015
Location	Brownsville, NY		PERSONNEL:	Wai Kwan
Roux Project No.:	2158.0002Y002			John Freijomil
System:	Active Mix Use Sub-Slab Depressurization System		ALARM WARNING LIGHT CHECKED?:	
Blower:	Rotron EN858, 7.5 Hp (Blower A)			Yes
Blower Range:	120 IWG pressure, 98 IWG vac, 400 cfm			
Blower Influent	**Operational Status**	**Inlet Vacuum (in. w.c.)**	**Comment**	
INF-A1	Functional	20	After knock-out tank	
Knock-out Tank-A1	Functional	20	After fully closed dilution valve	
Blower Effluent	**PID Reading (ppm)**	**Pressure (in. w.c.)**	**Comment**	
EFF-A1	0.1	--	Collected grab air sample in 1-liter summa canister	
Suction Point	**PID Reading (ppm)**	**Vacuum (in. w.c.)**	**Comment**	
MG-A1	0.6	5.072		
MG-A2	0	5.062		
MG-A3	0.7	6.411		
MG-A4	0	6.424		
MG-A5	1.4	5.138		
MG-A6	1.6	5.123		
MG-A7	0	0.141		
MG-A8	0	0.119		
MG-A9	0	0.77		
MG-A10	0	2.006		
MG-A11	0.5	1.308		
MG-A12	3	1.311		
MG-A13	0.5	1.326		
Soil Vapor Monitoring Point	**PID Reading (ppm)**	**Vacuum (in. w.c.)**	**Comment**	
SVMP-A1			Could not unscrew inverted cap	
SVMP-A2			Could not find	

Table 2. Blower B Startup Performance Monitoring Log

Site:	Marcus Garvey Apartments	DATE:	8/13/2015
Location	Brownsville, NY	PERSONNEL:	Wai Kwan
Roux Project No.:	2158.0002Y002		John Freijomil
System:	Active Mix Use Sub-Slab Depressurization System	ALARM WARNING LIGHT CHECKED?:	
Blower:	Rotron EN909 15 Hp (Blower B)		Yes
Blower Range:	20 IWG pressure, 100 IWG vac, 600 cfm		

Blower Influent	**Operational Status**	**Inlet Vacuum (in. w.c.)**	**Comment**
INF-B1	Functional	32	After knock-out tank
Knock-out Tank-B1	Functional	35	After fully closed dilution valve
Blower Effluent	**PID Reading (ppm)**	**Pressure (in. w.c.)**	**Comment**
EFF-B1	124.4	--	Collected grab air sample in 1-liter summa canister
Suction Point	**PID Reading (ppm)**	**Vacuum (in. w.c.)**	**Comment**
MG-B1	0	13.356	
MG-B2	0	14.59	
MG-B3	1.8	14.651	
MG-B4	11.5	14.938	
MG-B5	61.1	14.989	
MG-B6	49.1	15.62	
MG-B7	14.4	15.65	
MG-B8	7.8	8.333	
MG-B9	3.1	8.28	
MG-B10	47.7	8.222	
MG-B11	9	8.202	
MG-B12	45.3	8.189	
MG-B13	197.4	7.77	
MG-B14	154.7	7.85	
MG-B15	1,118	7.687	
MG-B16	346.2	7.605	
MG-B17	43.1	7.629	
Soil Vapor Monitoring Point	**PID Reading (ppm)**	**Vacuum (in. w.c.)**	**Comment**
SVMP-B1	0	0.025	
SVMP-B2	334.1	5.818	

Table 3. Summary of Volatile Organic Compounds in SSDS Effluent
Marcus Garvey Preservation LLC, Marcus Garvey Apartments, Brooklyn, New York

Parameter (Concentrations in µg/m^3)	**Sample Designation:** **Sample Date:**	BLOWER A-GRAB-EFF 8/13/2015	BLOWER B-GRAB-EFF 8/13/2015
1,1,1-Trichloroethane		2.47 U	486 U
1,1,2,2-Tetrachloroethane		3.11 U	612 U
1,1,2-Trichloroethane		2.47 U	486 U
1,1-Dichloroethane		1.83 U	361 U
1,1-Dichloroethene		1.80 U	353 U
1,2,4-Trichlorobenzene		3.36 U	661 U
1,2,4-Trimethylbenzene		2.23 U	438 U
1,2-Dibromoethane		3.48 U	685 U
1,2-Dichlorobenzene		2.72 U	536 U
1,2-Dichloroethane		1.83 U	361 U
1,2-Dichloropropane		2.09 U	412 U
1,3,5-Trimethylbenzene		2.23 U	438 U
1,3-Butadiene		1.00 U	197 U
1,3-Dichlorobenzene		2.72 U	536 U
1,4-Dichlorobenzene		**50**	536 U
1,4-Dioxane		1.63 U	321 U
2-Butanone (MEK)		**7.37**	658 U
2-Hexanone		1.86 U	365 U
3-Chloropropene		1.42 U	279 U
4-Ethyltoluene		2.23 U	438 U
4-Methyl-2-pentanone (MIBK)		4.63 U	914 U
Acetone		**51.3**	1060 U
Benzene		**3.8**	285 U
Benzyl chloride		2.35 U	461 U
Bromodichloromethane		3.03 U	597 U
Bromoethene		1.98 U	390 U
Bromoform		4.68 U	921 U
Bromomethane		1.76 U	346 U
Carbon disulfide		1.41 U	277 U
Carbon tetrachloride		2.85 U	560 U
Chlorobenzene		2.09 U	410 U
Chloroethane		1.20 U	235 U
Chloroform		**5.47**	435 U
Chloromethane		**1.18**	184 U
cis-1,2-Dichloroethene		1.80 U	**2260**
cis-1,3-Dichloropropene		2.06 U	405 U
Cyclohexane		1.56 U	307 U
Dibromochloromethane		3.86 U	759 U
Dichlorodifluoromethane		**8.6**	441 U
Ethanol		**324**	2090 U
Ethyl Acetate		**5.05**	804 U
Ethylbenzene		1.97 U	387 U
Freon 113		3.47 U	683 U
Freon 114		3.17 U	623 U
Heptane		1.86 U	365 U
Hexachlorobutadiene		4.83 U	950 U

Table 3. Summary of Volatile Organic Compounds in SSDS Effluent
Marcus Garvey Preservation LLC, Marcus Garvey Apartments, Brooklyn, New York

Parameter (Concentrations in µg/m^3)	**Sample Designation:** **Sample Date:**	BLOWER A-GRAB-EFF 8/13/2015	BLOWER B-GRAB-EFF 8/13/2015
Isooctane		2.12 U	416 U
Isopropanol		**19.7**	548 U
m+p-Xylene		3.94 U	773 U
Methylene chloride		**4.2**	775 U
Methyl Tertiary Butyl Ether		1.63 U	321 U
n-Hexane		1.60 U	314 U
o-Xylene		1.97 U	387 U
Styrene		1.93 U	379 U
t-Butyl Alcohol		3.43 U	676 U
Tetrachloroethene		**347**	**252000**
Tetrahydrofuran		**11**	658 U
Toluene		**6.1**	336 U
trans-1,2-Dichloroethene		1.80 U	353 U
trans-1,3-Dichloropropene		2.06 U	405 U
Trichloroethene		**4.46**	**2430**
Trichlorofluoromethane		2.55 U	501 U
Vinyl chloride		1.16 U	228 U

U - Indicates that the compound was analyzed for but not detected
µg/m^3 - Micrograms per cubic meter
Bold data indicates that parameter was detected

Table 4. Marcus Garvey DAR-1 Screening Level Worksheet, Blower B

650 Rockaway Avenue, Brooklyn, NY

Calculations based on effluent vapor sample, BLOWER B-GRAB-EFF, collected on 8/13/15.

	µg/m3	PPMv
Tetrachloroethene (PCE) concentration:	252,000	36.554
Trichloroethene (TCE) concentration:	2,430	0.445
Dichloroethene (DCE) concentration:	2,260	0.560

Air flow rate (cubic feet per minute [cfm]): 480

Calculate Emission Rate in Pounds/Hour (lb/hr):

Flow Rate = 480 cfm

Emission Rate (lb/hr) = flow rate * concentration (PPMv) * molecular weight * 1.581E-07

Note that 1.581E-07 = $1/10^6$ ppm-v * 60 minutes/hour * 1 lb-mole/379.5 ft^3

Emission Rate for PCE (lb/hr) = 480 cfm * 36.554 PPMv * 165.8 * 1.581E-07 = **0.460 lb/hr or 4029.0 lb/yr**

Emission Rate for TCE (lb/hr) = 480 cfm * 0.445 PPMv * 131.4 * 1.581E-07 = **0.004 lb/hr or 38.9 lb/yr**

Emission Rate for DCE (lb/hr) = 480 cfm * 0.560 PPMv * 97 * 1.581E-07 = **0.004 lb/hr or 36.1 lb/yr**

Standard Point Source Method (Appendix B – Division of Air Resources):

Hs (Height of Stack) = 48' Hb (Height of Building) = 38'

Hs/Hb = 1.26 < 1.5 No Plume Rise

Therefore effective stack height = Hs, H_E= 48 feet

Calculate Maximum Annual Impact (Ca)

Ca ($\mu g/m^3$) = $6 * Q_a/H_E^{2.25}$

Q_a = Emission Rate in pounds per year calculated above

Ca for PCE ($\mu g/m^3$) = 3.99

Ca for TCE ($\mu g/m^3$) = 0.0384

Ca for DCE ($\mu g/m^3$) = 0.0357

Calculate Maximum Potential Annual Impact (Cp)

Cp ($\mu g/m^3$) = $52{,}500 * Q/H_E^{2.25}$

Q = Emission Rate in pounds per hour calculated above

Cp for PCE ($\mu g/m^3$) = 3.98

Cp for TCE ($\mu g/m^3$) = 0.0384

Since Hs/Hb < 1.5 -- No Stack Reduction Factors Apply

AGC for PCE = 4.0 $\mu g/m^3$	Ca for PCE = 3.99 < 4.0 -- OK!
AGC for TCE = 0.2 $\mu g/m^3$	Ca for TCE = 0.0384 < 0.2 -- OK!
AGC for DCE = 63.0 $\mu g/m^3$	Ca for DCE = 0.0357 < 63.0 -- OK!

Calculate Maximum Short Term Impact (Cst)

Cst ($\mu g/m^3$) = Cp * 65

Cst for PCE ($\mu g/m^3$) = 258.80

Cst for TCE ($\mu g/m^3$) = 2.50

SGC for PCE = 300 $\mu g/m^3$	Cst for PCE = 258.8 < 300 -- OK!
SGC for TCE = 14,000 $\mu g/m^3$	Cst for TCE = 2.5 < 14,000 -- OK!

There is no SGC for DCE.

Since Ca for PCE, TCE, and DCE are less than their respective AGC values, no vapor phase carbon units are necessary.

PIPING TO ROOF (TYP.)

SSDS PIPING (TYP.)

TYPICAL VERTICAL SUCTION POINT

PIPING TO ROOF (TYP.)

TYPICAL BASEMENT SUCTION POINT

TYPICAL SOIL VAPOR MONITORING POINT

TYPICAL APARTMENT SUCTION POINT

TYPICAL BASEMENT SUCTION POINT

TYPICAL VERTICAL SUCTION POINT

APPROXIMATE LOCATION OF BASEMENT BOILER ROOM

APPROXIMATE LOCATION OF BASEMENT BENEATH FORMER RESTAURANT

APPROXIMATE LOCATION OF FORMER JOHNNY'S CLEANERS

APPROXIMATE LOCATION OF BASEMENT BENEATH FORMER JOHNNY'S CLEANERS

TYPE OF WALL?

4 STORY BRICK BUILDINGS
ST. NO. 327–333

1 STORY BRICK BUILDINGS
PROJECTIONS BEYOND STREET LINE
SIGN ON POLE.....1.1'±
SECURITY GATE.....1.0'±

2 STORY BRICK PASSAGE-WAY

1 STORY BRICK BUILDINGS
PROJECTIONS BEYOND STREET LINE
SIGN ON POLE.....10.0'±
CAMERA.....0.5'±

Show Window @ Security Gate (typical)

Concrete Enclosure for Garbage Containers(typical)

Iron Fence on Brick Wall

Concrete Walk

Steel Faced Concrete Curb

Concrete Bus Pad

Bus Shelter

Column (typical)

DUMONT AVENUE

ROCKAWAY AVENUE

Asphalt Pavement

City Combined Sewer

NO BC & TC SHOTS
Steel Faced Concrete Curb

90' WIDE

250.24'

250.9'±

16.7'±

LEGEND

- APPROXIMATE FOOTPRINT OF FORMER JOHNNY'S CLEANERS
- BCP SITE /ENVIRONMENTAL EASEMENT BOUNDARY
- APPROXIMATE LOCATION OF BASEMENT

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991–1)
2. NOT ALL SSDS PIPING IS SHOWN FOR CLARITY REASONS.

STATE OF NEW YORK
Noelle M. Clarke
No. 072491
LICENSED PROFESSIONAL ENGINEER

Title:
AS-BUILT SUB-SLAB DEPRESSURIZATION SYSTEM PLAN

MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVENUE
BROOKLYN, NEW YORK

Prepared For:
MARCUS GARVEY PRESERVATION LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: W.K.	Date: 14NOV16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	D-1
Project Mgr: N.C.	Project: 2158.0002Y002	
File: 2158.0002Y145.04.DWG		

V:\CAD\PROJECTS\2158Y\0002Y\145\2158.0002Y145.04.DWG

ANALYTICAL REPORT

Lab Number:	L1519671
Client:	Roux Associates, Inc. 209 Shafter Street Islandia, NY 11749-5074
ATTN:	Wai Kwan
Phone:	(631) 232-2600
Project Name:	MARCUS GARVEY
Project Number:	2158.0002Y
Report Date:	08/20/15

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1519671-01	BLOWER B-GRAB-EFF	SOIL_VAPOR	BROOKLYN, NY	08/13/15 15:22	08/14/15
L1519671-02	BLOWER A-GRAB-EFF	SOIL_VAPOR	BROOKLYN, NY	08/13/15 15:29	08/14/15

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name: MARCUS GARVEY **Lab Number:** L1519671
Project Number: 2158.0002Y **Report Date:** 08/20/15

Case Narrative (continued)

Volatile Organics in Air

Canisters were released from the laboratory on August 11, 2015. The canister certification results are provided as an addendum.

Sample L1519671-01 and -02: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the samples. The reporting limits have been elevated accordingly.

Sample L1519671-01: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

Sample L1519671-02 results for Acetone should be considered estimated due to co-elution with a non-target peak.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 08/20/15

AIR

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-01 D
Client ID: BLOWER B-GRAB-EFF
Sample Location: BROOKLYN, NY
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 08/18/15 23:37
Analyst: MB

Date Collected: 08/13/15 15:22
Date Received: 08/14/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Dichlorodifluoromethane	ND	89.1	--	ND	441	--		445.3
Chloromethane	ND	89.1	--	ND	184	--		445.3
Freon-114	ND	89.1	--	ND	623	--		445.3
Vinyl chloride	ND	89.1	--	ND	228	--		445.3
1,3-Butadiene	ND	89.1	--	ND	197	--		445.3
Bromomethane	ND	89.1	--	ND	346	--		445.3
Chloroethane	ND	89.1	--	ND	235	--		445.3
Ethanol	ND	1110	--	ND	2090	--		445.3
Vinyl bromide	ND	89.1	--	ND	390	--		445.3
Acetone	ND	445	--	ND	1060	--		445.3
Trichlorofluoromethane	ND	89.1	--	ND	501	--		445.3
Isopropanol	ND	223.	--	ND	548	--		445.3
1,1-Dichloroethene	ND	89.1	--	ND	353	--		445.3
Tertiary butyl Alcohol	ND	223	--	ND	676	--		445.3
Methylene chloride	ND	223	--	ND	775	--		445.3
3-Chloropropene	ND	89.1	--	ND	279	--		445.3
Carbon disulfide	ND	89.1	--	ND	277	--		445.3
Freon-113	ND	89.1	--	ND	683	--		445.3
trans-1,2-Dichloroethene	ND	89.1	--	ND	353	--		445.3
1,1-Dichloroethane	ND	89.1	--	ND	361	--		445.3
Methyl tert butyl ether	ND	89.1	--	ND	321	--		445.3
2-Butanone	ND	223.	--	ND	658	--		445.3
cis-1,2-Dichloroethene	571	89.1	--	2260	353	--		445.3
Ethyl Acetate	ND	223.	--	ND	804	--		445.3

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-01 D
Client ID: BLOWER B-GRAB-EFF
Sample Location: BROOKLYN, NY

Date Collected: 08/13/15 15:22
Date Received: 08/14/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chloroform	ND	89.1	--	ND	435	--		445.3
Tetrahydrofuran	ND	223	--	ND	658	--		445.3
1,2-Dichloroethane	ND	89.1	--	ND	361	--		445.3
n-Hexane	ND	89.1	--	ND	314	--		445.3
1,1,1-Trichloroethane	ND	89.1	--	ND	486	--		445.3
Benzene	ND	89.1	--	ND	285	--		445.3
Carbon tetrachloride	ND	89.1	--	ND	560	--		445.3
Cyclohexane	ND	89.1	--	ND	307	--		445.3
1,2-Dichloropropane	ND	89.1	--	ND	412	--		445.3
Bromodichloromethane	ND	89.1	--	ND	597	--		445.3
1,4-Dioxane	ND	89.1	--	ND	321	--		445.3
Trichloroethene	452	89.1	--	2430	479	--		445.3
2,2,4-Trimethylpentane	ND	89.1	--	ND	416	--		445.3
Heptane	ND	89.1	--	ND	365	--		445.3
cis-1,3-Dichloropropene	ND	89.1	--	ND	405	--		445.3
4-Methyl-2-pentanone	ND	223.	--	ND	914	--		445.3
trans-1,3-Dichloropropene	ND	89.1	--	ND	405	--		445.3
1,1,2-Trichloroethane	ND	89.1	--	ND	486	--		445.3
Toluene	ND	89.1	--	ND	336	--		445.3
2-Hexanone	ND	89.1	--	ND	365	--		445.3
Dibromochloromethane	ND	89.1	--	ND	759	--		445.3
1,2-Dibromoethane	ND	89.1	--	ND	685	--		445.3
Tetrachloroethene	37200	89.1	--	252000	604	--		445.3
Chlorobenzene	ND	89.1	--	ND	410	--		445.3
Ethylbenzene	ND	89.1	--	ND	387	--		445.3
p/m-Xylene	ND	178.	--	ND	773	--		445.3
Bromoform	ND	89.1	--	ND	921	--		445.3
Styrene	ND	89.1	--	ND	379	--		445.3

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-01 D
Client ID: BLOWER B-GRAB-EFF
Sample Location: BROOKLYN, NY
Date Collected: 08/13/15 15:22
Date Received: 08/14/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
1,1,2,2-Tetrachloroethane	ND	89.1	--	ND	612	--		445.3
o-Xylene	ND	89.1	--	ND	387	--		445.3
4-Ethyltoluene	ND	89.1	--	ND	438	--		445.3
1,3,5-Trimethylbenzene	ND	89.1	--	ND	438	--		445.3
1,2,4-Trimethylbenzene	ND	89.1	--	ND	438	--		445.3
Benzyl chloride	ND	89.1	--	ND	461	--		445.3
1,3-Dichlorobenzene	ND	89.1	--	ND	536	--		445.3
1,4-Dichlorobenzene	ND	89.1	--	ND	536	--		445.3
1,2-Dichlorobenzene	ND	89.1	--	ND	536	--		445.3
1,2,4-Trichlorobenzene	ND	89.1	--	ND	661	--		445.3
Hexachlorobutadiene	ND	89.1	--	ND	950	--		445.3

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	89		60-140
Bromochloromethane	90		60-140
chlorobenzene-d5	92		60-140

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-02 D
Client ID: BLOWER A-GRAB-EFF
Sample Location: BROOKLYN, NY
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 08/18/15 23:05
Analyst: MB

Date Collected: 08/13/15 15:29
Date Received: 08/14/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Dichlorodifluoromethane	1.74	0.453	--	8.60	2.24	--		2.267
Chloromethane	0.571	0.453	--	1.18	0.935	--		2.267
Freon-114	ND	0.453	--	ND	3.17	--		2.267
Vinyl chloride	ND	0.453	--	ND	1.16	--		2.267
1,3-Butadiene	ND	0.453	--	ND	1.00	--		2.267
Bromomethane	ND	0.453	--	ND	1.76	--		2.267
Chloroethane	ND	0.453	--	ND	1.20	--		2.267
Ethanol	172	5.67	--	324	10.7	--		2.267
Vinyl bromide	ND	0.453	--	ND	1.98	--		2.267
Acetone	21.6	2.27	--	51.3	5.39	--		2.267
Trichlorofluoromethane	ND	0.453	--	ND	2.55	--		2.267
Isopropanol	8.03	1.13	--	19.7	2.78	--		2.267
1,1-Dichloroethene	ND	0.453	--	ND	1.80	--		2.267
Tertiary butyl Alcohol	ND	1.13	--	ND	3.43	--		2.267
Methylene chloride	1.21	1.13	--	4.20	3.93	--		2.267
3-Chloropropene	ND	0.453	--	ND	1.42	--		2.267
Carbon disulfide	ND	0.453	--	ND	1.41	--		2.267
Freon-113	ND	0.453	--	ND	3.47	--		2.267
trans-1,2-Dichloroethene	ND	0.453	--	ND	1.80	--		2.267
1,1-Dichloroethane	ND	0.453	--	ND	1.83	--		2.267
Methyl tert butyl ether	ND	0.453	--	ND	1.63	--		2.267
2-Butanone	2.50	1.13	--	7.37	3.33	--		2.267
cis-1,2-Dichloroethene	ND	0.453	--	ND	1.80	--		2.267
Ethyl Acetate	1.40	1.13	--	5.05	4.07	--		2.267

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-02 D
Client ID: BLOWER A-GRAB-EFF
Sample Location: BROOKLYN, NY
Date Collected: 08/13/15 15:29
Date Received: 08/14/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chloroform	1.12	0.453	--	5.47	2.21	--		2.267
Tetrahydrofuran	3.73	1.13	--	11.0	3.33	--		2.267
1,2-Dichloroethane	ND	0.453	--	ND	1.83	--		2.267
n-Hexane	ND	0.453	--	ND	1.60	--		2.267
1,1,1-Trichloroethane	ND	0.453	--	ND	2.47	--		2.267
Benzene	1.19	0.453	--	3.80	1.45	--		2.267
Carbon tetrachloride	ND	0.453	--	ND	2.85	--		2.267
Cyclohexane	ND	0.453	--	ND	1.56	--		2.267
1,2-Dichloropropane	ND	0.453	--	ND	2.09	--		2.267
Bromodichloromethane	ND	0.453	--	ND	3.03	--		2.267
1,4-Dioxane	ND	0.453	--	ND	1.63	--		2.267
Trichloroethene	0.830	0.453	--	4.46	2.43	--		2.267
2,2,4-Trimethylpentane	ND	0.453	--	ND	2.12	--		2.267
Heptane	ND	0.453	--	ND	1.86	--		2.267
cis-1,3-Dichloropropene	ND	0.453	--	ND	2.06	--		2.267
4-Methyl-2-pentanone	ND	1.13	--	ND	4.63	--		2.267
trans-1,3-Dichloropropene	ND	0.453	--	ND	2.06	--		2.267
1,1,2-Trichloroethane	ND	0.453	--	ND	2.47	--		2.267
Toluene	1.62	0.453	--	6.10	1.71	--		2.267
2-Hexanone	ND	0.453	--	ND	1.86	--		2.267
Dibromochloromethane	ND	0.453	--	ND	3.86	--		2.267
1,2-Dibromoethane	ND	0.453	--	ND	3.48	--		2.267
Tetrachloroethene	51.2	0.453	--	347	3.07	--		2.267
Chlorobenzene	ND	0.453	--	ND	2.09	--		2.267
Ethylbenzene	ND	0.453	--	ND	1.97	--		2.267
p/m-Xylene	ND	0.907	--	ND	3.94	--		2.267
Bromoform	ND	0.453	--	ND	4.68	--		2.267
Styrene	ND	0.453	--	ND	1.93	--		2.267

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

SAMPLE RESULTS

Lab ID: L1519671-02 D
Client ID: BLOWER A-GRAB-EFF
Sample Location: BROOKLYN, NY
Date Collected: 08/13/15 15:29
Date Received: 08/14/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
1,1,2,2-Tetrachloroethane	ND	0.453	--	ND	3.11	--		2.267
o-Xylene	ND	0.453	--	ND	1.97	--		2.267
4-Ethyltoluene	ND	0.453	--	ND	2.23	--		2.267
1,3,5-Trimethylbenzene	ND	0.453	--	ND	2.23	--		2.267
1,2,4-Trimethylbenzene	ND	0.453	--	ND	2.23	--		2.267
Benzyl chloride	ND	0.453	--	ND	2.35	--		2.267
1,3-Dichlorobenzene	ND	0.453	--	ND	2.72	--		2.267
1,4-Dichlorobenzene	8.31	0.453	--	50.0	2.72	--		2.267
1,2-Dichlorobenzene	ND	0.453	--	ND	2.72	--		2.267
1,2,4-Trichlorobenzene	ND	0.453	--	ND	3.36	--		2.267
Hexachlorobutadiene	ND	0.453	--	ND	4.83	--		2.267

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	90		60-140
Bromochloromethane	92		60-140
chlorobenzene-d5	93		60-140

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/18/15 15:33

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG813182-4								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethyl Alcohol	ND	2.50	--	ND	4.71	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/18/15 15:33

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG813182-4								
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Isopropyl Ether	ND	0.200	--	ND	0.836	--		1
Ethyl-Tert-Butyl-Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Tertiary-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/18/15 15:33

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG813182-4								
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl Acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/18/15 15:33

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG813182-4								
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane (C9)	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
o-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
p-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane (C10)	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane (C12)	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y
Lab Number: L1519671
Report Date: 08/20/15

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/18/15 15:33

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG813182-4								
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					
No Tentatively Identified Compounds					

Lab Control Sample Analysis

Batch Quality Control

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG813182-3								
Chlorodifluoromethane	99		-		70-130	-		
Propylene	119		-		70-130	-		
Propane	88		-		70-130	-		
Dichlorodifluoromethane	97		-		70-130	-		
Chloromethane	115		-		70-130	-		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	118		-		70-130	-		
Methanol	112		-		70-130	-		
Vinyl chloride	118		-		70-130	-		
1,3-Butadiene	127		-		70-130	-		
Butane	108		-		70-130	-		
Bromomethane	110		-		70-130	-		
Chloroethane	112		-		70-130	-		
Ethyl Alcohol	116		-		70-130	-		
Dichlorofluoromethane	107		-		70-130	-		
Vinyl bromide	115		-		70-130	-		
Acrolein	118		-		70-130	-		
Acetone	118		-		70-130	-		
Acetonitrile	111		-		70-130	-		
Trichlorofluoromethane	112		-		70-130	-		
iso-Propyl Alcohol	126		-		70-130	-		
Acrylonitrile	119		-		70-130	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG813182-3								
Pentane	107		-		70-130	-		
Ethyl ether	107		-		70-130	-		
1,1-Dichloroethene	113		-		70-130	-		
tert-Butyl Alcohol	111		-		70-130	-		
Methylene chloride	120		-		70-130	-		
3-Chloropropene	121		-		70-130	-		
Carbon disulfide	113		-		70-130	-		
1,1,2-Trichloro-1,2,2-Trifluoroethane	117		-		70-130	-		
trans-1,2-Dichloroethene	97		-		70-130	-		
1,1-Dichloroethane	100		-		70-130	-		
Methyl tert butyl ether	101		-		70-130	-		
Vinyl acetate	107		-		70-130	-		
2-Butanone	99		-		70-130	-		
cis-1,2-Dichloroethene	108		-		70-130	-		
Ethyl Acetate	116		-		70-130	-		
Chloroform	112		-		70-130	-		
Tetrahydrofuran	106		-		70-130	-		
2,2-Dichloropropane	100		-		70-130	-		
1,2-Dichloroethane	109		-		70-130	-		
n-Hexane	92		-		70-130	-		
Isopropyl Ether	89		-		70-130	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG813182-3								
Ethyl-Tert-Butyl-Ether	89		-		70-130	-		
1,1,1-Trichloroethane	95		-		70-130	-		
1,1-Dichloropropene	92		-		70-130	-		
Benzene	93		-		70-130	-		
Carbon tetrachloride	100		-		70-130	-		
Cyclohexane	96		-		70-130	-		
Tertiary-Amyl Methyl Ether	90		-		70-130	-		
Dibromomethane	88		-		70-130	-		
1,2-Dichloropropane	95		-		70-130	-		
Bromodichloromethane	95		-		70-130	-		
1,4-Dioxane	102		-		70-130	-		
Trichloroethene	98		-		70-130	-		
2,2,4-Trimethylpentane	94		-		70-130	-		
Methyl Methacrylate	89		-		70-130	-		
Heptane	91		-		70-130	-		
cis-1,3-Dichloropropene	100		-		70-130	-		
4-Methyl-2-pentanone	95		-		70-130	-		
trans-1,3-Dichloropropene	88		-		70-130	-		
1,1,2-Trichloroethane	98		-		70-130	-		
Toluene	96		-		70-130	-		
1,3-Dichloropropane	91		-		70-130	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG813182-3								
2-Hexanone	101		-		70-130	-		
Dibromochloromethane	102		-		70-130	-		
1,2-Dibromoethane	102		-		70-130	-		
Butyl Acetate	98		-		70-130	-		
Octane	89		-		70-130	-		
Tetrachloroethene	96		-		70-130	-		
1,1,1,2-Tetrachloroethane	93		-		70-130	-		
Chlorobenzene	98		-		70-130	-		
Ethylbenzene	97		-		70-130	-		
p/m-Xylene	98		-		70-130	-		
Bromoform	100		-		70-130	-		
Styrene	99		-		70-130	-		
1,1,2,2-Tetrachloroethane	104		-		70-130	-		
o-Xylene	101		-		70-130	-		
1,2,3-Trichloropropane	94		-		70-130	-		
Nonane (C9)	90		-		70-130	-		
Isopropylbenzene	96		-		70-130	-		
Bromobenzene	93		-		70-130	-		
o-Chlorotoluene	94		-		70-130	-		
n-Propylbenzene	94		-		70-130	-		
p-Chlorotoluene	94		-		70-130	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG813182-3								
4-Ethyltoluene	94		-		70-130	-		
1,3,5-Trimethylbenzene	98		-		70-130	-		
tert-Butylbenzene	94		-		70-130	-		
1,2,4-Trimethylbenzene	102		-		70-130	-		
Decane (C10)	94		-		70-130	-		
Benzyl chloride	101		-		70-130	-		
1,3-Dichlorobenzene	102		-		70-130	-		
1,4-Dichlorobenzene	102		-		70-130	-		
sec-Butylbenzene	96		-		70-130	-		
p-Isopropyltoluene	90		-		70-130	-		
1,2-Dichlorobenzene	102		-		70-130	-		
n-Butylbenzene	99		-		70-130	-		
1,2-Dibromo-3-chloropropane	94		-		70-130	-		
Undecane	104		-		70-130	-		
Dodecane (C12)	127		-		70-130	-		
1,2,4-Trichlorobenzene	119		-		70-130	-		
Naphthalene	114		-		70-130	-		
1,2,3-Trichlorobenzene	112		-		70-130	-		
Hexachlorobutadiene	112		-		70-130	-		

Lab Duplicate Analysis
Batch Quality Control

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG813182-5 QC Sample: L1519577-01 Client ID: DUP Sample						
Dichlorodifluoromethane	3.28	2.89	ppbV	13		25
Chloromethane	ND	ND	ppbV	NC		25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	ND	ppbV	NC		25
Vinyl chloride	ND	ND	ppbV	NC		25
1,3-Butadiene	ND	ND	ppbV	NC		25
Bromomethane	ND	ND	ppbV	NC		25
Chloroethane	ND	ND	ppbV	NC		25
Ethyl Alcohol	ND	ND	ppbV	NC		25
Vinyl bromide	ND	ND	ppbV	NC		25
Acetone	13.6	12.8	ppbV	6		25
Trichlorofluoromethane	36.8	36.8	ppbV	0		25
iso-Propyl Alcohol	4.67	4.73	ppbV	1		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
tert-Butyl Alcohol	12.5	12.0	ppbV	4		25
Methylene chloride	1.65	1.54	ppbV	7		25
3-Chloropropene	ND	ND	ppbV	NC		25
Carbon disulfide	1.36	1.31	ppbV	4		25
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	ND	ppbV	NC		25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC		25

Lab Duplicate Analysis
Batch Quality Control

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG813182-5 QC Sample: L1519577-01 Client ID: DUP Sample					
1,1-Dichloroethane	ND	ND	ppbV	NC	25
Methyl tert butyl ether	ND	ND	ppbV	NC	25
2-Butanone	ND	ND	ppbV	NC	25
cis-1,2-Dichloroethene	ND	ND	ppbV	NC	25
Ethyl Acetate	ND	ND	ppbV	NC	25
Chloroform	1.48	1.46	ppbV	1	25
Tetrahydrofuran	1.74	1.84	ppbV	6	25
1,2-Dichloroethane	ND	ND	ppbV	NC	25
n-Hexane	0.676	0.629	ppbV	7	25
1,1,1-Trichloroethane	1.36	1.45	ppbV	6	25
Benzene	ND	ND	ppbV	NC	25
Carbon tetrachloride	ND	ND	ppbV	NC	25
Cyclohexane	0.679	0.693	ppbV	2	25
1,2-Dichloropropane	ND	ND	ppbV	NC	25
Bromodichloromethane	ND	ND	ppbV	NC	25
1,4-Dioxane	ND	ND	ppbV	NC	25
Trichloroethene	ND	ND	ppbV	NC	25
2,2,4-Trimethylpentane	1.34	1.36	ppbV	1	25
Heptane	0.614	ND	ppbV	NC	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG813182-5 QC Sample: L1519577-01 Client ID: DUP Sample					
cis-1,3-Dichloropropene	ND	ND	ppbV	NC	25
4-Methyl-2-pentanone	ND	ND	ppbV	NC	25
trans-1,3-Dichloropropene	ND	ND	ppbV	NC	25
1,1,2-Trichloroethane	ND	ND	ppbV	NC	25
Toluene	5.07	5.04	ppbV	1	25
2-Hexanone	ND	ND	ppbV	NC	25
Dibromochloromethane	ND	ND	ppbV	NC	25
1,2-Dibromoethane	ND	ND	ppbV	NC	25
Tetrachloroethene	3.54	3.58	ppbV	1	25
Chlorobenzene	ND	ND	ppbV	NC	25
Ethylbenzene	0.727	0.727	ppbV	0	25
p/m-Xylene	3.13	3.12	ppbV	0	25
Bromoform	ND	ND	ppbV	NC	25
Styrene	ND	ND	ppbV	NC	25
1,1,2,2-Tetrachloroethane	ND	ND	ppbV	NC	25
o-Xylene	1.16	1.16	ppbV	0	25
4-Ethyltoluene	ND	ND	ppbV	NC	25
1,3,5-Trimethylbenzene	ND	ND	ppbV	NC	25
1,2,4-Trimethylbenzene	0.648	0.612	ppbV	6	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG813182-5 QC Sample: L1519577-01 Client ID: DUP Sample					
Benzyl chloride	ND	ND	ppbV	NC	25
1,3-Dichlorobenzene	ND	ND	ppbV	NC	25
1,4-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2-Dichlorobenzene	ND	ND	ppbV	NC	25
1,2,4-Trichlorobenzene	ND	ND	ppbV	NC	25
Hexachlorobutadiene	ND	ND	ppbV	NC	25

Project Name: MARCUS GARVEY

Project Number: 2158.0002Y

Lab Number: L1519671

Report Date: 08/20/15

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1519671-01	BLOWER B-GRAB-EFF	862	1.0L Can	08/11/15	207738	L1514476-02	Pass	-29.2	-6.3	-	-	-	-
L1519671-02	BLOWER A-GRAB-EFF	829	1.0L Can	08/11/15	207738	L1514476-02	Pass	-29.6	-1.2	-	-	-	-

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 06/25/15 17:47
Analyst: RY

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethyl Alcohol	ND	2.50	--	ND	4.71	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Isopropyl Ether	ND	0.200	--	ND	0.836	--		1
Ethyl-Tert-Butyl-Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Tertiary-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1

Project Name: **Lab Number:** L1514476

Project Number: CANISTER QC BAT **Report Date:** 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02 Date Collected: 06/24/15 18:00

Client ID: CAN 2144 SHELF 16 Date Received: 06/25/15

Sample Location: Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl Acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane (C9)	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
o-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
p-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane (C10)	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane (C12)	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

	Results	**Qualifier**	**Units**	**RDL**	**Dilution Factor**
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	88		60-140
Bromochloromethane	90		60-140
chlorobenzene-d5	89		60-140

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 06/25/15 17:47
Analyst: RY

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.020	--	ND	0.053	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.050	--	ND	0.383	--		1
Halothane	ND	0.050	--	ND	0.404	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.020	--	ND	0.092	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1

Project Name:

Lab Number: L1514476

Project Number: CANISTER QC BAT

Report Date: 08/20/15

Air Canister Certification Results

Lab ID: L1514476-02
Client ID: CAN 2144 SHELF 16
Sample Location:

Date Collected: 06/24/15 18:00
Date Received: 06/25/15
Field Prep: Not Specified

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-difluorobenzene	91		60-140
bromochloromethane	93		60-140
chlorobenzene-d5	90		60-140

Project Name: MARCUS GARVEY
Project Number: 2158.0002Y

Lab Number: L1519671
Report Date: 08/20/15

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information **Custody Seal**
Cooler
N/A Present/Intact

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1519671-01A	Canister - 1 Liter	N/A	N/A		Y	Absent	TO15-LL(30)
L1519671-02A	Canister - 1 Liter	N/A	N/A		Y	Absent	TO15-LL(30)

*Values in parentheses indicate holding time in days

Project Name:	MARCUS GARVEY	**Lab Number:**	L1519671
Project Number:	2158.0002Y	**Report Date:**	08/20/15

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

Report Format: Data Usability Report

Project Name:	MARCUS GARVEY	**Lab Number:**	L1519671
Project Number:	2158.0002Y	**Report Date:**	08/20/15

Data Qualifiers

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	MARCUS GARVEY	**Lab Number:**	L1519671
Project Number:	2158.0002Y	**Report Date:**	08/20/15

REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

Last revised December 16, 2014

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility
EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 625: 4-Chloroaniline, 4-Methylphenol.
SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.
EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility
EPA 8270D: Biphenyl.
EPA 2540D: TSS
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water
EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

Non-Potable Water
EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

AIR ANALYSIS

PAGE 1 OF 1

CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 8/15/15

ALPHA Job #: L1519671

Client Information

Client: ROUX ASSOCIATES
Address: 209 SHAFTER ST
ISLANDIA NY 11749
Phone: (631) 232-2600
Fax: (631) 232-9898
Email: wkwan@rouxinc.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: MARCUS GARVEY
Project Location: BROOKLYN NY
Project #: 2158.0002Y
Project Manager: WAI KWAN
ALPHA Quote #: A2015053

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☒ EMAIL (standard pdf report)
☒ Additional Deliverables: ROUX EDD, NYSDEC
Report to: (if different than Project Manager)

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed	Program	Criteria

Other Project Specific Requirements/Comments:

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES	TO-13A	TO-4 / TO-10	Sample Comments (i.e. PID)
19671-01	BLOWER B-GRAB-EFF	8/13/15	1522	1522	-29.2	-2	SV	WK	1-L	862	NA		X						
-02	BLOWER A-GRAB-EFF	8/13/15	1529	1529	-29.6	-1	SV	WK	1-L	829	NA		X						

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:
	1125 @ 8/14		8/14/15 1600
	8/14/15 1910		8-14-15 1910
	8-15-15 0210		8/15/15 02:100

Gasho
SINCE 1982
The Leader in Blower & Vacuum Solutions

L&M Builders Group LLC
1865 Palmer Avenue, Suite 203
Larchmont, NY 10538

Purchase Order # 802864-28

Gasho Custom Package Utilizing AMETEK Model EN858BA72WLL, Moisture Separator, Enclosure & Control Panel

JG15C-2966

June 19, 2015

AMETEK

Rotron® Industrial Products

Field Service Tool – FST11

Field start up/ review check list.

Rotron blowers are known for their reliability, durability and long life. Below are some general items to check prior to starting up the blower. Additional details can be found in the O&M manuals as well as the installation guidelines sheet that is included in the blower shipment. If additional information is needed, please contact the factory.

Overview:

1) Initial impressions
2) Blower information
3) Filter information
4) Relief valve information
5) Gage information
6) Noise enclosure information
7) Moisture Separator information
8) Remote drive belt tension information

1. **Initial impressions**:
   - Is the area around the blower clear of obstructions
   - Is the piping supported to minimize the stress on the blower flanges
   - Are any hazards labeled
   - Is the area(s) secure
   - Are the relevant persons present for this review and instruction time.
   - Does the appropriate persons have the correct O&M manuals, catalog cut sheets etc for the blower and any accessories

2. **Blower review**

- Is the blower bolted securely to a foundation/ skid/ structure
- Is the blower wired properly (for XP motors are the PDTO thermal leads used (labeled "J")).
- If this is a remote drive, are the belts tightened correctly (see section on belts)
- Is the blower turning in the correct rotation (ie. Jog the motor to check). (note rotation arrows on the blower, as well as In and Out ports
- Is the filter installed correctly (see filter section next page)
- Is the relief valve present, and set (as it's not factory set)
- Are the gages installed correctly (see system sketch, as well as relief valve section)
- Is there a noise enclosure present (see noise enclosure section).

Field start up check list.

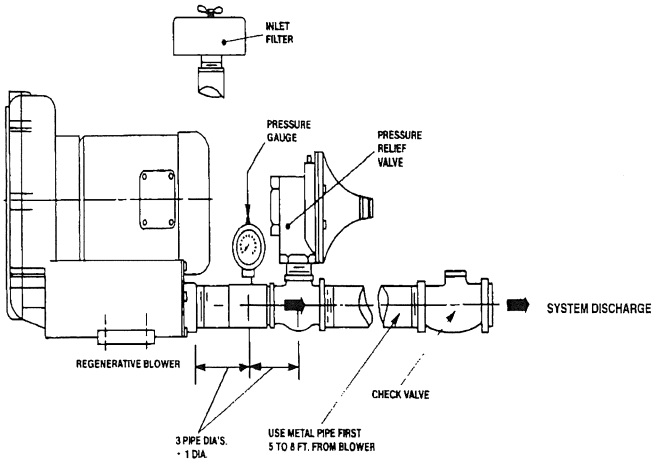
3. **Filter**

- Is the filter supported
- Is the element present inside the filter body.
- For inline filters, the lid is removed via three latches, for single connection filters, the wing nut holds the weather hood on.
- The element is washable in lukewarm water, and air dried. This can be done 2 to 3 times.
- If the differential over the initial vacuum reading increases by 10 IWG, then the filter needs to be cleaned or changed.
- For spare elements, see Ametek Rotron catalog.

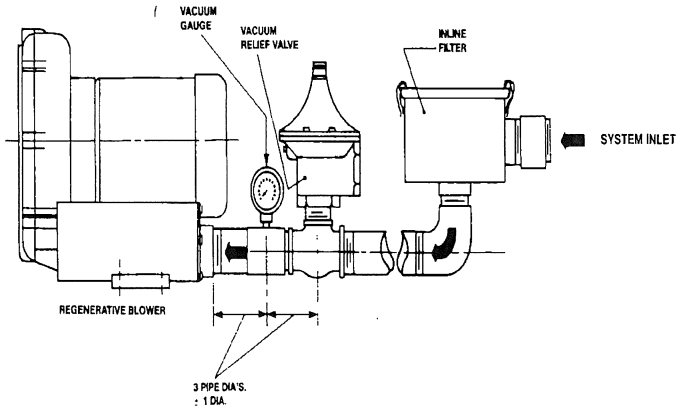
4. **Relief Valve**

- Is the valve supported by hard piping.
- Is the vent port open, and not blocked.
- Is valve connected correctly? See sketches at bottom of this page.
- Note: Vacuum gage will NOT work attached to the relief valve.
-

Typical Pressure System



Typical Vacuum System



Field start up check list.

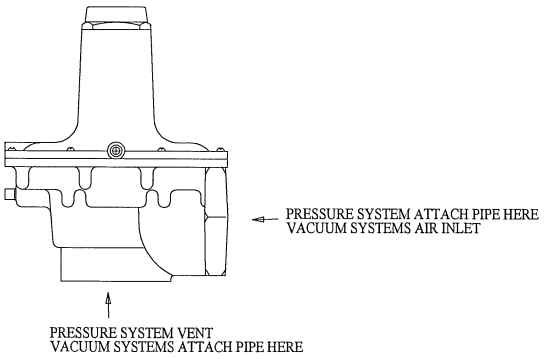
4. Relief valve (con't)

- Setting instructions for 1" and 2" relief valves

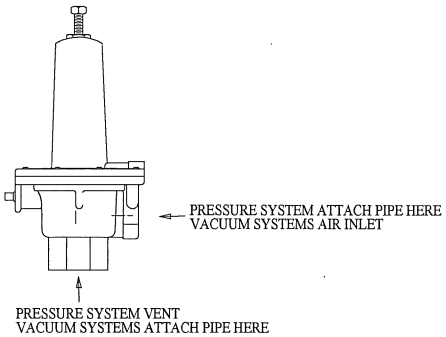
Procedure

1. For use as a vacuum relief valve, remove and discard the internal snap ring and screen guard on the valve's outlet. Mount valve and gauge as shown on the diagram.
2. Loosen locknut and turn adjustment bolt counterclockwise, obtaining a low pressure/vacuum relief valve cracking point. For 2" valves, an access cover must be removed and replaced after setting.
3. Fully impede air stream to/from the application, energize blower, and observe system pressure/vacuum.
4. Adjust relief valve, turning bolt clockwise (1" valve), obtaining a system pressure/vacuum about 10% below published maximum pressure/vacuum capability. For 2" valve, the slotted washer is used to set the valve, not the small center bolt.
5. Tighten locknut and retest for appropriate setting, repeatedly allowing air to flow through delivery line and then impeding it. Re-adjust as necessary.

2" valve



1" valve

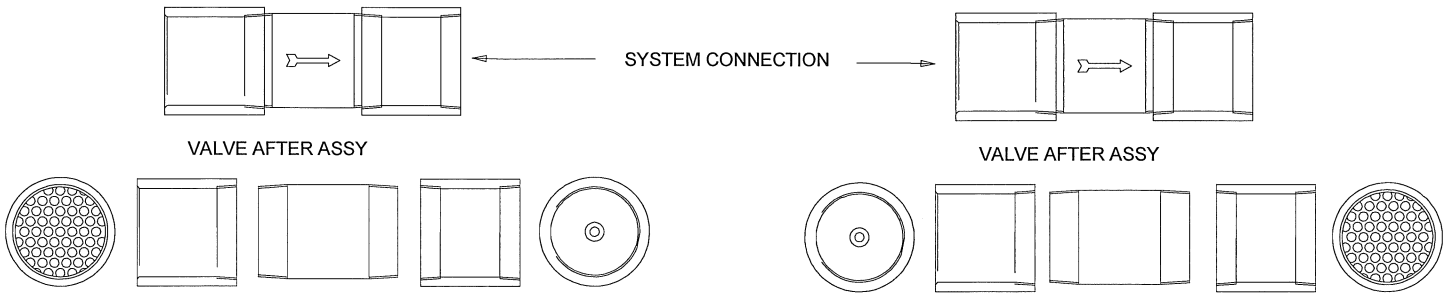


4. Relief valve (con't)

- Setting instructions for 551026 and 551027

Procedure

1. Both the above valves are initially set for VACUUM SERIVCE.
2. Note picture below on left is how valve arrives, simply flip endpieces to change from suction to a pressure valve.
3. Turn adjustment bolt counterclockwise, obtaining a low pressure/vacuum relief valve cracking point.
3. Fully impede air stream to/from the application, energize blower, and observe system pressure/vacuum.
4. Adjust nut, tightening nut increases vacuum/ pressure cracking point.

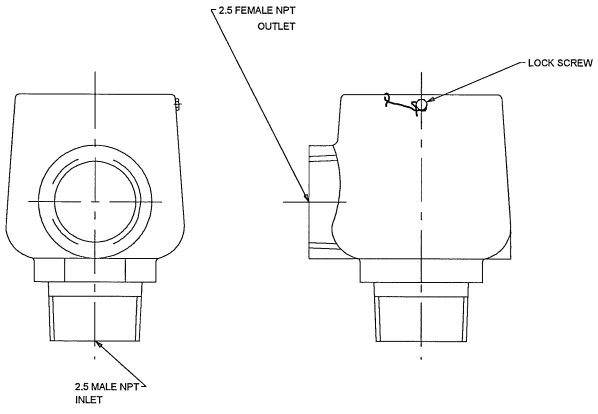


4. Relief valve (con't)

- Setting instructions for 550246 and 550247

Procedure

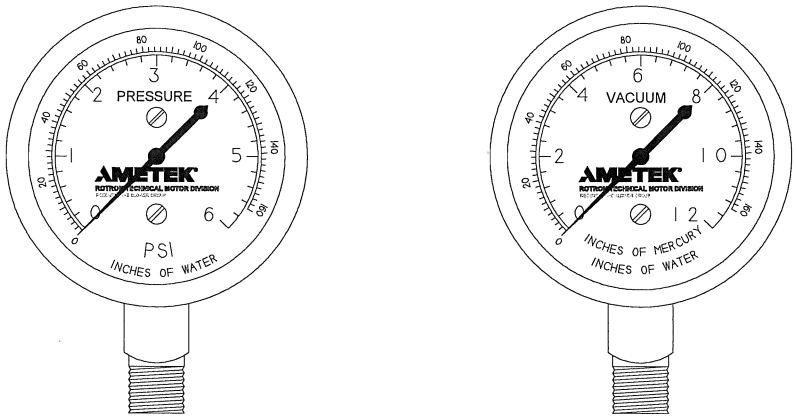
1. Mount the valve and gauge as shown in the system diagram.
2. Cut the wire to locknut and loosen.
3. Turn the top of the valve counterclockwise , obtaining a low pressure/vacuum relief valve cracking point.
4. Fully impede air stream to/from the application. Energize blower and observe system pressure/vacuum.
5. Adjust relief valve by turning the top of the valve clockwise to obtain a pressure/vacuum about 10% below published maximum pressure/vacuum.
6. Tighten locknut and retest for appropriate setting, repeatedly allowing air to flow through delivery line and then impeding air stream until relief valve cracks. Readjust as necessary.



550247	VAC.	8" HG
550246	PRESS.	4 PSIG
ROTRON PART NO.	MODE	SET PRESS./VAC.

5 Gages

- Gages are used to measure vacuum, pressure and temperature. They are very useful in troubleshooting the blower should that be necessary, and are essential for setting the relief valve.
- Note a vacuum gage can not be used on the relief valve in the vacuum mode as it will read atmospheric vacuum, and not system vacuum.
- Gages that Ametek supplies can be attached to piping systems by drilling a ¼" female connection in the pipe. This hole should be drilled prior to the piping being connected, and cleaned out prior to installation to prevent shavings from being ingested into the blower.



TYPE: 2 1/2" DIAL SIZE- DIAPHRAGM OPERATED.
CONNECTION-1/4" NPT MALE BOTTOM CONNECTION

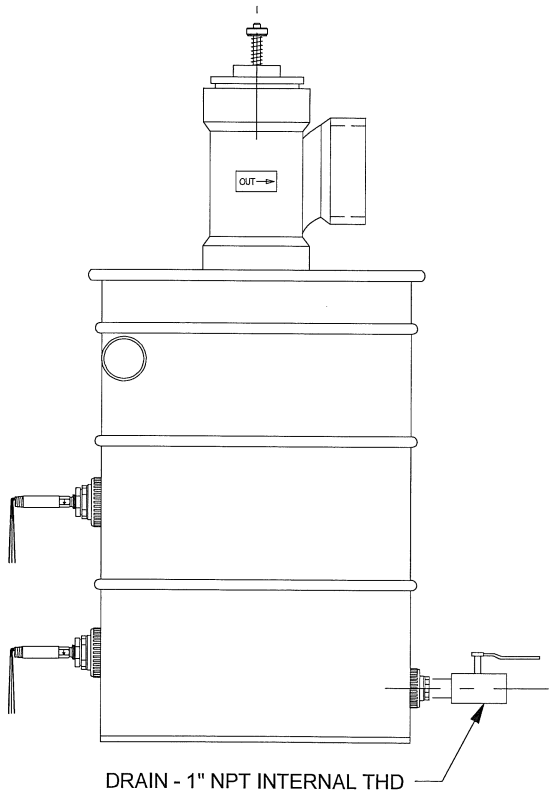
6 Noise Enclosure

- Noise enclosure is used to reduce the blower noise to 80 dba @ 1 meter (or less)
- Enclosure should be bolted down.
- Note: Customer must cut enclosure for the connections (inlet or outlet).
- In addition, the customer must wire the cooling fan, as Ametek supplies forced air ventilated enclosures.
- Sides are removable, but may require system piping to be disconnected to do so.
- See catalog cut sheets or customer drawing for further information.

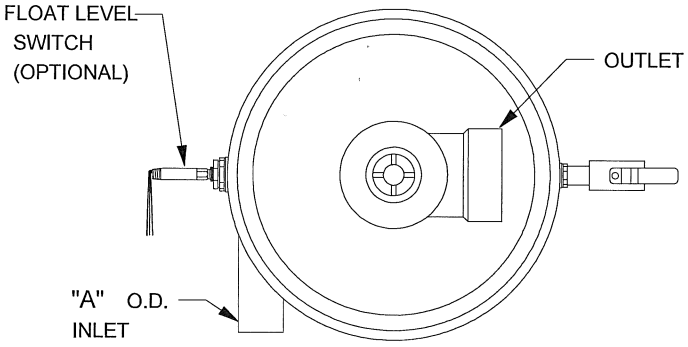
7 Moisture Separator

- Is the MS unit bolted securely to a foundation/ skid/ structure
- Has the float ball been cut loose, and lowered to the bottom of the screen. It has 2 to 3 cable ties that need to be removed and properly discarded.
- Connections to the MS unit should be done with a flexible coupling like a Fernco brand.
- The relief valve on top is NOT factory preset, and should be set.
- If the unit has float switches, these should be wired according to the diagram on the float switch itself.
- If there are additional questions about parts, please see the catalog cut sheet or the O&M manual.

SIDE VIEW



TOP VIEW



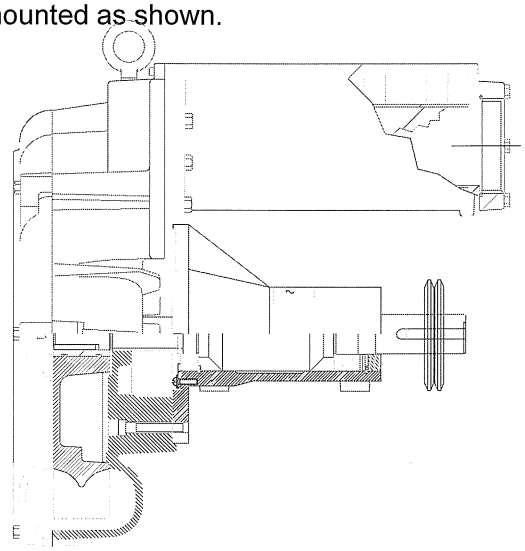
AMETEK

Rotron® Industrial Products

Field Service Tool – FST11

Remote Drive Blower Belt Tensioning Guidelines

Proper belt tensioning can increase the life expectancy and reduce the maintenance requirements of Rotron Remote Drive Regenerative blowers. Primary factors which influence bearing life include sheave location, shaft alignment, shaft speed and belt tension. Rotron recommends installing the belt sheave mid way on the shaft keyhole as shown below. Below are factory recommended maximum belt tensions for properly aligned blowers designed to operate with bearing L10 life of 25,000 hours with the blower sheave mounted as shown.



Procedure:

1) Find correct table for Remote Drive Blower Model
2) Choose the highest RPM the blower will be operating at.
3) Reference table for maximum recommended belt tension loads (lbs).

Example: An EN909RDL operating at 4500 RPM with the sheave mounted mid-way between the shaft end and keyway end should have a belt tension no greater than 450 lbs. for an estimated bearing life of 25,000 hrs.

DR/CP/EN404-DR/CP/EN606 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs) L10 Life (HRS)	
1500 RPM	471
2500 RPM	397
3500 RPM	355
4500 RPM	327
5500 RPM	306

DR/CP/EN523 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	499
2500 RPM	421
3500 RPM	376
4500 RPM	346
5500 RPM	323

DR/CP/EN6 - DR/CP/EN707 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	530
2500 RPM	447
3500 RPM	400
4500 RPM	367
5500 RPM	344

DR/EN/CP858 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	652
2500 RPM	550
3500 RPM	492
4500 RPM	452
5500 RPM	423

DR909 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	1040
2500 RPM	877
3500 RPM	784
4500 RPM	721
5500 RPM	674

EN/CP909 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	649
2500 RPM	547
3500 RPM	489
4500 RPM	450
5500 RPM	421

DR/EN/CP14 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	1231
2500 RPM	1038
3500 RPM	928
4500 RPM	854
5500 RPM	798

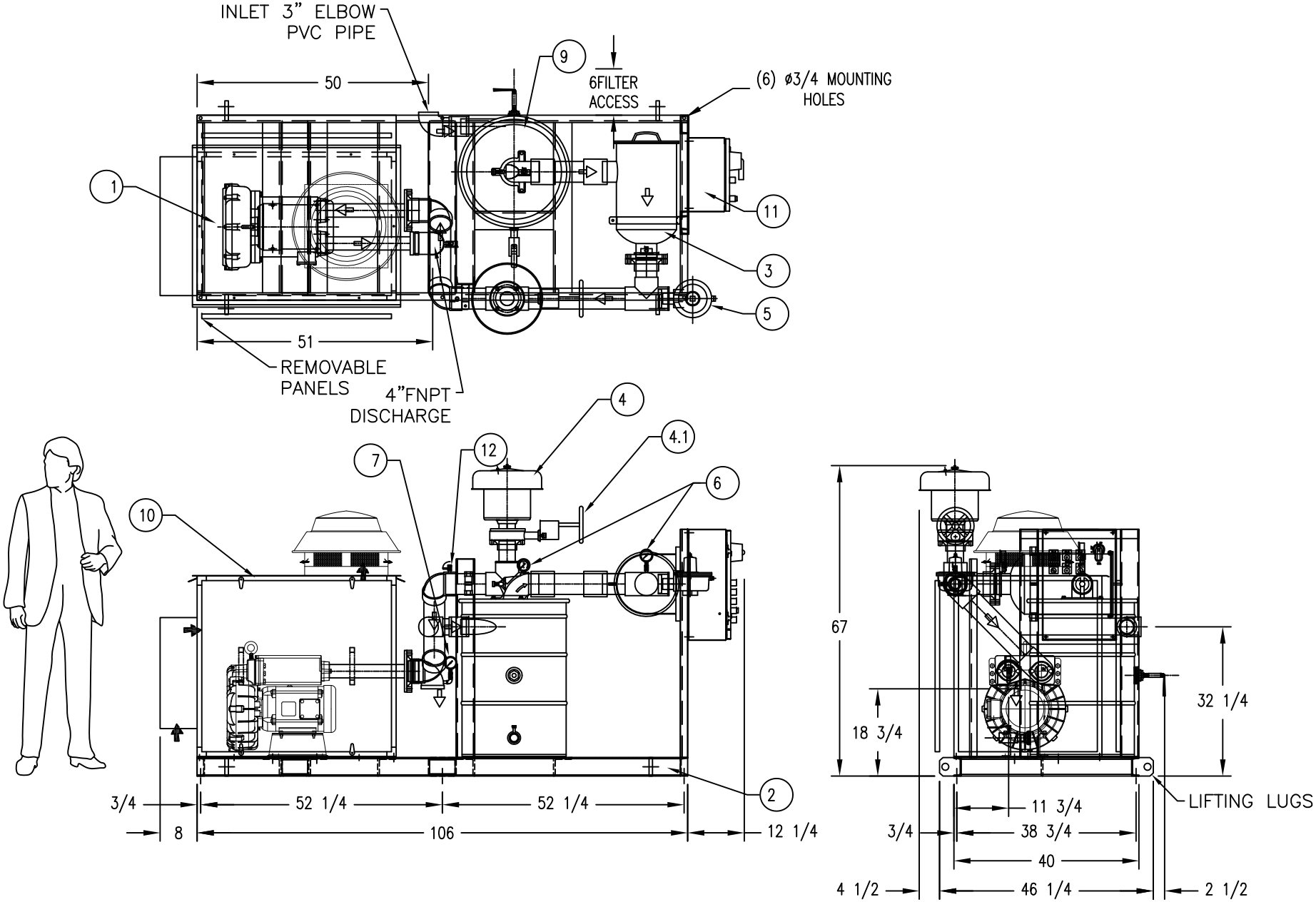
If blower sheave must be located at end of the blower shaft keyway, multiply table value of maximum recommended belt tension X ***1.13.***

If blower sheave must be located at end of the blower shaft, multiply table value of maximum recommended belt tension X ***0.86.***

Gasho, Inc.
Blower Package
JG15C-2966

Description	Date	Revision

Item	Qty.	Supplier	Description	Part Number	Misc ID	Weight
1	1	Ametek Rotron	Regenerative Blower	EN858BA72WL	P/N 080070	326
2	1	Gasho	Base Weldment	9494		250
3	1	Solberg Mfg.	4" Inline filter	CSL-235P-400		52
4	1	Westwood	3" Dilution Valve	EMSP-03	GA-0472	15
4.01	1	Mueller	3" Butterfly Valve	87INB65-3"		20
5	1	Fisher	2" Relief Valve	289H-3	set @ 75" H2O	7
6	2	Gasho	Vacuum Gauges	25.0.12.HG.160.IWC		1
7	1	Gasho	Pressure Gauge	25.1.006.PSI.160.IWC		1
8	3	SMC Specialties	Isolation Valves	VA BRS 025-4F4M-BT		1
9	1	Ametek Rotron	Moisture Separator MS350BS	p/n 038357		82
10	1	Artusa	Sound Enclosure, Outdoor	43 x 32 x 39	1" walls	250
11	1	ICP	Nema 4 208 volt			30
12	1	Gasho	Sample port			1
					Weight	1036



NOTES:
1. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
2. TOLERANCE ± 1/2"

REV.	DATE	DESCRIPTION
B	6/17 2015	AS BUILT
A	5/4 2015	CHANGED FAN DESIGN

DRAWN BY: JJH | DATE: 4/6/15
APPROVED BY: | DATE:
DIMENSIONS IN INCHES
SCALE: NA
TOLERANCE: ±1/2" | ANGULAR TOLERANCE:
MATERIAL: | WEIGHT: 900
SHEET 1 OF 2

J.E.GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

EN858 REGEN BLOWER
7.5HP MOTOR, MOIST.
SEPARATOR, SE

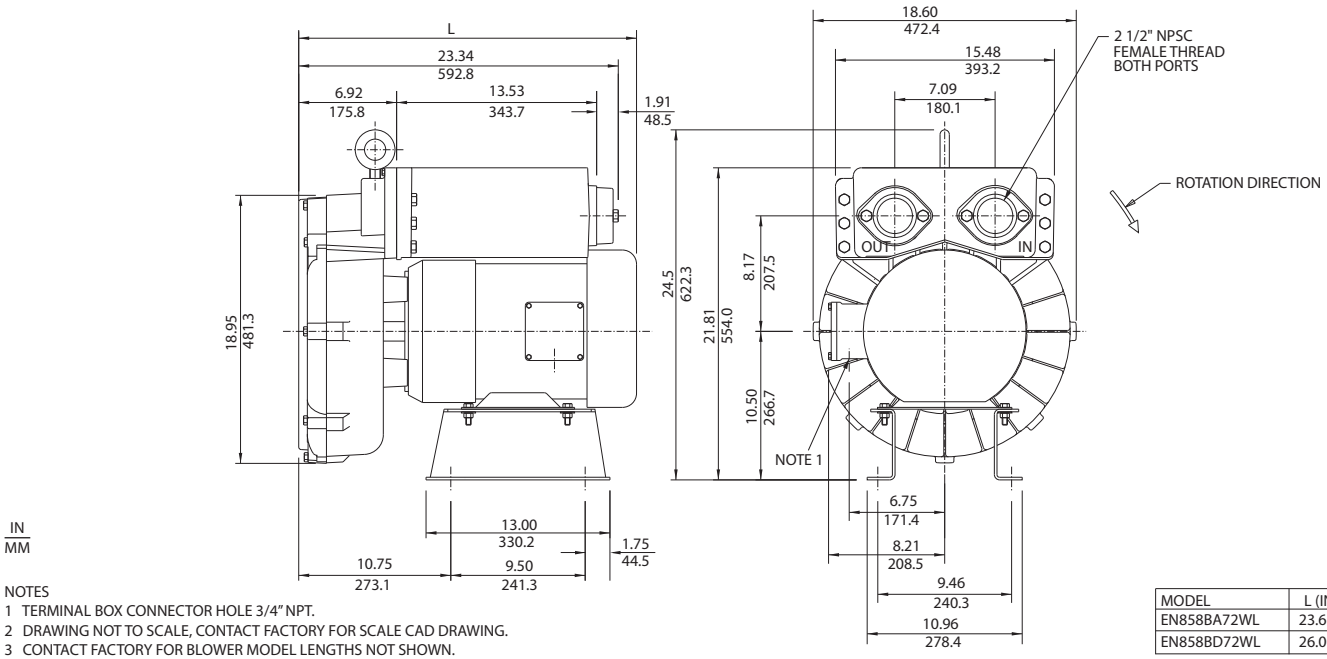
JG15-C-2966 | B

Environmental / Chemical Processing Blowers

EN 858 & CP 858

ROTRON®

7.5 / 10.0 HP Sealed Regenerative w/Explosion-Proof Motor



IN
MM

NOTES
1 TERMINAL BOX CONNECTOR HOLE 3/4" NPT.
2 DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3 CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

MODEL	L (IN/MM)
EN858BA72WL	23.65/600.7
EN858BD72WL	26.00/660.4

		Part/Model Number			
		EN858BD72WL	EN858BD86WL	EN858BA72WL	CP858FZ72WLR
Specification	Units	038744	038745	080070	038980
Motor Enclosure - Shaft Mtl.	-	Explosion-proof-CS	Explosion-proof-CS	Explosion-proof-CS	Chem XP-SS
Horsepower	-	10.0	10.0	7.5	10.0
Phase - Frequency	-	Three-60 hz	Three-60 hz	Three-60 hz	Three-60 hz
Voltage	AC	230/460	575	230/460	230/460
Motor Nameplate Amps	Amps (A)	24/12	9.6	18.6/9.3	24/12
Max. Blower Amps	Amps (A)	30/15	11.6	26/13	30/15
Inrush Amps	Amps (A)	234/117	93	126/63	234/117
Service Factor	-	1.0	1.0	1.0	1.0
Starter Size	-	2/1	1	1/1	2/1
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G
Shipping Weight	Lbs	338	338	326	338
	Kg	153.3	153.3	147.9	153.3

Voltage - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

Operating Temperatures - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

Maximum Blower Amps - Corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

XP Motor Class - Group - See Explosive Atmosphere Classification Chart in Section I

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.

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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

Environmental / Chemical Processing Blowers

EN 858 & CP 858

ROTRON®

7.5 / 10.0 HP Sealed Regenerative w/Explosion-Proof Motor

FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 380 SCFM
- Maximum pressure: 120 IWG
- Maximum vacuum: 95 IWG
- Standard motor: 10 HP, explosion-proof
- Cast aluminum blower housing, impeller , cover & manifold; cast iron flanges (threaded); teflon® lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS

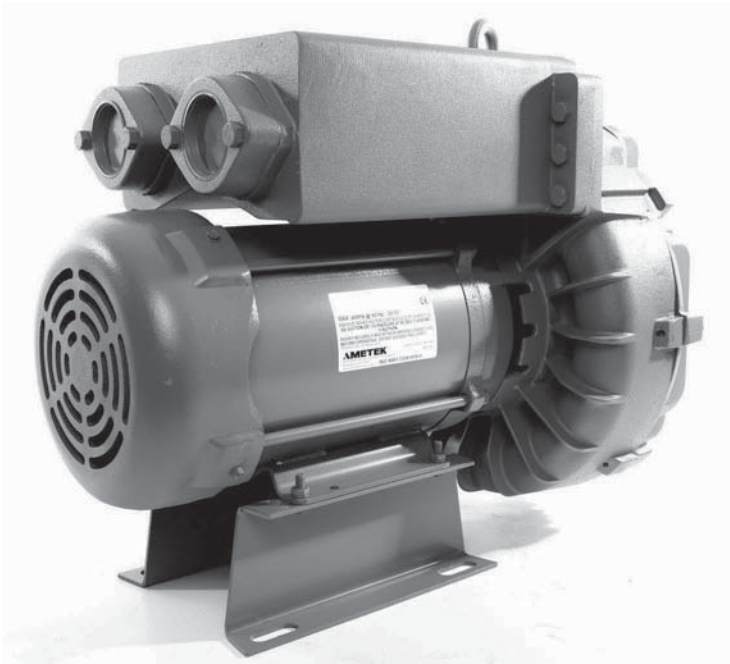
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS

- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

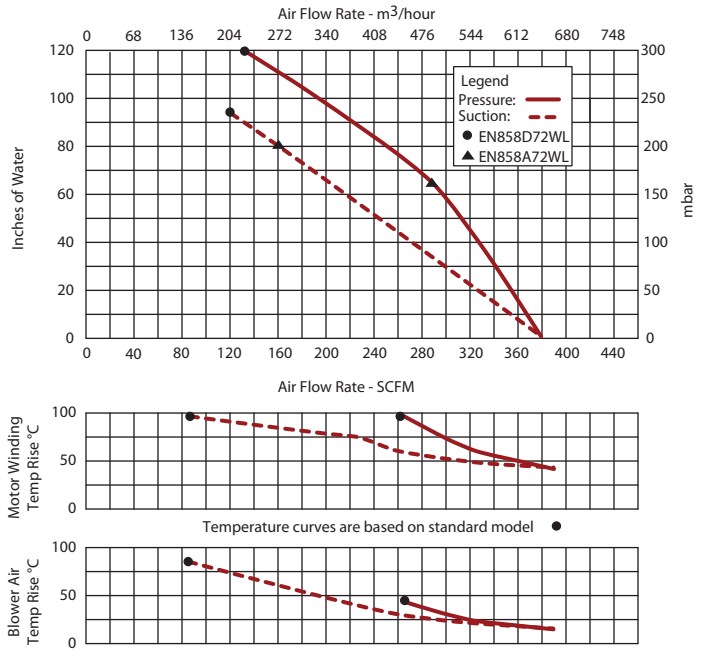
ACCESSORIES

- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

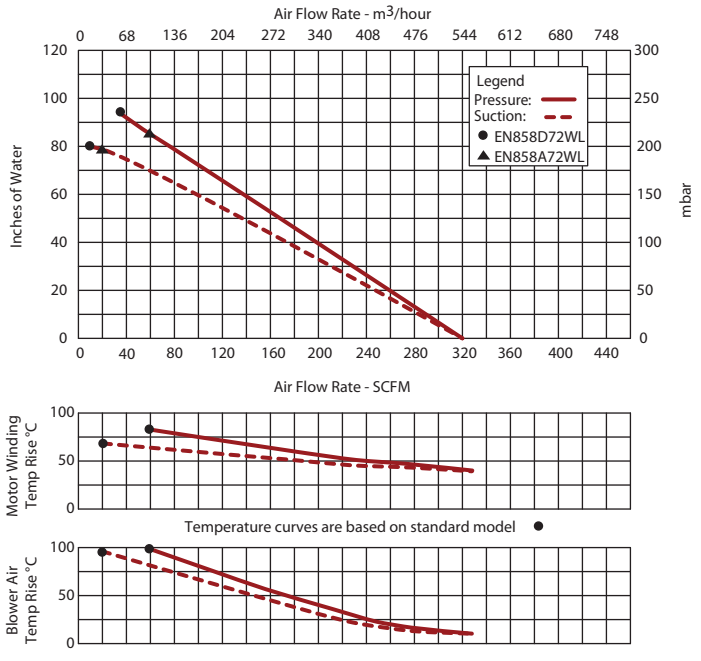


Blower Performance at Standard Conditions

60 Hz



50 Hz



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AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL
FOR
BLOWER MODEL

EN6, EN858, EN909, EN979, EN14

DIRECT DRIVE REGENERATIVE BLOWER

Technical & Industrial Products
627 Lake Street, Kent, Ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
internet: www.ametektip.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

TECHNICAL AND INDUSTRIAL PRODUCTS
627 Lake Street, Kent, Ohio 44240 USA
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com web site: www.ametektip.com

1. AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment) to the original purchaser only. Should the blower fail we will evaluate the failure If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

2. AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of-warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200ºF. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

*** 3 phase units**

**** 1 phase units**

***** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.**

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	**Torque** **Pound-Force-Foot**
1/4-20	**6.25 +/- 0.25**
5/16-18	**11.5 +/- 0.25**
3/8-16	**20.0 +/- 0.5**
½-13	**49.0 +/- 1**
5/8 –11	**90.0 +/- 2**

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

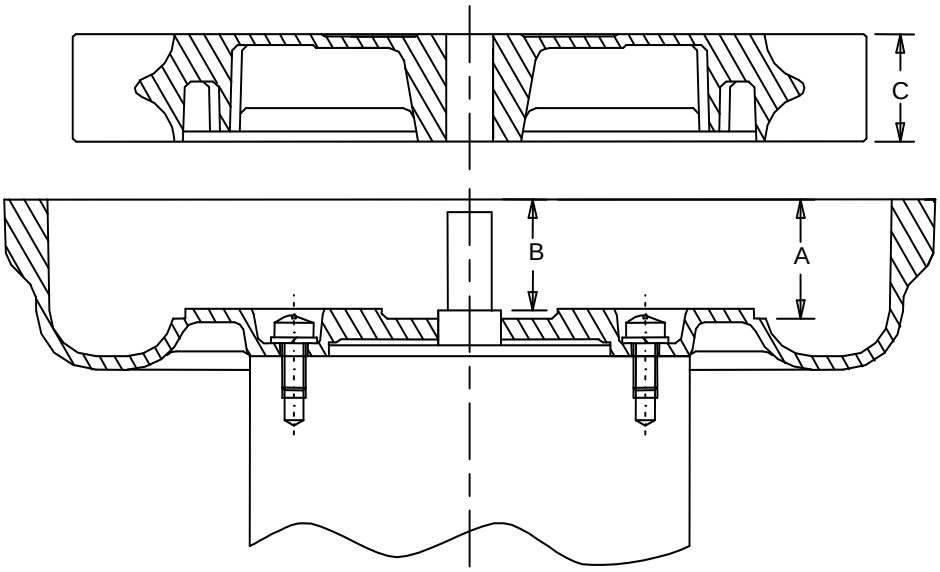
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

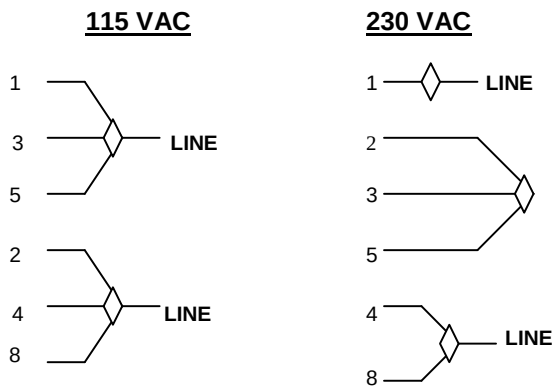
Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A-C)/2.



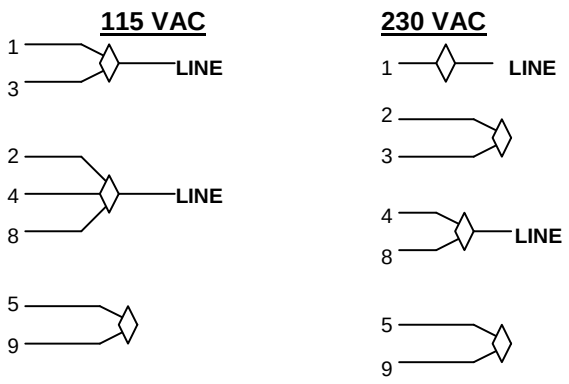
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



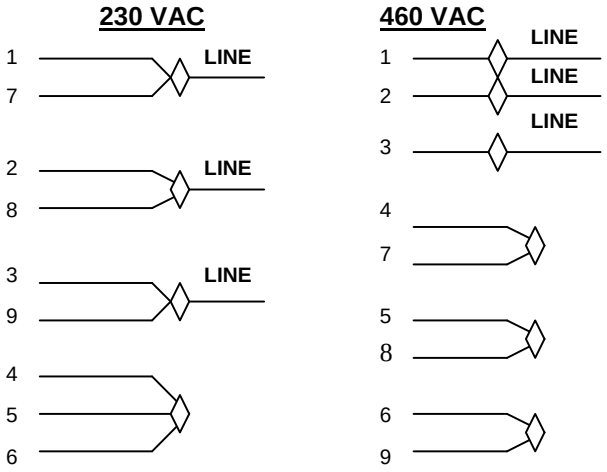
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



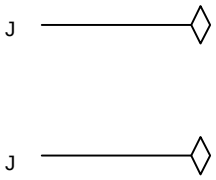
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

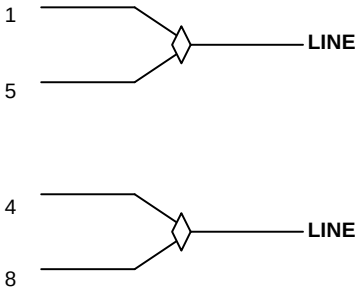
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

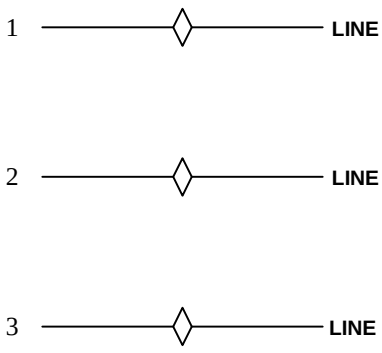
M. 1Ø 230 VAC

SINGLE VOLTAGE



INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

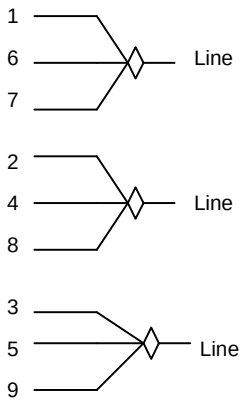
N. 3Ø 575 VAC



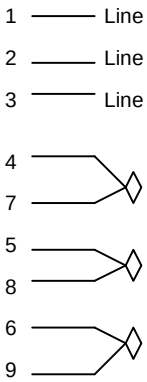
INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

P 3∅, 9 WIRE

230 VAC



460 VAC



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

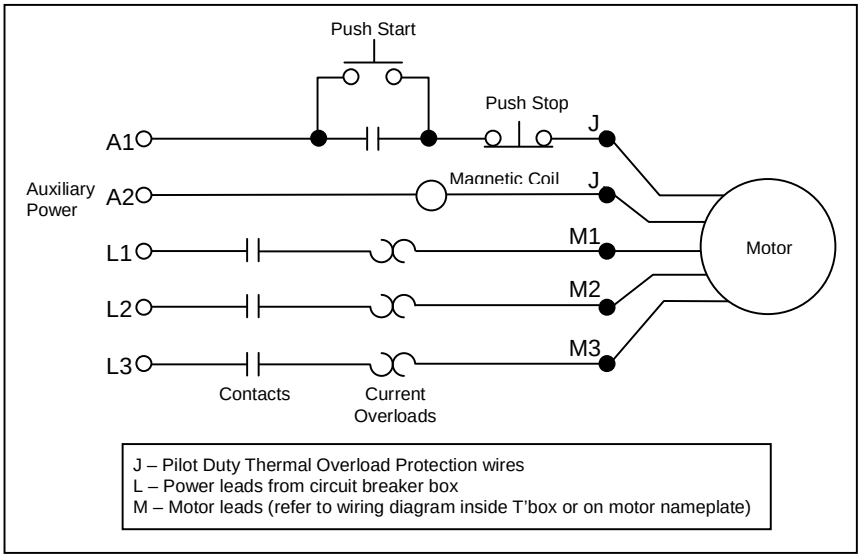
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

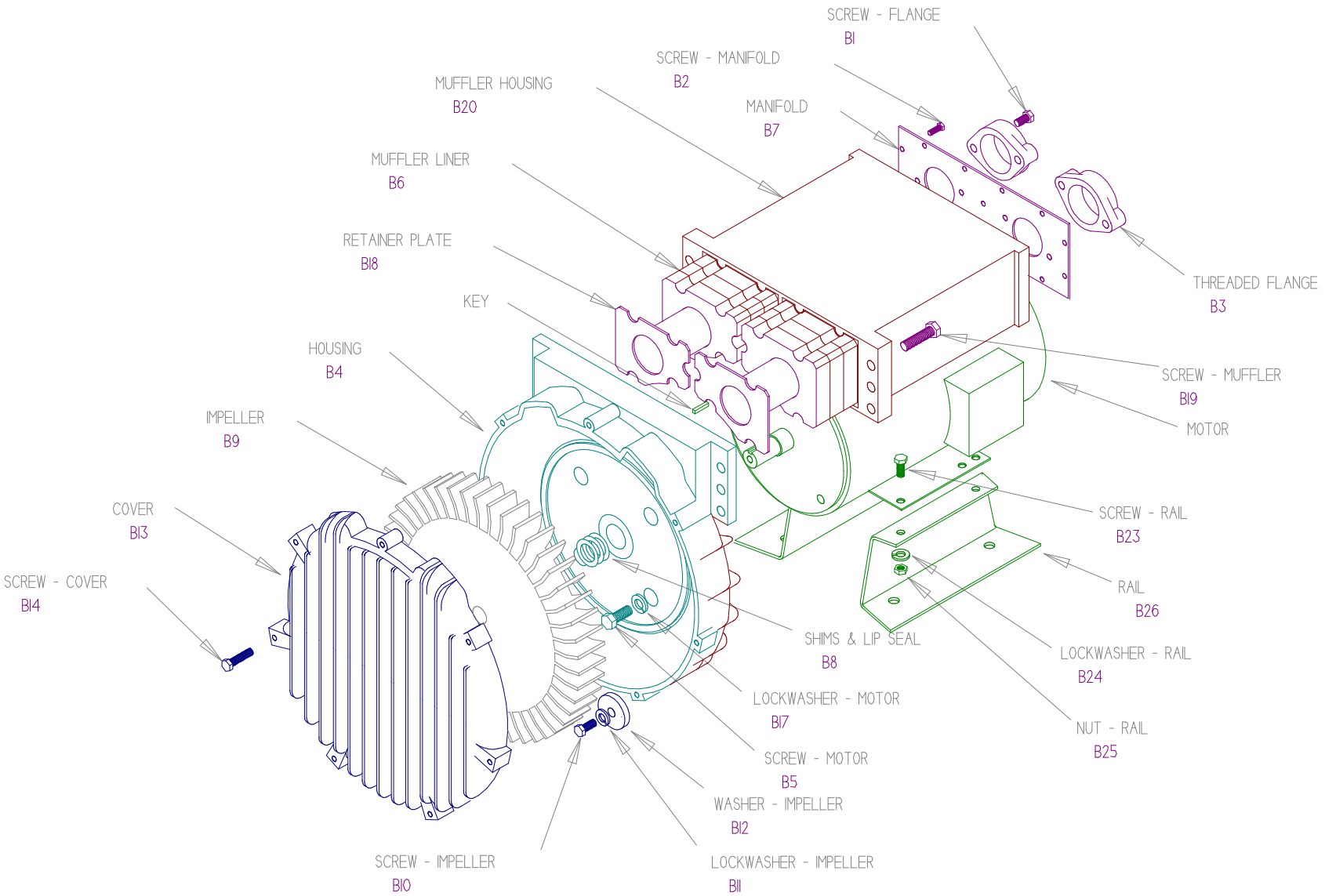
AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

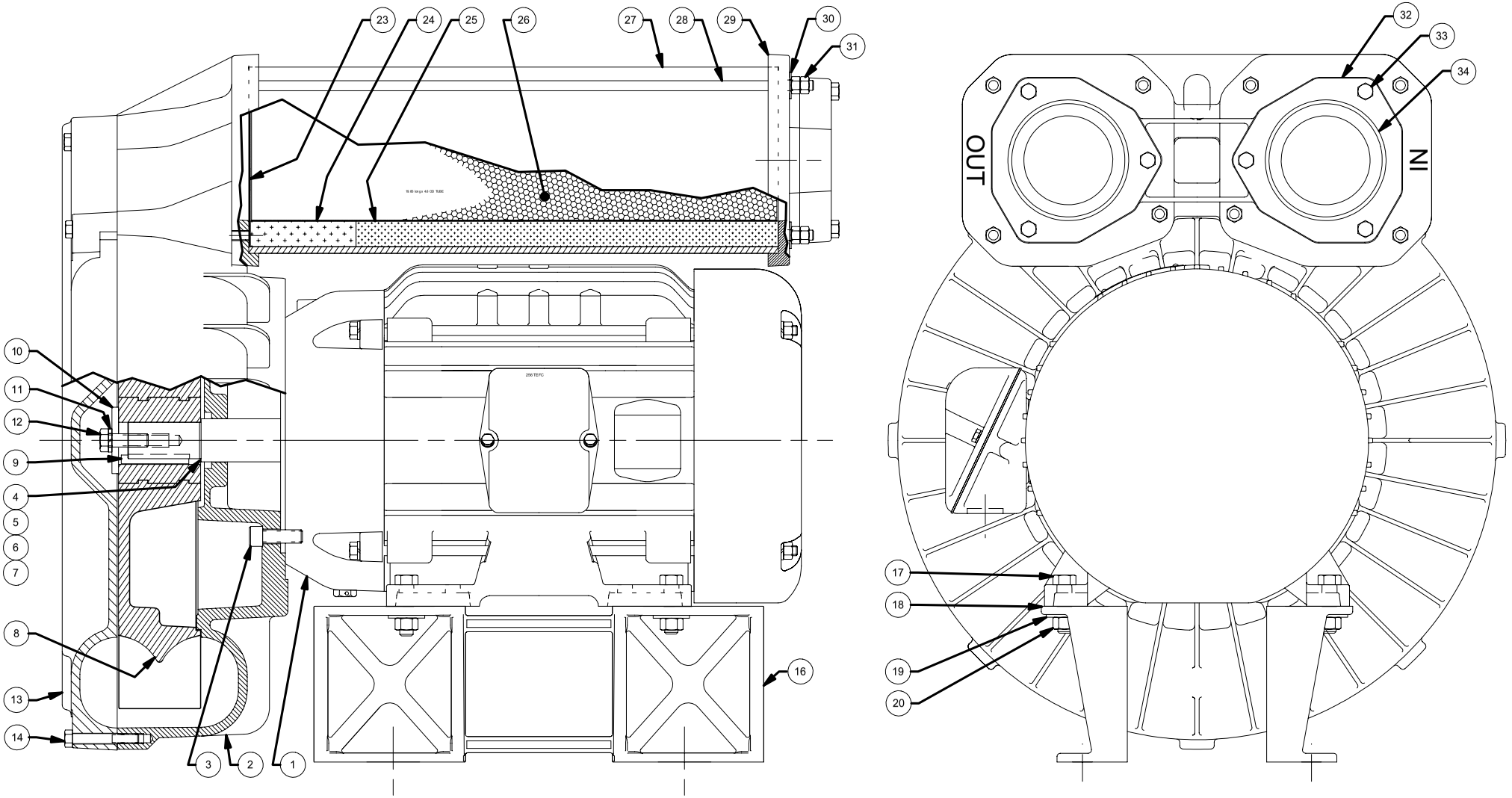
AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

FS2 Rev B 3/10/98

ASSEMBLY DIAGRAM
EN6 EN808 EN909 EN14



ASSEMBLY DIAGRAM "B"



EN 6/858/909/14

Service and Parts Manual

Parts Breakdown

Item No.	Qty. Req'd	Description	EN6	EN858	EN909	EN909	EN14	EN14	EN979
		Model:	**EN6**	**EN858**	**EN909**	**EN909**	**EN14**	**EN14**	**EN979**
		Part No.:	**038361**	**038744**	**038629**	**081741**	**038762**	**038760**	80724
			038180	**038745**	**038634**	**081736**	**038761**		
			038438	**080070**	**080071**	**081743**			
					OBSOLETE				
M3	1	Key Motor Shaft	510212	511532	511532	511532	155066	511532	551570
B1	6	Screw, Flange	(4 pcs) 120065	(4 pcs) 155067	140016	140016	140016	140016	140016
B2		Screw, Manifold	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B3	2	Flange	See Next Page	511614	529912	529912	529912	529912	529912
	2	O-ring	Not Used	Not Used	155377	155377	155377	155377	155377
		Elbow 90º	See Next Page	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B4	1	Housing	516747	516764	515356	552409	516799	516797	551560
B5	4	Screw, Hsg /Motor	251792	155034	140014	see below	120205	120205	120205
B6	7	Muffler Material (Gray)	Not Used	551736	(10 pcs) 551738	(2 pcs) 552477	(12)551740	(12)551740	(8) 551571
	2	Muffler Material (White)	Not Used	551737	551739	552483	551741	551741	Not Used
	2	Finger Guard	Not Used	Not Used	551730	Not Used	551744	551744	Not Used
B8	*	Shim .002"	272703	511547	511547	511547	515991	511547	511547
	*	Shim .005"	272704	511548	511548	511548	515992	511548	511548
	*	Shim .010"	272705	511549	511549	511549	515993	511549	511549
	*	Shim .020"	272706	511550	511550	511550	515994	511550	511550
	*	Shim .030"	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B9	1	Impeller	515484	515249	552544	552431	515509	515683	551566
B10	1	Bolt, Impeller	251791	120210	140015	140015	155068	120251	140015
B11	1	Lockwasher, Impeller	251787	251788	251788	251788	251788	251788	251788
B12	1	Washer, Impeller	Not Used	511529	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	515488	515247	515359	515359	515910	515910	551409
B14	8	Screw, Cover	155170	140016	140016	140016	155069	155069	155512
B15	1	Eye Bolt	Not Used	140019	140019	Not Used	140019	140019	Not Used
B16	1	Spacer, Impeller Bolt	478336	515555	511529	511529	515990	515990	511529
		Shaft Sleeve	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B18	2	Screen, Muffler Retaining,	Not Used	551723	551725	552479	551727	551727	551611
B19	6	Bolt, Muffler Hsg/Hsg	Not Used	155025	155025	(4 pcs) 155025	155067	155067	155512
B19A	4	Bolt, Muffler/Housing	Not Used	120214	120214	120210	120214	120214	Not Used
B20	1	Muffler Housing	Not Used	550019	529932	552428	550039	550039	551422
	1	Muffler Discrete	522948	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B21		Heat Slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B22		Guard Heat slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B23	4	Bolt, Rail	251791	120007	140016	120205	120256	155025	120256
B24	4	Lockwasher Rail	251787	251787	251787	251787	251788	251788	Not Used
B24A	8	Washer, Rail/Motor	Not Used	Not Used	155091	see below	Not Used	Not Used	(4) 155091

*As needed **Viewed looking at inlet/outlet ports

B25	6	Nut, Rail	251789	251789	251789	(4 pcs) 251789	(4 pcs)155070	(4 pcs)155070	155070
B26	2	Rail Mounting	478338	595301	551584	see below	551658	551658	551658
	1	Lip Seal	516691	516693	516693	516693	516694	516693	516693

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Impeller End (M2)
EN6F5L	038361	529475	M + L	B3 Flange 511480 (2 pcs) Elbow 120153 (2 pcs)		
EN6F72L	038180	500297	K + L	B3 Flange 478341 (2 pcs) Elbow Not Used, Screen Guard, Flange 511479 (2 pcs)	510217	510218
EN6F86L	038438	529634	N + L	B3 Flange 478341 (2 pcs) , Elbow Not Used Screen Guard, Flange 511479 (2 pcs)		
EN858BD72WL	038744	515556	K + L			
EN858BD86WL	038745	529627	N + L		516840	516844
EN858BA72W	080070	515558	K + L			
EN909BG72WL	038629	511512	K + L			
EN909BG86WL	038634	529631	N + L		516842	516844
EN909BD72WL	080071	515556	K + L			
EN909BG72WL	081741	511512	K + L	B5 140016 B26 551584,B24A not used		
EN909BG86WL	081736	529631	N + L	B5 140016 B26 551584,B24A not used		
EN909BD72WL	081743	515556	K + L	B5 155092 B26 595301,B24A 155091 (20 pcs)	516842	516844
EN14DX86MWL	038762	529632	N + L		516844	516846
EN14DX72MWL	038761	516095	P +L			
EN14BK72MWL	038760	511513	K + L		516842	516844
EN979BK72WL	080724	551637	K + L		516842	516844

*As needed **Viewed looking at inlet/outlet ports

Use Assembly Diagram "B"

EN/CP 14

Service and Parts Manual

Parts Breakdown

Model:	**EN14**	**EN14**
Part No.:	**081486**	**081485**
	081487	

REF #	QTY	Description		
1	1	Motor	See below	See below
2	1	Housing	552373	552375
3	4	Housing to mtr bolts	120256	155025
4	*	Shim	515991	511547
5	*	Shim	515992	511548
6	*	Shim	515993	511549
7	*	Shim	515994	511550
8	1	Impeller	515509	515683
9	1	Mtr shaft Key	155066	511532
10	1	Impeller washer	515990	515990
11	1	Impeller lockwasher	251788	251788
12	1	Impeller bolt	155068	120251
13	1	Cover	515910	515910
14	8	Cover screws	155069	155069
15		Not used	Not used	Not used
16	2	Mounting Rails	551658	551658
17	4	Rail Bolts	120205	120205
18	4	Rail spacers	Not used	Not used
19	4	Rail lockwashers	251788	251788
20	4	Rail -Nuts	155070	155070
21	4	Rail washers	155091	155091
22		Not used	Not used	Not used
23	2	Finger guard screen	552322	552322
24	2	Muffler foam (hi temp)	552328	552328
25	2	Muffler foam (regular)	552327	552327
26	2	Retainer	552332	552332
27	2	Muffler tube	552324	552324
28	8	Muffler Tie Rod	552325	552325
29	1	Connector plate	552298	552298
30	8	Muffler washer	155091	155091

*As needed **Viewed looking at inlet/outlet ports

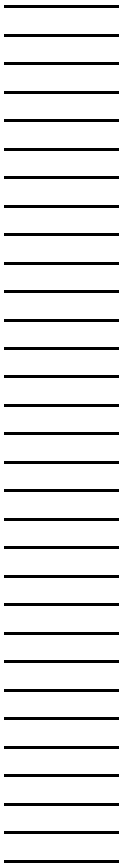
31	16	Muffler tie rod nuts	251789	251789
32	2	Flange	529912	529912
	2	Flange - O-Ring	155377	155377
33	6	Flange bolts	140016	140016
34		Flange Cap.	Not used	Not used
35		Not used	Not used	Not used
36		Nameplate- Blower	Not used	Not used
37		Rotation Sticker	Not used	Not used
38		Not used	Not used	Not used
39				
40		Lip Seal	516694	516693
41				
42				

Model	Part #	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Beari Impeller E
EN14DX86MWL	081487	529632	N + L		516844	5168
EN14DX72MWL	081486	516095	K + L			
EN14BK72MWL	081485	511513	K + L		516842	5168

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports



*As needed **Viewed looking at inlet/outlet ports

ng, nd (M2)
46
44

*As needed **Viewed looking at inlet/outlet ports

INLET VACUUM FILTERS

"CSL" Series 3 - 6 BSPT

APPLICATIONS & EQUIPMENT

- Vacuum Pumps & Systems – P.D., Side Channel, Rotary Vane, Screw, Piston
- Vacuum Packaging Equipment
- Vacuum Furnaces
- Blowers - Side Channel & P.D.
- Intake Suction Filters
- Pneumatic Conveying Systems
- Remote Install for Piston, Screw & Centrifugal Compressors
- Factory Automation Equip
- Ash Handling
- Food Industry
- Paper Processing
- Glass, Ceramic Processing
- Waste Water Treatment
- Woodworking
- Cement
- Bag House Systems
- Envelope Manufacturing
- Medical Industry
- Chemical Processing

FEATURES & SPECIFICATIONS

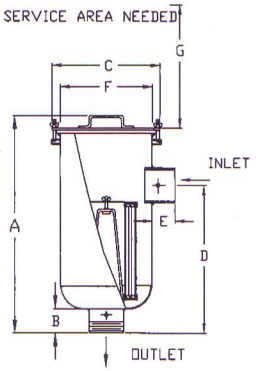
- **Vacuum level**: Typically $1x10^{-3}$ mmHg ($1.3x10^{-3}$ mbar)
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron
- Heavy duty T bolts for easy maintenance
- Baked enamel finish
- Rugged all steel construction
- Low pressure drop
- Positive engagement O-ring seal system
- **Large** dirt holding capacity and **Easy** field cleaning, especially when mounted horizontally or inverted
- Inlet/outlet 1/4" gauge taps standard
- Hydrostatically tested to 0.5 bar pressure for vacuum tightness
- Temp (continuous): min -15°F (-26°C) 220°F (max 104°C)
- Filter change out differential: 10" - 15" H_2O over initial delta P
- Pressure drop graphs available upon request

OPTIONS (Inquiries Encouraged)

- Various media
- Larger sizes available
- Support brackets
- Available in ***Stainless Steel***
- Epoxy coated housings
- Special connections
- Activated carbon prefilters to reduce order

CONFIGURATION

DRAWING



Dimension tolerance ± 1/8"

I = Industrial Duty S = Severe Duty E = Extreme Duty

	with Polyester Element	with Paper Element	MPT Inlet & Outlet	DIMENSIONS - inches A	B	C	D	E	F	G	Rated Flow SCFM Nominal Rating	Element Rating	Approx. Wt. lbs
I	CSL-235P-300	CSL-234P-300	3"	27 1/8	3	14	18 1/2	3	12	10	300	570	47
S	CSL-335P-300	CSL-334P-300	3"	27 1/8	3	14	18 1/2	3	12	15	300	800	50
	CSL-235P-400	CSL-234P-400	4"	27 1/8	3	14	18 1/2	3	12	10	520	570	52
S	CSL-335P-400	CSL-334P-400	4"	27 1/8	3	14	18 1/2	3	12	15	520	800	55
I	CSL-245P-500	CSL-244P-500	5"	28 1/8	3	18 1/2	19 1/2	3	16	10	800	880	82
S	CSL-345P-500	CSL-344P-500	5"	28 1/8	3	18 1/2	19 1/2	3	16	15	800	1100	88
I	CSL-275P-600	CSL-274P-600	6"	29 1/8	4	18 1/2	20 1/2	4	16	10	1100	1100	95
S	CSL-375P-600	CSL-374P-600	6"	29 1/8	4	18 1/2	20 1/2	4	16	15	1100	1500	97

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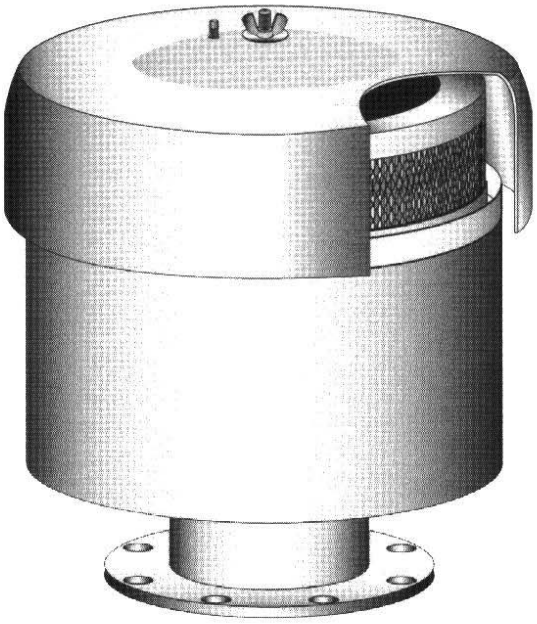
Air Intake Filter/Silencers

Model EMS - Series



The "EMS" Series air intake filter/silencer is designed for both indoor and outdoor applications requiring 6 - 8 dB noise reduction and a high degree of filtration. The unique heavy gauge construction reduces noise transmission and enhances durability in even the most severe environments. This series is ideal for applications such as reciprocating engines, positive displacement blowers and centrifugal compressors. Easy filter element access reduces maintenance time during filter element replacement.

Standard Construction Features

- Available in sizes from 1 inch to 16 inch
- Female NPT discharge connection sizes 1 inch to 4 inch
- 125/150# ANSI drilled plate flanges for sizes 5 inch to 16 inch
- Carbon steel construction
- Removable weatherhood
- Available with paper, felt and wire mesh filter element
- Removable weatherhood
- Gray phenolic resin based fast drying primer suitable for overcoating with urethanes, acrylics, epoxies and industrial enamels. Standard two mil thickness
- 1/8" NPT pressure tab

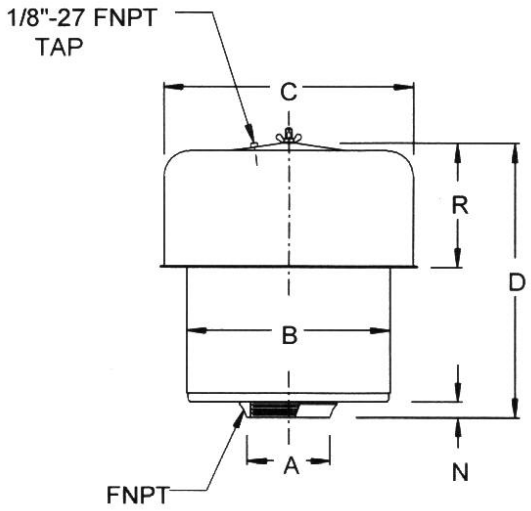
Optional Construction Features and Accessories

- Stainless steel construction
- Aluminum construction
- Special finish per specification
- Pre-filter wraps
- Special filtration and back-pressure designs
- Special acoustic designs
- Oversized flanges
- Contact factory for additional features to meet your requirements

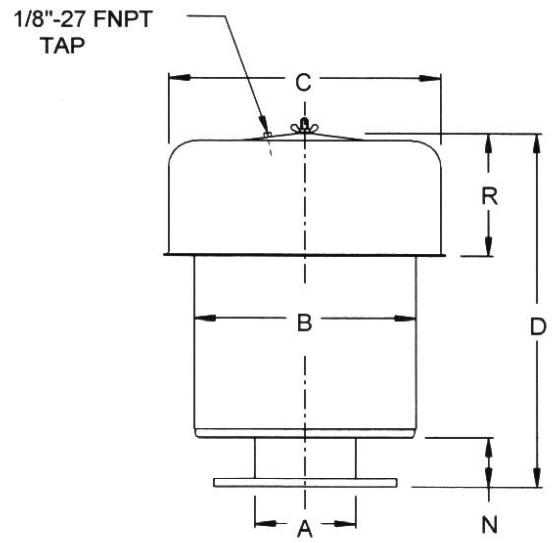
10/98
98BC-2004

Air Intake Filter/Silencers

Model EMS - Series



1" to 4" Female NPT Connection
(4" flange connection available upon requrest)



5" and Larger-125/150# ANSI Drilled Plate Flange
(5" FNPT connection available upon request)

									Element Model Number		
Model No.	A	C	B	D	N	R	Weight	CFM	Paper	Felt	Wire
EMS-1	1	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-125	1 1/4	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-15	1 1/2	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	75	P-642	F-642	W-642
EMS-2	2	9 1/2	6 5/8	5 7/16	5/8	2 1/4	8	120	P-642	F-642	W-642
EMS-25	2 1/2	14 7/8	12	11 7/8	13/16	4 7/16	20	200	P-974	F-974	W-974
EMS-3	3	14 7/8	12	13 5/8	13/16	4 7/16	20	275	P-974	F-974	W-974
EMS-35	3 1/2	14 7/8	12	13 5/8	13/16	6 7/16	25	375	P-976	F-976	W-976
EMS-4	4	14 7/8	12	13 5/8	1	6 7/16	25	500	P-976	F-976	W-976
EMS-5	5	14 7/8	12	25 1/2	3	7 3/8	36	750	P-1197	F-1197	W-1197
EMS-6	6	22	18	26 1/4	3	8 5/8	53	1100	P-13118	F-13118	W-13118
EMS-8	8	22	18	25	3	10 3/4	70	2200	P-171310	F-171310	W-171310
EMS-10	10	22	18	25	3	10 3/4	95	3000	P-171310	F-171310	W-171310
EMS-12	12	22	18	25	3	10 3/4	108	4300	P-171310	F-171310	W-171310
EMS-14	14	30	24	40	4	15 3/4	180	5900	P-231914	F-231914	W-231914
EMS-16	16	30	24	40	4	15 3/4	190	7700	P-231914	F-231914	W-231914

- When ordering specify paper (P); felt (F) or wire mesh (W) filter element.
- 1 inch to 4 inch standard female NPT connection; 4 inch flange connection available upon request
- 5 inch to 16 inch standard 125/150# ANSI drilled plate flange connection; 5 inch female NPT connection available upon request

Dimensions in inches, weights in pounds. Dimensions and weights are nominal and may vary slightly with production models. Request certified drawings for exact dimensions.

Gasho
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The Leader in Blower & Vacuum Solutions
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West Chester, PA 19380
610-692-5650 Fax 610-692-5837
cs@gasho.org

Gasho Replacement Inlet Filter Elements

High quality replacement elements are available for the filters of various manufactures used on packages built by Gasho.
Paper elements are normally used in inlet filters and replaced when they are dirty.
Polyester elements are cleanable.

Filter Size, In.	Gasho Filter #	Box Quantity	O.D.	I.D.	Ht.	List Price
1	GA-0470	6	5-13/16	4	2	$17.00
2	GA-0471	6	5-13/16	4	2-1/2	$17.00
2.5-3	GA-0472	2	9-3/4	7-1/4	4	$23.00
4	GA-1063	2	9-3/4	7-1/4	6	$27.00
5	GA-0474	1	11-1/2	9-7/8	7	$35.00
6	GA-0475	1	13-5/8	11-5/8	8-5/8	$53.00
8-12	GA-1163	1	17	13	10	$185.00

GA-0471 Elements are frequently used to replace GA -0470

Manufacturer Cross Reference

Gasho Filter #	Universal Filter #	EM Prod. Filter #	Full-On Filters #	Solberg #
GA-0470	81-0470		FOF810470	32-00
GA-0471	81-0471	P-642	FOF810471	32-02
GA-0472	81-0472	P-974	FOF810472	32-04
GA-1063	81-1063	P-976	FOF811063	32-06
GA-0474	81-0474	P-1197	FOF810474	32-08
GA-0475	81-0475	P-13118	FOF810475	32-10
GA-1163	81-1163	P-171310	FOF811163	32-12

Models: 87, 88

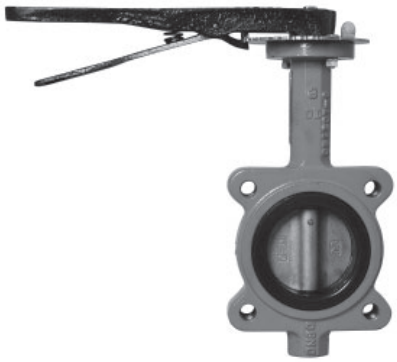
Ductile Iron Wafer and Full Lug Butterfly Valves Sizes: 2" – 24" (25 – 60mm)

Pressure/Temperature–Non-Shock			
Model	Size	Material	Rating
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F

Max. temp. can be limited by seat material. Consult Factory.

Not Recommended for Steam Service.

Model 87M (Wafer)



Model 88M (Lug)

Typical Service

These soft-seated butterfly valves are designed for a variety of general applications in the control of water, air, oil, gases, and corrosive media. They are equally effective for on-off, throttling, or isolation service requirements. Lug style valves are designed for dead-end service to the full pressure rating of the valve. Models 87 and 88 butterfly valves are especially well suited for higher velocity service and vacuum service.

Features

- Phenolic backed (2" – 14"), aluminum backed (16" – 24"),
- non-collapsible, resilient elastomer seat. Available in EPDM or Buna-N.
- ISO 5211 mount is standard. Double D shaft is standard 2" – 10" while keyway design is supplied 12" – 24"
- Stem is a one-piece design for maximum strength and is retained in valve body for blowout proof operation. 416SS stem is standard with aluminum bronze or ductile iron discs. 316SS is standard for 316SS discs (2" – 12") and 431SS is standard for 316SS discs (14" – 24")
- Stem bushings provide shaft support for proper stem alignment and minimize stem deflection. Duralon bushings are standard material in 2" – 12" sizes. Bronze bushings are standard in 14" – 24" sizes.
- Stem seals prevent external contamination of stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- ASTM-A563 ductile iron body available in full lug (Model 88) or wafer (Model 87) designed for use between ANSI 125 and 150 flanges. Face-to-face dimension comply with API 609 and MSS-SP-67.
- Available in standard 10-position locking handle or optional infinite positioning locking handle. Also gear operators are available 2" – 24". Contact the factory for electric or pneumatic actuation.

Performance Guidelines

Guidelines for throttling service:

Liquids – Line velocity should not exceed 20ft./sec.

Gases – Line velocity should not exceed 15,000 ft./sec.

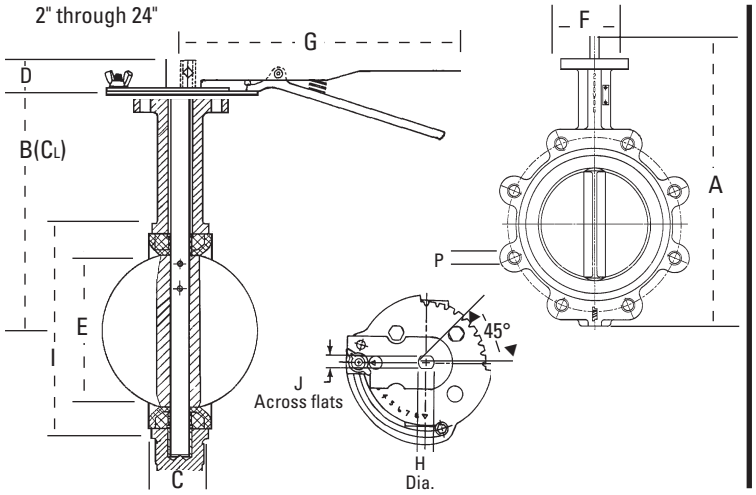
Materials

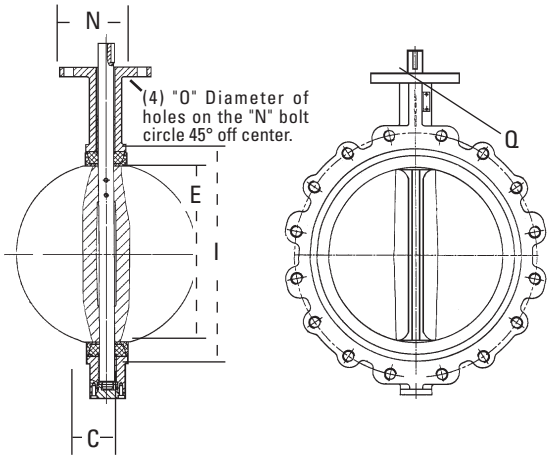
	MODEL 87, MODEL 88
Body	Ductile Iron
Stem	416SS, 316SS, 431SS
Disc	Ductile Iron, Aluminum Bronze, 316SS
Seat	EPDM - 5°F to 248°F (-15°C to +120°C)
	Buna-N - 14°F to 176°F (-10°C to +80°C)

Note: Do not use EPDM when hydrocarbons are present

Dimensions and Weights

2" through 24"





Size	A in.	A mm	B in.	B mm	C in.	C mm	D in.	D mm	E in.	E mm	F in.	F mm	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm
2"	10¾	273	6⅜	161	1⅝	42	1¼	32	2⅛	54	3 1/16	77	10½	267	½	13	3¾	95	⅜	9
2½"	11⅝	295	6⅞	175	1¾	45	1¼	32	2½	64	3 1/16	77	10½	267	½	13	4¼	108	⅜	9
3"	12⅛	308	7⅛	181	1¾	45	1¼	32	3⅛	79	3 1/16	77	10½	267	½	13	4¾	120	⅜	9
4"	13⅝	346	7⅞	200	2	52	1¼	32	4⅛	105	3⅝	92	10½	267	⅝	16	6 1/16	154	7/16	11
5"	14⅝	372	8⅜	213	2 3/16	56	1¼	32	4⅞	124	3⅝	92	10½	267	¾	19	7⅛	181	½	13
6"	15⅝	397	8⅞	226	2 3/16	56	1¼	32	6⅛	156	3⅝	92	10½	267	¾	19	8 3/16	208	½	13
8"	18⅞	479	10¼	260	2⅜	60	1¾	45	8	202	5	125	14	356	⅞	22	10¼	260	⅝	16
10"	21¼	540	11½	292	2⅝	66	1¾	45	9⅛	251	5	125	14	356	1⅛	29	12⅝	320	13/16	21
12"	24⅝	626	13¼	337	3	76	1¾	45	11⅞	301	6	150	14	356	1¼	32	14¾	375	–	–
14"	26¾	679	14½	368	3	76	1¾	45	13⅛	333	6	150	–	–	1¼	32	15 15/16	405	–	–
16"	30	762	15¾	400	3⅜	87	2	50	15⅜	391	6⅞	175	–	–	1 5/16	33	18½	470	–	–
18"	31½	800	16⅝	422	4⅛	105	2	50	17⅜	442	6⅞	175	–	–	1½	38	20 1/16	525	–	–
20"	35 5/16	897	18⅞	480	5⅛	130	2⅛	53	19⅜	493	8¼	210	–	–	1⅝	41	22¼	565	–	–
24"	42⅛	1088	22⅛	562	6	152	2¼	58	23⅜	594	8¼	210	–	–	2	50	27 5/16	693	–	–

Size	TOP PLATE DRILLING N in.	N mm	O in.	O mm	TAPPED LUG DATA BOLT CIRCLE in.	BOLT CIRCLE mm	NO. Holes	BOLT P	KEY WAY Q in.	Q mm	WEIGHT (LBS.)† 88	87
2"	2	50	¼	7	4¾	121	4	5/8"-11UNC x 1⅝"	–	–	8	6
2½"	2	50	¼	7	5½	140	4	5/8"-11UNC x 1¾"	–	–	10	7
3"	2	50	¼	7	6	150	4	5/8"-11UNC x 1¾"	–	–	10	7
4"	2¾	70	⅜	10	7½	191	8	5/8"-11UNC x 2"	–	–	17	12
5"	2¾	70	⅜	10	8½	216	8	¾"-10UNC x 2 3/16"	–	–	25	16
6"	2¾	70	⅜	10	9½	241	8	¾"-10UNC x 2 3/16"	–	–	27	20
8"	4	102	½	13	11¾	298	8	¾"-10UNC x 2⅜"	–	–	40	29
10"	4	102	½	13	14¼	362	12	⅞"-9UNC x 2⅝"	–	–	63	48
12"	5	125	½	13	17	432	12	⅞"-9UNC x 3"	¼ x 1¼	6 x 32	107	78
14"	5	125	½	13	18¾	476	12	1"-8UNC x 3"	¼ x 1¼	6 x 32	156	99
16"	5½	140	1/16	18	21¼	540	16	1"-8UNC x 3⅜"	5/16 x 1 13/16	8 x 46	203	140
18"	5½	140	1/16	18	22¾	578	16	1⅛"-7UNC x 4⅛"	⅜ x 1 5/16	10 x 40	269	188
20"	6½	165	⅞	22	25	635	20	1⅛"-7UNC x 5⅛"	⅜ x 1 5/16	10 x 40	392	248
24"	6½	165	⅞	22	29½	750	20	1¼"-7UNC x 6"	½ x 2⅜	13 x 60	593	450

†Weights are for valves with ductile iron or aluminum bronze discs. 2" – 12" have levers; 14" – 24" have bare shafts.
Refer to Watts F-CDBF for gear operator weights.

Size	Buna-N, EPDM (in./lbs.) NormalConditions WET/DRY
2"	134/214
2½"	190/289
3"	250/387
4"	390/644
5"	600/959
6"	907/1,542
8"	1,697/2,919
10"	2,500/4,857
12"	3,300/7,071
14"	3,500/7,305
16"	5,500/10,027
18"	8,200/13,437
20"	10,000/17,925
24"	18,680/28,020

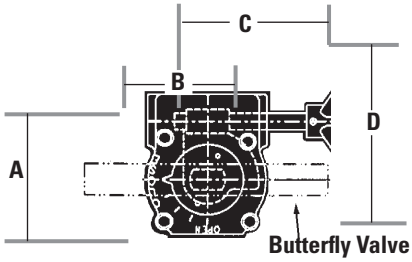
SEATING TORQUE

Size	Cv Rating (Full Open)
2"	135
2½"	220
3"	302
4"	600
5"	1,022
6"	1,579
8"	3,136
10"	5,340
12"	8,250
14"	11,917
16"	16,388
18"	21,705
20"	27,908
24"	43,116

Cv RATING

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL

Valve Size	A Depth	B Width	C CL to HW	D HW Dia.	E Height	F CL to MT Pad	#Turns Open - Close	Unit Weight (lbs)
2", 2½", 3"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
4"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
5", 6"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
8"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
10"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
12", 14"	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0
16"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
18"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
20"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
24"	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0



Butterfly Valve

Adjustable Stops (Set Screws)

Mueller Steam Specialty™

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Watts BF-03 and BF-04

Resilient Seated Butterfly Valves

Size: 2" - 24" (50-600mm)

Installation and Repair Instructions

Watts Series BF-03, BF-04 butterfly valves are designed for use between ANSI 125 and 150 class flanges of either flat or raised face type.

Note: Installation between class 150 flanges does not increase the valve 200 psig (13.8 bar) rating

Installation

Note: When using piping reducers, the transition area of said reducers must be sufficient enough so as to allow disc protrusion as the valve opens. The same consideration applies when using heavy schedule or lined pipe.

Warning: Failure to ascertain adequate clearance **before** installation could damage the disc's sealing surface.

A. Installation Between Existing Flanges

Note: To avoid forcing the valve between flanges and subsequent distortion or damage to the valve seat it may be necessary to spread mating flanges. **See Note 1.**

1. Rotate valve clockwise to position the disc sealing edge approximately ½" from the valve sealing face.
2. Insert the valve between the flanges, loosely assemble flange bolts and align by:
   - A. BF-03-Bolting the valve to the flanges
   - B. BF-04-By positioning the valve equidistant from the bolt studs and aligning body O.D. with flange raised face.
3. Turn valve to its full open position and hand tighten flange bolts. Operate the valve to assure proper alignment and clearance.
4. Return valve to its full open position and tighten all bolts in a sequential pattern to the proper torque for the bolting and flanged material selected.
5. Install valve handle - See Note 2.

B. Installation in New Piping Systems

1. Follow steps 1 - 4 as outlined in section A, however, the valve should be aligned as above and assembled between the flanges if they are to be welded. Use the assembly for fit-up and centering to the pipe.
2. Tack weld the flanges and then remove the valve assembly.
3. Complete welding the flanges and allow them to cool completely before reinstalling the valve. Failure to do so could damage the valve seat.

Removal From Line For Rebuild

A. Removal from Line

1. Place valve approximately 20° open.
2. Loosen and remove bolting, spread flanges and remove valve.

B. Disassembly

1. Place valve in its full open position, remove handle or operator.
2. Remove disc pins. (Pins will have to be replaced).
3. Remove stem from body.
4. Remove disc from seat and store in such a manner so as to not to damage its sealing surface. (If damaged, disc and stem must be replaced.)
5. Remove seat from body.

C. Reassembly

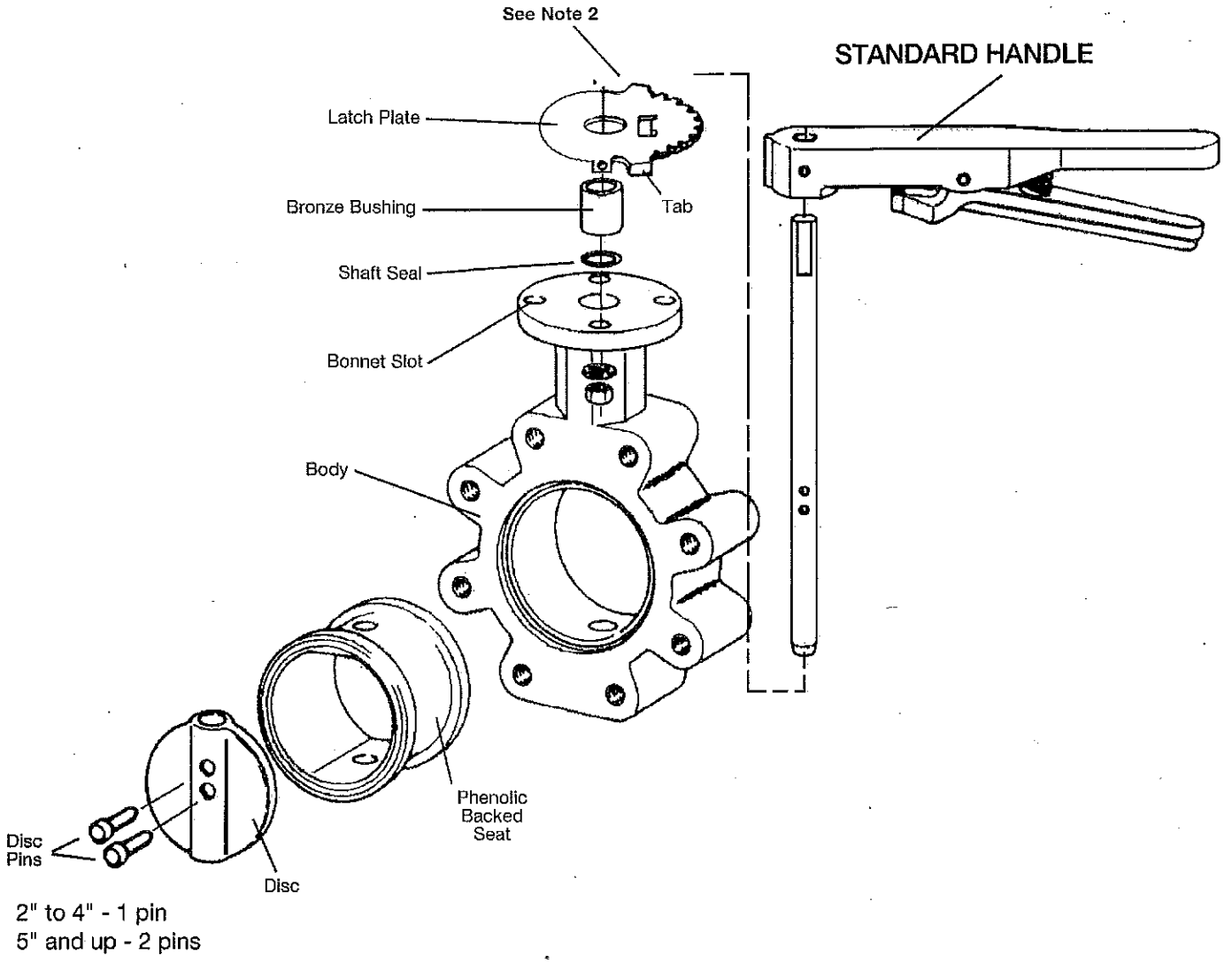
1. Inspect and clean all parts to be used.
2. Insert disc into seat (aligning stem holes).
3. Press seat into body (aligning stem holes).
4. Insert stem taking care not to dislodge and or damage the seat.
5. Close valve aligning stem flat parallel to closed valve.
6. Drill and ream (per specification) thru disc and stem. (Do not use oil when drilling)
7. Place disc pins and knock pin into place.
8. Clean valve free of shavings.

Note 1 - Valve seat also serves as flange gasket

Note 2 - Standard handle must be field mounted.

** (See back for handle information)*

WATTS®



Note 2: Standard handle must be field mounted.

Note: Product information is subject to change without notice and supersedes all previous publications.

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. (California law requires this warning to be given to customers in the State of California.)

For more information: www.watts.com/prop65

Limited Warranty: Watts Regulator Co. (the "Company") warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge.
THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product.
Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**

WATTS®

ISO 9001-2000 CERTIFIED

Water Safety & Flow Control Products

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.watts.com
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February 2012

289 Series Spring-Loaded Relief Valves

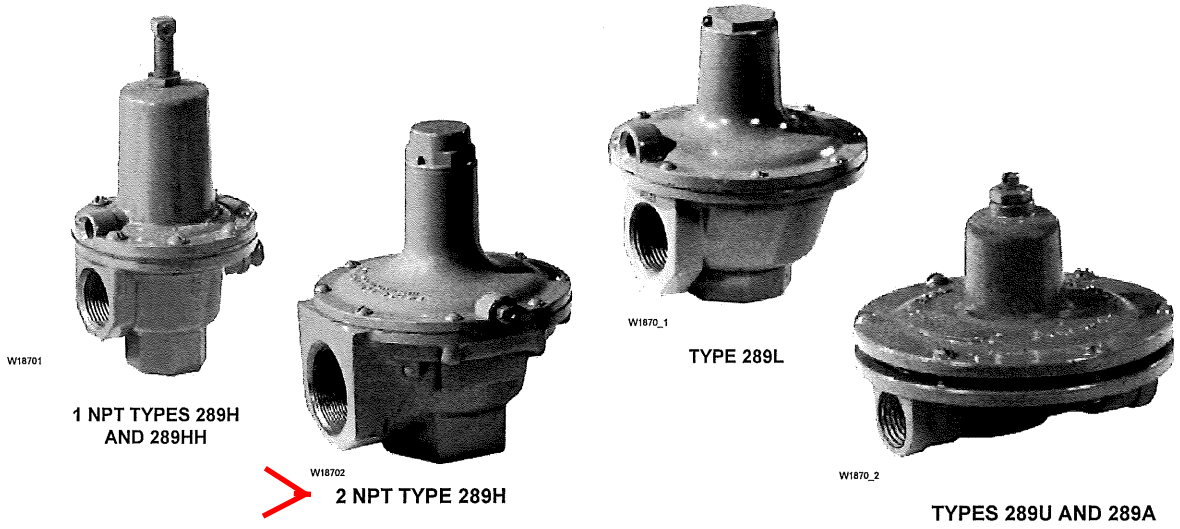


Figure 1. *Types 289H, 289L, and 289U Relief Valves*

Introduction

The 289 Series relief valve is a throttling relief valve used downstream of pressure regulators to protect the downstream system from overpressure. A smooth throttling action minimizes pressure surges in the system during emergency operation. These relief valves are available in 1/4, 3/4, 1, or 2 NPT sizes with spring ranges (relief pressure settings) from 5-inches w.c. to 75 psig / 12 mbar to 5.2 bar.

All sizes above 1/4 NPT feature a pitot tube booster (Figure 1) for achieving the highest possible relief capacity with a minimum buildup of system pressure. When the valve is opening, high gas velocity through the orifice creates an area of relatively low pressure near the end of the pitot tube. This pitot tube effect forms a partial vacuum above the diaphragm which helps to open the valve.

The relief valve diaphragm functions as a valve disk to control flow in all types except the Types 289H and 289HH, which use O-ring seats. The Nitrile (NBR) or Neoprene (CR) seating surfaces provide tight shutoff. The 289 Series relief valves are ideal for low-pressure settings due to the increased sensitivity provided by the large diaphragm area.

Features

- **Throttling Type Relief**—Smooth, sensitive throttling action minimizes pressure surges.
- **High Flow Rates**—As shown by the Figure 3 capacity curves, high flow rates can be achieved with minimum pressure buildup due to the boosting system which increases the relief valve opening.
- **Small Size**—The 289 Series relief valves are small and compact, making them suitable for areas limited in space.
- **Reliability Due to Simplicity**—A single internal assembly decreases the possibility of mechanical failure.

D100154X012

Specifications

Available Configurations

Type 289A: 1/4 NPT spring-loaded relief valve for relief pressure settings of 3 to 22 psig / 0.21 to 1.5 bar, two spring ranges

Type 289H: 1 or 2 NPT spring-loaded relief valve for relief pressure settings of 1 to 50 psig / 0.07 to 3.4 bar four spring ranges, in the 1 NPT and of 7-inches w.c. to 10 psig / 17 mbar to 0.69 bar, four spring ranges, in the 2 NPT

Type 289HH: 1 NPT spring-loaded relief valve for relief pressure settings of 45 to 75 psig / 3.1 to 5.2 bar

Type 289L: 3/4 or 1 NPT spring-loaded relief valve for relief pressure settings of 10 to 40-inches w.c. / 25 to 99 mbar, two spring ranges

Type 289U: 1/4 NPT spring-loaded relief valve for relief pressure settings of 5-inches w.c. to 3 psig / 12 mbar to 0.21 bar, two spring ranges

Inlet Connections

Type 289L: 3/4 or 1 NPT

Types 289A and 289U: 1/4 NPT

Type 289H: 1 or 2 NPT

Type 289HH: 1 NPT

Outlet (Vent) Connections

Same size as inlet connection

Maximum Allowable Relief (Inlet) Pressure[1] and Maximum Relief Set Pressure

See Table 1

Capacity Data

See Figure 3

Standard Construction Materials

Valve Body and Spring Case

Types 289A and 289U: Zinc
Types 289H (1 NPT), 289HH, and 289L: Aluminum
Type 289H (2 NPT): Cast iron body with Aluminum spring case

Diaphragm

Type 289A: Neoprene (CR)
Types 289H and 289HH: Nitrile (NBR) or Fluorocarbon (FKM)
Types 289L and 289U: Nitrile (NBR)

Standard Construction Materials (continued)

Orifice

Types 289A and 289L: Aluminum
Type 289H (2 NPT Only): Brass or Stainless steel

O-Ring Seat (Types 289H and 289HH Only):
Nitrile (NBR) or Fluorocarbon (FKM)[2]

O-Ring Seat Holder and Washer (1 NPT Types 289H and 289HH Only):
Aluminum

Seat Washer (2 NPT Type 289H Only):
Stainless steel

Pitot Tube

Types 289H, 289HH (1 NPT), and 289L: Aluminum*Type 289H (2 NPT):* Brass or Stainless steel

Gaskets

Type 289L: Neoprene (CR)
All Others: Composition

Spring: Zinc-plated steel

Diaphragm Plate

Types 289A and 289U: Zinc
All Others: Zinc-plated steel

Closing Cap

Type 289L: Plastic, Aluminum, or Zinc
Type 289H (2 NPT): Zinc

Temperature Capabilities[1]

With Nitrile (NBR) and Neoprene (CR) Elastomer:
-20° to 150°F / -29° to 66°C

With Fluorocarbon (FKM):
20° to 300°F / -7° to 149°C
Available with Types 289H and 289HH only

Approximate Weights

Types 289A and 289U: 0.75 pounds / 0.3 kg

Type 289H

1 NPT: 4 pounds / 2 kg
2 NPT: 15 pounds / 7 kg

Type 289HH: 4 pounds / 2 kg

Type 289L: 15 pounds / 7 kg

Options

- Polytetrafluoroethylene (PTFE) diaphragm protector (Types 289A and 289U only)
- Wire-seal on closing cap (1 NPT Type 289L only)

1. The pressure/temperature limits in this Bulletin and any applicable standard limitation should not be exceeded.
2. Bubble-tight shutoff cannot be attained at settings below 5 psig / 0.35 bar with Fluorocarbon (FKM) O-ring seat.

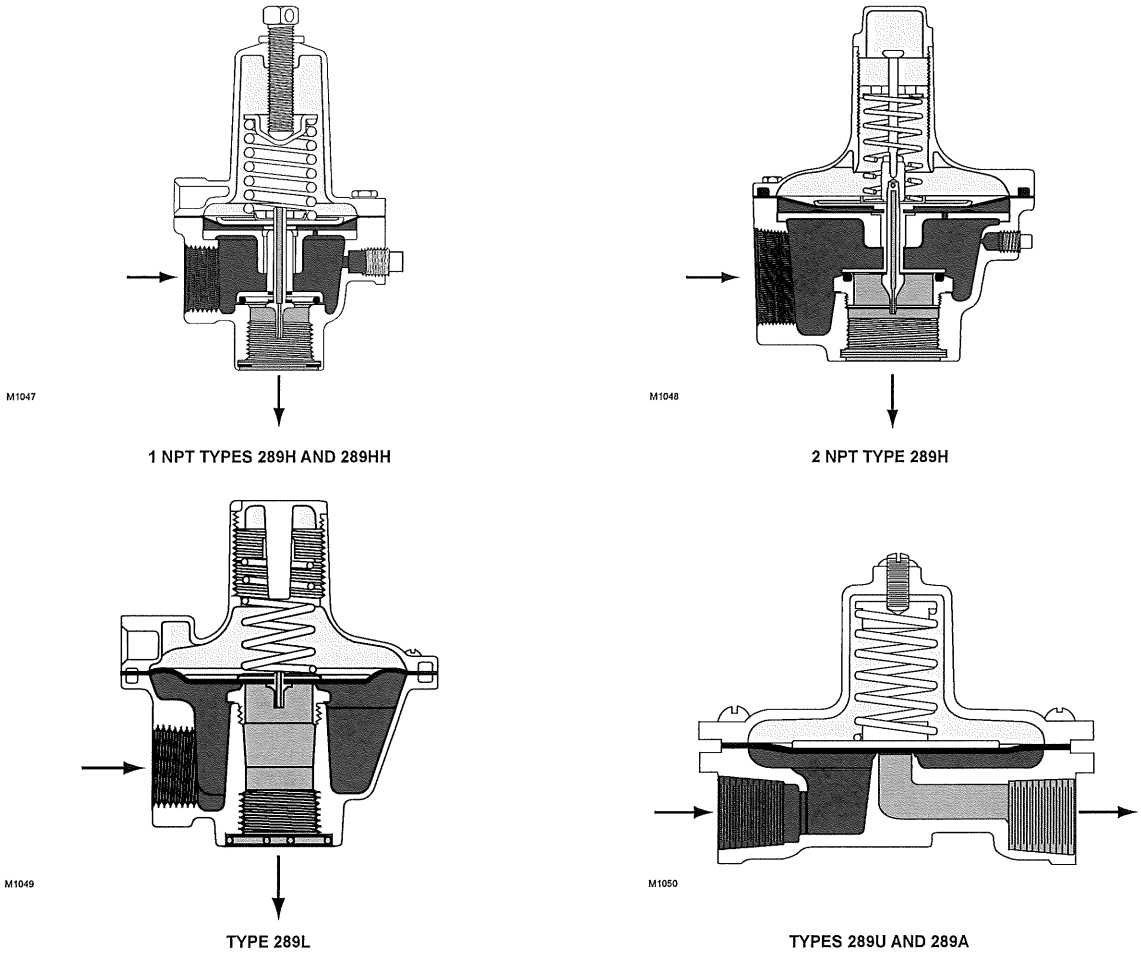
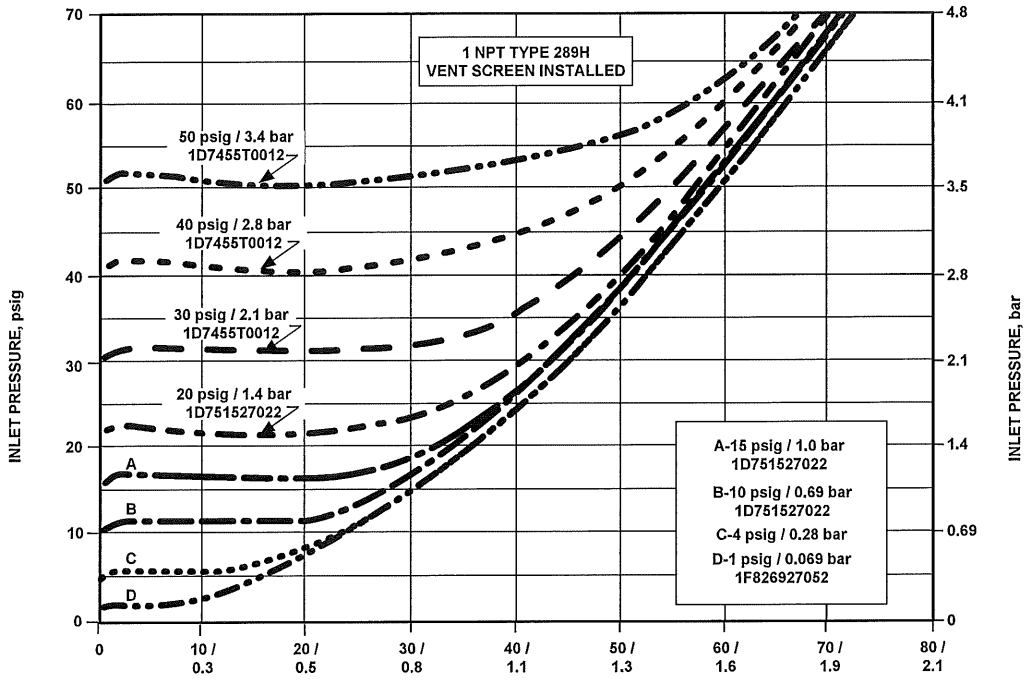


Figure 2. *Types 289H, 289L, and 289U Operational Schematics*

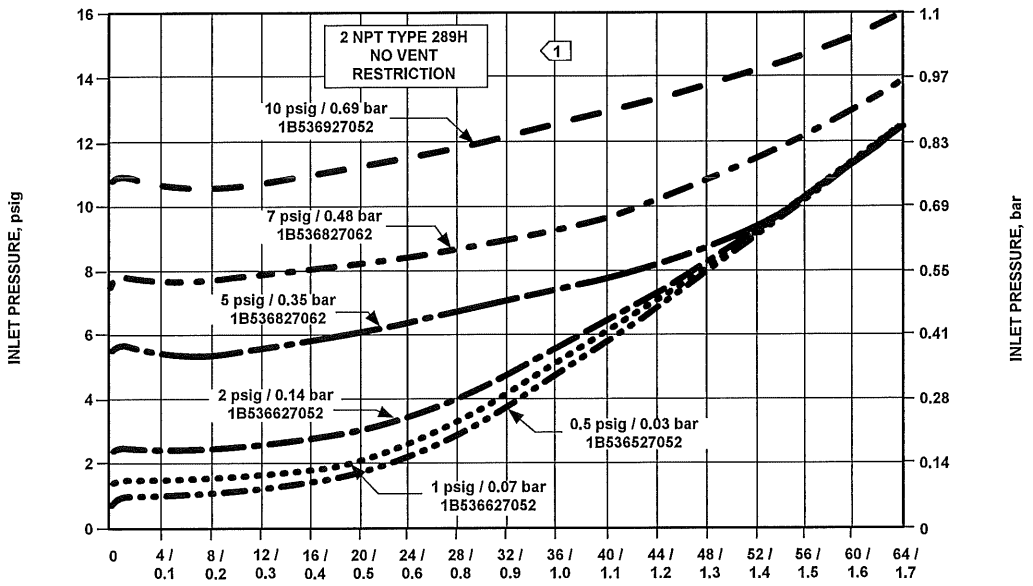
Table 1. *Maximum Allowable Relief (Inlet) Pressure*

AVAILABLE CONFIGURATION	BODY SIZE, NPT	SPRING PART NUMBER	COLOR CODE	SPRING RANGE (RELIEF PRESSURE SETTINGS)		MAXIMUM ALLOWABLE RELIEF (INLET) PRESSURE[1]	
Type 289A	1/4	0Z056327022 1B268227022	Silver Silver	3 to 13 psig 11 to 22 psig	0.21 to 0.90 bar 0.76 to 1.5 bar	45 psig	3.1 bar
Type 289H	1	1F826927052 1D892327022 1D751527022 1D7455T0012	Pink Red Silver Green	1 to 4.5 psig 4 to 15 psig 10 to 20 psig 15 to 50 psig	0.07 to 0.31 bar 0.28 to 1.0 bar 0.69 to 1.4 bar 1.0 to 3.5 bar	100 psig	6.9 bar
	2	1B536527052 1B536627052 1B536827062 1B536927052	Dark Blue Gray Dark Green Red Stripe	7 to 18-inches w.c. 0.5 to 2.25 psig 1.75 to 7 psig 4 to 10 psig	17 to 45 mbar 0.03 to 0.16 bar 0.12 to 0.48 bar 0.28 to 0.69 bar	25 psig	1.7 bar
Type 289HH	1	1D7455T0012	Green	45 to 75 psig	3.1 to 5.2 bar	100 psig	6.9 bar
Type 289L	3/4 or 1	13A7917X012 13A7916X012	Silver Red Stripe	10 to 18-inches w.c. 12 to 40-inches w.c.	25 to 45 mbar 30 to 99 mbar	7 psig	0.48 bar
Type 289U	1/4	0V060227022 0F058227022	Silver Silver	5 to 25-inches w.c. 20-inches w.c. to 3 psig	12 to 62 mbar 50 to 207 mbar	10 psig	0.69 bar

1. This value indicates the relief pressure setting plus pressure build-up.



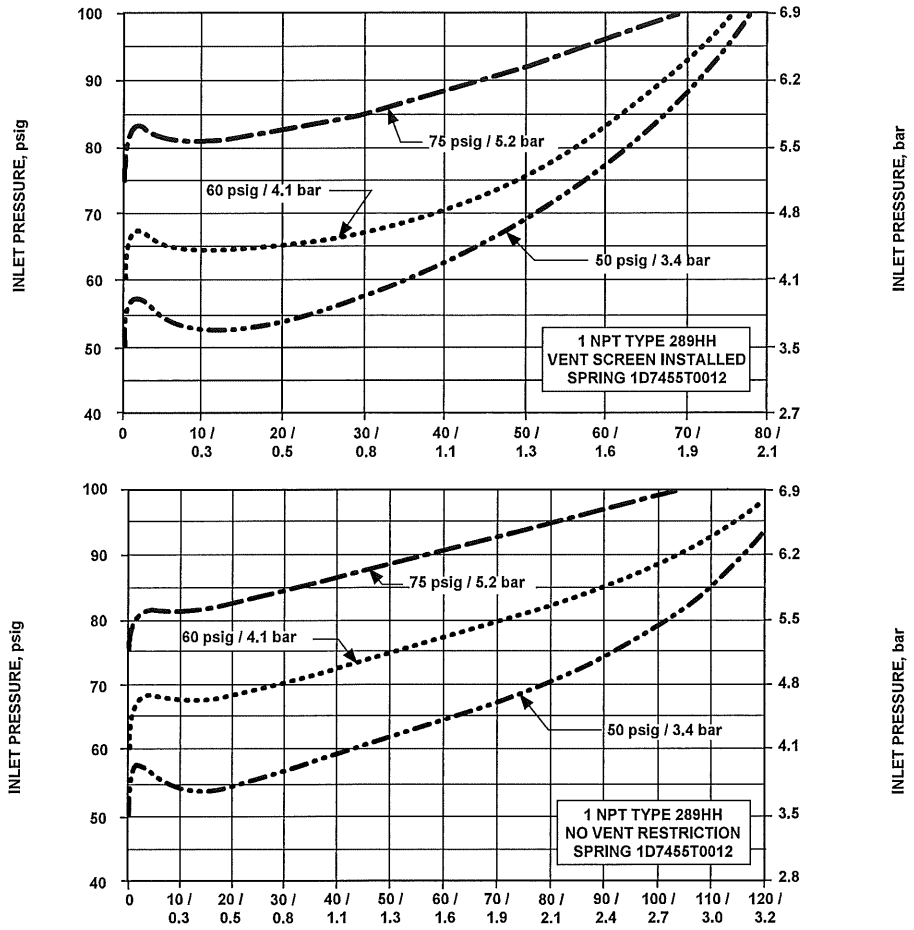
CAPACITIES IN THOUSANDS OF SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 psia AT 60°F / 1.01325 bar AT 0°C



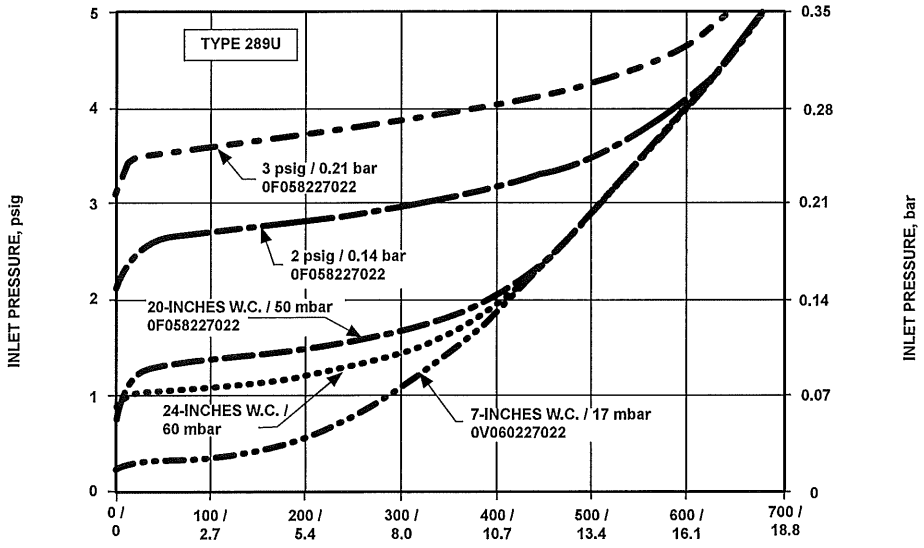
CAPACITIES IN THOUSANDS OF SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 psia AT 60°F / 1.01325 bar AT 0°C

NOTE:
1. LESS THAN A 5% CAPACITY LOSS CAN BE EXPECTED WITH THE VENT SCREEN INSTALLED ON THE 2 NPT TYPE 289H AT MAXIMUM FLOW.
2. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
3. BUBBLE POINT RELIEF SETTING AND SPRING PART NUMBER ARE NOTED ON EACH CURVE.
4. TO CONVERT TO EQUIVALENT CAPACITIES OF OTHER GASES, MULTIPLY VALUES OBTAINED FROM CURVE BY THE FOLLOWING FACTORS: AIR–0.78, PROPANE–0.628, BUTANE–0.548, NITROGEN–0.789.

Figure 3. *Capacity Curves*



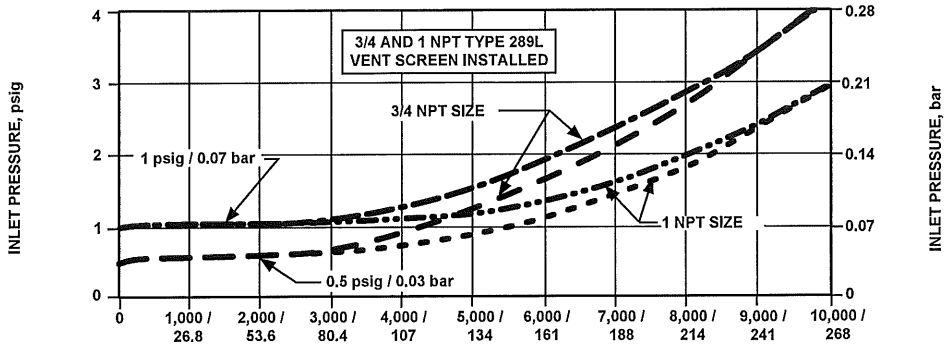
CAPACITIES IN THOUSANDS OF SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 psia AT 60°F / 1.01325 bar AT 0°C



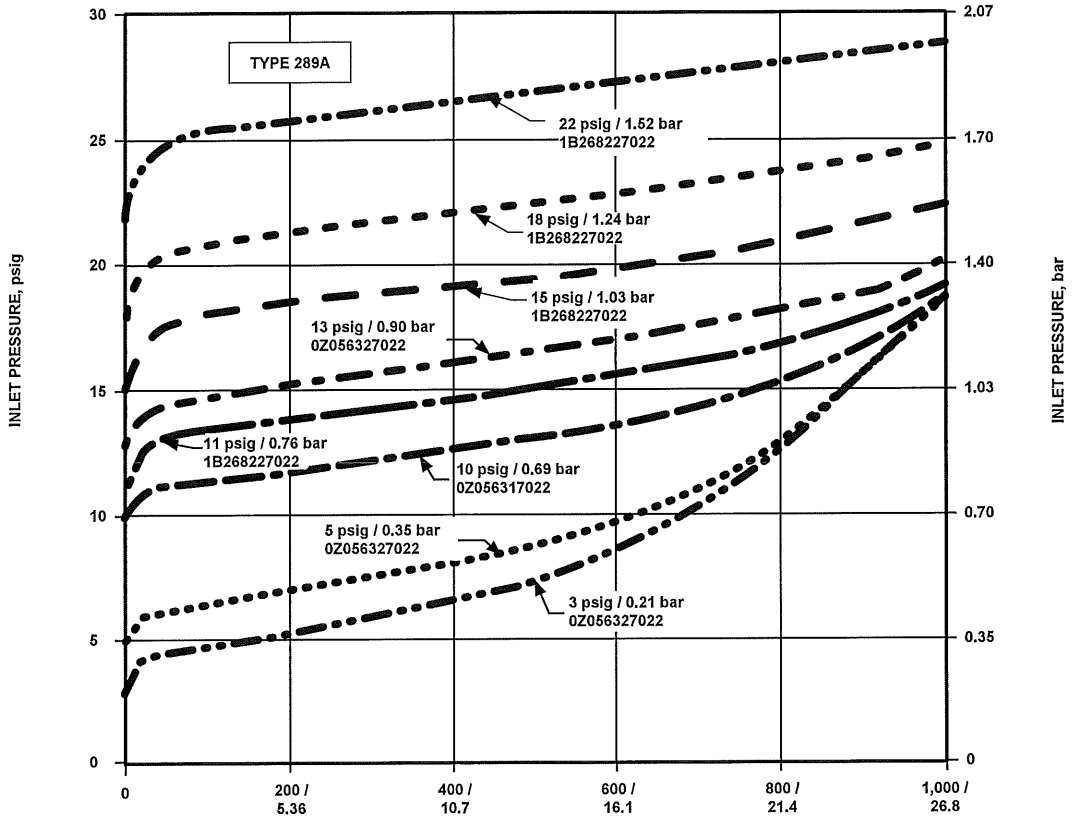
CAPACITIES IN 0.6 SPECIFIC GRAVITY GAS —
CUBIC FEET PER HOUR / Nm³/h—14.7 psia AT 60°F / 1.01325 bar AT 0°C

NOTE:
1. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
2. BUBBLE POINT RELIEF SETTING AND SPRING PART NUMBER ARE NOTED ON EACH CURVE.
3. TO CONVERT TO EQUIVALENT CAPACITIES OF OTHER GASES, MULTIPLY VALUES OBTAINED FROM CURVE BY THE FOLLOWING FACTORS: AIR–0.78, PROPANE–0.628, BUTANE–0.548, NITROGEN–0.789.

Figure 3. *Capacity Curves (continued)*



CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 PSIA AT 60°F / 1.01325 bar AT 0°C



CAPACITIES IN SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 psia AT 60°F / 1.01325 bar AT 0°C

NOTE:
1. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
2. BUBBLE POINT RELIEF SETTING IS NOTED ON EACH CURVE.
3. TO CONVERT TO EQUIVALENT CAPACITIES OF OTHER GASES, MULTIPLY VALUES OBTAINED FROM CURVE BY THE FOLLOWING FACTORS: AIR–0.78, PROPANE–0.628, BUTANE–0.548, NITROGEN–0.789.

Figure 3. *Capacity Curves (continued)*

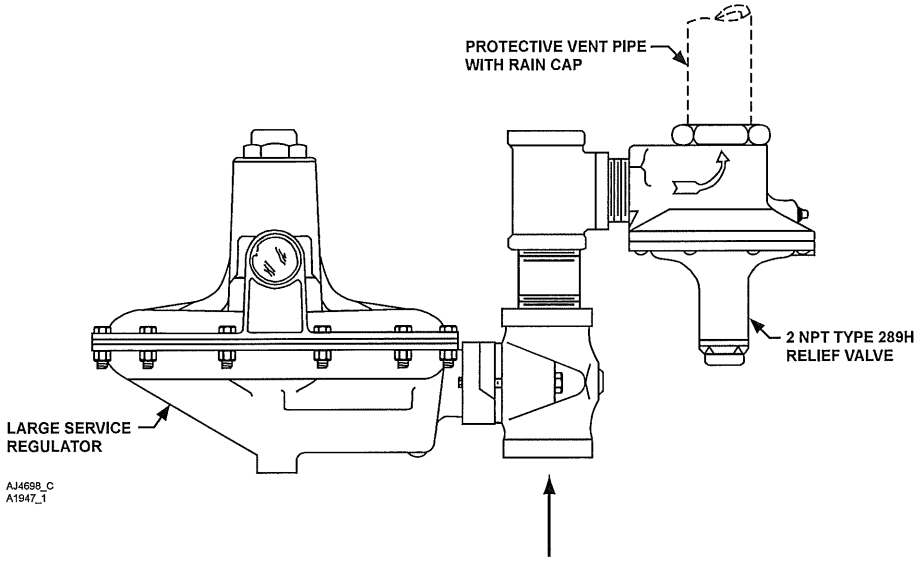


Figure 4. *Typical Installation of a 289 Series Relief Valve*

Installation

The 289 Series relief valves may be installed in any position. However, the outlet connection must be protected against the entrance of rain, snow, insects, or any other foreign material that may plug the outlet or affect the opening and closing of the valve (see Figure 4). If it is necessary to pipe away the outlet, remove the outlet screen (if one is present).

Flow through the valve must be as indicated by the flow direction arrow on the body (inlet connection is marked on some sizes).

The spring case vent on the 2 NPT Type 289H is tapped and plugged. This vent opening must remain plugged to allow the pitot tube booster to function.

Overpressure

Overpressure conditions in a regulating system may cause personal injury or equipment damage due to bursting of pressure-containing parts or explosion of accumulated gas. Check the system for damage if any of the maximum allowable relief (inlet) pressure ratings in Table 1 are exceeded.

Ordering Information

When ordering, specify:

1. Type number and size
2. Relief pressure range and setting desired
3. Type of gas (natural gas, air, etc.); list any factors such as impurities in the gas that may affect compatibility of the gas with valve trim parts
4. Temperature and specific gravity of the gas
5. Maximum relief (inlet) pressure and flow rate desired
6. Line size and end connection size of adjacent piping
7. For Types 289H and 289HH, specify material of diaphragm and O-ring seat; for 2 NPT Type 289H, specify material of orifice and pitot tube
8. Options desired, if any

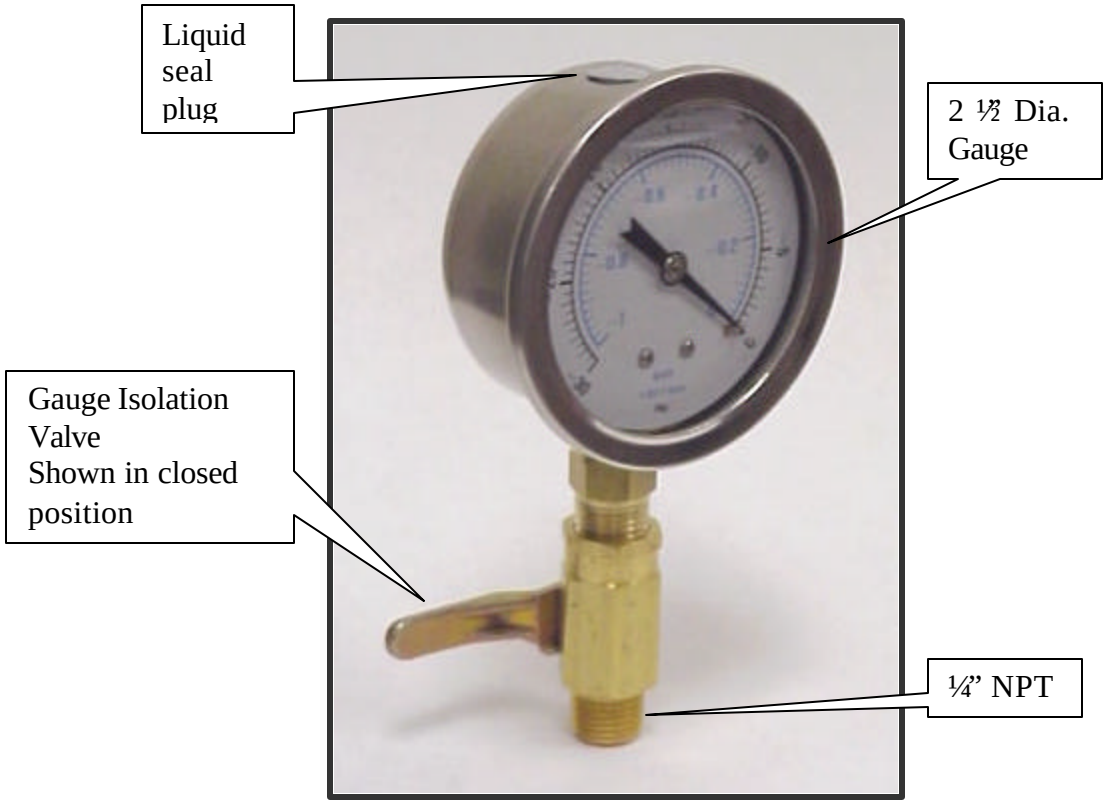
J. E. GASHO & ASSOCIATES, INC.

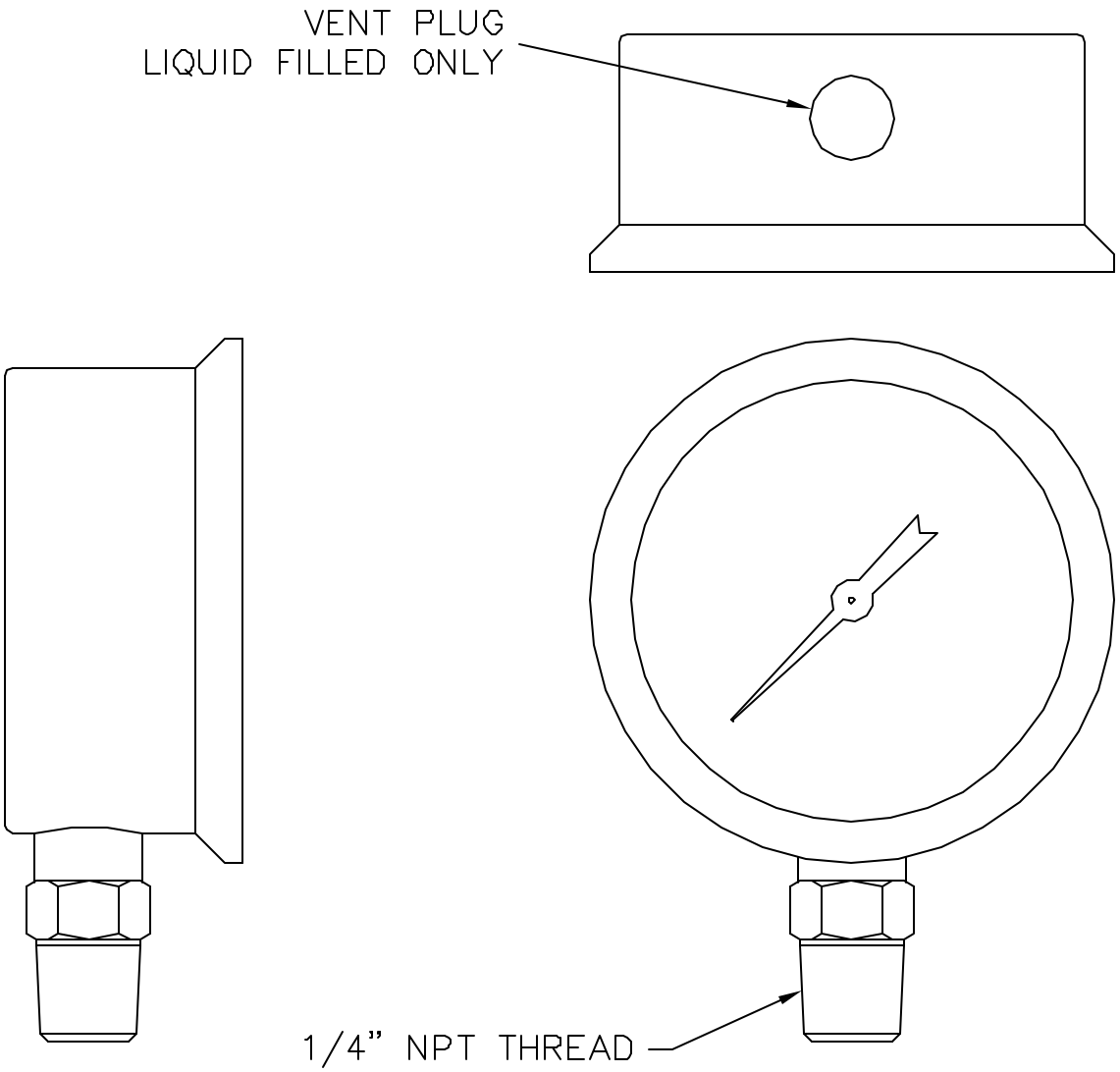
Authorized Manufacturer's Representative
Air / Gas Moving Equipment
460 W. GAY STREET
WEST CHESTER, PA 19380
PHONE: 610-692-5650 FAX: 610-692-5837

Pressure and Vacuum Gauges

We use both standard gauges and liquid filled gauges from a variety of manufacturers. Gauges are installed on our packages with gauge isolation valves (gauge cocks) part number BRS-VA-025-4F4M-BT. The gauge isolation valve can be used as a snubber while reading the gauge by opening it slightly. To protect gauges from damage due to shocks or pulsations in the system, gauge isolation valves should be closed except when the gauge is being read.

Liquid filled gauges may display incorrect readings due to variations in atmospheric pressure. To determine if a gauge is subject to this condition, the liquid filled cavity should be temporarily vented to atmosphere. Most liquid filled gauges have a seal plug in the liquid filled cavity. Remove this plug to allow the cavity to be vented to atmosphere. In some instances the case can be lightly squeezed to burp it. Replace the plug.





25.0.015PSI

NOMINAL SIZE
- 25 = 2.5in
- 40 = 4.0 in.

TYPE
- 0 = NON-FILLED
- 1 = LIQUID FILLED

RANGE

NOTES:
1. WE USE BOTH STANDARD GAUGES & LIQUID FILLED GAUGES FROM A VARIETY OF MANUFACTURERS
2. STANDARD RANGES:
   - PRESSURE: 0–6 PSI & 0–160 IWC
     0–15 PSI
     0–30 PSI
   - VACUUM: 0–12 IN. HG. & 0–160 IWC
     0–30 IN., HG.

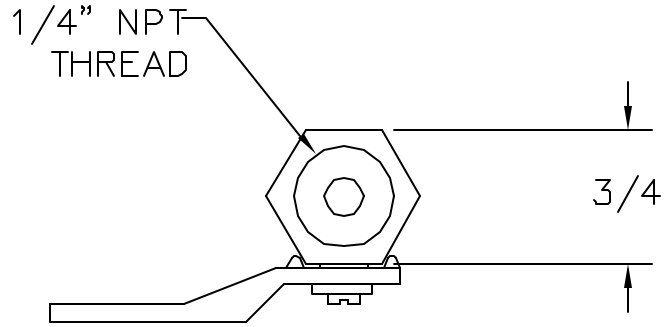
REV.	DATE	DESCRIPTION

DRAWN BY: M. WITTE	DATE 8-18-00
APPROVED BY:	DATE
DIMENSIONS IN INCHES	
SCALE	
TOLERANCE	ANGULAR TOLERANCE
MATERIAL	WEIGHT
SHEET 1 OF 1	

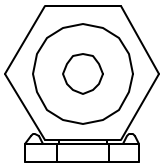
J. E. GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

PRESSURE GAUGE NUMBERING SYSTEM

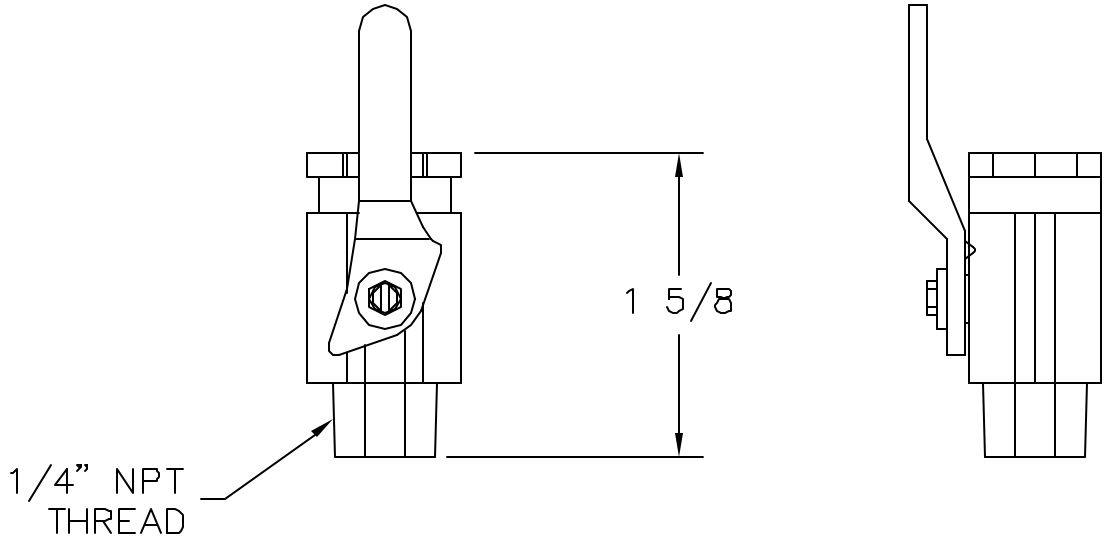
—



PLAN VIEW – CLOSED



PLAN VIEW – OPEN



			DRAWN BY: M. WITTE	DATE 8–17–00	J. E. GASHO & Assoc., Inc. 460 W. GAY ST. WEST CHESTER, PENNSYLVANIA 19380
			APPROVED BY:	DATE	
			DIMENSIONS IN INCHES		GAUGE ISOLATION VALVE SMC VA BRS 025–4F4M–BT
			SCALE		
			TOLERANCE	ANGULAR TOLERANCE	
			MATERIAL	WEIGHT	
REV.	DATE	DESCRIPTION	SHEET 1 OF 1		—

Maximum Operating Pressure - 500 psi
Maximum Operating Temperature - 180 Degrees F
Ball Through Hole Diameter - .218

025 SERIES BALL VALVE

025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

Example:	Inlet End	Outlet End	Seal	Handle	Plating
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP

SMC Part Number: 025-4F4M-B,SH,ENP

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

025 Series Options

Material Options Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

Body Options

- 1/4 Female x 1/4 Female NPT
- 1/4 Female x 1/4 Male NPT
- 1/4 Female x 1/8 Female NPT
- 1/4 Female x 1/8 Male NPT
- 1/4 Female x 1/4 Hose Barb
- 1/4 Female x 11/16-16 Male
- 1/4 Female x 7/16-24 Female
- 1/4 Female x 1/4 Female Flare
- 1/4 Female x 3/8 Compression

Handle Options Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

Plating Options Electroless Nickel, Black Zinc

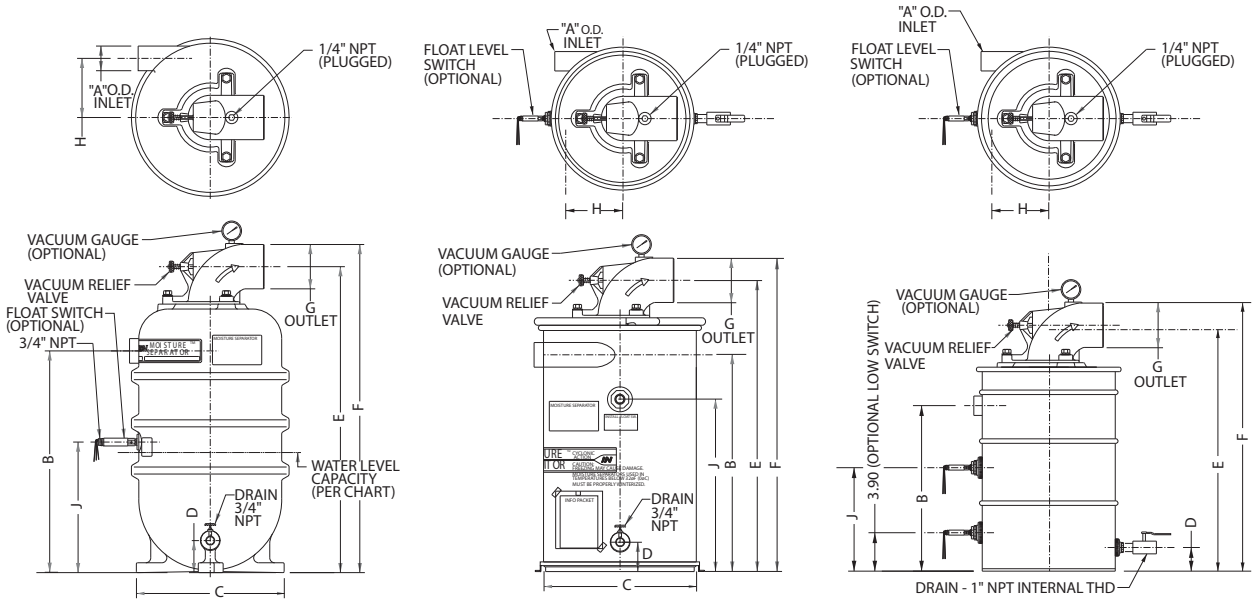
SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

Filtration - Moisture Separator

ROTRON®

By separating and containing entrained liquids, ROTRON'S™ moisture separator helps protect our regenerative blowers and the end treatment system from corrosion and mineralization damage. Recommended for all soil vacuum extraction applications.

SPECIFICATIONS:
SEPARATION METHOD – High E ciency Cyclonic
RELIEF VALVE MATERIAL – Brass & Stainless Steel
FLOAT MATERIAL – Copper
FLOAT SWITCH – SPDT, Explosion-proof
NEMA 7&9, 5 Amp max.



PLASTIC "P" DESIGN | METAL "D" DESIGN | METAL "B" DESIGN

Models without oat switch available. Metal MS200/300DS models are not the standard stocked, but are available.

		Part/Model Number							
		MS200PS	MS300PS	MS200DS	MS300DS	MS350BS	MS500BS	MS600BS	MS1000BS
Specification	Units	038519	038520	080086	080087	038357	080660	080659	038914
Dimension A	Inches	2.38	2.88	2.00	2.50	3.25	3.25	4.00	6.00
	mm	60.5	73.2	50.8	63.5	82.6	82.6	101.6	152.4
CFM Max.	CFM	200	300	200	300	350	500	600	1000
	m3/hr	340	510	340	510	595	850	1020	1700
Dimension B	Inches	22.46	22.46	22.12	22.12	28.00	28.00	27.00	31.00
	mm	570.5	570.5	561.8	561.8	711.2	711.2	685.8	787.4
Dimension C	Inches	16.00	16.00	16.75	16.75	23.00	23.00	23.00	27.00
	mm	406.4	406.4	425.5	425.5	584.2	584.2	584.2	685.8
Dimension D	Inches	3.25	3.25	2.75	2.75	4.00	4.00	4.00	4.00
	mm	82.6	82.6	69.9	69.9	101.6	101.6	101.6	101.6
Dimension E	Inches	31.05	31.05	27.92	27.92	37.25	37.37	37.37	47.32
	mm	788.7	788.7	709.2	709.2	946.2	949.2	949.2	1201.9
Dimension F	Inches	33.30	33.30	30.17	30.17	39.50	54.50	54.50	51.70
	mm	845.8	845.8	766.3	766.3	1003.3	1384.3	1384.3	1313.2
Dimension H	Inches	6	6.00	6.56	6.81	9.75	9.75	9.25	10.00
	mm	152.4	152.4	166.6	173	247.7	247.7	235	254
Dimension G	Inches	4.50 OD	4.50 D	4.50 D	4.50 OD	4.50 OD	6.63 ID	6.63 ID	8.62 OD
	mm	114.3	114.3	114.3	114.3	114.3	168.4	168.4	218.9
Dimension J	Inches	13.25	13.25	12.62	12.62	17.50	17.50	17.50	19.88
	mm	336.6	336.6	320.5	320.5	444.5	444.5	444.5	505
Drain Internal Thd	-	3/4	3/4	3/4	3/4	1	1	1	1
Shipping Weight	Lbs	42	42	42	42	82	95	96	150
	Kg	19.1	19.1	19.1	19.1	37.2	43.1	43.5	68

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
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

2.0 Moisture Separator™ Specifications

2.1 Duty

The moisture separator shall be designed for use in a soil vapor extraction system capable of continuous operation with a pressure drop of less than six inches of water at the rated flow of _____ SCFM. The separator shall be capable of operation under various inlet conditions randing from a fine mist to slugs of water with high efficiency.

2.2 Principle of Operation

The moisture separator shall incorporate cyclonic separation to remove entrained water. The separator must protect against an overflow by fail safe mechanical means. An electrical switch or contact(s) alone is not an acceptable means of protection against overflow, but is a good backup.

2.3 Construction

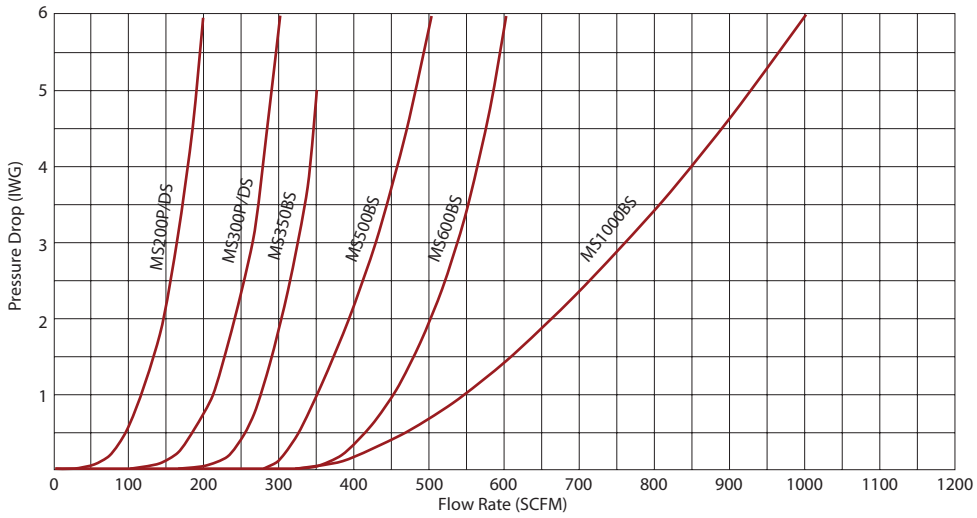
The body of the moisture separator shall be constructed of heavy wall plastic or heavy gauge cold rolled steel. The steel interior and exterior shall be epoxy (powder) coated to resist abrasion, corrosion, and chipping that might expose the surface. The inlet shall be tangentially located and welded to the body. The outlet port shall be constructed of PVC or cast aluminum alloy, flanged and sealed to the center of the top of the separator. The separator shall incorporate a non-sparking copper float ball and an adjustable relief valve to protect against overflow and overheating the blower.

2.4 Capacity and Dimension

The moisture separator must have a liquid capacity of _____ gallons. The inlet shall be _____ inch OD slip-on type. The outlet shall be _____ inch OD slip-on type.

For DR/EN/CP Blower Model	Selector Moisture Separator Model	Liquid-holding Capacity (gallons)	Inlet (OD)	Outlet	Max Vacuum Allow (IHG)
404 454 505 513	MS200PS	7	2.38	4.5 OD	12
523 555 633 833	MS200DS	10	2.0		22
656	MS300PS	7	2.88		12
6 757	MS300DS	10	2.5		22
808	MS350BS	40	3.25		
858 1233	MS500BS			6.63 ID	
909	MS600BS		4.0		
979 14	MS1000BS	65	6.0	8.62 OD	

2.5 Pressure Drop



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SERVICE AND PARTS MANUAL
FOR

MOISTURE SEPARATORS

Technical & Industrial Products
627 Lake Street, Kent, Ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
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OPERATION & MAINTENANCE MANUAL

Technical & Industrial Products
627 Lake Street, Kent, Ohio 44240 U.S.A.
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Rotron Moisture Separator

Thank you for purchasing an AMETEK Rotron MS series moisture separator. When matched with the correct Rotron blower, and properly installed and maintained, this separator will effectively and efficiently remove moisture from the air stream. To ensure good results, please take the time to read these instructions before starting the installation of your moisture separator.

Sizing for Optimal Efficiency

Separator	Max. CFM	Max. Vac	Capacity	Blowers – DR, EN & CP
MS200P(S)	200	12* IHg	7 gal.	101-555, 513, 523, 623
MS200D(S)	200	22 IHg	10 gal.	101-555, 513, 523, 623
MS300P(S)	300	12* IHg	7 gal.	606, 6, 707, 823
MS300D(S)	300	22 IHg	10 gal.	606, 6, 707, 823
MS350B(S)	350	22 IHg	40 gal.	808, 1223
MS500B(S)	500	22 IHg	40 gal.	858
MS600B(S)	600	22 IHg	40 gal.	909
MS1000B(S)	1000	22 IHg	65 gal.	14
Note: "S" suffix denotes presence of XP high level switch. * Special Construction with 20 IHg capability available.				

Installation

1. **Unpacking** - For MS200/300, remove drain valve taped to packing material and box containing liquid level switch, if so equipped. For MS350/500/600, remove box containing valve hardware as well as box containing liquid level switch (if so equipped) and remove internal cardboard packaging and cable ties from screen assembly.

2. **Bolt Down** (w/ feet included) - For MS200/300 models, built-in feet or a mounting ring is included. It is recommended that these units be bolted in place. All models will only work in an upright position.

3. **Piping** - Attach to system piping with flexible couplings to minimize stress incurred by rigid system piping. The connections should be airtight but not sealed with an adhesive for ease of disassembly during routine maintenance. Install drain valve, using teflon tape on threads.

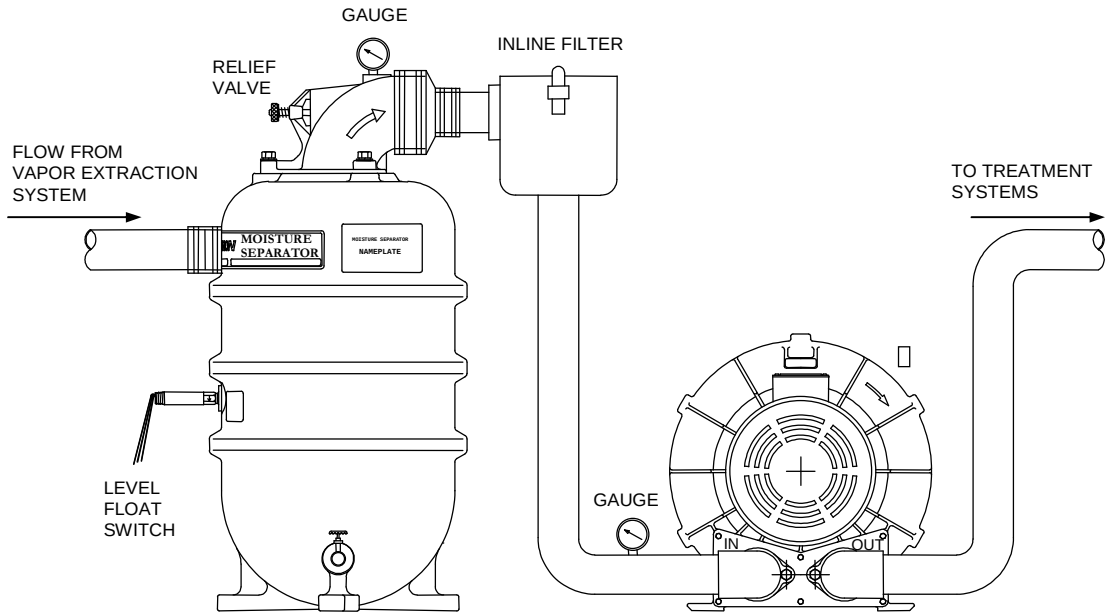
4. **Installation and Wiring of Liquid Level Switch** - Remove plug from the bulkhead fitting. Thread the switch by hand until snug with index arrow pointing down. Wire in accordance with the nameplate wiring schematic. Typically, the wiring is connected back to the starter to shut down the system but can be used for other purposes.

5. **Install/Adjust Relief Valve** - For MS500/600, first install the relief valve with teflon tape on threads. Use a wrench, but tighten only enough to prevent leakage. Next step for all MS units, back off the relief valve adjuster relaxing spring pressure. Then block the moisture separator inlet while measuring the motor current. Adjust the valve until the motor current is 90% of the max. nameplate blower amps.

6. **Continuous Service** - For cold weather service, appropriate steps should be taken to prevent freezing. Also, the maximum vacuum ratings are based on 115°F maximum. Consult factory for higher potential ambients.

Note: A moisture separator is not a substitute for an inline air filter. A Rotron inline filter should be used to remove particles that pass through the separator.

Typical Vapor Extraction System



Operation

Moisture-laden air enters the separator through the tangential inlet. Cyclonic action removes free moisture from the air stream and allows the air to discharge through the top of the separator. When the separator is full, the float valve shuts off the air flow through the separator, and the relief valve opens to limit the vacuum of the blower.

To drain the separator, turn off the blower and open the drain valve at the bottom of the separator. Caution: The liquid contained in the separator should be analyzed before it is released back into the environment. It may be considered hazardous waste in certain geographical areas and require special treatment/disposal. Once the liquid is drained, the unit can be reset by turning the blower back on.

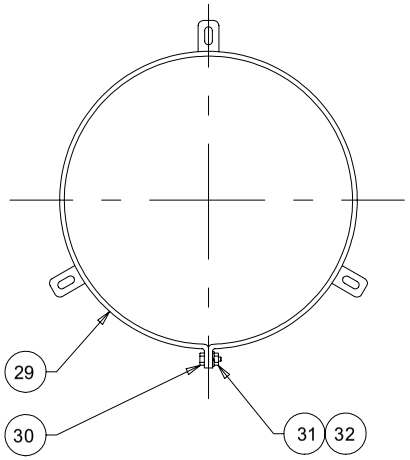
Automatic draining options are at the discretion of the customer.

Maintenance

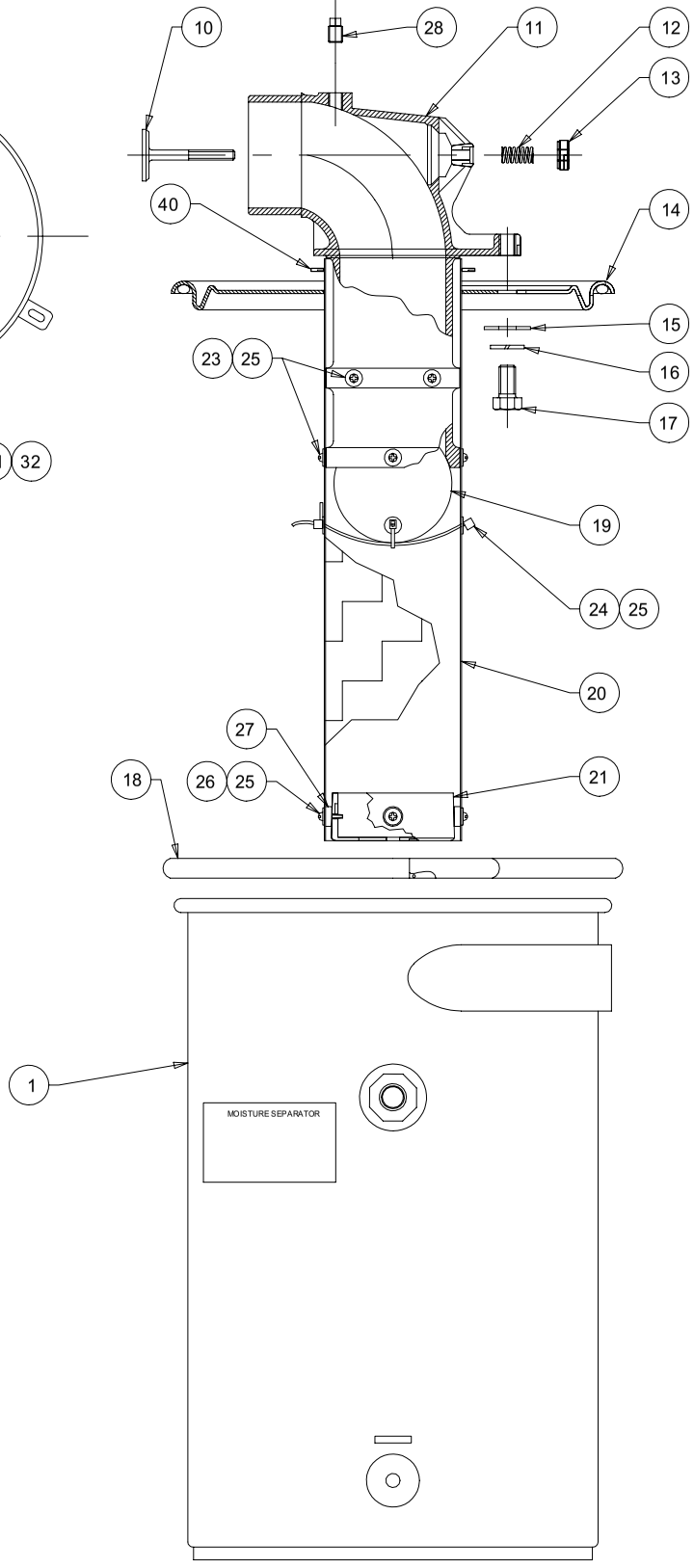
This MS series moisture separator has been designed to require minimal maintenance. During normal operation a layer of sludge may build up on the bottom of the separator. As necessary, the top assembly of the moisture separator should be removed and the inside cleaned out with water. Keeping the inside clean will prevent the valve from becoming clogged with sediment. The relief valve should be inspected upon emptying the separator and readjusted (per installation instruction 5) upon restart.

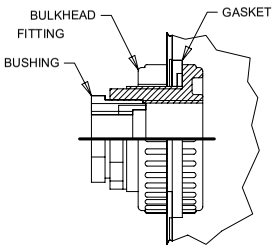
If you have any questions regarding this product, contact your local sales representative or our Application Engineering Department at the factory.

AMETEK ROTRON
MOISTURE SEPERATOR

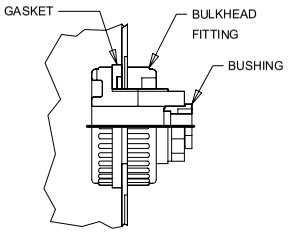


FOOT CLAMP DETAIL

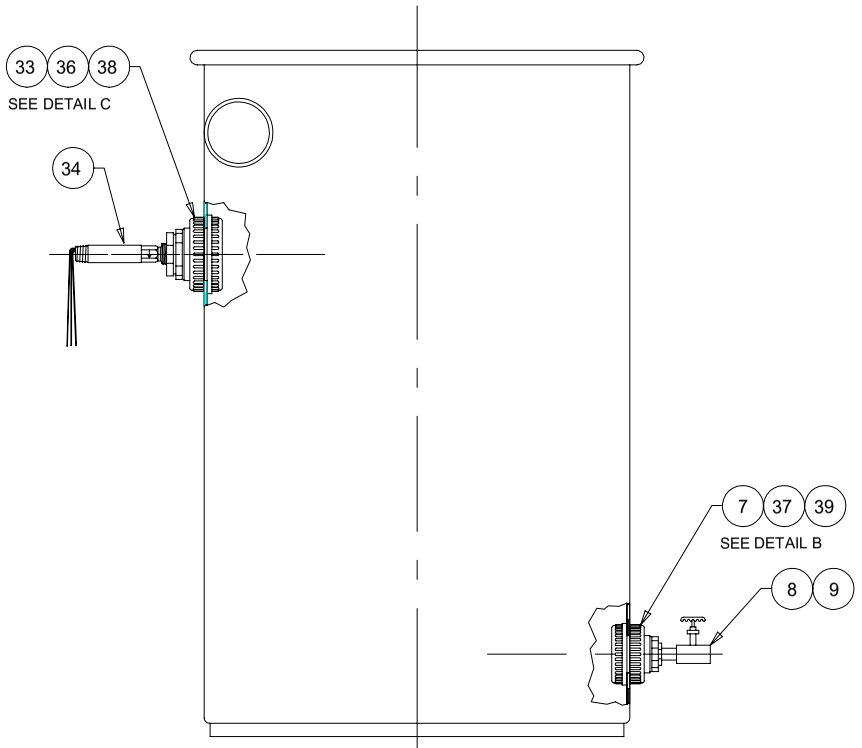




DETAIL C
BULKHEAD FITTING ASSY



DETAIL B
BULKHEAD FITTING ASSY



Moisture Separator
Service and Parts Manual

Parts Breakdown

Model:	**MS200/300D_**	**MS350B_**	**MS200/300P_**	**MS500/600B_**	**MS1000**
Part No.:	**038355**	**038277**	**038517**	***038353***	**038914**
	038356	**038357**	**038518**	***038354***	**038916**
	038275		**038519**	***038003***	**080019**
	038276		**038520**	***038075***	
	080086			**080657**	
	080087			**080658**	
				080659	
				080660	
				080661	
				080662	
				OBSOLETE	

Item No.	Qty. Req'd	Description					
1	1	Drum Assembly	See Next Page	See Next Page	See Next Page	See Next Page	See Next Page
7	1	Bulkhead Fitting Drain	529830	529830	Not Used	529830	529830
8	1	Drain Valve	523374	523407	523374	523407	523407
9	1	Pipe Nipple Drain	551140	523406	155416	523406	523406
10	1	Relief Valve Stem	529318	529318	529318	Not Used	550621
11	1	Outlet	529323	529323	529323	See Outlet Assy #42 Below	550646
12	1	Spring - Relief Valve	155339	155339	155339	Not Used	155476
13	1	Nut-Knurled Relief Valve	155342	155342	155342	Not Used	155471
14	1	Lid	550674	523403	Not Used	523404	550566
	1	Gasket for lid	Not Used	551102	Not Used	551102	551640
15	3	Washer, Flat, Lid/Outlet	155159	155159	155091	Not Used	155159
16	3	Washer, Lock, Lid/Outlet	120338	120338	251787	Not Used	120338
17	3	Bolt, Lid/Outlet	155343	155343	120255	Not Used	155343
18	1	Lock Ring - Lid	See Next Page	528926	Not Used	528926	550652
19	1	Float Ball	528803	528803	528803	528956	550569
20	1	Cage, Float	551138	528957	529887	528958	550568
21	1	Endcap	529884	529884	529884	528954	550678
23	6	Screws Cage	251645	251645	251645	(9 pcs) 251645	(11 pcs) 251645
24	4	Tie Cable *	155276	155276	Not Used	155276	155276
25	13	Washer Cage - Various Places	155115	155115	(9 pcs) 155115	(16 pcs) 155115	(18 pcs) 155115
26	3	Screws Endcap	155415	155415	155415	(3 pcs) 251645	(3 pcs) 251645
27	3	Spacer Endcap	155417	155417	155417	Not Used	Not Used
28	1	Pipe Plug - Outlet	155344	155344	155344	Not Used	155344
29	1	Foot Clamp	See Next Page	Not Used	Not Used	Not Used	Not Used
30	1	Bolt, Foot Clamp	120325	Not Used	Not Used	Not Used	Not Used
31	1	Nut, Foot Clamp	155049	Not Used	Not Used	Not Used	Not Used
32	1	Lockwasher, Foot Clamp	120203	Not Used	Not Used	Not Used	Not Used
33	1	Bulkhead Fitting Float Switch	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
34	1	Float Switch	See Next Page	See Next Page	See Next Page	See Next Page	See Next Page
36	1	Bushing, Float Switch	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
37	1	Gasket, Blulkhead Fitting - Drain Spigot	529831	529831	Not Used	529831	529831
38	1	Gasket, Bulkhead Fitting	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
39	1	Bushing, Drain Valve	529849	Not Used	Not Used	Not Used	Not Used
40		Gasket, Outlet	529514	529514	529514	Not Used	550653
41		Pipe Plug, Float Switch	Not Used	Not Used	See Next Page	Not Used	Not Used
42		Outlet Assembly (consists of one each of the following)				Tee - 523402 Pipe - 116135 Seat Float - 528955 Reducer, Relief Valve - 528959 Bushing, Relief Valve - 551639	
43		Relief Valve Complete	Not Used	Not Used	Not Used	523230	Not Used

*As Needed **Viewed looking at inlet/outlet ports

Model	Model Part No.	Item No.	Item Part #
MS200DS	038355	1	529463
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS300DS	038356	1	529464
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS200D	038275	1	523362
		14	529006
		18	529004
		29*	529367
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS300D	038276	1	551141
		14	529006
		18	529004
		29	529367
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS350BS	038357	1	529465
		33	529841
		34	529461
		36	552634
		38	529842
MS350B	038277	1	523399
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS300PS	038520	1	529668
		34	529461
		41	Not Used
MS1000B	038916	1	550560
		33,34,36,38	Not Used
MS1000B2S	080019	1	550566
		18	Not Used
		33 (2 pcs)	529841
		34 (2 pcs)	529461
		36 (2 pcs)	552634
		38 (2 pcs)	529842

Model	Model Part No.	Item No.	Item Part #
MS200PS	038519	1	529435
		34	529461
		41	Not Used
MS300P	038518	1	529668
		34	Not Used
		41	155405
MS200P	038517	1	529435
		34	Not Used
		41	155405
MS500B	038354	1	529465
	(Obsolete)	33	529841
		34	529461
	080660	36	552634
	(New P/N)	38	529842
MS600BS	038353	1	529466
	(Obsolete)	33	529841
		34	529461
	080659	36	552634
	(New P/N)	38	529842
MS500B	038075(Obsolete)	1	523399
		33	Not Used
	080658 (New P/N)	34	Not Used
		36	Not Used
		38	Not Used
MS600B	038003	1	551143
	(Obsolete)	33	Not Used
		34	Not Used
	080657	36	Not Used
	(New P/N)	38	Not Used
MS1000BS	038914	1	550561
		33	529841
		34	529461
		36	552634
		38	529842
MS300DS	080087	1	550672
		18	523296
		29	550688
		33	529841
		34	529461
		36	552634
		38	529842
MS200DS	080086	1	550669
		18	523296
		29	550688
		33	529841
		34	529461
		36	552634
		38	529842
MS500B2S	080662	1	550650
		33 (2 pcs)	529841
		34 (2 pcs)	529461
		36 (2 pcs)	552634
		38 (2 pcs)	529842

*As Needed **Viewed looking at inlet/outlet ports

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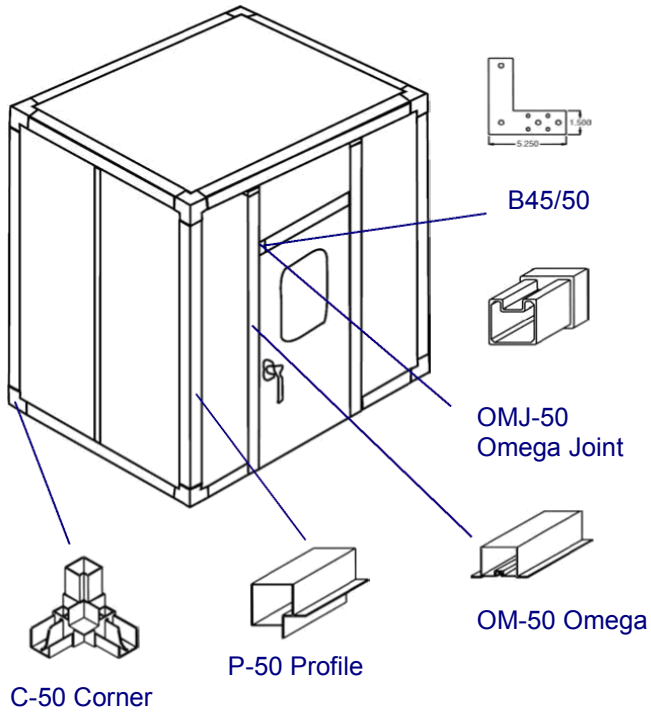


Options:

- ♦ STC Rated Panels up to 55 dBA
- ♦ Mylar, Polyethylene or Fiberglass Cloth Lining
- ♦ Framed Cutouts/Openings
- ♦ Primer or Finish Paint
- ♦ Multiple Gauge Construction
- ♦ Variety of materials available
- ♦ Custom Designs per You Acoustical/Thermal Requirements
- ♦ Multiple Insulation Materials and Densities
- ♦ Available in Quick Removable Panels

Thermal Performance:

Individual panels will have a "U" factor 0.07 and an entire panel enclosure will have a 0.14

Fire Hazard Rating:

Standard acoustical fill will have the following UL Fire Hazard Ratings as per ASTM E-84: **Flame Spread -15 / Fuel Contributed -0 / Smoke Developed -0**

Acoustical Performance* - Standard Construction

Sound Transmission Loss (ASTM E-90-81)							*All acoustical tests were performed and reported by an Independent Accredited Acoustical Laboratory. Copies of test reports furnished upon request.
Octave Band Center Frequency (Hz)	125	250	500	1000	2000	4000	STC
4" Panel (TL in dB)	22	29	40	48	54	60	41
2" Panel (TL in dB)	21	24	35	43	52	57	37

Sound Absorption Coefficients (ANSI/ASTM C243-81 and E795)							
Octave Band Center Frequency (Hz)	125	250	500	1000	2000	4000	NRC
4" Panel	.86	1.09	1.22	1.06	1.05	1.04	1.10
2"Panel	.31	.82	1.19	1.12	1.07	1.06	1.11

Maximum Operating Pressure - 500 psi
Maximum Operating Temperature - 180 Degrees F
Ball Through Hole Diameter - .218

025 SERIES BALL VALVE

025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

Example:	Inlet End	Outlet End	Seal	Handle	Plating
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP

SMC Part Number: 025-4F4M-B,SH,ENP

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

025 Series Options

Material Options Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

Body Options

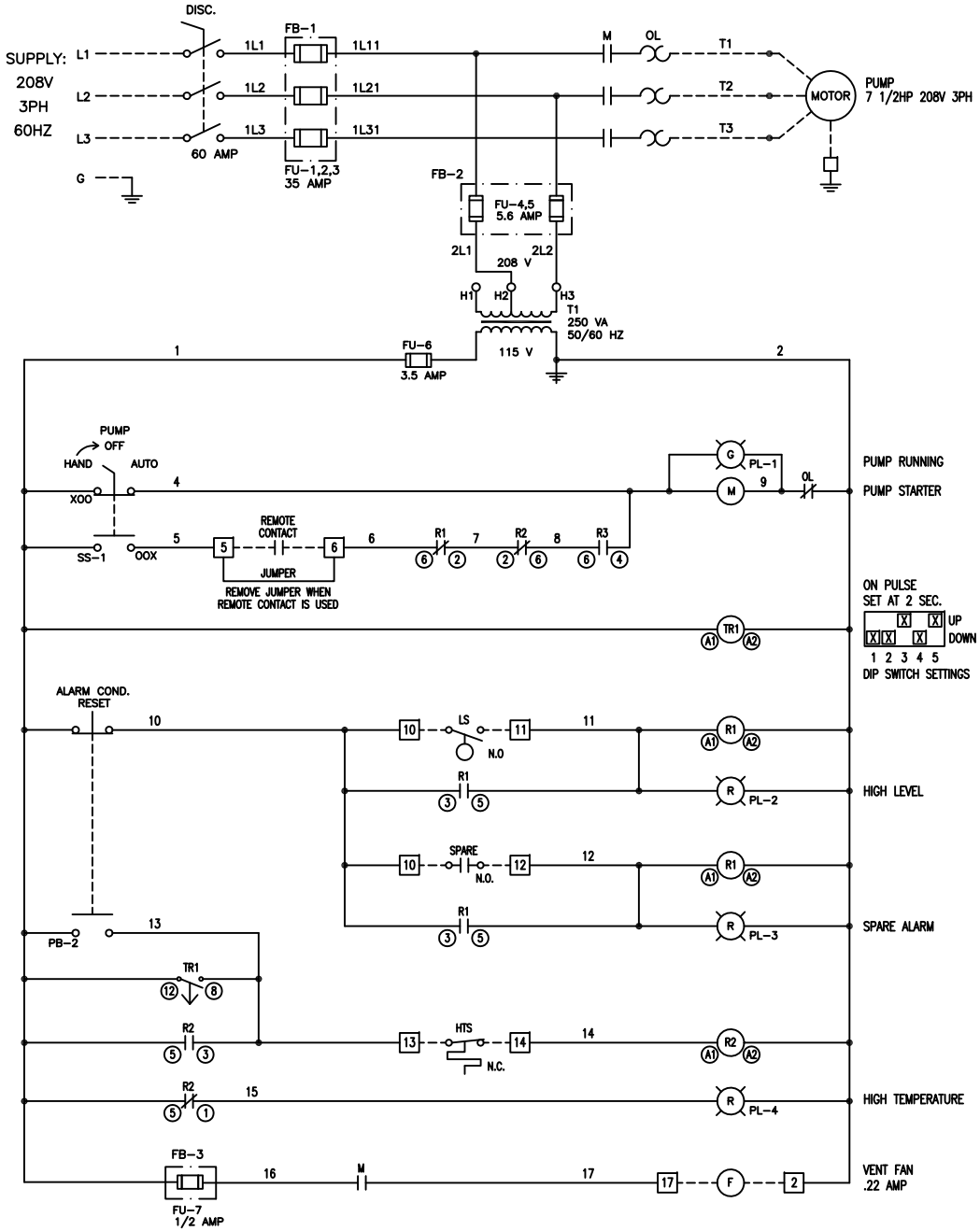
- 1/4 Female x 1/4 Female NPT
- 1/4 Female x 1/4 Male NPT
- 1/4 Female x 1/8 Female NPT
- 1/4 Female x 1/8 Male NPT
- 1/4 Female x 1/4 Hose Barb
- 1/4 Female x 11/16-16 Male
- 1/4 Female x 7/16-24 Female
- 1/4 Female x 1/4 Female Flare
- 1/4 Female x 3/8 Compression

Handle Options Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

Plating Options Electroless Nickel, Black Zinc

SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF
DELIVERING NOT MORE THAN 5Ka RMS
SYMMETRICAL AMPERES, 480 VOLTS MAXIMUM



REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

NOTES:

1. ☐ INDICATES TERMINAL BLOCK
2. ○ INDICATES COMPONENT TERMINAL POINT
3. USE COPPER WIRE ONLY
4. REPLACE WITH LIKE FUSES ONLY
5. ALL CONTACTS SHOWN WITH POWER OFF
6. HTS – INDICATES TEMPERATURE SWITCH
7. LS – INDICATES LEVEL SWITCH
8. TORQUE TERMINALS TO 5-7 LB-IN
9. UL LISTED CONTROL PANEL

J.E. GASHO & ASSOCIATES
PO# 52744-2966

ICP S.O.# XXX

HP 7 1/2

VOLTAGE 208/3/60

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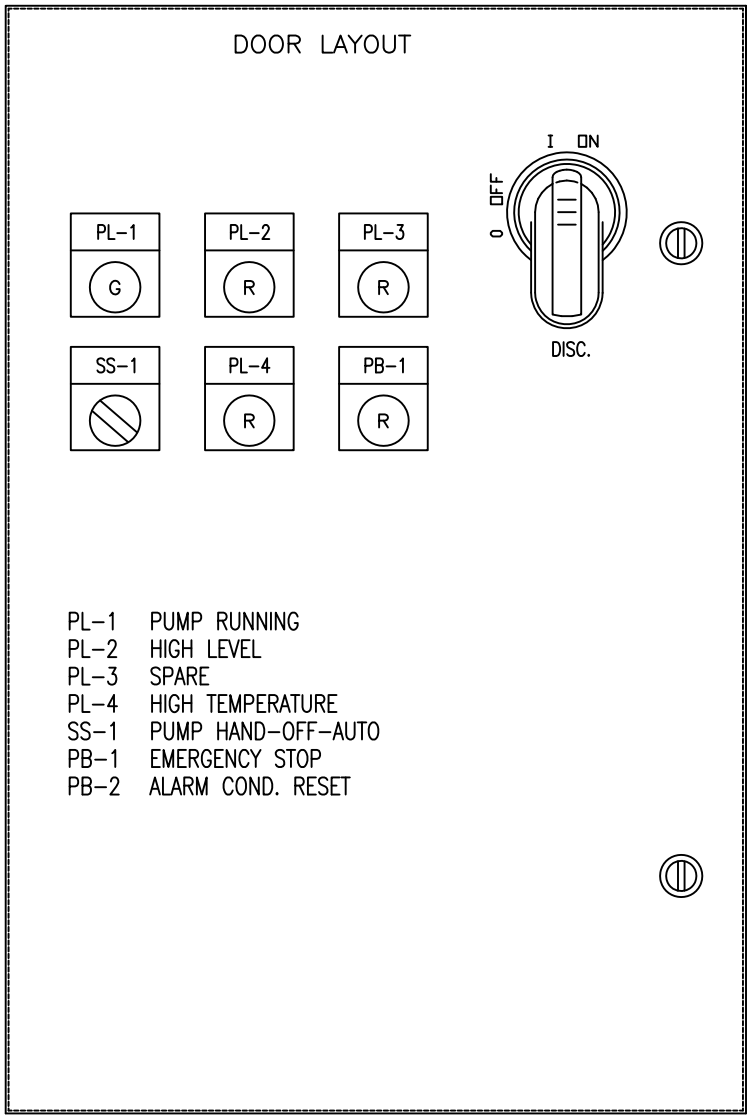
TITLE: STARTER CONTROL PANEL

DATE	PAGE	DWG NO.	
4/12/15	1 OF 2	GASH133	INTERNATIONAL CONTROL PRODUCTS, INC.

DOOR LAYOUT



PL-1 PUMP RUNNING
PL-2 HIGH LEVEL
PL-3 SPARE
PL-4 HIGH TEMPERATURE
SS-1 PUMP HAND-OFF-AUTO
PB-1 EMERGENCY STOP
PB-2 ALARM COND. RESET

BILL OF MATERIALS

ITEM	QTY	ITEM LABEL	MFG.	DESCRIPTION	PART NUMBER
1	1	ENCL	SCE	24x16x8 NEMA 4 ENCLOSURE	SCE-24EL1608LP
2	1	ENCL	SCE	21x13 STEEL BACK PANEL	SCE-24P16
3	1	DISC.	ABB	3P 60 AMP DISCONNECT	OT63F3
4	1	DISC.	ABB	NEMA 4 DISCONNECT HANDLE	OHB65L6
5	1	DISC.	ABB	DISCONNECT SHAFT	OXP6X210
6	1	FB-1	MERSEN	3P 60A CLASS J FUSE BLOCK	60608J
7	3	FU1,2,3	MERSEN	35 AMP CLASS J FUSE	AJT-35
8	1	M	SIEMENS	28 AMP IEC CONTACTOR	3RT1033-1AK60
9	1	M	SIEMENS	1 N.O. AUX. CONTACT	3RH1921-1CA10
10	1	OL	SIEMENS	OVERLOAD RELAY (18-25 FLA)	3RU1136-4DB0
11	1	SS-1	ABB	3 POS. S.S. SPRG. RET. L TO C (2 N.O.)	M3SS7-30B-20
12	1	PL-1	ABB	GREEN F.V. PILOT LIGHT - 120V	CL-100G
13	2	PL-2,3	ABB	RED F.V. PILOT LIGHT - 120V	CL-100R
14	1	PB-1	ABB	BLACK FLUSH P.B. (1 N.O./1 N.C.)	MP1-30B-11
15	1	T1	SIEMENS	250VA CONTROL TRANSFORMER	MT0250F
16	1	FB-2	MERSEN	2P 30A CLASS CC FUSE BLOCK	30322R
17	2	FU-4,5	MERSEN	5 6/10 AMP CLASS CC FUSE	ATQR-5 6/10
18	1	FU-6	MERSEN	3 1/2 AMP TIME DELAY FUSE	TRM-3 1/2
19	1	FB-3	MERSEN	1P 30A MIDGET FUSE BLOCK	30321
20	1	FU-7	MERSEN	1/2 AMP TIME DELAY FUSE	TRM-1/2
21	1	TR1	FINDER	2 POLE TIMER - 120V	85.02.0.125.0000
22	1	TR1	FINDER	2 POLE TIMER SOCKET	94.82
23	3	R1,2,3	FINDER	2 POLE RELAY - 120V	56.32.8.120.0040
24	3	R1,2,3	FINDER	2 POLE RELAY SOCKET	96.72
25	8	T.B.'S	PHOENIX	TERMINAL BLOCK	3004362
26	1	T.B.'S	PHOENIX	TERMINAL BLOCK END COVER	3003020
27	2	T.B.'S	PHOENIX	DIN RAIL END RETAINER	0800886
28	2	GROUND	BURNDY	14-2 AWG GROUND LUG	DLA2

REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

J.E. GASHO & ASSOCIATES
PO# 52744-2966

ICP S.O.# XXX

HP 7 1/2

VOLTAGE 208/3/60

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TITLE: STARTER CONTROL PANEL

DATE	PAGE	DWG NO.	
4/12/15	2 OF 2	GASH133	INTERNATIONAL CONTROL PRODUCTS, INC.

Gasho
SINCE 1982
The Leader in Blower & Vacuum Solutions

L&M Builders Group LLC
1865 Palmer Avenue, Suite 203
Larchmont, NY 10538

Purchase Order # 802864-28

Gasho Custom Package Utilizing AMETEK Model **EN909BG72WL,** Moisture Separator, Enclosure & Control Panel

May 7, 2015

AMETEK

Rotron® Industrial Products

Field Service Tool – FST11

Field start up/ review check list.

Rotron blowers are known for their reliability, durability and long life. Below are some general items to check prior to starting up the blower. Additional details can be found in the O&M manuals as well as the installation guidelines sheet that is included in the blower shipment. If additional information is needed, please contact the factory.

Overview:

1) Initial impressions
2) Blower information
3) Filter information
4) Relief valve information
5) Gage information
6) Noise enclosure information
7) Moisture Separator information
8) Remote drive belt tension information

1. **Initial impressions**:
   - Is the area around the blower clear of obstructions
   - Is the piping supported to minimize the stress on the blower flanges
   - Are any hazards labeled
   - Is the area(s) secure
   - Are the relevant persons present for this review and instruction time.
   - Does the appropriate persons have the correct O&M manuals, catalog cut sheets etc for the blower and any accessories

2. **Blower review**

- Is the blower bolted securely to a foundation/ skid/ structure
- Is the blower wired properly (for XP motors are the PDTO thermal leads used (labeled "J")).
- If this is a remote drive, are the belts tightened correctly (see section on belts)
- Is the blower turning in the correct rotation (ie. Jog the motor to check). (note rotation arrows on the blower, as well as In and Out ports
- Is the filter installed correctly (see filter section next page)
- Is the relief valve present, and set (as it's not factory set)
- Are the gages installed correctly (see system sketch, as well as relief valve section)
- Is there a noise enclosure present (see noise enclosure section).

Field start up check list.

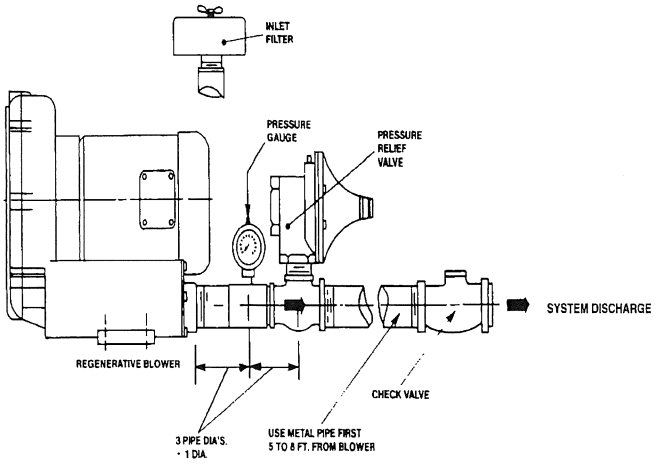
3. **Filter**

- Is the filter supported
- Is the element present inside the filter body.
- For inline filters, the lid is removed via three latches, for single connection filters, the wing nut holds the weather hood on.
- The element is washable in lukewarm water, and air dried. This can be done 2 to 3 times.
- If the differential over the initial vacuum reading increases by 10 IWG, then the filter needs to be cleaned or changed.
- For spare elements, see Ametek Rotron catalog.

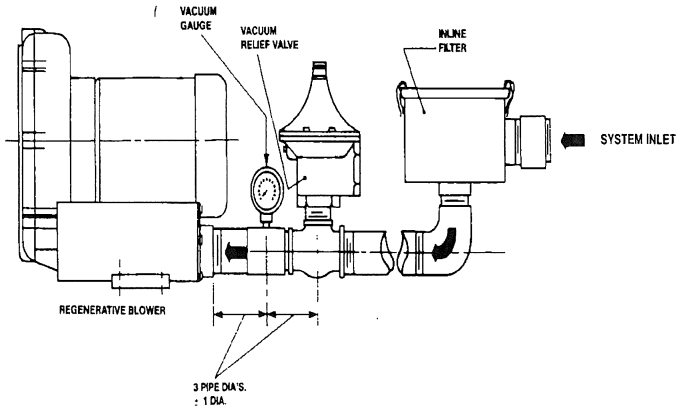
4. **Relief Valve**

- Is the valve supported by hard piping.
- Is the vent port open, and not blocked.
- Is valve connected correctly? See sketches at bottom of this page.
- Note: Vacuum gage will NOT work attached to the relief valve.
-

Typical Pressure System



Typical Vacuum System



Field start up check list.

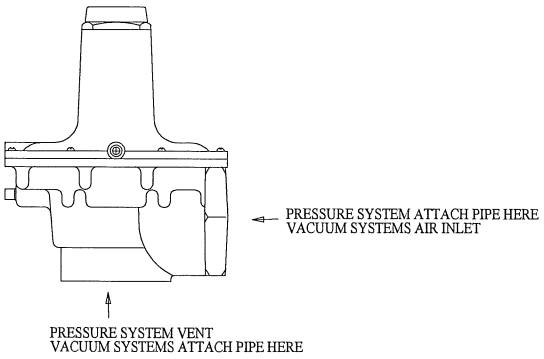
4. Relief valve (con't)

- Setting instructions for 1" and 2" relief valves

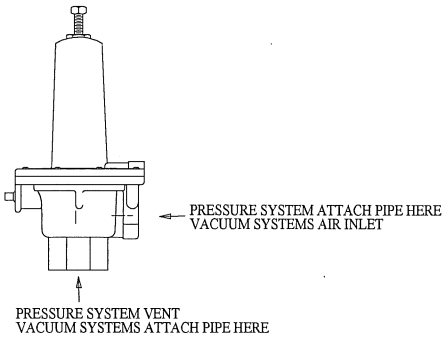
Procedure

1. For use as a vacuum relief valve, remove and discard the internal snap ring and screen guard on the valve's outlet. Mount valve and gauge as shown on the diagram.
2. Loosen locknut and turn adjustment bolt counterclockwise, obtaining a low pressure/vacuum relief valve cracking point. For 2" valves, an access cover must be removed and replaced after setting.
3. Fully impede air stream to/from the application, energize blower, and observe system pressure/vacuum.
4. Adjust relief valve, turning bolt clockwise (1" valve), obtaining a system pressure/vacuum about 10% below published maximum pressure/vacuum capability. For 2" valve, the slotted washer is used to set the valve, not the small center bolt.
5. Tighten locknut and retest for appropriate setting, repeatedly allowing air to flow through delivery line and then impeding it. Re-adjust as necessary.

2" valve



1" valve

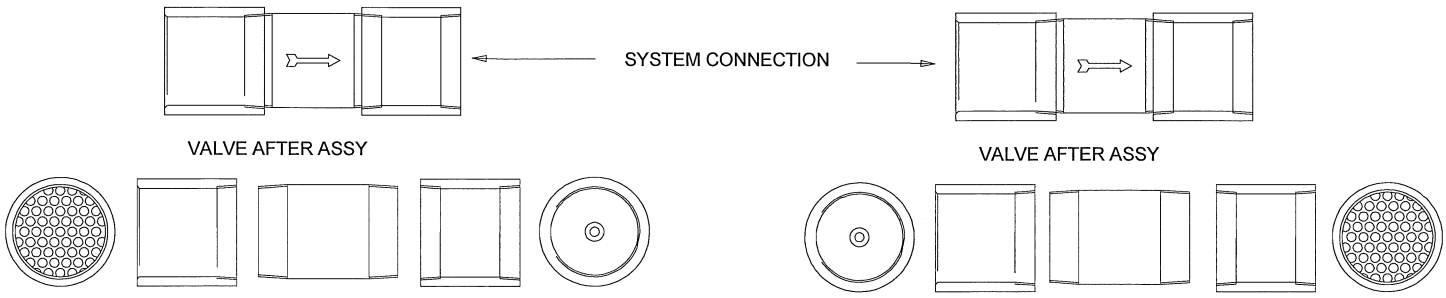


4. Relief valve (con't)

- Setting instructions for 551026 and 551027

Procedure

1. Both the above valves are initially set for VACUUM SERIVCE.
2. Note picture below on left is how valve arrives, simply flip endpieces to change from suction to a pressure valve.
3. Turn adjustment bolt counterclockwise, obtaining a low pressure/vacuum relief valve cracking point.
3. Fully impede air stream to/from the application, energize blower, and observe system pressure/vacuum.
4. Adjust nut, tightening nut increases vacuum/ pressure cracking point.

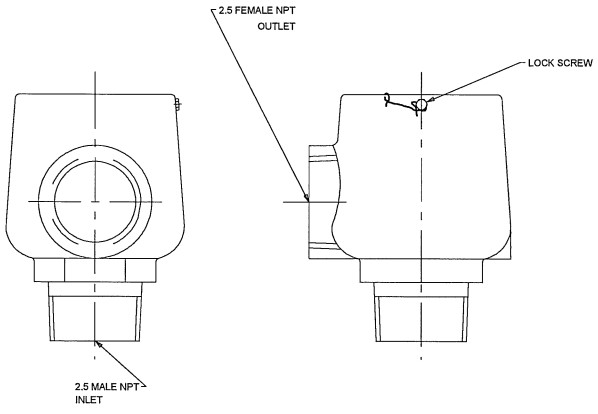


4. Relief valve (con't)

- Setting instructions for 550246 and 550247

Procedure

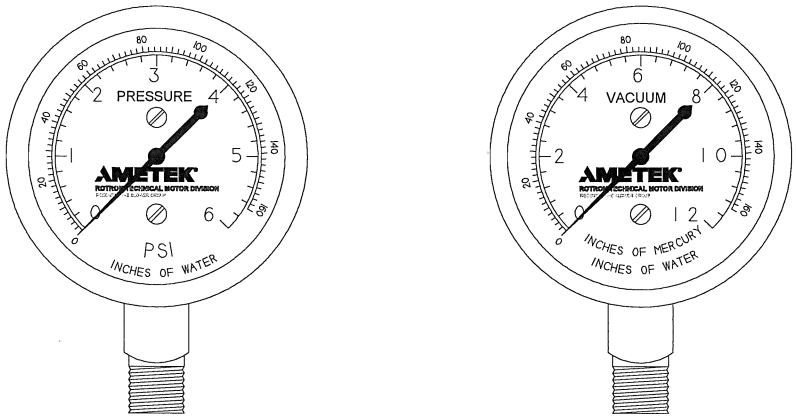
1. Mount the valve and gauge as shown in the system diagram.
2. Cut the wire to locknut and loosen.
3. Turn the top of the valve counterclockwise , obtaining a low pressure/vacuum relief valve cracking point.
4. Fully impede air stream to/from the application. Energize blower and observe system pressure/vacuum.
5. Adjust relief valve by turning the top of the valve clockwise to obtain a pressure/vacuum about 10% below published maximum pressure/vacuum.
6. Tighten locknut and retest for appropriate setting, repeatedly allowing air to flow through delivery line and then impeding air stream until relief valve cracks. Readjust as necessary.



550247	VAC.	8" HG
550246	PRESS.	4 PSIG
ROTRON PART NO.	MODE	SET PRESS./VAC.

5 Gages

- Gages are used to measure vacuum, pressure and temperature. They are very useful in troubleshooting the blower should that be necessary, and are essential for setting the relief valve.
- Note a vacuum gage can not be used on the relief valve in the vacuum mode as it will read atmospheric vacuum, and not system vacuum.
- Gages that Ametek supplies can be attached to piping systems by drilling a ¼" female connection in the pipe. This hole should be drilled prior to the piping being connected, and cleaned out prior to installation to prevent shavings from being ingested into the blower.



TYPE: 2 1/2" DIAL SIZE- DIAPHRAGM OPERATED.
CONNECTION-1/4" NPT MALE BOTTOM CONNECTION

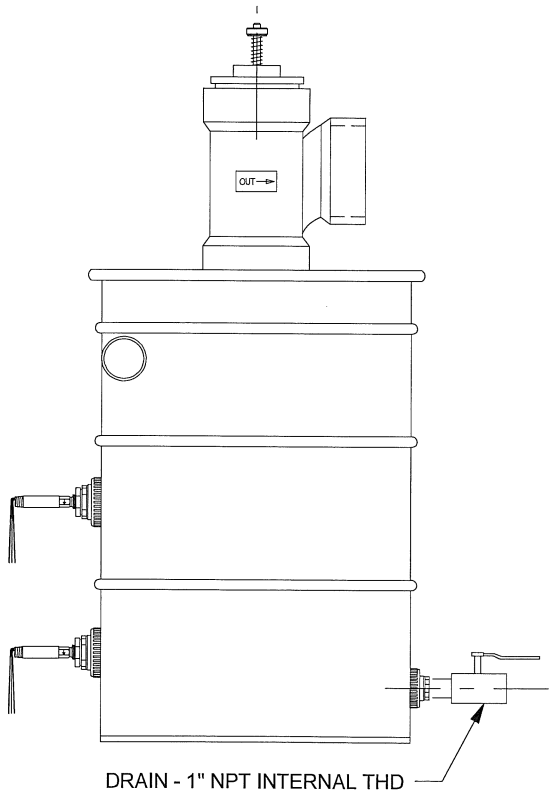
6 Noise Enclosure

- Noise enclosure is used to reduce the blower noise to 80 dba @ 1 meter (or less)
- Enclosure should be bolted down.
- Note: Customer must cut enclosure for the connections (inlet or outlet).
- In addition, the customer must wire the cooling fan, as Ametek supplies forced air ventilated enclosures.
- Sides are removable, but may require system piping to be disconnected to do so.
- See catalog cut sheets or customer drawing for further information.

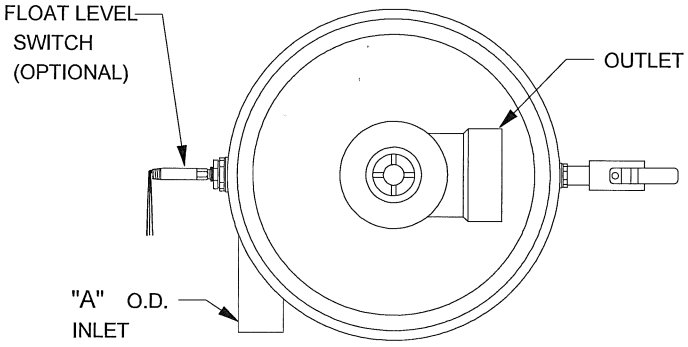
7 Moisture Separator

- Is the MS unit bolted securely to a foundation/ skid/ structure
- Has the float ball been cut loose, and lowered to the bottom of the screen. It has 2 to 3 cable ties that need to be removed and properly discarded.
- Connections to the MS unit should be done with a flexible coupling like a Fernco brand.
- The relief valve on top is NOT factory preset, and should be set.
- If the unit has float switches, these should be wired according to the diagram on the float switch itself.
- If there are additional questions about parts, please see the catalog cut sheet or the O&M manual.

SIDE VIEW



TOP VIEW



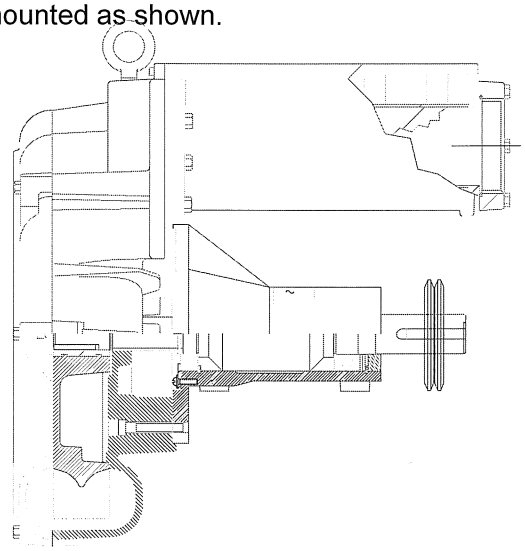
AMETEK

Rotron® Industrial Products

Field Service Tool – FST11

Remote Drive Blower Belt Tensioning Guidelines

Proper belt tensioning can increase the life expectancy and reduce the maintenance requirements of Rotron Remote Drive Regenerative blowers. Primary factors which influence bearing life include sheave location, shaft alignment, shaft speed and belt tension. Rotron recommends installing the belt sheave mid way on the shaft keyhole as shown below. Below are factory recommended maximum belt tensions for properly aligned blowers designed to operate with bearing L10 life of 25,000 hours with the blower sheave mounted as shown.



Procedure:

1) Find correct table for Remote Drive Blower Model
2) Choose the highest RPM the blower will be operating at.
3) Reference table for maximum recommended belt tension loads (lbs).

Example: An EN909RDL operating at 4500 RPM with the sheave mounted mid-way between the shaft end and keyway end should have a belt tension no greater than 450 lbs. for an estimated bearing life of 25,000 hrs.

DR/CP/EN404-DR/CP/EN606 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs) L10 Life (HRS)	
1500 RPM	471
2500 RPM	397
3500 RPM	355
4500 RPM	327
5500 RPM	306

DR/CP/EN523 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	499
2500 RPM	421
3500 RPM	376
4500 RPM	346
5500 RPM	323

DR/CP/EN6 - DR/CP/EN707 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	530
2500 RPM	447
3500 RPM	400
4500 RPM	367
5500 RPM	344

DR/EN/CP858 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	652
2500 RPM	550
3500 RPM	492
4500 RPM	452
5500 RPM	423

DR909 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	1040
2500 RPM	877
3500 RPM	784
4500 RPM	721
5500 RPM	674

EN/CP909 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	649
2500 RPM	547
3500 RPM	489
4500 RPM	450
5500 RPM	421

DR/EN/CP14 REMOTE DRIVE MODELS	
Maximum Recommended Belt Tension (lbs)	
1500 RPM	1231
2500 RPM	1038
3500 RPM	928
4500 RPM	854
5500 RPM	798

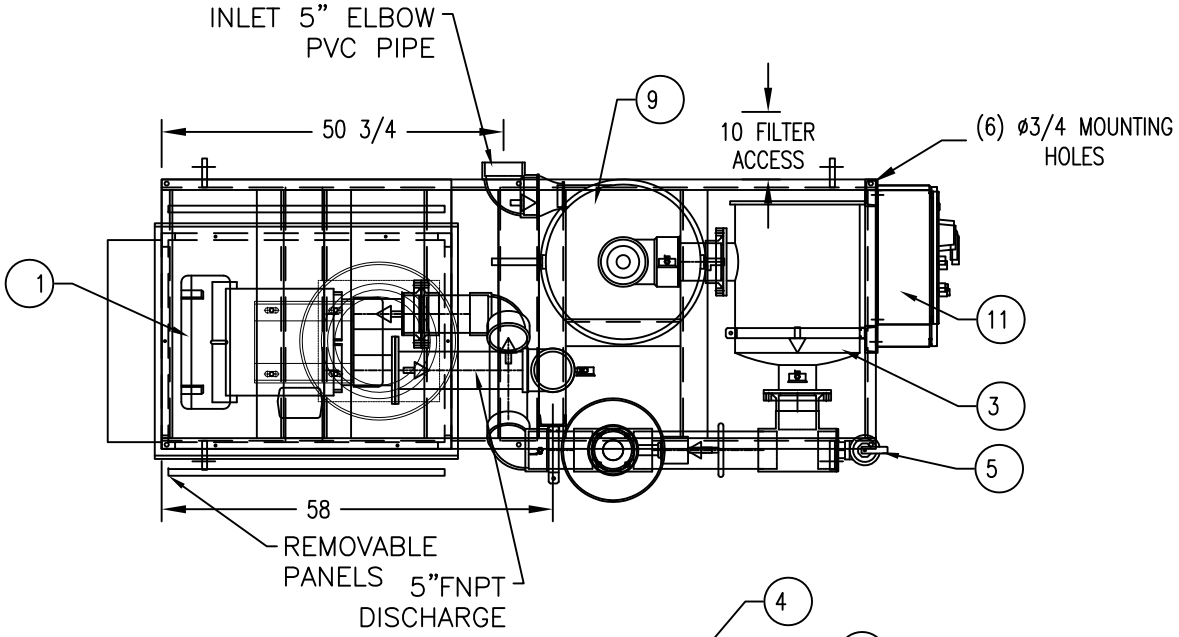
If blower sheave must be located at end of the blower shaft keyway, multiply table value of maximum recommended belt tension X ***1.13.***

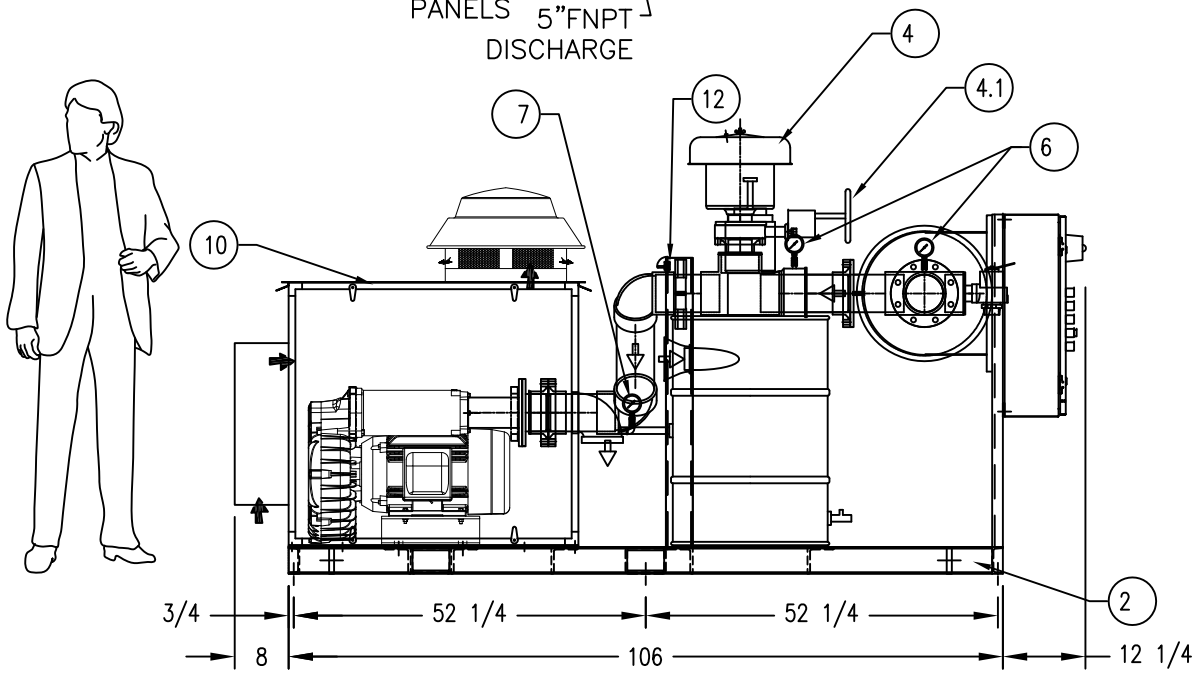
If blower sheave must be located at end of the blower shaft, multiply table value of maximum recommended belt tension X ***0.86.***

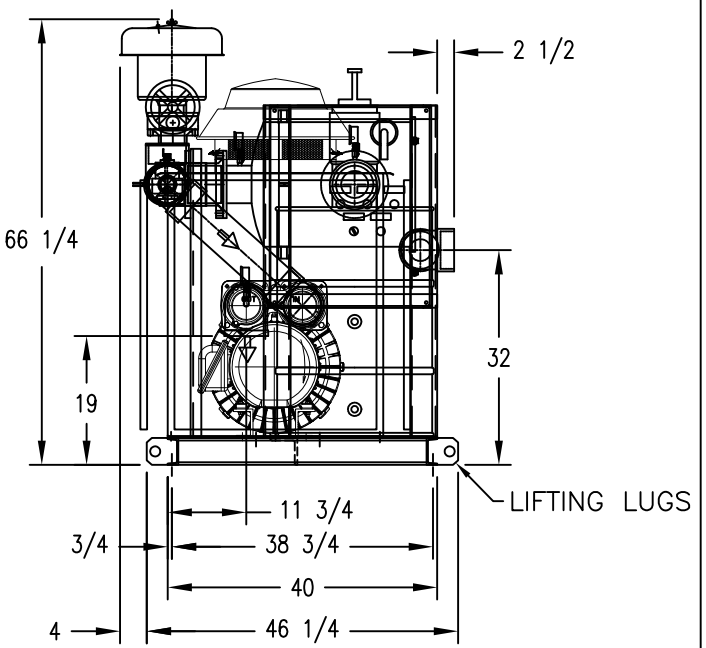
Gasho, Inc.
Blower Package
JG15C-2966-1

Description	Date	Revision

Item	Qty.	Supplier	Description	Part Number	Misc ID	Weight
1	1	Ametek Rotron	Regenerative Blower	EN909BG72WL	P/N 081741	524
2	1	Gasho	Base Weldment	9494	with lifting lugs	250
3	1	Solberg	5" Inline Filter	CSL-245P-500F		90
4	1	Westwood	3" Dilution Valve	EMSP-03	GA-0472	20
4.1	1	Mueller	3" Butterfly Valve with gear	87INB65-3"		20
5	1	Tuthill	2" Relief Valve	1362-6	set @ 105" H2O	7
6	2	Gasho	Vacuum Gauges	25.0.12.HG.160.IWC		1
7	1	Gasho	Pressure Gauge	25.1.006.PSI.160.IWC		1
8	3	SMC Specialties	Isolation Valves	VA BRS 025-4F4M-BT		1
9	1	Ametek Rotron	Moisture Separator MS500BS	80660		65
10	1	Artusa	Sound Enclosure, Outdoor	43 x 32 x 39	1" walls	250
11	1	ICP	NEMA 4 208v			30
12	1	Gasho	Sample port			1
					Estimated weight	1260







NOTES:
1. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
2. TOLERANCE ± 1/2"

REV.	DATE	DESCRIPTION
B	6/17 2015	AS BUILT
A	5/4 2015	CHANGED FAN DESIGN

DRAWN BY: JJH — DATE: 4/6/15
APPROVED BY: — DATE:
DIMENSIONS IN INCHES
SCALE: NA
TOLERANCE: ±1/2" — ANGULAR TOLERANCE:
MATERIAL: — WEIGHT: 1150
SHEET 2 OF 2

J.E.GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

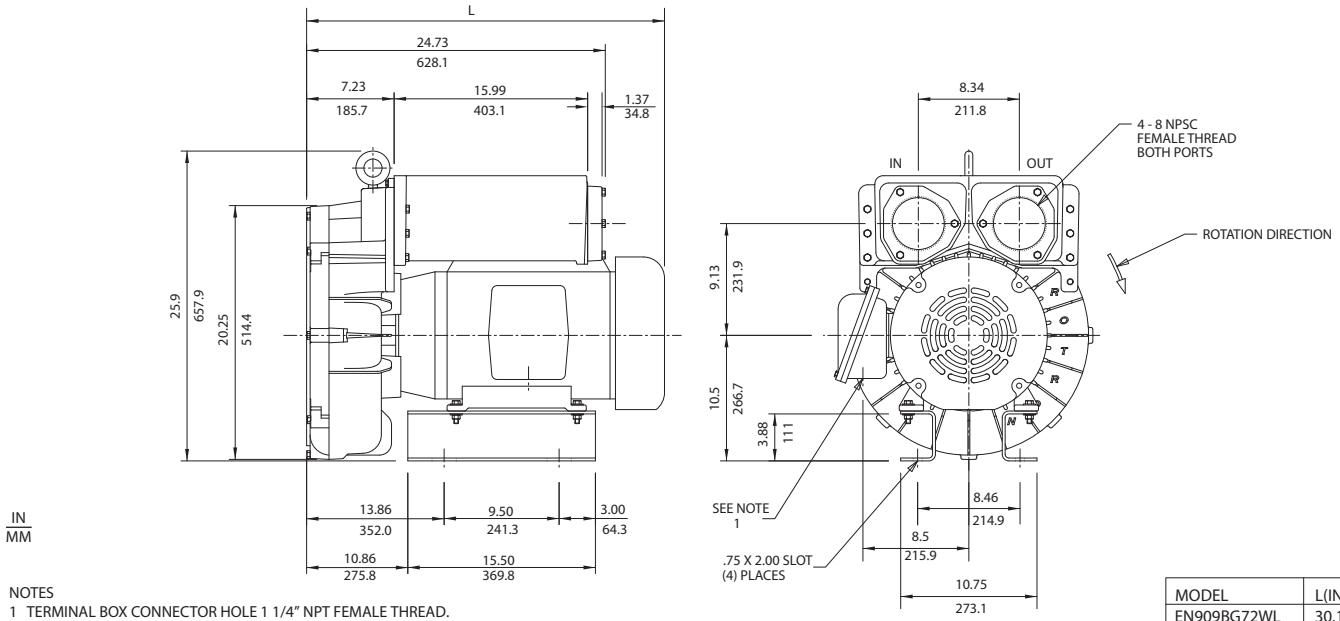
EN909 REGEN BLOWER
15HP MOTOR, MOIST.
SEPARATOR, SE

JG15-C-2966-1 B

EN 909 & CP 909

ROTRON®

10.0 / 15.0 HP Sealed Regenerative w/Explosion-Proof Motor



NOTES
1 TERMINAL BOX CONNECTOR HOLE 1 1/4" NPT FEMALE THREAD.
2 DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3 CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

MODEL	L(IN/MM)
EN909BG72WL	30.17/766.3
EN909DB72WL	23.66/601.0

		Part/Model Number			
		EN909BG72WL	EN909BG86WL	EN909BD72WL	CP909GA72WLR
Specification	Units	081741	081736	081743	038982
Motor Enclosure - Shaft Mtl.	-	Explosion-proof-CS	Explosion-proof-CS	Explosion-proof-CS	Chem XP-SS
Horsepower	-	15	15	10	15
Phase - Frequency	-	Three-60 hz	Three-60 hz	Three-60 hz	Three-60 hz
Voltage	AC	230/460	575	230/460	230/460
Motor Nameplate Amps	Amps (A)	36/18	14.4	24/12	36/18
Max. Blower Amps	Amps (A)	48/24	18	32/16	48/24
Inrush Amps	Amps (A)	240/120	100	234/117	240/120
Service Factor	-	1.0	1.0	1.0	1.0
Starter Size	-	2/2	2	2/1	2/2
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G
Shipping Weight	Lbs	524	524	504	524
	Kg	237.7	237.7	228.6	237.7

Voltage - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

Operating Temperatures - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

Maximum Blower Amps - Corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

XP Motor Class - Group - See Explosive Atmosphere Classification Chart in Section I

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
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

Environmental / Chemical Processing Blowers

EN 909 & CP 909

ROTRON®

10.0 / 15.0 HP Sealed Regenerative w/Explosion-Proof Motor

FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 615 SCFM
- Maximum pressure: 140 IWG
- Maximum vacuum: 112 IWG
- Standard motor: 15 HP, explosion-proof
- Cast aluminum blower housing, impeller , cover & manifold; cast iron flanges (threaded); teflon® lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS

- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS

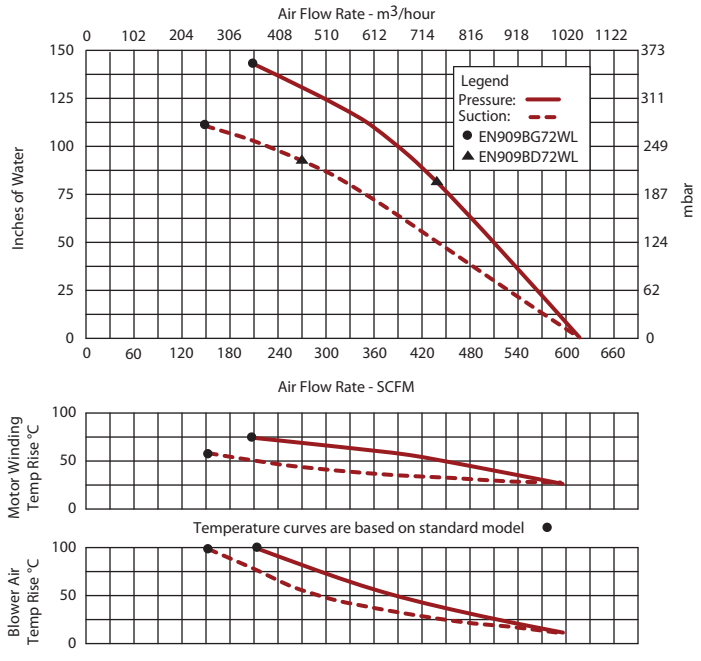
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES

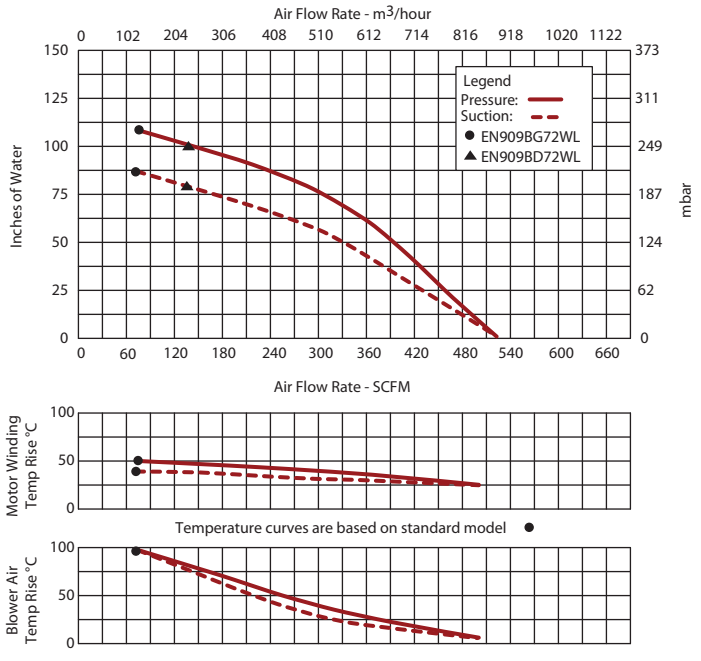
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

Blower Performance at Standard Conditions

60 Hz



50 Hz



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
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AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL
FOR
BLOWER MODEL

EN6, EN858, EN909, EN979, EN14

DIRECT DRIVE REGENERATIVE BLOWER

Technical & Industrial Products
627 Lake Street, Kent, Ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
internet: www.ametektip.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

TECHNICAL AND INDUSTRIAL PRODUCTS
627 Lake Street, Kent, Ohio 44240 USA
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com web site: www.ametektip.com

1. AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment) to the original purchaser only. Should the blower fail we will evaluate the failure If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

2. AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of-warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200ºF. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

*** 3 phase units**

**** 1 phase units**

***** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.**

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	**Torque** **Pound-Force-Foot**
1/4-20	**6.25 +/- 0.25**
5/16-18	**11.5 +/- 0.25**
3/8-16	**20.0 +/- 0.5**
½-13	**49.0 +/- 1**
5/8 –11	**90.0 +/- 2**

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

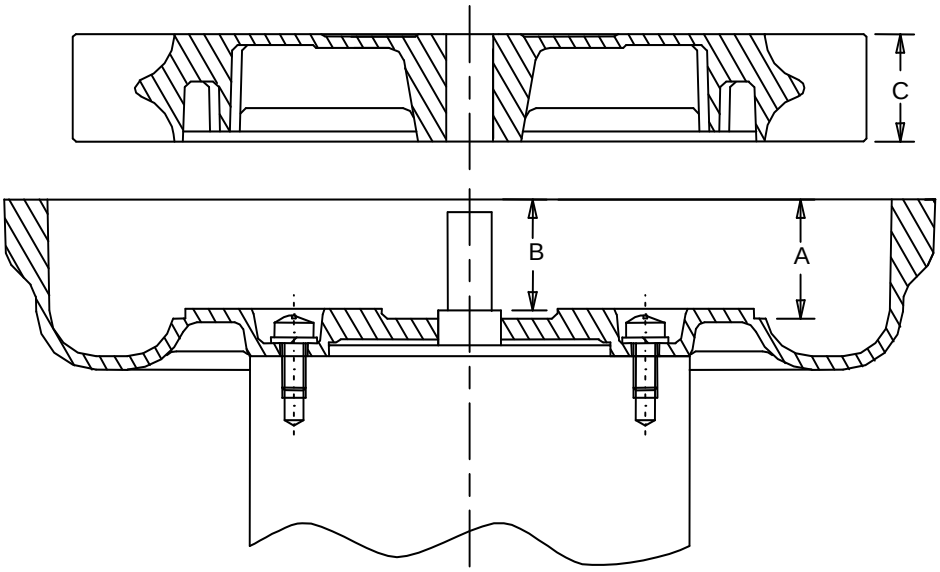
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

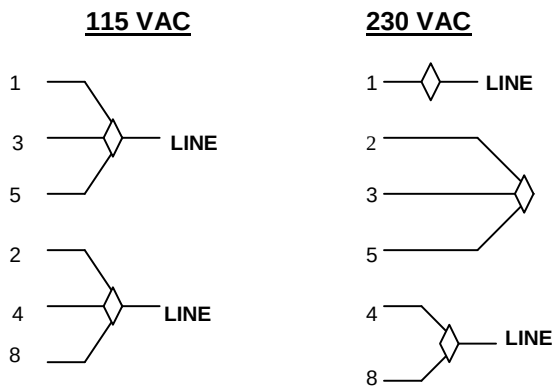
Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A-C)/2.



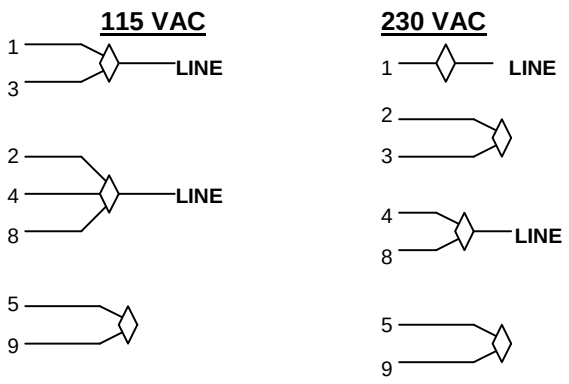
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



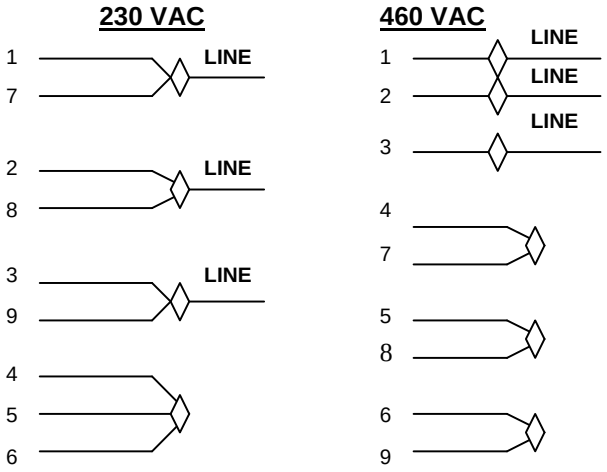
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



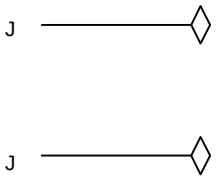
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

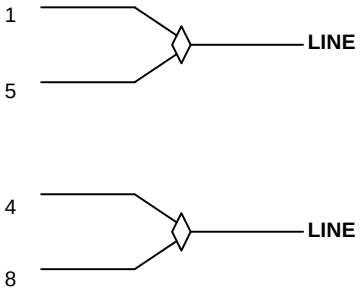
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

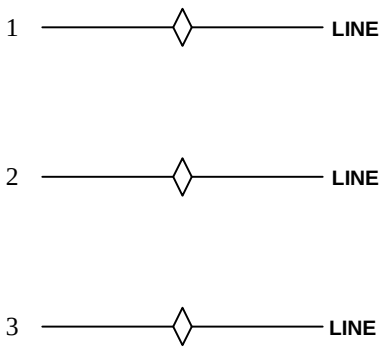
M. 1Ø 230 VAC

SINGLE VOLTAGE



INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

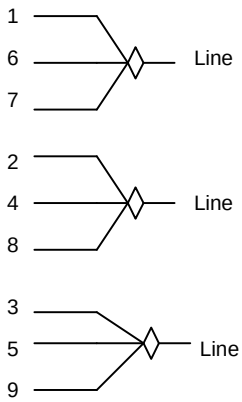
N. 3Ø 575 VAC



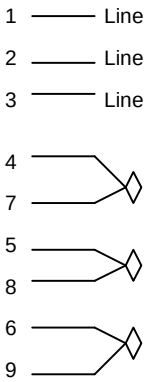
INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

P 3∅, 9 WIRE

230 VAC



460 VAC



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

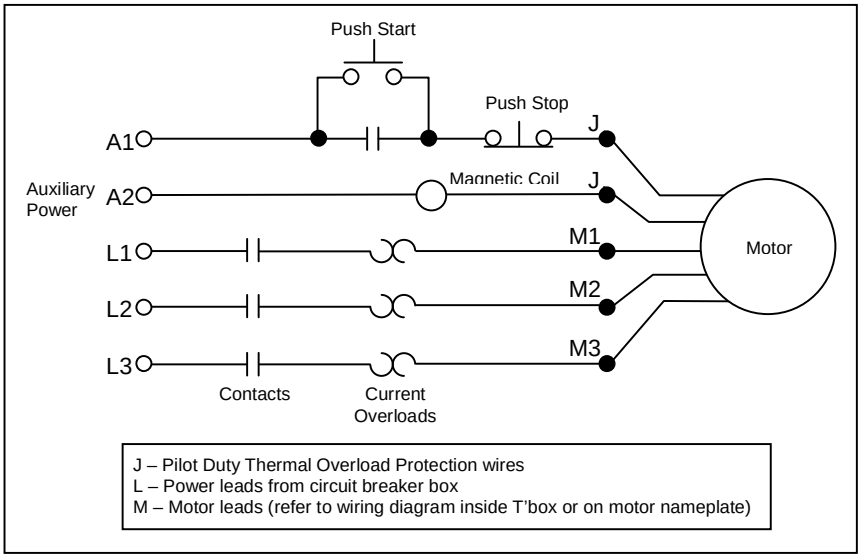
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

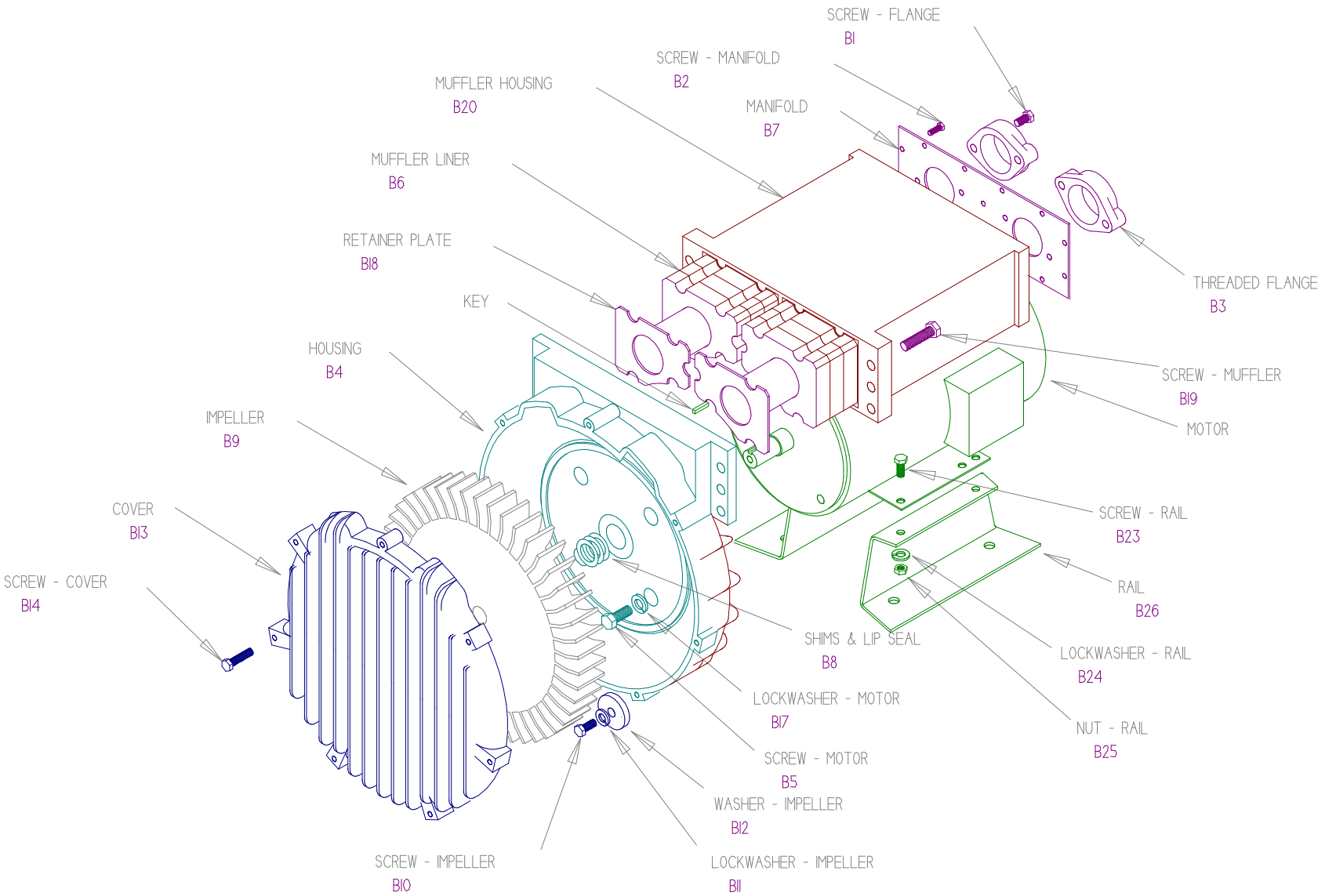
AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

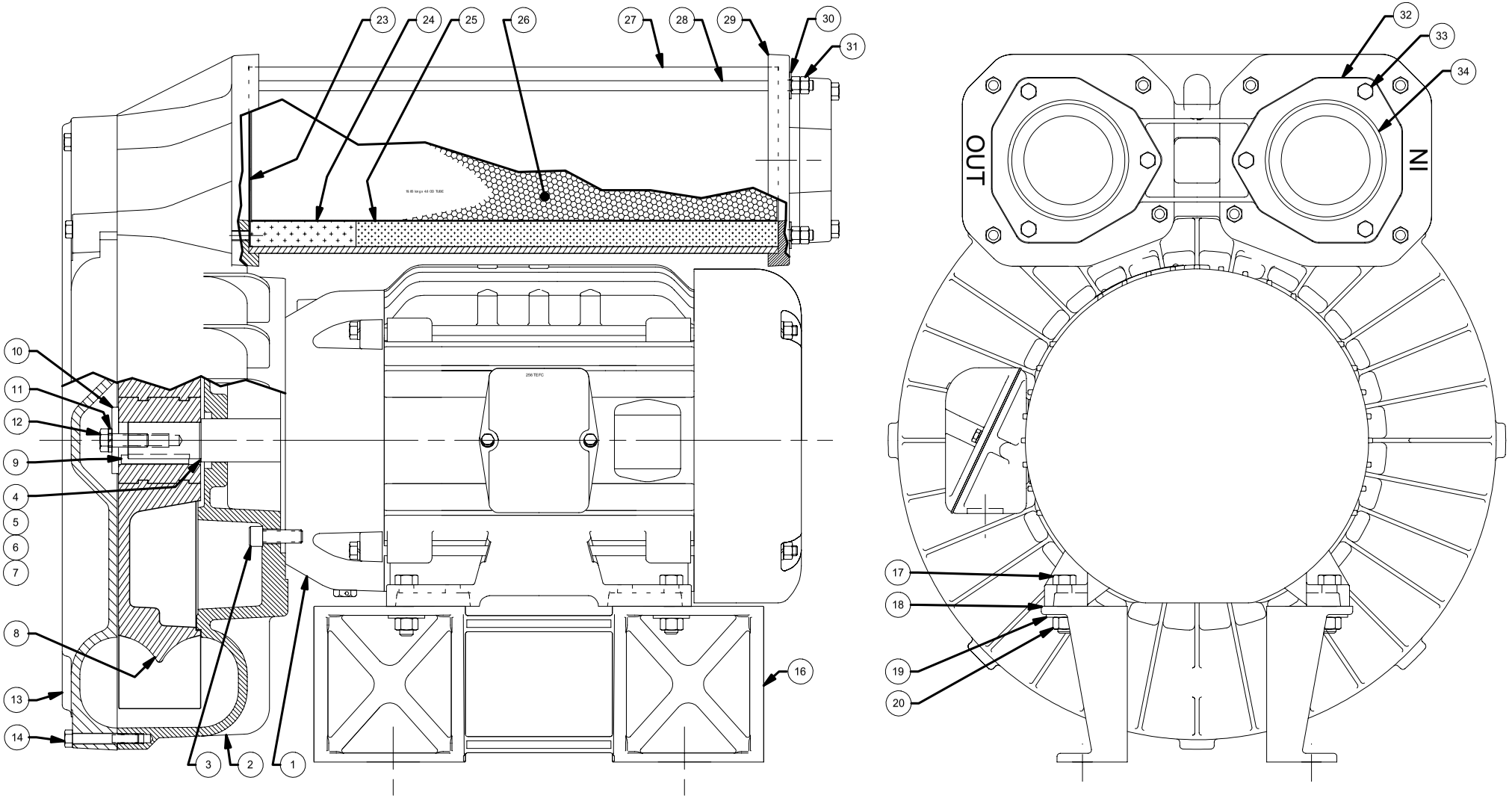
AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

FS2 Rev B 3/10/98

ASSEMBLY DIAGRAM
EN6 EN808 EN909 EN14



ASSEMBLY DIAGRAM "B"



EN 6/858/909/14

Service and Parts Manual

Parts Breakdown

Item No.	Qty. Req'd	Description	EN6	EN858	EN909	EN909	EN14	EN14	EN979
		Model:	**EN6**	**EN858**	**EN909**	**EN909**	**EN14**	**EN14**	**EN979**
		Part No.:	**038361**	**038744**	**038629**	**081741**	**038762**	**038760**	80724
			038180	**038745**	**038634**	**081736**	**038761**		
			038438	**080070**	**080071**	**081743**			
					OBSOLETE				
M3	1	Key Motor Shaft	510212	511532	511532	511532	155066	511532	551570
B1	6	Screw, Flange	(4 pcs) 120065	(4 pcs) 155067	140016	140016	140016	140016	140016
B2		Screw, Manifold	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B3	2	Flange	See Next Page	511614	529912	529912	529912	529912	529912
	2	O-ring	Not Used	Not Used	155377	155377	155377	155377	155377
		Elbow 90º	See Next Page	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B4	1	Housing	516747	516764	515356	552409	516799	516797	551560
B5	4	Screw, Hsg /Motor	251792	155034	140014	see below	120205	120205	120205
B6	7	Muffler Material (Gray)	Not Used	551736	(10 pcs) 551738	(2 pcs) 552477	(12)551740	(12)551740	(8) 551571
	2	Muffler Material (White)	Not Used	551737	551739	552483	551741	551741	Not Used
	2	Finger Guard	Not Used	Not Used	551730	Not Used	551744	551744	Not Used
B8	*	Shim .002"	272703	511547	511547	511547	515991	511547	511547
	*	Shim .005"	272704	511548	511548	511548	515992	511548	511548
	*	Shim .010"	272705	511549	511549	511549	515993	511549	511549
	*	Shim .020"	272706	511550	511550	511550	515994	511550	511550
	*	Shim .030"	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B9	1	Impeller	515484	515249	552544	552431	515509	515683	551566
B10	1	Bolt, Impeller	251791	120210	140015	140015	155068	120251	140015
B11	1	Lockwasher, Impeller	251787	251788	251788	251788	251788	251788	251788
B12	1	Washer, Impeller	Not Used	511529	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	515488	515247	515359	515359	515910	515910	551409
B14	8	Screw, Cover	155170	140016	140016	140016	155069	155069	155512
B15	1	Eye Bolt	Not Used	140019	140019	Not Used	140019	140019	Not Used
B16	1	Spacer, Impeller Bolt	478336	515555	511529	511529	515990	515990	511529
		Shaft Sleeve	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B18	2	Screen, Muffler Retaining,	Not Used	551723	551725	552479	551727	551727	551611
B19	6	Bolt, Muffler Hsg/Hsg	Not Used	155025	155025	(4 pcs) 155025	155067	155067	155512
B19A	4	Bolt, Muffler/Housing	Not Used	120214	120214	120210	120214	120214	Not Used
B20	1	Muffler Housing	Not Used	550019	529932	552428	550039	550039	551422
	1	Muffler Discrete	522948	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B21		Heat Slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B22		Guard Heat slinger	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B23	4	Bolt, Rail	251791	120007	140016	120205	120256	155025	120256
B24	4	Lockwasher Rail	251787	251787	251787	251787	251788	251788	Not Used
B24A	8	Washer, Rail/Motor	Not Used	Not Used	155091	see below	Not Used	Not Used	(4) 155091

*As needed **Viewed looking at inlet/outlet ports

B25	6	Nut, Rail	251789	251789	251789	(4 pcs) 251789	(4 pcs)155070	(4 pcs)155070	155070
B26	2	Rail Mounting	478338	595301	551584	see below	551658	551658	551658
	1	Lip Seal	516691	516693	516693	516693	516694	516693	516693

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Impeller End (M2)
EN6F5L	038361	529475	M + L	B3 Flange 511480 (2 pcs) Elbow 120153 (2 pcs)		
EN6F72L	038180	500297	K + L	B3 Flange 478341 (2 pcs) Elbow Not Used, Screen Guard, Flange 511479 (2 pcs)	510217	510218
EN6F86L	038438	529634	N + L	B3 Flange 478341 (2 pcs) , Elbow Not Used Screen Guard, Flange 511479 (2 pcs)		
EN858BD72WL	038744	515556	K + L			
EN858BD86WL	038745	529627	N + L		516840	516844
EN858BA72W	080070	515558	K + L			
EN909BG72WL	038629	511512	K + L			
EN909BG86WL	038634	529631	N + L		516842	516844
EN909BD72WL	080071	515556	K + L			
EN909BG72WL	081741	511512	K + L	B5 140016 B26 551584,B24A not used		
EN909BG86WL	081736	529631	N + L	B5 140016 B26 551584,B24A not used		
EN909BD72WL	081743	515556	K + L	B5 155092 B26 595301,B24A 155091 (20 pcs)	516842	516844
EN14DX86MWL	038762	529632	N + L		516844	516846
EN14DX72MWL	038761	516095	P +L			
EN14BK72MWL	038760	511513	K + L		516842	516844
EN979BK72WL	080724	551637	K + L		516842	516844

*As needed **Viewed looking at inlet/outlet ports

Use Assembly Diagram "B"

EN/CP 14

Service and Parts Manual

Parts Breakdown

Model:	**EN14**	**EN14**
Part No.:	**081486**	**081485**
	081487	

REF #	QTY	Description		
1	1	Motor	See below	See below
2	1	Housing	552373	552375
3	4	Housing to mtr bolts	120256	155025
4	*	Shim	515991	511547
5	*	Shim	515992	511548
6	*	Shim	515993	511549
7	*	Shim	515994	511550
8	1	Impeller	515509	515683
9	1	Mtr shaft Key	155066	511532
10	1	Impeller washer	515990	515990
11	1	Impeller lockwasher	251788	251788
12	1	Impeller bolt	155068	120251
13	1	Cover	515910	515910
14	8	Cover screws	155069	155069
15		Not used	Not used	Not used
16	2	Mounting Rails	551658	551658
17	4	Rail Bolts	120205	120205
18	4	Rail spacers	Not used	Not used
19	4	Rail lockwashers	251788	251788
20	4	Rail -Nuts	155070	155070
21	4	Rail washers	155091	155091
22		Not used	Not used	Not used
23	2	Finger guard screen	552322	552322
24	2	Muffler foam (hi temp)	552328	552328
25	2	Muffler foam (regular)	552327	552327
26	2	Retainer	552332	552332
27	2	Muffler tube	552324	552324
28	8	Muffler Tie Rod	552325	552325
29	1	Connector plate	552298	552298
30	8	Muffler washer	155091	155091

*As needed **Viewed looking at inlet/outlet ports

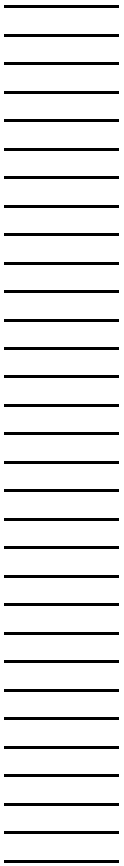
31	16	Muffler tie rod nuts	251789	251789
32	2	Flange	529912	529912
	2	Flange - O-Ring	155377	155377
33	6	Flange bolts	140016	140016
34		Flange Cap.	Not used	Not used
35		Not used	Not used	Not used
36		Nameplate- Blower	Not used	Not used
37		Rotation Sticker	Not used	Not used
38		Not used	Not used	Not used
39				
40		Lip Seal	516694	516693
41				
42				

Model	Part #	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Beari Impeller E
EN14DX86MWL	081487	529632	N + L		516844	5168
EN14DX72MWL	081486	516095	K + L			
EN14BK72MWL	081485	511513	K + L		516842	5168

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports

*As needed **Viewed looking at inlet/outlet ports



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INLET VACUUM FILTERS

"CSL" Series 3 - 6 BSPT

APPLICATIONS & EQUIPMENT

- Vacuum Pumps & Systems – P.D., Side Channel, Rotary Vane, Screw, Piston
- Vacuum Packaging Equipment
- Vacuum Furnaces
- Blowers - Side Channel & P.D.
- Intake Suction Filters
- Pneumatic Conveying Systems
- Remote Install for Piston, Screw & Centrifugal Compressors
- Factory Automation Equip
- Ash Handling
- Food Industry
- Paper Processing
- Glass, Ceramic Processing
- Waste Water Treatment
- Woodworking
- Cement
- Bag House Systems
- Envelope Manufacturing
- Medical Industry
- Chemical Processing

FEATURES & SPECIFICATIONS

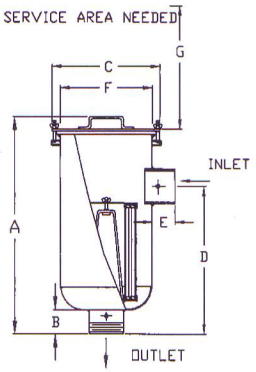
- **Vacuum level**: Typically $1x10^{-3}$ mmHg ($1.3x10^{-3}$ mbar)
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron
- Heavy duty T bolts for easy maintenance
- Baked enamel finish
- Rugged all steel construction
- Low pressure drop
- Positive engagement O-ring seal system
- **Large** dirt holding capacity and **Easy** field cleaning, especially when mounted horizontally or inverted
- Inlet/outlet 1/4" gauge taps standard
- Hydrostatically tested to 0.5 bar pressure for vacuum tightness
- Temp (continuous): min -15°F (-26°C) 220°F (max 104°C)
- Filter change out differential: 10" - 15" H_2O over initial delta P
- Pressure drop graphs available upon request

OPTIONS (Inquiries Encouraged)

- Various media
- Larger sizes available
- Support brackets
- Available in ***Stainless Steel***
- Epoxy coated housings
- Special connections
- Activated carbon prefilters to reduce order

CONFIGURATION

DRAWING



Dimension tolerance ± 1/8"

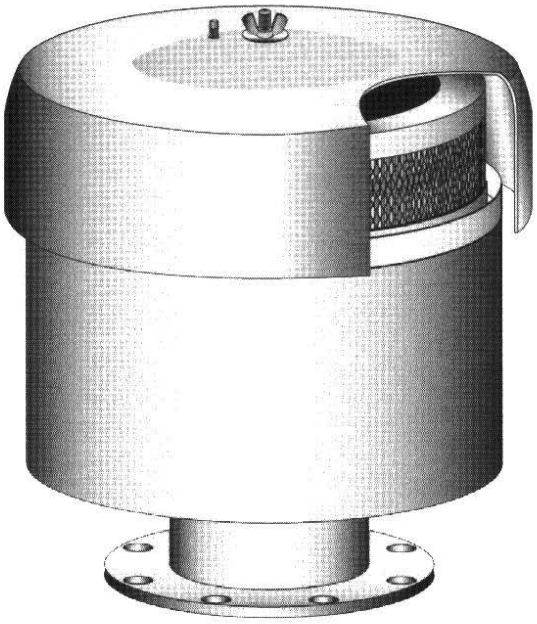
I = Industrial Duty S = Severe Duty E = Extreme Duty

	with Polyester Element	with Paper Element	MPT Inlet & Outlet	DIMENSIONS - inches A	B	C	D	E	F	G	Rated Flow SCFM Nominal Rating	Element Rating	Approx. Wt. lbs
I	CSL-235P-300	CSL-234P-300	3"	27 1/8	3	14	18 1/2	3	12	10	300	570	47
S	CSL-335P-300	CSL-334P-300	3"	27 1/8	3	14	18 1/2	3	12	15	300	800	50
I	CSL-235P-400	CSL-234P-400	4"	27 1/8	3	14	18 1/2	3	12	10	520	570	52
S	CSL-335P-400	CSL-334P-400	4"	27 1/8	3	14	18 1/2	3	12	15	520	800	55
I	CSL-245P-500	CSL-244P-500	5"	28 1/8	3	18 1/2	19 1/2	3	16	10	800	880	82
S	CSL-345P-500	CSL-344P-500	5"	28 1/8	3	18 1/2	19 1/2	3	16	15	800	1100	88
I	CSL-275P-600	CSL-274P-600	6"	29 1/8	4	18 1/2	20 1/2	4	16	10	1100	1100	95
S	CSL-375P-600	CSL-374P-600	6"	29 1/8	4	18 1/2	20 1/2	4	16	15	1100	1500	97

1151 W. Ardmore Ave. • Itasca, IL 60143 • 630 773 1363 • Fax: 630 773 0727
E-mail: sales@solbergmfg.com • Web Site: www.solbergmfg.com

Air Intake Filter/Silencers

Model EMS - Series



The "EMS" Series air intake filter/silencer is designed for both indoor and outdoor applications requiring 6 - 8 dB noise reduction and a high degree of filtration. The unique heavy gauge construction reduces noise transmission and enhances durability in even the most severe environments. This series is ideal for applications such as reciprocating engines, positive displacement blowers and centrifugal compressors. Easy filter element access reduces maintenance time during filter element replacement.

Standard Construction Features

- Available in sizes from 1 inch to 16 inch
- Female NPT discharge connection sizes 1 inch to 4 inch
- 125/150# ANSI drilled plate flanges for sizes 5 inch to 16 inch
- Carbon steel construction
- Removable weatherhood
- Available with paper, felt and wire mesh filter element
- Removable weatherhood
- Gray phenolic resin based fast drying primer suitable for overcoating with urethanes, acrylics, epoxies and industrial enamels. Standard two mil thickness
- 1/8" NPT pressure tab

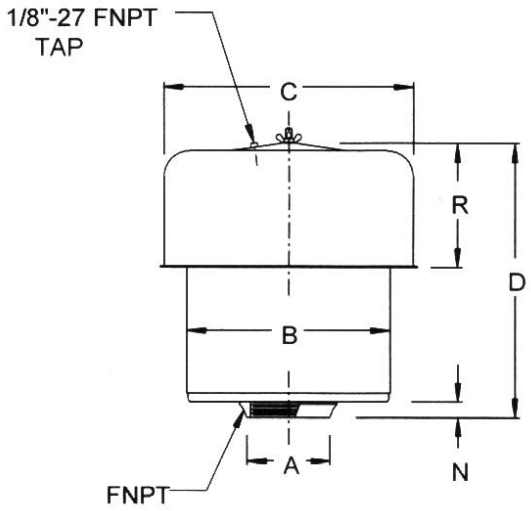
Optional Construction Features and Accessories

- Stainless steel construction
- Aluminum construction
- Special finish per specification
- Pre-filter wraps
- Special filtration and back-pressure designs
- Special acoustic designs
- Oversized flanges
- Contact factory for additional features to meet your requirements

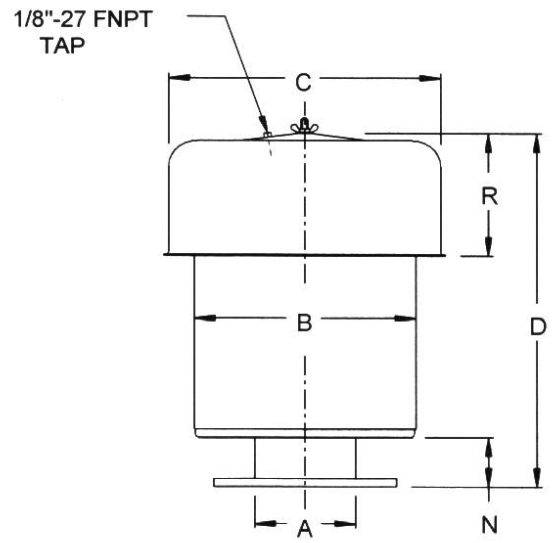
10/98
98BC-2004

Air Intake Filter/Silencers

Model EMS - Series



1" to 4" Female NPT Connection
(4" flange connection available upon requrest)



5" and Larger-125/150# ANSI Drilled Plate Flange
(5" FNPT connection available upon request)

									Element Model Number		
Model No.	A	C	B	D	N	R	Weight	CFM	Paper	Felt	Wire
EMS-1	1	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-125	1 1/4	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-15	1 1/2	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	75	P-642	F-642	W-642
EMS-2	2	9 1/2	6 5/8	5 7/16	5/8	2 1/4	8	120	P-642	F-642	W-642
EMS-25	2 1/2	14 7/8	12	11 7/8	13/16	4 7/16	20	200	P-974	F-974	W-974
EMS-3	3	14 7/8	12	13 5/8	13/16	4 7/16	20	275	P-974	F-974	W-974
EMS-35	3 1/2	14 7/8	12	13 5/8	13/16	6 7/16	25	375	P-976	F-976	W-976
EMS-4	4	14 7/8	12	13 5/8	1	6 7/16	25	500	P-976	F-976	W-976
EMS-5	5	14 7/8	12	25 1/2	3	7 3/8	36	750	P-1197	F-1197	W-1197
EMS-6	6	22	18	26 1/4	3	8 5/8	53	1100	P-13118	F-13118	W-13118
EMS-8	8	22	18	25	3	10 3/4	70	2200	P-171310	F-171310	W-171310
EMS-10	10	22	18	25	3	10 3/4	95	3000	P-171310	F-171310	W-171310
EMS-12	12	22	18	25	3	10 3/4	108	4300	P-171310	F-171310	W-171310
EMS-14	14	30	24	40	4	15 3/4	180	5900	P-231914	F-231914	W-231914
EMS-16	16	30	24	40	4	15 3/4	190	7700	P-231914	F-231914	W-231914

- When ordering specify paper (P); felt (F) or wire mesh (W) filter element.
- 1 inch to 4 inch standard female NPT connection; 4 inch flange connection available upon request
- 5 inch to 16 inch standard 125/150# ANSI drilled plate flange connection; 5 inch female NPT connection available upon request

Dimensions in inches, weights in pounds. Dimensions and weights are nominal and may vary slightly with production models. Request certified drawings for exact dimensions.

Gasho
SINCE 1982
The Leader in Blower & Vacuum Solutions
460 West Gay Street
West Chester, PA 19380
610-692-5650 Fax 610-692-5837
cs@gasho.org

Gasho Replacement Inlet Filter Elements

High quality replacement elements are available for the filters of various manufactures used on packages built by Gasho.
Paper elements are normally used in inlet filters and replaced when they are dirty.
Polyester elements are cleanable.

Filter Size, In.	Gasho Filter #	Box Quantity	O.D.	I.D.	Ht.	List Price
1	GA-0470	6	5-13/16	4	2	$17.00
2	GA-0471	6	5-13/16	4	2-1/2	$17.00
2.5-3	GA-0472	2	9-3/4	7-1/4	4	$23.00
4	GA-1063	2	9-3/4	7-1/4	6	$27.00
5	GA-0474	1	11-1/2	9-7/8	7	$35.00
6	GA-0475	1	13-5/8	11-5/8	8-5/8	$53.00
8-12	GA-1163	1	17	13	10	$185.00

GA-0471 Elements are frequently used to replace GA -0470

Manufacturer Cross Reference

Gasho Filter #	Universal Filter #	EM Prod. Filter #	Full-On Filters #	Solberg #
GA-0470	81-0470		FOF810470	32-00
GA-0471	81-0471	P-642	FOF810471	32-02
GA-0472	81-0472	P-974	FOF810472	32-04
GA-1063	81-1063	P-976	FOF811063	32-06
GA-0474	81-0474	P-1197	FOF810474	32-08
GA-0475	81-0475	P-13118	FOF810475	32-10
GA-1163	81-1163	P-171310	FOF811163	32-12

Models: 87, 88

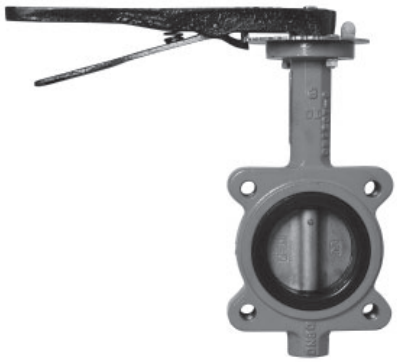
Ductile Iron Wafer and Full Lug Butterfly Valves Sizes: 2" – 24" (25 – 60mm)

Pressure/Temperature–Non-Shock			
Model	Size	Material	Rating
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F
87	2"-12"	Ductile Iron	200psi @ 100° F
87	14"-24"	Ductile Iron	150psi @ 100° F

Max. temp. can be limited by seat material. Consult Factory.

Not Recommended for Steam Service.

Model 87M (Wafer)



Model 88M (Lug)

Typical Service

These soft-seated butterfly valves are designed for a variety of general applications in the control of water, air, oil, gases, and corrosive media. They are equally effective for on-off, throttling, or isolation service requirements. Lug style valves are designed for dead-end service to the full pressure rating of the valve. Models 87 and 88 butterfly valves are especially well suited for higher velocity service and vacuum service.

Features

- Phenolic backed (2" – 14"), aluminum backed (16" – 24"),
- non-collapsible, resilient elastomer seat. Available in EPDM or Buna-N.
- ISO 5211 mount is standard. Double D shaft is standard 2" – 10" while keyway design is supplied 12" – 24"
- Stem is a one-piece design for maximum strength and is retained in valve body for blowout proof operation. 416SS stem is standard with aluminum bronze or ductile iron discs. 316SS is standard for 316SS discs (2" – 12") and 431SS is standard for 316SS discs (14" – 24")
- Stem bushings provide shaft support for proper stem alignment and minimize stem deflection. Duralon bushings are standard material in 2" – 12" sizes. Bronze bushings are standard in 14" – 24" sizes.
- Stem seals prevent external contamination of stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- ASTM-A563 ductile iron body available in full lug (Model 88) or wafer (Model 87) designed for use between ANSI 125 and 150 flanges. Face-to-face dimension comply with API 609 and MSS-SP-67.
- Available in standard 10-position locking handle or optional infinite positioning locking handle. Also gear operators are available 2" – 24". Contact the factory for electric or pneumatic actuation.

Performance Guidelines

Guidelines for throttling service:

Liquids – Line velocity should not exceed 20ft./sec.

Gases – Line velocity should not exceed 15,000 ft./sec.

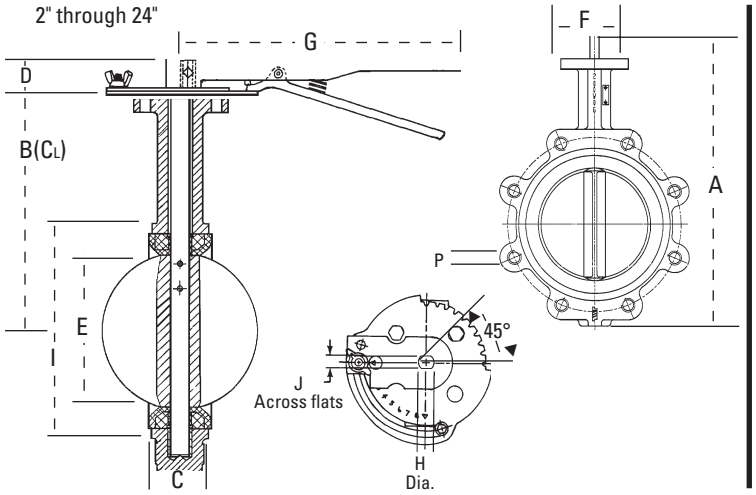
Materials

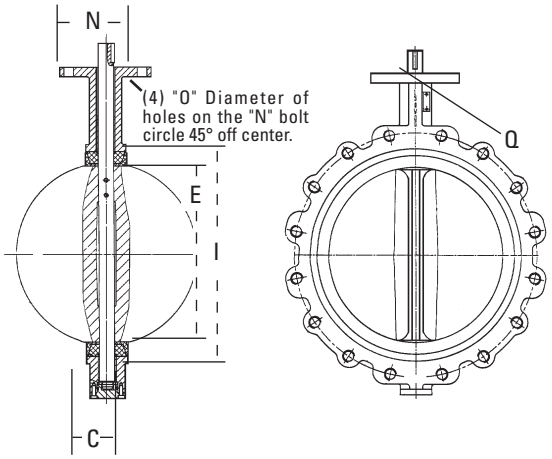
	MODEL 87, MODEL 88
Body	Ductile Iron
Stem	416SS, 316SS, 431SS
Disc	Ductile Iron, Aluminum Bronze, 316SS
Seat	EPDM - 5°F to 248°F (-15°C to +120°C)
	Buna-N - 14°F to 176°F (-10°C to +80°C)

Note: Do not use EPDM when hydrocarbons are present

Dimensions and Weights

2" through 24"





Size	A in.	A mm	B in.	B mm	C in.	C mm	D in.	D mm	E in.	E mm	F in.	F mm	G in.	G mm	H in.	H mm	I in.	I mm	J in.	J mm
2"	10¾	273	6⅜	161	1⅝	42	1¼	32	2⅛	54	3 1/16	77	10½	267	½	13	3¾	95	⅜	9
2½"	11⅝	295	6⅞	175	1¾	45	1¼	32	2½	64	3 1/16	77	10½	267	½	13	4¼	108	⅜	9
3"	12⅛	308	7⅛	181	1¾	45	1¼	32	3⅛	79	3 1/16	77	10½	267	½	13	4¾	120	⅜	9
4"	13⅝	346	7⅞	200	2	52	1¼	32	4⅛	105	3⅝	92	10½	267	⅝	16	6 1/16	154	7/16	11
5"	14⅝	372	8⅜	213	2 3/16	56	1¼	32	4⅞	124	3⅝	92	10½	267	¾	19	7⅛	181	½	13
6"	15⅝	397	8⅞	226	2 3/16	56	1¼	32	6⅛	156	3⅝	92	10½	267	¾	19	8 3/16	208	½	13
8"	18⅞	479	10¼	260	2⅜	60	1¾	45	8	202	5	125	14	356	⅞	22	10¼	260	⅝	16
10"	21¼	540	11½	292	2⅝	66	1¾	45	9⅛	251	5	125	14	356	1⅛	29	12⅝	320	13/16	21
12"	24⅝	626	13¼	337	3	76	1¾	45	11⅞	301	6	150	14	356	1¼	32	14¾	375	–	–
14"	26¾	679	14½	368	3	76	1¾	45	13⅛	333	6	150	–	–	1¼	32	15 15/16	405	–	–
16"	30	762	15¾	400	3⅜	87	2	50	15⅜	391	6⅞	175	–	–	1 5/16	33	18½	470	–	–
18"	31½	800	16⅝	422	4⅛	105	2	50	17⅜	442	6⅞	175	–	–	1½	38	20 1/16	525	–	–
20"	35 5/16	897	18⅞	480	5⅛	130	2⅛	53	19⅜	493	8¼	210	–	–	1⅝	41	22¼	565	–	–
24"	42⅛	1088	22⅛	562	6	152	2¼	58	23⅜	594	8¼	210	–	–	2	50	27 5/16	693	–	–

Size	TOP PLATE DRILLING N in.	N mm	O in.	O mm	TAPPED LUG DATA BOLT CIRCLE in.	BOLT CIRCLE mm	NO. Holes	BOLT P	KEY WAY Q in.	Q mm	WEIGHT (LBS.)† 88	87
2"	2	50	¼	7	4¾	121	4	5/8"-11UNC x 1⅝"	–	–	8	6
2½"	2	50	¼	7	5½	140	4	5/8"-11UNC x 1¾"	–	–	10	7
3"	2	50	¼	7	6	150	4	5/8"-11UNC x 1¾"	–	–	10	7
4"	2¾	70	⅜	10	7½	191	8	5/8"-11UNC x 2"	–	–	17	12
5"	2¾	70	⅜	10	8½	216	8	¾"-10UNC x 2 3/16"	–	–	25	16
6"	2¾	70	⅜	10	9½	241	8	¾"-10UNC x 2 3/16"	–	–	27	20
8"	4	102	½	13	11¾	298	8	¾"-10UNC x 2⅜"	–	–	40	29
10"	4	102	½	13	14¼	362	12	⅞"-9UNC x 2⅝"	–	–	63	48
12"	5	125	½	13	17	432	12	⅞"-9UNC x 3"	¼ x 1¼	6 x 32	107	78
14"	5	125	½	13	18¾	476	12	1"-8UNC x 3"	¼ x 1¼	6 x 32	156	99
16"	5½	140	1/16	18	21¼	540	16	1"-8UNC x 3⅜"	5/16 x 1 13/16	8 x 46	203	140
18"	5½	140	1/16	18	22¾	578	16	1⅛"-7UNC x 4⅛"	⅜ x 1 5/16	10 x 40	269	188
20"	6½	165	⅞	22	25	635	20	1⅛"-7UNC x 5⅛"	⅜ x 1 5/16	10 x 40	392	248
24"	6½	165	⅞	22	29½	750	20	1¼"-7UNC x 6"	½ x 2⅜	13 x 60	593	450

†Weights are for valves with ductile iron or aluminum bronze discs. 2" – 12" have levers; 14" – 24" have bare shafts.
Refer to Watts F-CDBF for gear operator weights.

Size	Buna-N, EPDM (in./lbs.) Normal Conditions WET/DRY
2"	134/214
2½"	190/289
3"	250/387
4"	390/644
5"	600/959
6"	907/1,542
8"	1,697/2,919
10"	2,500/4,857
12"	3,300/7,071
14"	3,500/7,305
16"	5,500/10,027
18"	8,200/13,437
20"	10,000/17,925
24"	18,680/28,020

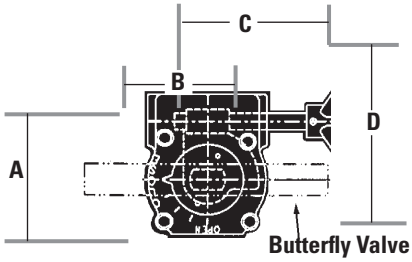
SEATING TORQUE

Size	Cv Rating (Full Open)
2"	135
2½"	220
3"	302
4"	600
5"	1,022
6"	1,579
8"	3,136
10"	5,340
12"	8,250
14"	11,917
16"	16,388
18"	21,705
20"	27,908
24"	43,116

Cv RATING

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL

Valve Size	A Depth	B Width	C CL to HW	D HW Dia.	E Height	F CL to MT Pad	#Turns Open - Close	Unit Weight (lbs)
2", 2½", 3"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
4"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
5", 6"	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
8"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
10"	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
12", 14"	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0
16"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
18"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
20"	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
24"	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0



Butterfly Valve

Adjustable Stops (Set Screws)

Mueller Steam Specialty™

Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.

A Division of Watts Water Technologies, Inc.

USA: 1491 NC Hwy 20 West St. Pauls, NC 28384; www.muellersteam.com
Tel: 910-865-8241 Fax: 910-865-6220
Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772

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Watts BF-03 and BF-04

Resilient Seated Butterfly Valves

Size: 2" - 24" (50-600mm)

Installation and Repair Instructions

Watts Series BF-03, BF-04 butterfly valves are designed for use between ANSI 125 and 150 class flanges of either flat or raised face type.

Note: Installation between class 150 flanges does not increase the valve 200 psig (13.8 bar) rating

Installation

Note: When using piping reducers, the transition area of said reducers must be sufficient enough so as to allow disc protrusion as the valve opens. The same consideration applies when using heavy schedule or lined pipe.

Warning: Failure to ascertain adequate clearance **before** installation could damage the disc's sealing surface.

A. Installation Between Existing Flanges

Note: To avoid forcing the valve between flanges and subsequent distortion or damage to the valve seat it may be necessary to spread mating flanges. **See Note 1.**

1. Rotate valve clockwise to position the disc sealing edge approximately ½" from the valve sealing face.
2. Insert the valve between the flanges, loosely assemble flange bolts and align by:
   - A. BF-03-Bolting the valve to the flanges
   - B. BF-04-By positioning the valve equidistant from the bolt studs and aligning body O.D. with flange raised face.
3. Turn valve to its full open position and hand tighten flange bolts. Operate the valve to assure proper alignment and clearance.
4. Return valve to its full open position and tighten all bolts in a sequential pattern to the proper torque for the bolting and flanged material selected.
5. Install valve handle - See Note 2.

B. Installation in New Piping Systems

1. Follow steps 1 - 4 as outlined in section A, however, the valve should be aligned as above and assembled between the flanges if they are to be welded. Use the assembly for fit-up and centering to the pipe.
2. Tack weld the flanges and then remove the valve assembly.
3. Complete welding the flanges and allow them to cool completely before reinstalling the valve. Failure to do so could damage the valve seat.

Removal From Line For Rebuild

A. Removal from Line

1. Place valve approximately 20° open.
2. Loosen and remove bolting, spread flanges and remove valve.

B. Disassembly

1. Place valve in its full open position, remove handle or operator.
2. Remove disc pins. (Pins will have to be replaced).
3. Remove stem from body.
4. Remove disc from seat and store in such a manner so as to not to damage its sealing surface. (If damaged, disc and stem must be replaced.)
5. Remove seat from body.

C. Reassembly

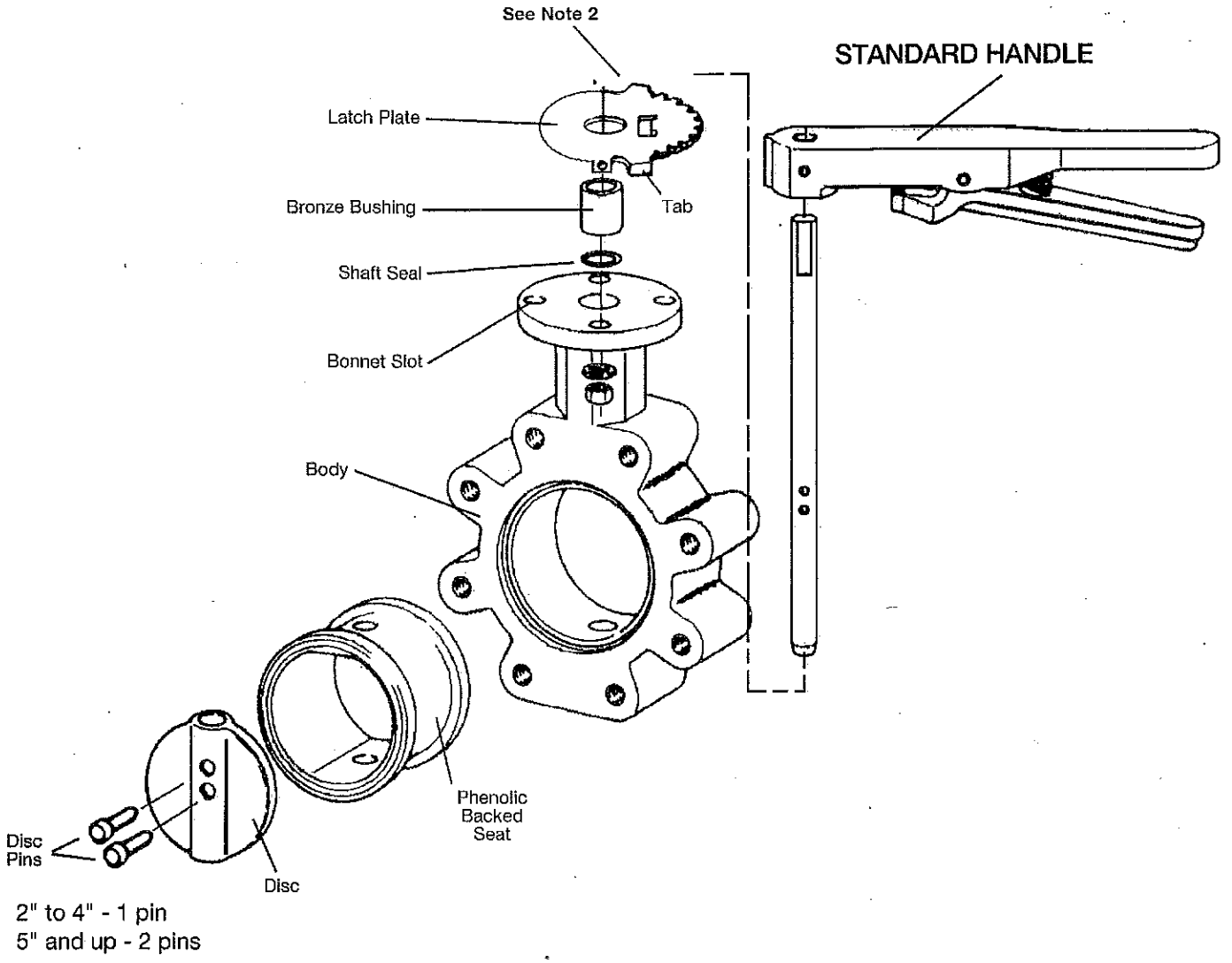
1. Inspect and clean all parts to be used.
2. Insert disc into seat (aligning stem holes).
3. Press seat into body (aligning stem holes).
4. Insert stem taking care not to dislodge and or damage the seat.
5. Close valve aligning stem flat parallel to closed valve.
6. Drill and ream (per specification) thru disc and stem. (Do not use oil when drilling)
7. Place disc pins and knock pin into place.
8. Clean valve free of shavings.

Note 1 - Valve seat also serves as flange gasket

Note 2 - Standard handle must be field mounted.

** (See back for handle information)*

WATTS®



Note 2: Standard handle must be field mounted.

Note: Product information is subject to change without notice and supersedes all previous publications.

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. (California law requires this warning to be given to customers in the State of California.)

For more information: www.watts.com/prop65

Limited Warranty: Watts Regulator Co. (the "Company") warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge.
THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product.
Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**

WATTS®

ISO 9001-2000 CERTIFIED

Water Safety & Flow Control Products

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.watts.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca

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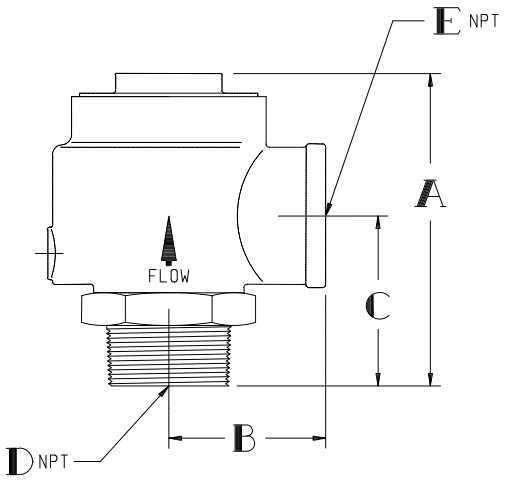
LTR	REVISION	DATE	DR	CH
A	REDRAWN WITH REVISIONS (ECN 2665)	8-22-97	SM	NF

M-D PART NUMBER	SEAT DIAMETER	VALVE SIZE	A ± 1/4	B ± 3/32	C ± 3/32	D NPT	E NPT	WEIGHT LBS
1362-6	2	2	7 1/4	3 1/4	3 1/4	2" MALE	2" FEMALE	8
1362-7	2 1/2	2 1/2	8	3 3/4	3 3/4	2 1/2" MALE	2 1/2" FEMALE	12
1362-8	3	3	9 1/2	4 1/4	4 1/4	3" MALE	3" FEMALE	19



NOTE:
SERVICE RECOMMENDATONS: AIR OR GAS. 22" HG AT 300°F

MATERIALS OF CONSTRUCTION:
BRONZE NOZZLE. DISC. GUIDE & SEAT.
SST SPRING.

INSTRUCTIONS:
1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROXIMATELY ± 10% OF ORIGINAL SETTING BY REMOVING AND LOOSENING THE FILLISTER HEAD MACHINE SCREW AND THEN RUNNING SCREW IN OR OUT AS DESIRED.
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.
4. REFER TO M-D SPRING DRAWING 1352S SERIES FOR VACUUMS FROM 1" HG TO 30" HG.
5. VALVE PRE-SET TO RECOMMENDED SPECIFICATIONS OF PURCHASE ORDER AT M-D PRIOR TO SHIPMENT.

VACUUM SET AT 105 " HG

TOLERANCES
.XX ± .
.XXX ± .
.XXXX ± .
ANGULAR ±
FRACTIONAL ±
CHAMFERS ± 2°

BREAK ALL SHARP EDGES AND CORNERS

DR SM 8-21-97
CH NF 9-12-97

FIRST USED ON

MATL P/N:
MATL:

TUTHILL Pneumatics Group Springfield, Missouri USA

VACUUM RELIEF VALVE

SIZE: B | 1362

SCALE: NONE | WT LBS | SHEET OF

PRESSURE AND VACUUM RELIEF VALVE 1351-1352-1361-1362 MAINTENANCE

TUTHILL CORPORATION | M-D Pneumatics
A Tuthill Subsidary

P.O. Box 2877, Springfield, MO 65801-0877 • (417) 865-8715 • TWX 910-775-4704 • FAX 417-865-2950

10/88/500

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MAINTENANCE:

1. Check pop off pressure every 2 to 6 months.
2. Inspect for dirt build up in bodies frequently.
3. Remove yearly for testing, inspection, and overhaul.

Valve failure may be caused by seizing of parts, scored or wire drawn seats and corroded or eroded springs. The first case may be corrected by careful cleaning followed by light sanding of the seating surfaces. For correction of the second, the seating surface may be remachined or carefully hand lapped if damage is less severe. Springs rarely required replacement, but may be purchased from manufacturer should replacement be necessary.

DISASSEMBLY

1351 & 1361 Series - Refer to Relief Valve Assembly Drgs. 1351 & 1361.

1. Remove Regulator Ring Set Screw.
2. Remove hood and mark relative positions of pressure screws, lockn t and cap.
3. Loosen pressure screw locknut and pressure screw to release pressure of spring.
4. Remove Cap.
5. Remove spring and spring plates, spindle and spindle retainer.
6. Mark location of regulator ring and remove.

1352 Series - Refer to Pressure Relief Valve Assembly Drg. 1352.

1. Remove fillister head machine screw.
2. Remove roll pin, washer, lever and pressure screw.
3. Remove the spring and disc assembly.
4. Disassemble the disc assembly.

1362 Series - Refer to Vacuum Relief Valve Assembly Drg. 1362

1. Remove fillister head machine screw.
2. Remove pressure screw.
3. Remove the spring and disc assembly.
4. Disassemble the disc assembly.

To Reassemble: Reverse the above procedures - being careful to return parts to their marked positions.
After reassembly, reset valves according to instructions under adjustment, setting and testing.

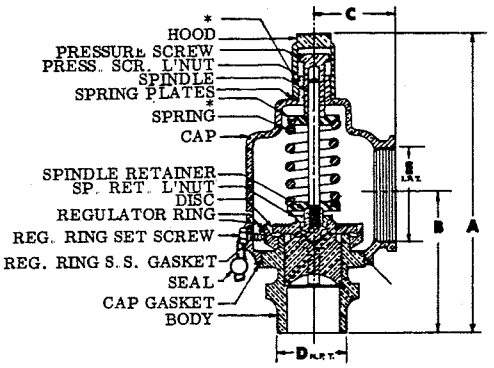
ADJUSTMENT, SETTING AND TESTING

Popping Pressure: 1351 & 1361 Series
Refer to Relief Valve Test Set Ups.
Make sure of gauge accuracy before beginning. Remove hood - exposing pressure screw and locknut, Loosen locknut and raise pressure or vacuum until valve opens or pops. If opening pressure or vacuum is too low, turn down on pressure screw. If pressure or vacuum is too high, back-off pressure screw. After proper pressure has been reached, securely tighten locknut and replace hood.

1352 & 1362 Series
Refer to Relief Valve Test Set Ups.
Make sure of gauge accuracy before beginning. Remove filister head machine screws. Raise pressure or vacuum until valve opens or pops. If opening pressure or vacuum is too low, turn down on pressure screw. If pressure or vacuum is too high, back-off pressure screw. After proper setting has been reached, replace filister head screws, making sure they align with slots provided in pressure screw.

BLOWDOWN ADJUSTMENT

1351 & 1361 Series
When popping pressure is changed, a slight adjustment in blow down may be required. Raising the popping pressure or vacuum lengthens the blow down, and lowering the popping pressure or vacuum shortens the blow down. Raising the regulator ring - towards the disc - will increase blowdown and should be made a notch at a time as the adjustment is sensitive. The normal position would be three or four notches down from touching the disc, but this figure will vary with conditions.
CAUTION: Retighten regulator ring set screw.



1351 & 1361 RELIEF VALVE

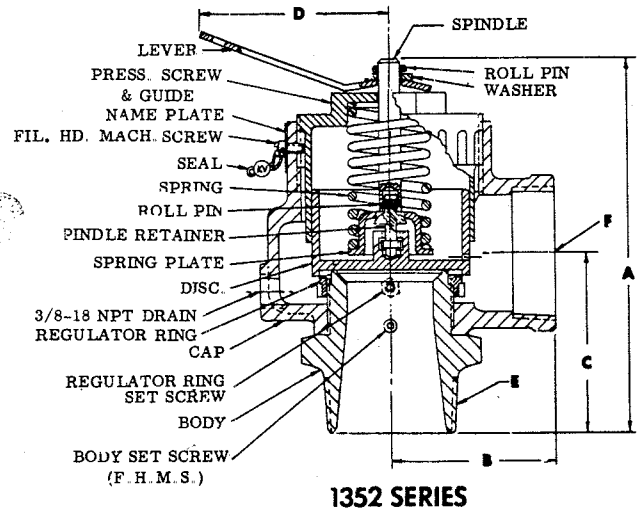
1351 Denotes Pressure Valve
1361 Denotes Vacuum Valve
*Joints sealed on 1361 Vacuum Valves with Crane Pipe Compound or equiv.

PART NO.	SEAT DIA.	VALVE SIZE	WT. LBS.	A	B	C	D	E
1351-1	1/2	1/2	1-3/8	4.63	2.38	1.12	1/2	3/4
1351-2	3/4	3/4	2-1/4	6.66	2.53	1.50	3/4	1-1/4
1351-3	1	1	3	6.97	2.75	1.81	1	1-1/2
1351-4	1-1/4	1-1/4	5-1/2	8.59	3.97	2.18	1-1/4	2
1351-5	1-1/2	1-1/2	7-3/4	9.59	4.31	2.31	1-1/2	2-1/2
1351-6	2	2	11-1/2	10.91	4.88	2.62	2	3
1351-7	2-1/2	2-1/2	20-1/2	13.75	6.09	3.50	2-1/2	3
1351-8	3	3	29	14.75	7.06	4.12	3	4

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. 60 PSIG AT 450° F.

INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING HOOD AND RUNNING PRESSURE SCREW IN OR OUT AS DESIRED. (CAUTION: RETIGHTEN LOCKNUT AFTER EACH ADJUSTMENT)
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANI NG SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.



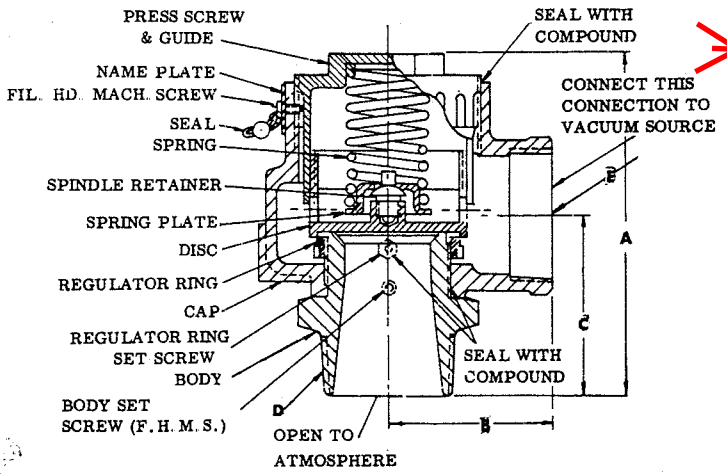
1352 SERIES

PART NO.	SEAT DIA.	VALVE SIZE	Wt. LBS.	A	B	C	D	E	F
1352-6	2	2	7-1/2	7.18	2.94	3.18	3.38	2	2
1352-7	2 -1/2	2-1/2	12-1/4	8.00	3.50	3.75	4.12	2-1/2	2-1/2
1352-8	3	3	18-3/4	9.00	4.0	4.18	4.18	3	3

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. 60 PSIG AT 450° F.

INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. VACUUM SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING HOOD AND RUNNING PRESSURE SCREW IN OR OUT AS DESIRED. (CAUTION: RETIGHTEN LOCKNUT AFTER EACH ADJUSTMENT)
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.



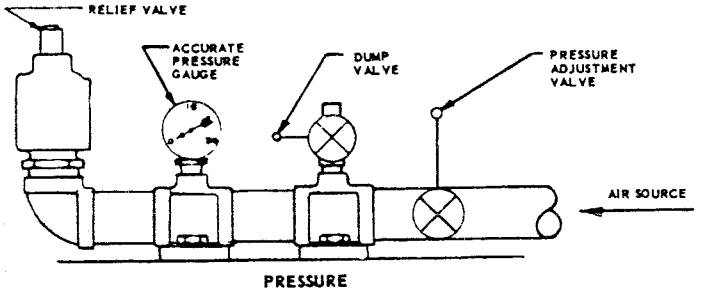
1362 SERIES

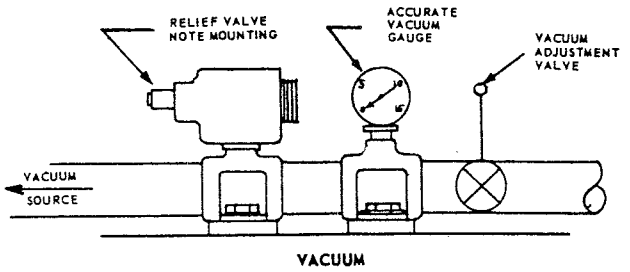
PART NO.	SEAT DIA.	VALVE SIZE	WT. LBS.	A	B	C	D	E
1362-6	2	2	7	5.88	3.18	2.94	2	2
1362-7	2-1/2	2-1/2	11-3/4	6.94	3.50	3.75	2-1/2	2-1/2
1362-8	3	3	18-1/2	7.88	4.00	4.18	3	3

NOTE: SERVICE RECOMMENDATIONS
AIR OR GAS MAX. - 30 HG AT 450° F.

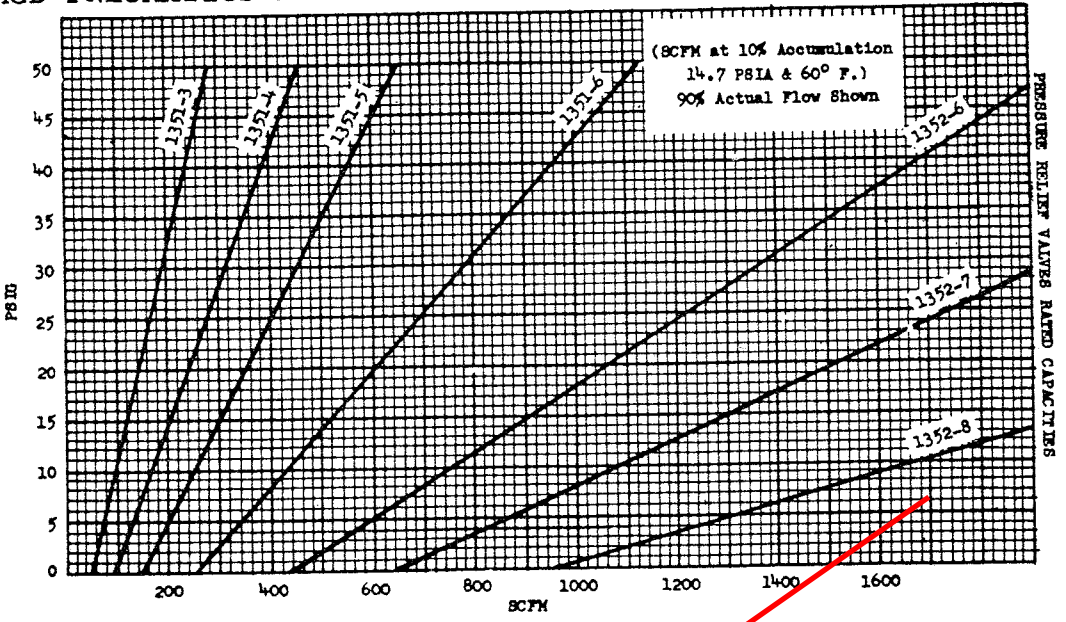
INSTRUCTIONS:

1. AVOID OVERTIGHTENING OF VALVE DURING INSTALLATION.
2. PRESSURE SETTING MAY BE VARIED APPROX. ± 10% OF ORIGINAL SETTING BY REMOVING AND LOOSENING THE FILLISTER HEAD MACHINE SCREW AND THEN RUNNING THE PRESSURE SCREW IN OR OUT AS DESIRED.
3. VALVE MAY BE CLEANED BY REMOVING DISC AND CLEANING SEAT SURFACE WITH A SOFT CLOTH. SEATING SURFACE MAY BE LAPPED IN CASE OF LEAKAGE BY USING A FINE GRIT COMPOUND.

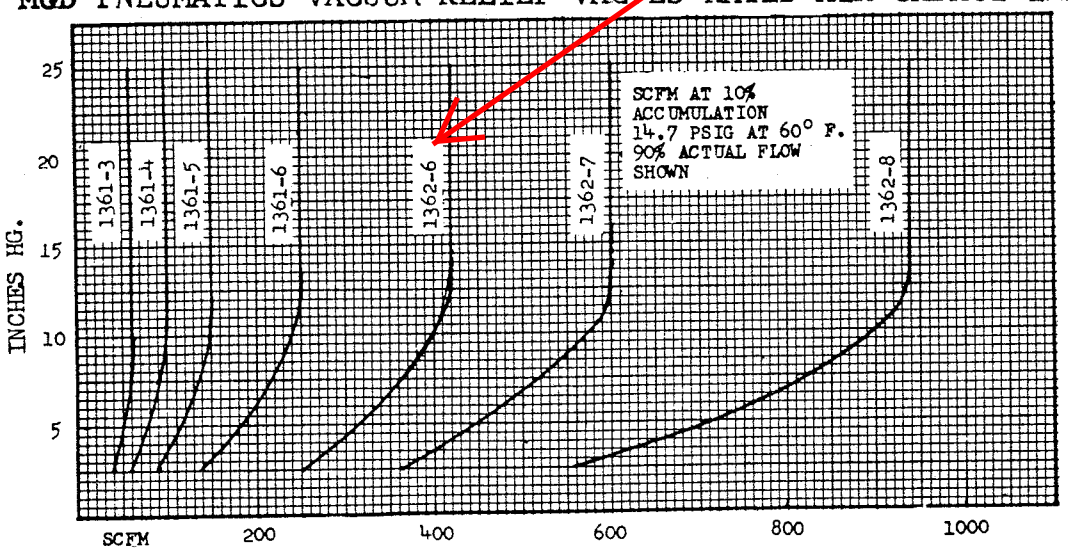




MGD PNEUMATICS PRESSURE RELIEF VALVES RATED AIR CAPACITIES



MGD PNEUMATICS VACUUM RELIEF VALVES RATED AIR CAPACITIES



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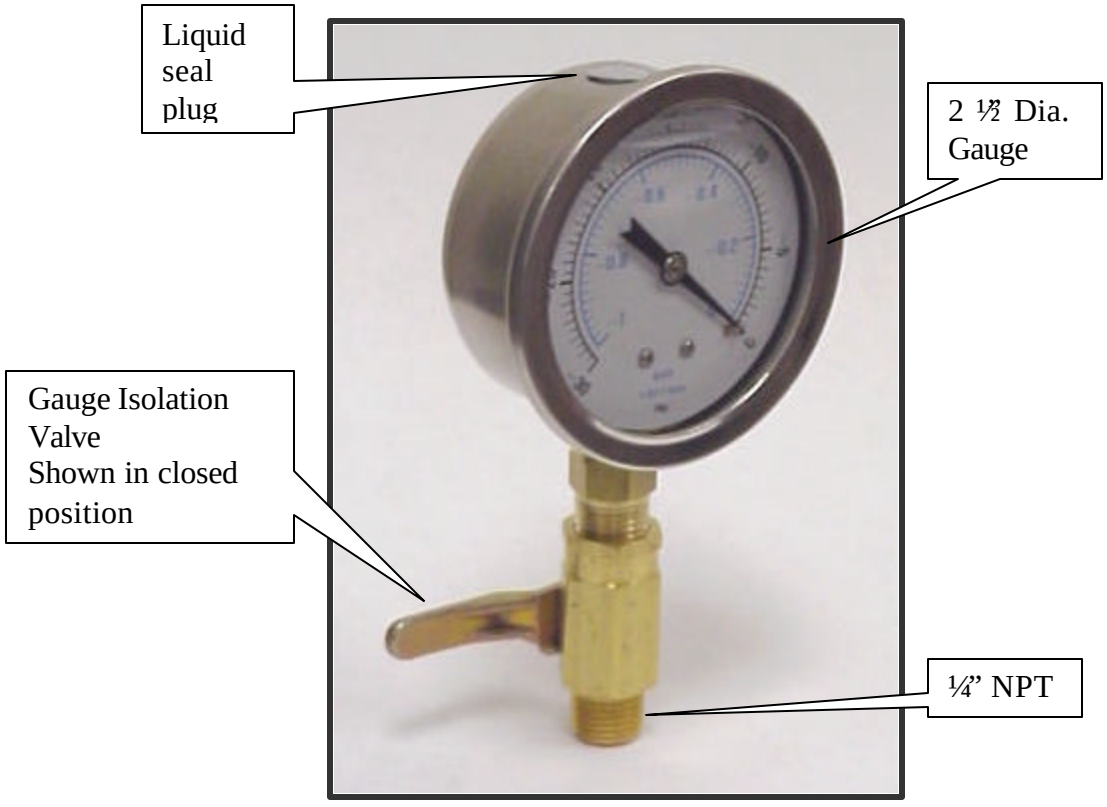
J. E. GASHO & ASSOCIATES, INC.

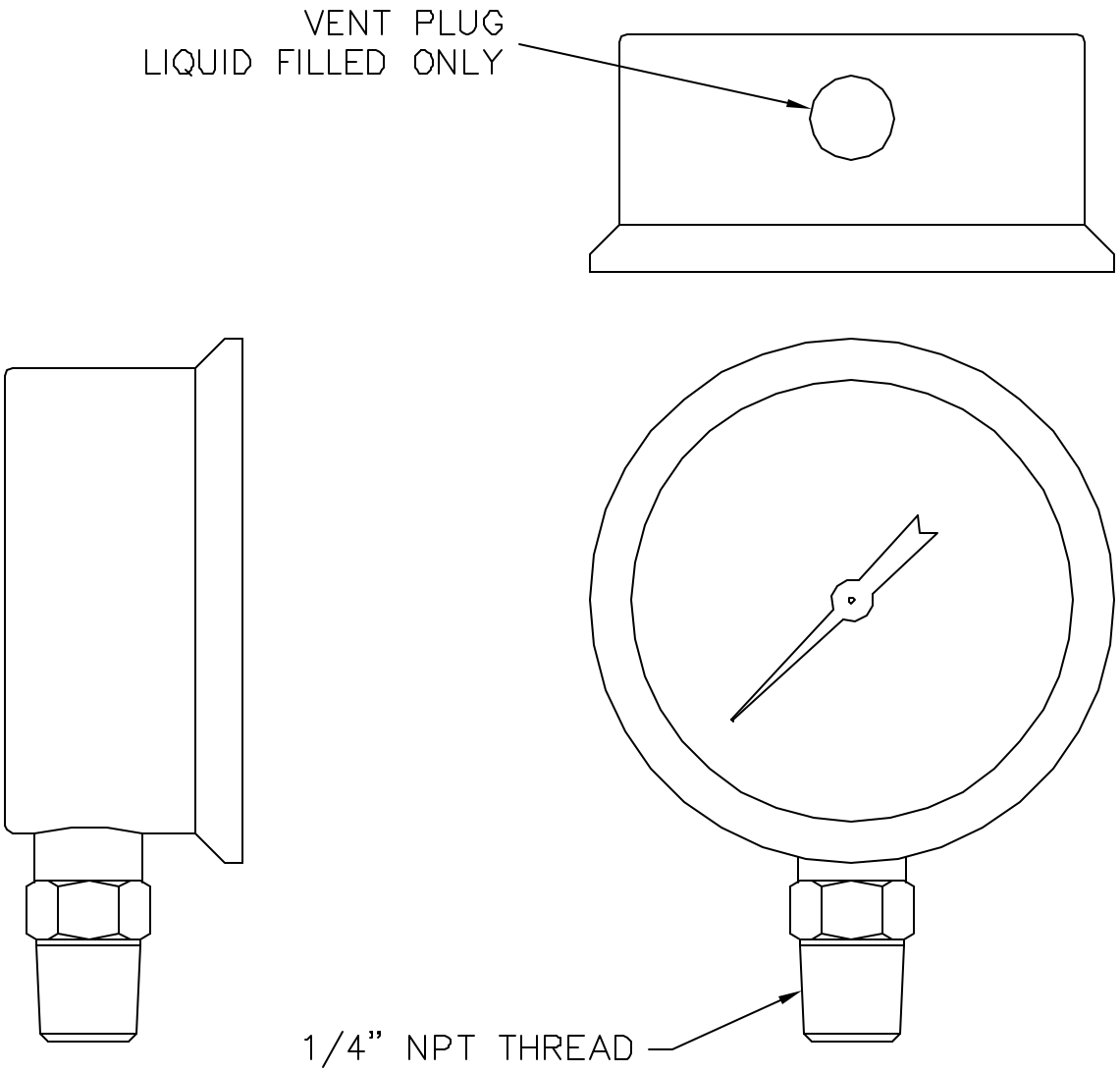
Authorized Manufacturer's Representative
Air / Gas Moving Equipment
460 W. GAY STREET
WEST CHESTER, PA 19380
PHONE: 610-692-5650 FAX: 610-692-5837

Pressure and Vacuum Gauges

We use both standard gauges and liquid filled gauges from a variety of manufacturers. Gauges are installed on our packages with gauge isolation valves (gauge cocks) part number BRS-VA-025-4F4M-BT. The gauge isolation valve can be used as a snubber while reading the gauge by opening it slightly. To protect gauges from damage due to shocks or pulsations in the system, gauge isolation valves should be closed except when the gauge is being read.

Liquid filled gauges may display incorrect readings due to variations in atmospheric pressure. To determine if a gauge is subject to this condition, the liquid filled cavity should be temporarily vented to atmosphere. Most liquid filled gauges have a seal plug in the liquid filled cavity. Remove this plug to allow the cavity to be vented to atmosphere. In some instances the case can be lightly squeezed to burp it. Replace the plug.





25.0.015PSI

NOMINAL SIZE
- 25 = 2.5in
- 40 = 4.0 in.

TYPE
- 0 = NON-FILLED
- 1 = LIQUID FILLED

RANGE

NOTES:
1. WE USE BOTH STANDARD GAUGES & LIQUID FILLED GAUGES FROM A VARIETY OF MANUFACTURERS
2. STANDARD RANGES:
   - PRESSURE: 0-6 PSI & 0-160 IWC
     0-15 PSI
     0-30 PSI
   - VACUUM: 0-12 IN. HG. & 0-160 IWC
     0-30 IN., HG.

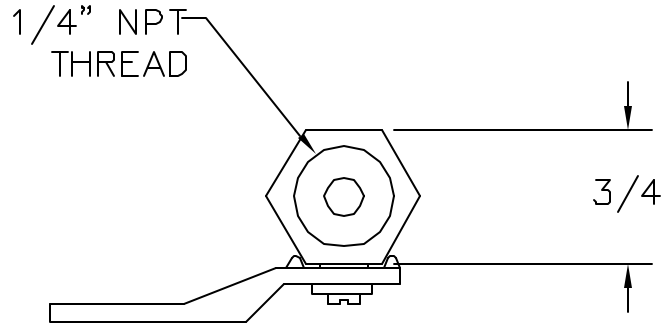
REV.	DATE	DESCRIPTION

DRAWN BY: M. WITTE — DATE: 8-18-00
APPROVED BY: — DATE:
DIMENSIONS IN INCHES
SCALE:
TOLERANCE — ANGULAR TOLERANCE
MATERIAL — WEIGHT
SHEET 1 OF 1

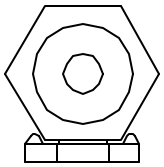
J. E. GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

PRESSURE GAUGE NUMBERING SYSTEM

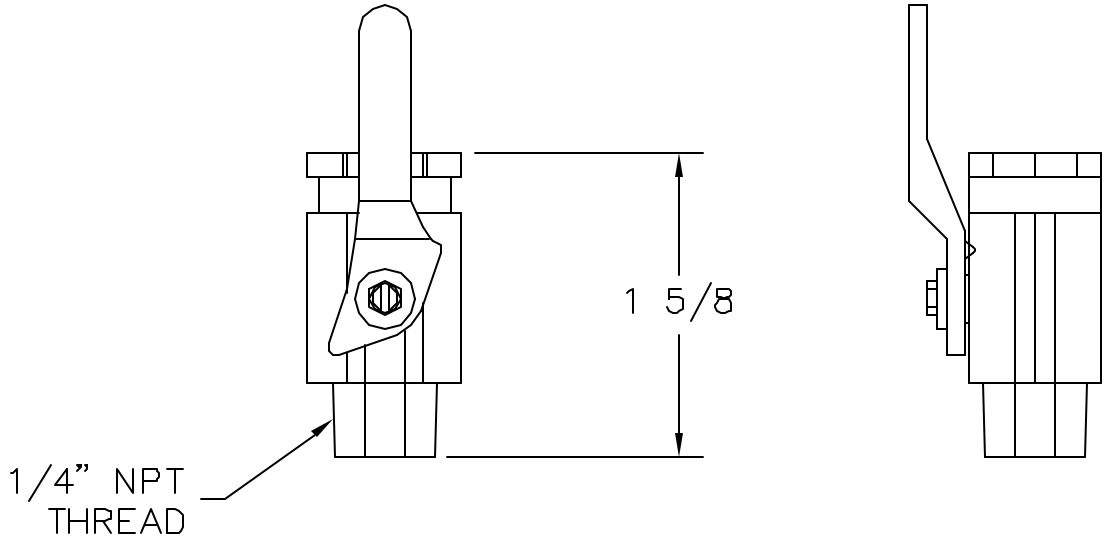
—



PLAN VIEW – CLOSED



PLAN VIEW – OPEN



			DRAWN BY: M. WITTE	DATE 8–17–00	J. E. GASHO & Assoc., Inc. 460 W. GAY ST. WEST CHESTER, PENNSYLVANIA 19380
			APPROVED BY:	DATE	
			DIMENSIONS IN INCHES		GAUGE ISOLATION VALVE SMC VA BRS 025–4F4M–BT
			SCALE		
			TOLERANCE	ANGULAR TOLERANCE	
			MATERIAL	WEIGHT	
REV.	DATE	DESCRIPTION	SHEET 1 OF 1		—

Maximum Operating Pressure - 500 psi
Maximum Operating Temperature - 180 Degrees F
Ball Through Hole Diameter - .218

025 SERIES BALL VALVE

025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

Example:	Inlet End	Outlet End	Seal	Handle	Plating
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP

SMC Part Number: 025-4F4M-B,SH,ENP

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

025 Series Options

Material Options Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

Body Options

- 1/4 Female x 1/4 Female NPT
- 1/4 Female x 1/4 Male NPT
- 1/4 Female x 1/8 Female NPT
- 1/4 Female x 1/8 Male NPT
- 1/4 Female x 1/4 Hose Barb
- 1/4 Female x 11/16-16 Male
- 1/4 Female x 7/16-24 Female
- 1/4 Female x 1/4 Female Flare
- 1/4 Female x 3/8 Compression

Handle Options Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

Plating Options Electroless Nickel, Black Zinc

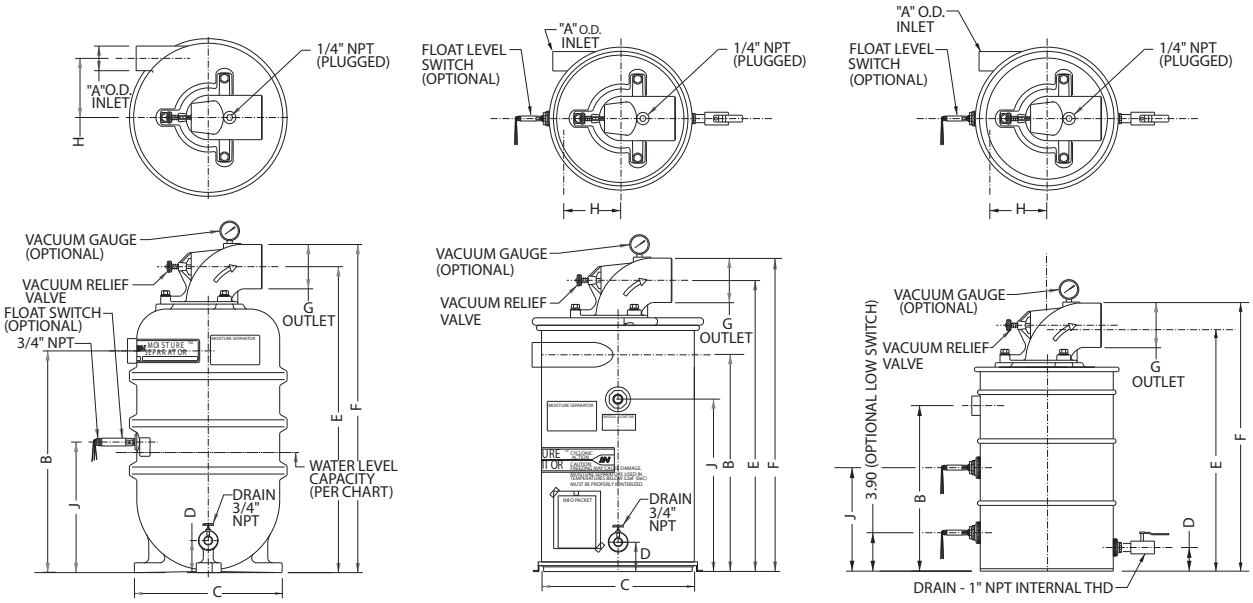
SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

Filtration - Moisture Separator

ROTRON®

By separating and containing entrained liquids, ROTRON'S™ moisture separator helps protect our regenerative blowers and the end treatment system from corrosion and mineralization damage. Recommended for all soil vacuum extraction applications.

SPECIFICATIONS:
SEPARATION METHOD – High E ciency Cyclonic
RELIEF VALVE MATERIAL – Brass & Stainless Steel
FLOAT MATERIAL – Copper
FLOAT SWITCH – SPDT, Explosion-proof NEMA 7&9, 5 Amp max.



PLASTIC "P" DESIGN | METAL "D" DESIGN | METAL "B" DESIGN

Models without oat switch available. Metal MS200/300DS models are not the standard stocked, but are available.

		Part/Model Number							
		MS200PS	MS300PS	MS200DS	MS300DS	MS350BS	MS500BS	MS600BS	MS1000BS
Specification	Units	038519	038520	080086	080087	038357	080660	080659	038914
Dimension A	Inches	2.38	2.88	2.00	2.50	3.25	3.25	4.00	6.00
	mm	60.5	73.2	50.8	63.5	82.6	82.6	101.6	152.4
CFM Max.	CFM	200	300	200	300	350	500	600	1000
	m3/hr	340	510	340	510	595	850	1020	1700
Dimension B	Inches	22.46	22.46	22.12	22.12	28.00	28.00	27.00	31.00
	mm	570.5	570.5	561.8	561.8	711.2	711.2	685.8	787.4
Dimension C	Inches	16.00	16.00	16.75	16.75	23.00	23.00	23.00	27.00
	mm	406.4	406.4	425.5	425.5	584.2	584.2	584.2	685.8
Dimension D	Inches	3.25	3.25	2.75	2.75	4.00	4.00	4.00	4.00
	mm	82.6	82.6	69.9	69.9	101.6	101.6	101.6	101.6
Dimension E	Inches	31.05	31.05	27.92	27.92	37.25	37.37	37.37	47.32
	mm	788.7	788.7	709.2	709.2	946.2	949.2	949.2	1201.9
Dimension F	Inches	33.30	33.30	30.17	30.17	39.50	54.50	54.50	51.70
	mm	845.8	845.8	766.3	766.3	1003.3	1384.3	1384.3	1313.2
Dimension H	Inches	6	6.00	6.56	6.81	9.75	9.75	9.25	10.00
	mm	152.4	152.4	166.6	173	247.7	247.7	235	254
Dimension G	Inches	4.50 OD	4.50 D	4.50 D	4.50 OD	4.50 OD	6.63 ID	6.63 ID	8.62 OD
	mm	114.3	114.3	114.3	114.3	114.3	168.4	168.4	218.9
Dimension J	Inches	13.25	13.25	12.62	12.62	17.50	17.50	17.50	19.88
	mm	336.6	336.6	320.5	320.5	444.5	444.5	444.5	505
Drain Internal Thd	-	3/4	3/4	3/4	3/4	1	1	1	1
Shipping Weight	Lbs	42	42	42	42	82	95	96	150
	Kg	19.1	19.1	19.1	19.1	37.2	43.1	43.5	68

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.

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Customer Service Fax: +1 215.256.1338
www.ametektip.com

2.0 Moisture Separator™ Specifications

2.1 Duty

The moisture separator shall be designed for use in a soil vapor extraction system capable of continuous operation with a pressure drop of less than six inches of water at the rated flow of _____ SCFM. The separator shall be capable of operation under various inlet conditions randing from a fine mist to slugs of water with high efficiency.

2.2 Principle of Operation

The moisture separator shall incorporate cyclonic separation to remove entrained water. The separator must protect against an overflow by fail safe mechanical means. An electrical switch or contact(s) alone is not an acceptable means of protection against overflow, but is a good backup.

2.3 Construction

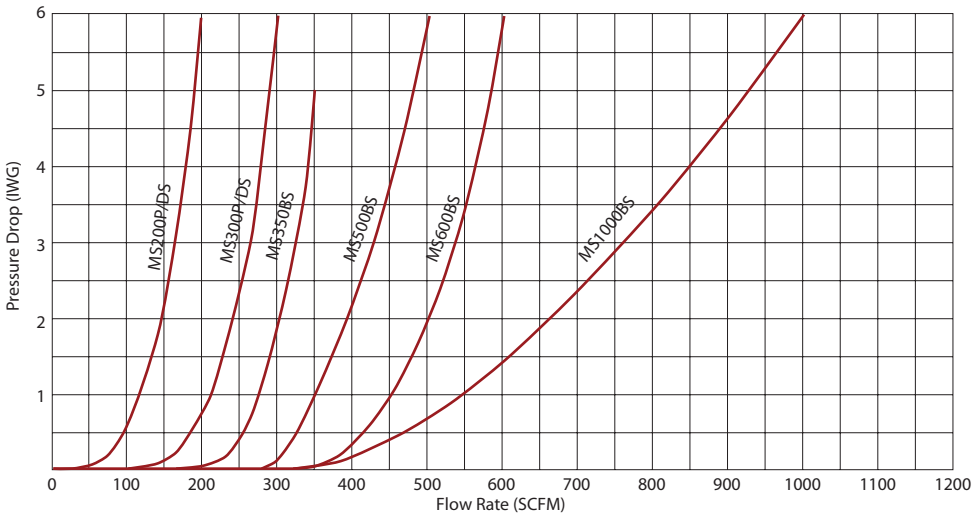
The body of the moisture separator shall be constructed of heavy wall plastic or heavy gauge cold rolled steel. The steel interior and exterior shall be epoxy (powder) coated to resist abrasion, corrosion, and chipping that might expose the surface. The inlet shall be tangentially located and welded to the body. The outlet port shall be constructed of PVC or cast aluminum alloy, flanged and sealed to the center of the top of the separator. The separator shall incorporate a non-sparking copper float ball and an adjustable relief valve to protect against overflow and overheating the blower.

2.4 Capacity and Dimension

The moisture separator must have a liquid capacity of _____ gallons. The inlet shall be _____ inch OD slip-on type. The outlet shall be _____ inch OD slip-on type.

For DR/EN/CP Blower Model	Selector Moisture Separator Model	Liquid-holding Capacity (gallons)	Inlet (OD)	Outlet	Max Vacuum Allow (IHG)
404 454 505 513	MS200PS	7	2.38	4.5 OD	12
523 555 633 833	MS200DS	10	2.0		22
656	MS300PS	7	2.88		12
6 757	MS300DS	10	2.5		22
808	MS350BS	40	3.25	6.63 ID	
858 1233	MS500BS				
909	MS600BS		4.0		
979 14	MS1000BS	65	6.0	8.62 OD	

2.5 Pressure Drop



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SERVICE AND PARTS MANUAL
FOR

MOISTURE SEPARATORS

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Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
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OPERATION & MAINTENANCE MANUAL

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Rotron Moisture Separator

Thank you for purchasing an AMETEK Rotron MS series moisture separator. When matched with the correct Rotron blower, and properly installed and maintained, this separator will effectively and efficiently remove moisture from the air stream. To ensure good results, please take the time to read these instructions before starting the installation of your moisture separator.

Sizing for Optimal Efficiency

Separator	Max. CFM	Max. Vac	Capacity	Blowers – DR, EN & CP
MS200P(S)	200	12* IHg	7 gal.	101-555, 513, 523, 623
MS200D(S)	200	22 IHg	10 gal.	101-555, 513, 523, 623
MS300P(S)	300	12* IHg	7 gal.	606, 6, 707, 823
MS300D(S)	300	22 IHg	10 gal.	606, 6, 707, 823
MS350B(S)	350	22 IHg	40 gal.	808, 1223
MS500B(S)	500	22 IHg	40 gal.	858
MS600B(S)	600	22 IHg	40 gal.	909
MS1000B(S)	1000	22 IHg	65 gal.	14
Note: "S" suffix denotes presence of XP high level switch. * Special Construction with 20 IHg capability available.				

Installation

1. **Unpacking** - For MS200/300, remove drain valve taped to packing material and box containing liquid level switch, if so equipped. For MS350/500/600, remove box containing valve hardware as well as box containing liquid level switch (if so equipped) and remove internal cardboard packaging and cable ties from screen assembly.

2. **Bolt Down** (w/ feet included) - For MS200/300 models, built-in feet or a mounting ring is included. It is recommended that these units be bolted in place. All models will only work in an upright position.

3. **Piping** - Attach to system piping with flexible couplings to minimize stress incurred by rigid system piping. The connections should be airtight but not sealed with an adhesive for ease of disassembly during routine maintenance. Install drain valve, using teflon tape on threads.

4. **Installation and Wiring of Liquid Level Switch** - Remove plug from the bulkhead fitting. Thread the switch by hand until snug with index arrow pointing down. Wire in accordance with the nameplate wiring schematic. Typically, the wiring is connected back to the starter to shut down the system but can be used for other purposes.

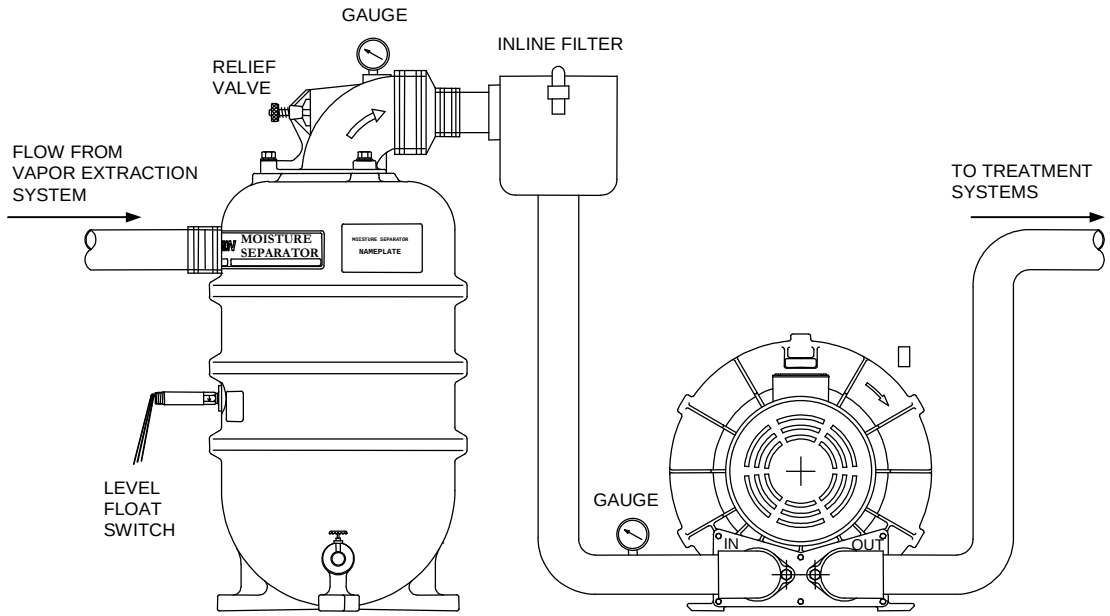
5. **Install/Adjust Relief Valve** - For MS500/600, first install the relief valve with teflon tape on threads. Use a wrench, but tighten only enough to prevent leakage. Next step for all MS units, back off the relief valve adjuster relaxing spring pressure. Then block the moisture separator inlet while measuring the motor current. Adjust the valve until the motor current is 90% of the max. nameplate blower amps.

6. **Continuous Service** - For cold weather service, appropriate steps should be taken to prevent freezing. Also, the maximum vacuum ratings are based on 115°F maximum. Consult factory for higher potential ambients.

Revised 17 February 2005

Note: A moisture separator is not a substitute for an inline air filter. A Rotron inline filter should be used to remove particles that pass through the separator.

Typical Vapor Extraction System



Operation

Moisture-laden air enters the separator through the tangential inlet. Cyclonic action removes free moisture from the air stream and allows the air to discharge through the top of the separator. When the separator is full, the float valve shuts off the air flow through the separator, and the relief valve opens to limit the vacuum of the blower.

To drain the separator, turn off the blower and open the drain valve at the bottom of the separator. Caution: The liquid contained in the separator should be analyzed before it is released back into the environment. It may be considered hazardous waste in certain geographical areas and require special treatment/disposal. Once the liquid is drained, the unit can be reset by turning the blower back on.

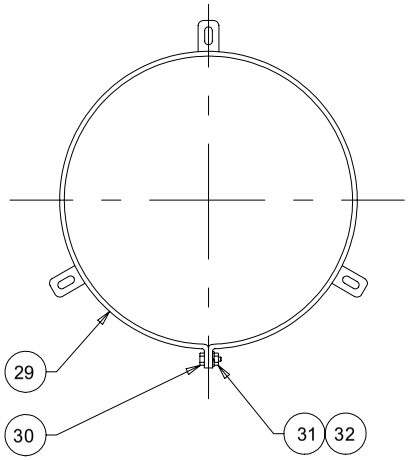
Automatic draining options are at the discretion of the customer.

Maintenance

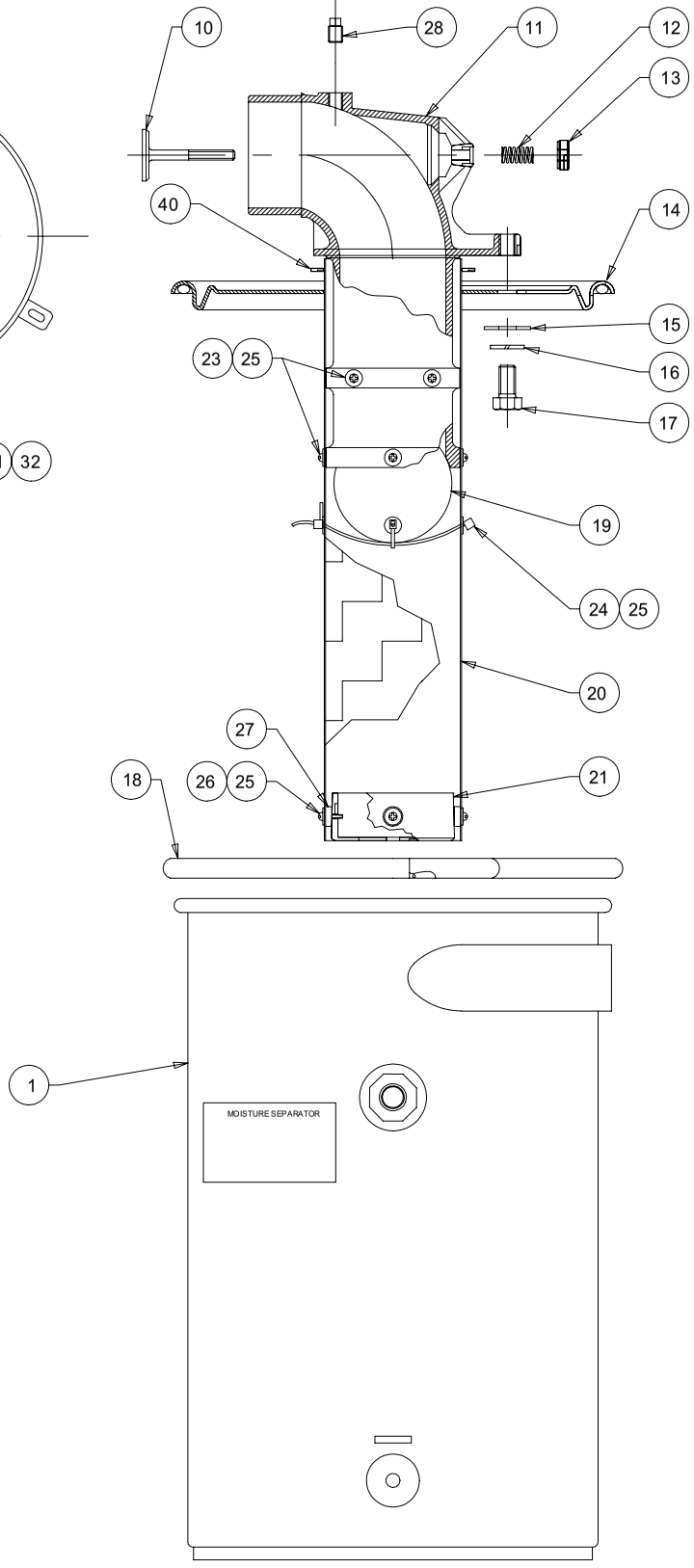
This MS series moisture separator has been designed to require minimal maintenance. During normal operation a layer of sludge may build up on the bottom of the separator. As necessary, the top assembly of the moisture separator should be removed and the inside cleaned out with water. Keeping the inside clean will prevent the valve from becoming clogged with sediment. The relief valve should be inspected upon emptying the separator and readjusted (per installation instruction 5) upon restart.

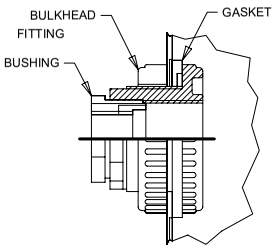
If you have any questions regarding this product, contact your local sales representative or our Application Engineering Department at the factory.

AMETEK ROTRON
MOISTURE SEPERATOR

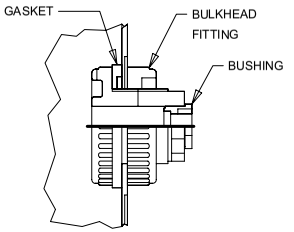


FOOT CLAMP DETAIL

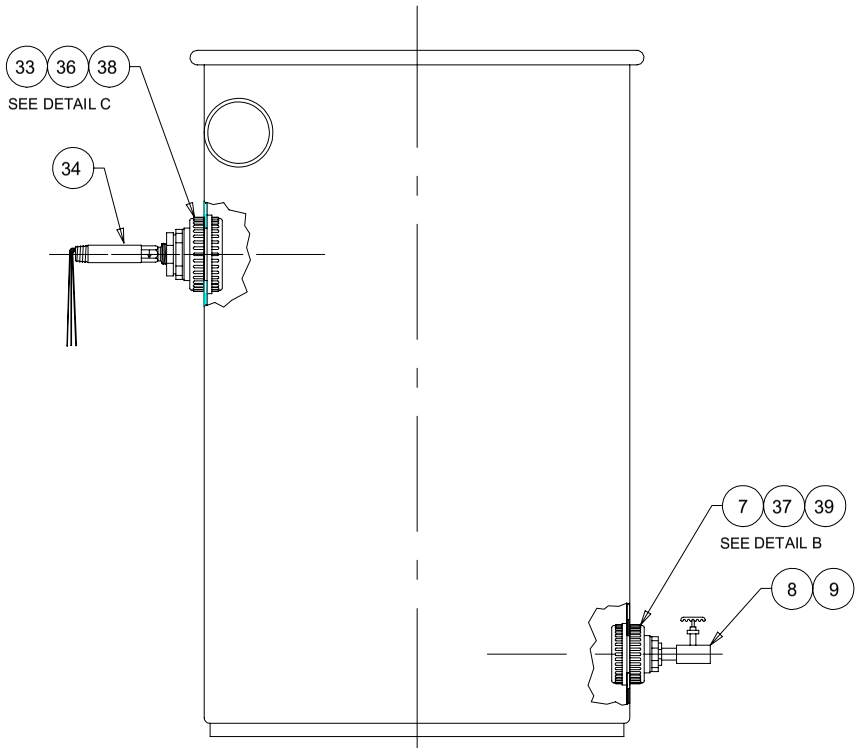




DETAIL C
BULKHEAD FITTING ASSY



DETAIL B
BULKHEAD FITTING ASSY



Moisture Separator
Service and Parts Manual

Parts Breakdown

Model:	**MS200/300D_**	**MS350B_**	**MS200/300P_**	**MS500/600B_**	**MS1000**
Part No.:	**038355**	**038277**	**038517**	***038353***	**038914**
	038356	**038357**	**038518**	***038354***	**038916**
	038275		**038519**	***038003***	**080019**
	038276		**038520**	***038075***	
	080086			**080657**	
	080087			**080658**	
				080659	
				080660	
				080661	
				080662	
				OBSOLETE	

Item No.	Qty. Req'd	Description					
1	1	Drum Assembly	See Next Page	See Next Page	See Next Page	See Next Page	See Next Page
7	1	Bulkhead Fitting Drain	529830	529830	Not Used	529830	529830
8	1	Drain Valve	523374	523407	523374	523407	523407
9	1	Pipe Nipple Drain	551140	523406	155416	523406	523406
10	1	Relief Valve Stem	529318	529318	529318	Not Used	550621
11	1	Outlet	529323	529323	529323	See Outlet Assy #42 Below	550646
12	1	Spring - Relief Valve	155339	155339	155339	Not Used	155476
13	1	Nut-Knurled Relief Valve	155342	155342	155342	Not Used	155471
14	1	Lid	550674	523403	Not Used	523404	550566
	1	Gasket for lid	Not Used	551102	Not Used	551102	551640
15	3	Washer, Flat, Lid/Outlet	155159	155159	155091	Not Used	155159
16	3	Washer, Lock, Lid/Outlet	120338	120338	251787	Not Used	120338
17	3	Bolt, Lid/Outlet	155343	155343	120255	Not Used	155343
18	1	Lock Ring - Lid	See Next Page	528926	Not Used	528926	550652
19	1	Float Ball	528803	528803	528803	528956	550569
20	1	Cage, Float	551138	528957	529887	528958	550568
21	1	Endcap	529884	529884	529884	528954	550678
23	6	Screws Cage	251645	251645	251645	(9 pcs) 251645	(11 pcs) 251645
24	4	Tie Cable *	155276	155276	Not Used	155276	155276
25	13	Washer Cage - Various Places	155115	155115	(9 pcs) 155115	(16 pcs) 155115	(18 pcs) 155115
26	3	Screws Endcap	155415	155415	155415	(3 pcs) 251645	(3 pcs) 251645
27	3	Spacer Endcap	155417	155417	155417	Not Used	Not Used
28	1	Pipe Plug - Outlet	155344	155344	155344	Not Used	155344
29	1	Foot Clamp	See Next Page	Not Used	Not Used	Not Used	Not Used
30	1	Bolt, Foot Clamp	120325	Not Used	Not Used	Not Used	Not Used
31	1	Nut, Foot Clamp	155049	Not Used	Not Used	Not Used	Not Used
32	1	Lockwasher, Foot Clamp	120203	Not Used	Not Used	Not Used	Not Used
33	1	Bulkhead Fitting Float Switch	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
34	1	Float Switch	See Next Page	See Next Page	See Next Page	See Next Page	See Next Page
36	1	Bushing, Float Switch	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
37	1	Gasket, Blulkhead Fitting - Drain Spigot	529831	529831	Not Used	529831	529831
38	1	Gasket, Bulkhead Fitting	See Next Page	See Next Page	Not Used	See Next Page	See Next Page
39	1	Bushing, Drain Valve	529849	Not Used	Not Used	Not Used	Not Used
40		Gasket, Outlet	529514	529514	529514	Not Used	550653
41		Pipe Plug, Float Switch	Not Used	Not Used	See Next Page	Not Used	Not Used
42		Outlet Assembly (consists of one each of the following)				Tee - 523402 Pipe - 116135 Seat Float - 528955 Reducer, Relief Valve - 528959 Bushing, Relief Valve - 551639	
43		Relief Valve Complete	Not Used	Not Used	Not Used	523230	Not Used

*As Needed **Viewed looking at inlet/outlet ports

Model	Model Part No.	Item No.	Item Part #
MS200DS	038355	1	529463
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS300DS	038356	1	529464
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS200D	038275	1	523362
		14	529006
		18	529004
		29*	529367
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS300D	038276	1	551141
		14	529006
		18	529004
		29	529367
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS350BS	038357	1	529465
		33	529841
		34	529461
		36	552634
		38	529842
MS350B	038277	1	523399
		33	Not Used
		34	Not Used
		36	Not Used
		38	Not Used
MS300PS	038520	1	529668
		34	529461
		41	Not Used
MS1000B	038916	1	550560
		33,34,36,38	Not Used
MS1000B2S	080019	1	550566
		18	Not Used
		33 (2 pcs)	529841
		34 (2 pcs)	529461
		36 (2 pcs)	552634
		38 (2 pcs)	529842

Model	Model Part No.	Item No.	Item Part #
MS200PS	038519	1	529435
		34	529461
		41	Not Used
MS300P	038518	1	529668
		34	Not Used
		41	155405
MS200P	038517	1	529435
		34	Not Used
		41	155405
MS500B	038354	1	529465
	(Obsolete)	33	529841
		34	529461
	080660	36	552634
	(New P/N)	38	529842
MS600BS	038353	1	529466
	(Obsolete)	33	529841
		34	529461
	080659	36	552634
	(New P/N)	38	529842
MS500B	038075(Obsolete)	1	523399
		33	Not Used
	080658 (New P/N)	34	Not Used
		36	Not Used
		38	Not Used
MS600B	038003	1	551143
	(Obsolete)	33	Not Used
		34	Not Used
	080657	36	Not Used
	(New P/N)	38	Not Used
MS1000BS	038914	1	550561
		33	529841
		34	529461
		36	552634
		38	529842
MS300DS	080087	1	550672
		18	523296
		29	550688
		33	529841
		34	529461
		36	552634
		38	529842
MS200DS	080086	1	550669
		18	523296
		29	550688
		33	529841
		34	529461
		36	552634
		38	529842
MS500B2S	080662	1	550650
		33 (2 pcs)	529841
		34 (2 pcs)	529461
		36 (2 pcs)	552634
		38 (2 pcs)	529842

*As Needed **Viewed looking at inlet/outlet ports

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Alum A Frame Enclosures

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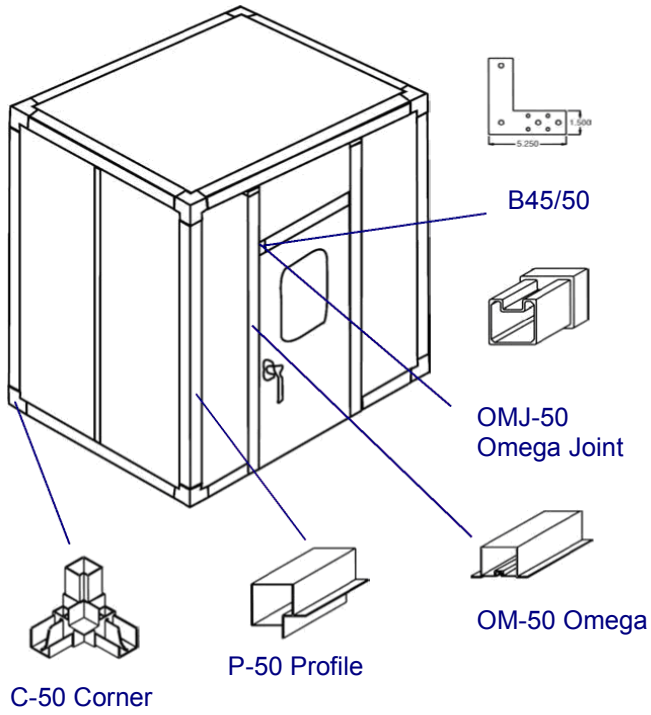
Noise Control Products Inc.

Call us at 888-454-6975 **Internet: www.noisecontrolproducts.com**



Options:

- ♦ STC Rated Panels up to 55 dBA
- ♦ Mylar, Polyethylene or Fiberglass Cloth Lining
- ♦ Framed Cutouts/Openings
- ♦ Primer or Finish Paint
- ♦ Multiple Gauge Construction
- ♦ Variety of materials available
- ♦ Custom Designs per You Acoustical/Thermal Requirements
- ♦ Multiple Insulation Materials and Densities
- ♦ Available in Quick Removable Panels

Thermal Performance:

Individual panels will have a "U" factor 0.07 and an entire panel enclosure will have a 0.14

Fire Hazard Rating:

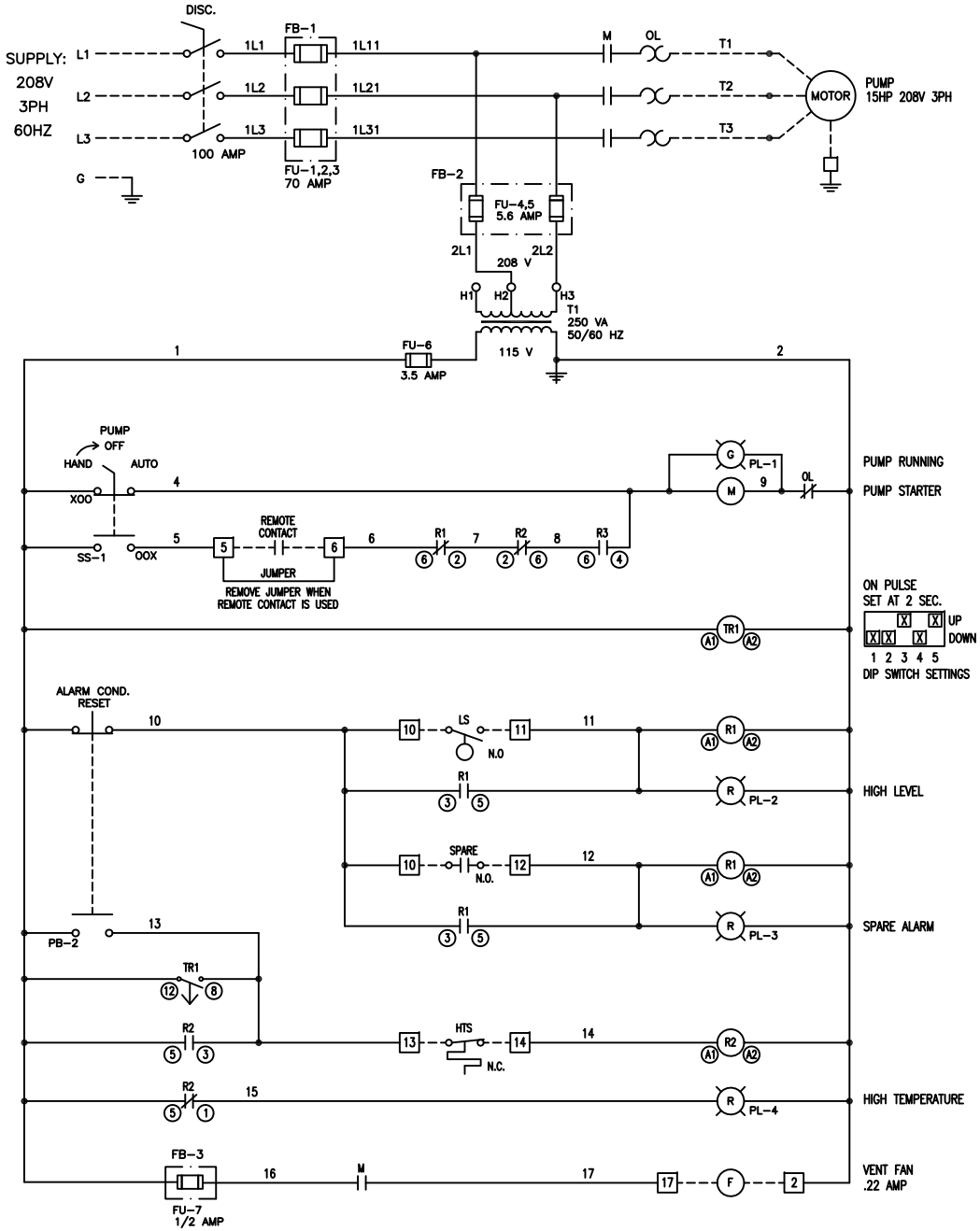
Standard acoustical fill will have the following UL Fire Hazard Ratings as per ASTM E-84: **Flame Spread -15 / Fuel Contributed -0 / Smoke Developed -0**

Acoustical Performance* - Standard Construction

Sound Transmission Loss (ASTM E-90-81)							*All acoustical tests were performed and reported by an Independent Accredited Acoustical Laboratory. Copies of test reports furnished upon request.
Octave Band Center Frequency (Hz)	125	250	500	1000	2000	4000	STC
4" Panel (TL in dB)	22	29	40	48	54	60	41
2" Panel (TL in dB)	21	24	35	43	52	57	37

Sound Absorption Coefficients (ANSI/ASTM C243-81 and E795)							
Octave Band Center Frequency (Hz)	125	250	500	1000	2000	4000	NRC
4" Panel	.86	1.09	1.22	1.06	1.05	1.04	1.10
2"Panel	.31	.82	1.19	1.12	1.07	1.06	1.11

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF
DELIVERING NOT MORE THAN 5Ka RMS
SYMMETRICAL AMPERES, 480 VOLTS MAXIMUM



NOTES:

1. ☐ INDICATES TERMINAL BLOCK
2. ○ INDICATES COMPONENT TERMINAL POINT
3. USE COPPER WIRE ONLY
4. REPLACE WITH LIKE FUSES ONLY
5. ALL CONTACTS SHOWN WITH POWER OFF
6. HTS – INDICATES TEMPERATURE SWITCH
7. LS – INDICATES LEVEL SWITCH
8. TORQUE TERMINALS TO 5-7 LB-IN
9. UL LISTED CONTROL PANEL

REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

J.E. GASHO & ASSOCIATES
PO# 52744-2966

ICP S.O.# XXX

HP 15

VOLTAGE 208/3/60

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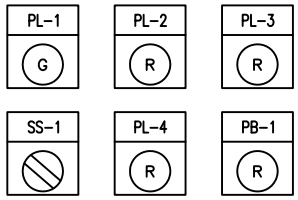
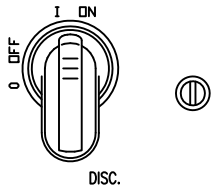
TITLE: STARTER CONTROL PANEL

DATE	PAGE	DWG NO.	
4/12/15	1 OF 2	GASH134	INTERNATIONAL CONTROL PRODUCTS, INC.

DOOR LAYOUT





PL-1 PUMP RUNNING
PL-2 HIGH LEVEL
PL-3 SPARE
PL-4 HIGH TEMPERATURE
SS-1 PUMP HAND-OFF-AUTO
PB-1 EMERGENCY STOP
PB-2 ALARM COND. RESET

BILL OF MATERIALS

ITEM	QTY	ITEM LABEL	MFG.	DESCRIPTION	PART NUMBER
1	1	ENCL	SCE	30x248 NEMA 4 ENCLOSURE	SCE-30EL2408LP
2	1	ENCL	SCE	27x21 STEEL BACK PANEL	SCE-30P24
3	1	DISC.	ABB	3P 100 AMP DISCONNECT	OT100F3
4	1	DISC.	ABB	NEMA 4 DISCONNECT HANDLE	OHB65L6
5	1	DISC.	ABB	DISCONNECT SHAFT	OXP6X210
6	1	FB-1	MERSEN	3P 100A CLASS J FUSE BLOCK	61008SJ
7	3	FU1,2,3	MERSEN	70 AMP CLASS J FUSE	AJT-70
8	1	M	SIEMENS	65 AMP IEC CONTACTOR	3RT1044-1AK60
9	1	M	SIEMENS	1 N.O. AUX. CONTACT	3RH1921-1CA10
10	1	OL	SIEMENS	OVERLOAD RELAY (18-25 FLA)	3RU1146-4JB0
11	1	SS-1	ABB	3 POS. S.S. SPRG. RET. L TO C (2 N.O.)	M3SS7-30B-20
12	1	PL-1	ABB	GREEN F.V. PILOT LIGHT - 120V	CL-100G
13	2	PL-2,3	ABB	RED F.V. PILOT LIGHT - 120V	CL-100R
14	1	PB-1	ABB	BLACK FLUSH P.B. (1 N.O./1 N.C.)	MP1-30B-11
15	1	T1	SIEMENS	250VA CONTROL TRANSFORMER	MT0250F
16	1	FB-2	MERSEN	2P 30A CLASS CC FUSE BLOCK	30322R
17	2	FU-4,5	MERSEN	5 6/10 AMP CLASS CC FUSE	ATQR-5 6/10
18	1	FU-6	MERSEN	3 1/2 AMP TIME DELAY FUSE	TRM-3 1/2
19	1	FB-3	MERSEN	1P 30A MIDGET FUSE BLOCK	30321
20	1	FU-7	MERSEN	1/2 AMP TIME DELAY FUSE	TRM-1/2
21	1	TR1	FINDER	2 POLE TIMER - 120V	85.02.0.125.0000
22	1	TR1	FINDER	2 POLE TIMER SOCKET	94.82
23	3	R1,2,3	FINDER	2 POLE RELAY - 120V	56.32.8.120.0040
24	3	R1,2,3	FINDER	2 POLE RELAY SOCKET	96.72
25	8	T.B.'S	PHOENIX	TERMINAL BLOCK	3004362
26	1	T.B.'S	PHOENIX	TERMINAL BLOCK END COVER	3003020
27	2	T.B.'S	PHOENIX	DIN RAIL END RETAINER	0800886
28	1	GROUND	BURNDY	14-1/0 AWG GROUND LUG	KA25U
29	2	GROUND	BURNDY	14-2 AWG GROUND LUG	DLA2

REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

J.E. GASHO & ASSOCIATES
PO# 52744-2966

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TITLE STARTER CONTROL PANEL

DATE	PAGE	DWG NO.	
4/12/15	2 OF 2	GASH134	INTERNATIONAL CONTROL PRODUCTS, INC.

Maximum Operating Pressure - 500 psi
Maximum Operating Temperature - 180 Degrees F
Ball Through Hole Diameter - .218

025 SERIES BALL VALVE

025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

Example:	Inlet End	Outlet End	Seal	Handle	Plating
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP

SMC Part Number: 025-4F4M-B,SH,ENP

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.
Example: 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

025 Series Options

Material Options Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

Seal Options Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

Body Options

- 1/4 Female x 1/4 Female NPT
- 1/4 Female x 1/4 Male NPT
- 1/4 Female x 1/8 Female NPT
- 1/4 Female x 1/8 Male NPT
- 1/4 Female x 1/4 Hose Barb
- 1/4 Female x 11/16-16 Male
- 1/4 Female x 7/16-24 Female
- 1/4 Female x 1/4 Female Flare
- 1/4 Female x 3/8 Compression

Handle Options Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

Plating Options Electroless Nickel, Black Zinc

SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

APPENDIX E

Excavation Work Plan

APPENDIX E

EXCAVATION WORK PLAN (EWP)

1. NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 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 B of the SMP.

Table 1: Notifications*

Stephen Malsan, NYSDEC Project Manager	518-402-9646; stephen.malsan@dec.ny.gov
Paul John, NYSDEC Regional HW Engineer	718-482-4995; paul.john@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	518-402-9553; kelly.lewandowski@dec.ny.gov

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

This notification will include:

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

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

2. SOIL SCREENING METHODS

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

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section 5 of this Appendix.

3. SOIL STAGING METHODS

The site has been remediated for restricted residential use (and less restricted uses defined in 6 NYCRR Part 375). The site is comprised of a single building that encompasses the entire site footprint, with the exception of a narrow passageway that separates the first floor of the building into two sections. As such, large-scale excavation in the future at this site is highly unlikely.

Excavated stockpiled soil that exceeds the lower of the protection of groundwater and protection of public health restricted-residential soil cleanup objectives (SCOs) as set forth in 6 NYCRR Table 375-6.8(b) shall be transported offsite to a permitted soil disposal or recycling facility. For any excavated soils that contain chlorinated solvents exceeding unrestricted use standards, a request must be made to NYSDEC for a contained-in determination prior to any potential off-site disposal of excavated soils.

The need for stockpiling significant amounts of soil outdoors at this site in the future is unlikely; therefore, many of the stockpile requirements do not apply. If small amounts of soil are generated from a localized excavation within the basement of the building, it will be staged on and covered with polyethylene sheeting until it can be removed from the site.

In the unlikely event that a significant outdoor stockpile is generated, 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 in the vicinity of the stockpile staging areas and the work in general. Excavated soil could also be staged in roll-off containers.

Stockpiles and roll-off containers will be kept covered at all times with appropriately anchored tarps. Stockpiles and roll-off containers will be routinely inspected and damaged tarp covers will be promptly replaced. An adequate supply of polyethylene sheeting will be available to cover stockpiles when not being actively managed.

Stockpiles and roll-off containers 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. MATERIALS EXCAVATION AND LOAD-OUT

All soil to be excavated from the site during the construction phase will be pre-characterized for the constituents required by the potential soil disposal facilities. These analyses will include, but may not be limited to, total petroleum hydrocarbons, the full Target Compound List (TCL)+15 of VOCs, the TCL+30 list of SVOCs, Pesticides and PCBs and the Target Analyte List (TAL) of metals including mercury, cyanide and hexavalent chromium. All excavated soils will be managed in accordance with NYSDEC regulations and guidance and the requirements of the soil disposal facilities where the soil is to be transported.

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

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

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

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

For future work at this site, it is highly unlikely that trucks will be driving on or otherwise contacting remaining contamination since the building covers the entire site. In the unlikely event that this occurs, the qualified environmental professional will be responsible for ensuring that all outbound trucks that have come in contact with remaining contamination will be decontaminated before leaving the site until the activities performed under this section are complete. It is likely that dry brushing of trucks will suffice as a means of decontamination at this site. However, if any is generated, equipment decontamination water will be collected and disposed in an appropriate manner.

If applicable, locations where vehicles enter or exit the site shall be inspected daily for evidence of offsite soil tracking.

In the unlikely event that large scale excavation occurs at the site in the future, 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.

5. MATERIALS TRANSPORT OFF-SITE

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

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

Truck transport routes to/from the nearest main artery are as follows:

- Outbound Route Headed to Queens/Bronx Via Interstate 278 (I-278):
    1. Head north on Rockaway Avenue toward Atlantic Avenue for 0.9 mi
    2. Turn left onto Atlantic Avenue and continue for 1.6 mi
    3. Keep right to stay on Atlantic Avenue and continue for 3.1 mi
    4. Merge onto ramp for I-278 east

- Inbound Route Headed to site from Queens/Bronx via I-278:
    1. Take I-278 west to Exit 27
    2. Turn right onto Columbia Street
    3. Immediately turn right onto Atlantic Avenue and continue for 4.9 mi
    4. Turn right on Rockaway Avenue for 0.9 mi (site is on the right)

Truck transport routes must be established before transporting any materials offsite. The truck transport route shall take 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.

In the unlikely event that large-scale excavation occurs at the site in the future, 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.

6. MATERIALS DISPOSAL OFF-SITE

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

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

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

7. MATERIALS REUSE ON-SITE

Only materials meeting the lower of the restricted residential use criteria for human health or the criteria for protection of groundwater presented in Table 6.8(b) of the latest revision of Title 6 of New York Code of Rules and Regulations Part 375 (Part 375) can be reused onsite.

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

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

8. FLUIDS MANAGEMENT

Construction wastewater may be generated from the following activities:

- Personnel and equipment decontamination;
- Runoff/run-on control operations in areas of impacted soil; and
- Excavation dewatering.

Construction wastewater will be collected and stored onsite in appropriate drums or temporary storage tanks. An in-line bag filter or equivalent will be used to remove any particulates from the pumped wastewater prior to discharge to the temporary storage tanks. When a temporary storage tank is full, the wastewater will be sampled and analyzed in accordance with applicable disposal requirements. Based on the laboratory analytical results, the construction wastewater will be properly disposed of in accordance with NYSDEC regulations. In the event that the laboratory analyses do not indicate exceedances of appropriate discharge standards, construction wastewater may be discharged to a publicly owned treatment works (POTW) under a discharge permit.

Temporary construction wastewater storage containers will conform to both New York State and federal requirements. Appropriate controls will be used to prevent spills and overflows, including monitoring, gauging, and quick-close shut off valves. The storage containers, filters, and pumps will be installed within secondary containment. All storage containers will be decontaminated following disposal or discharge activities.

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

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

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 Decision Document. The existing cover system is comprised of a minimum of asphalt pavement, concrete-covered sidewalks, and concrete building slabs. The demarcation layer, consisting of orange snow fencing material in the excavated portion of the basement of the former dry cleaner and the underside of the asphalt or concrete in all other areas, provides a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. 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.

10. BACKFILL FROM OFF-SITE SOURCES

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

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). 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 375-6.8(b) of 6 NYCRR Part 375. Non-compliant soils will not be imported onto the site without prior approval by NYSDEC. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

11. STORMWATER POLLUTION PREVENTION

In the unlikely event that large-scale excavation occurs at the site in the future, soil erosion and sediment control measures for management of stormwater will be installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control. Hay bales and/or silt fence will be placed by the remedial contractor at locations upgradient of excavation areas to control stormwater runoff and surface water from entering or exiting the excavation. These control measures shall be installed prior to initiating the soil excavation. Any collected surface water will be managed as discussed in Section 8.

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.

12. EXCAVATION CONTINGENCY PLAN

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

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

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

13. COMMUNITY AIR MONITORING PLAN

The air monitoring program will be implemented during all intrusive remedial actions to measure the concentration of particulates in ambient air in the work zone.

The Community Air Monitoring Plan (CAMP) was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan contained in Appendix 1A of the NYSDEC DER-10 and is provided as Appendix D of the SMP. The CAMP requires a dedicated air monitoring technician to implement real time air monitoring at the site's downwind perimeter. The monitoring program includes VOCs, particulates, and meteorological data be recorded. Action levels for VOCs and particulates are specified in the CAMP. Meteorological data consisting of wind speed, wind direction, temperatures, barometric pressures, and relative humidity shall be collected as part of the CAMP. Implementation and management procedures are specified within the CAMP. During all phases of work, the remedial contractor will be responsible for mitigating any vapor and particulate issues, via suppression techniques defined in the CAMP.

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 assigning an air monitoring technician to monitor odors, active removal of source materials within excavations when encountered, backfilling excavations in a timely manner, and maintaining covers over stockpiled impacted soils. 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.

15. DUST CONTROL PLAN

Dust will be controlled by spraying a water mist over the work area if perimeter action levels established in the CAMP are exceeded. The water mist will be generated by connecting a misting device to a hose, which will be connected to any potable water source. The degree to which these measures will be used will depend on particulate levels in ambient air at the perimeter of the work zone as determined through implementation of the CAMP.

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

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

16. OTHER NUISANCES

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

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

APPENDIX F

Health and Safety Plan

October 25, 2016

SITE SPECIFIC
HEALTH AND SAFETY PLAN

Marcus Garvey Preservation Project
650 Rockaway Avenue
Brooklyn, New York

Prepared for

MARCUS GARVEY PRESERVATION, LLC
1765 Palmer Avenue, Suite 203
Larchmont, New York 10538

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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APPROVALS

By their signature, the undersigned certify that this Health and Safety Plan (HASP) is approved and will be utilized at the project site located at 650 Rockaway Avenue, Brooklyn, New York.

Joseph Gentile Corporate Health and Safety Manager Roux Associates, Inc.	Date
Joseph Gavin Office Health and Safety Manager Roux Associates, Inc.	Date
TBD Site Health and Safety Officer Roux Associates, Inc.	Date
Joseph Duminuco Project Principal Roux Associates, Inc.	Date

1.0 INTRODUCTION

This Site-specific and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) and Roux Associates, Inc. (Roux Associates) Standard Operating Procedures (SOPs). It addresses all activities to be performed during the implementation of Site management activities for the Site known as the Marcus Garvey Apartments located at 650 Rockaway Avenue (a.k.a. 654, 658, 666, 670, 574 Rockaway Avenue and 327, 329, 331, 333, 335, 337, 339 Chester Avenue), Brooklyn, New York (Site) (Figure 1). The HASP will be implemented by the designated Site Health and Safety Officer (SSO) during Site management work at the Site. The HASP attempts to identify all potential hazards at the Site; however, Site conditions are dynamic and new hazards may appear constantly. Personnel must remain alert to existing and potential hazards as Site conditions change and protect themselves accordingly.

Compliance with this HASP is required of all persons and subcontractors who perform Site management fieldwork that will be involved with earth disturbance activities (which are discussed in this HASP but are not anticipated to occur during the Site management phase except to repair leaking or broken underground utilities) or work that result in the potential for exposure to environmental contaminants at the Site. The contents of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be reviewed and approved by the Corporate Health and Safety Manager (CHSM) or the Office Health and Safety Manager (OHSM), with the SSO implementing the changes to the HASP.

Upon entering the Site, all visitors are required to sign in. All visitors entering the Contamination Reduction Zone (CRZ) (defined in Section 8.1.2), the Contamination Reduction Corridor (CRC) (defined in Section 8.1.2), or the Exclusion Zone (EZ) (defined in Section 8.1.3) will be required to read and comply with the provisions of this HASP. Visitors will be required to comply with applicable OSHA requirements such as training, medical monitoring, and respiratory protection.

In the event that a visitor does not adhere to the provisions of this HASP, he or she will be required to leave the Site.

1.1 Scope of Work

The Scope of Work activities will include the implementation of Site management activities.

The Scope of Work activities are as follows:

1. Obtaining necessary permits and approvals.
2. Preparation and implementation of an approved Health and Safety Plan (HASP).
3. Implementation of Site management activities, consisting of site inspection/reconnaissance and groundwater sampling.
4. Mobilization and demobilization of equipment and supplies.
5. Maintenance of site housekeeping procedures at all times.
6. Identification, protection, and/or relocation of any utilities within the work area.

1.2 Emergency Numbers

1.2.1 Emergency Phone Numbers

Emergency Medical Service 911

Police: New York City Police Department (NYPD).....911

Fire: 911

Hospital: Kings County Hospital Center 718-245-4616

Occupational Health Clinic - HealthSure Medical Services.....631-435-0110

National Response Center.....800-424-8802

Poison Control Center.....800-222-1222

Chemtrec.....800-262-8200

Fire: 911

Center for Disease Control.....800-232-4636

USEPA (Region II).....212-637-5000

NYSDEC Emergency Spill Response 800-457-7362

1.2.2 Project Management/Health and Safety Personnel

Title	Contact	Telephone/Cell
Roux Associates		
Project Director	Joseph Duminuco	631-232-2600 Cell – 631-921-6279
Site Health and Safety Officer	TBD	631-232-2600 TBD
Corporate Health and Safety Manager	Joseph Gentile	856-423-8800 Cell – 610-844-6911
Office Health and Safety Manager	Joseph Gavin	631-630-2393 Cell – 516-754-6671

1.2.3 Directions to Kings County Hospital Center

450 Clarkson Avenue
Brooklyn, New York 11203

See Figure 2 for Street Map

- Head South on Rockaway Avenue toward Livonia Avenue (0.1 miles)
- Take 1st right onto Livonia Avenue (0.5 miles)
- Turn right onto East 98th Street (417 feet)
- Slight right onto Clarkson Avenue (0.4 miles)
- Turn left onto Remsen Avenue (279 feet)
- Take 1st right onto Clarkson Avenue (1.1 miles)
- Destination will be on the left

1.2.4 Directions to Occupational Health Clinic – HealthSure Medical Services

3001 Express Drive
Islandia, New York 11749

See Figure 3 for Street Map

- Head north on Rockaway Avenue towards Dumont Avenue (0.6 miles)
- Turn right onto East New York Avenue (0.7 miles)

- Continue onto Jamaica Avenue (0.2 miles)
- Turn left onto Jackie Robinson Parkway East (5.4 miles)
- Merge onto Grand Central Parkway (6.8 miles)
- Merge onto Northern State Parkway (15.1 miles)
- Take exit 37A for 495 East (14.7 miles)
- Take Exit 57 NY-454/Commack/Patchogue
- Turn left onto NY 454 West (0.1 miles)
- Take 1st left onto Long Island Expressway North Service Road (0.2 miles)
- Destination will be on the right

2.0 HEALTH AND SAFETY STAFF

This section briefly describes all site personnel and their health and safety responsibilities for the Site management work to be implemented at the Site. All personnel are responsible for ensuring compliance with the HASP.

2.1 Project Principal (PP) – Joseph Duminuco – Roux Associates

- Has the overall responsibility for the health and safety of Site personnel.
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below.

2.2 Corporate and Office Health and Safety Managers (CHSM/OHSM) – Joe Gentile / Joseph Gavin – Roux Associates

- Performs or oversees site-specific training and approves revised or new safety protocols or field operations.
- Coordinates revisions of this HASP with Project Principal.
- Responsible for the development of new task safety protocols and procedures and resolution of any outstanding safety issues which may arise during the conduction of site work.
- Review and approve all health and safety training and medical surveillance records for personnel and subcontractors.

2.3 Site Safety and Health Officer (SSO) – TBD – Roux Associates

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site specific training prior to personnel and/or subcontractors commencing work.
- Conducts and documents periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Completes and maintains Accident Report and Health and Safety Lessons Learned (H&S LL) Investigation Forms.
- Notifies PP, CHSM, and OHSM of all accident/incidents.

- Notifies PP of daily field operations and work progress, who will then communicate at the end of the day to the designated representative the following:
    1. End of day tasks completed
    2. Next day's planned activities
    3. Third party issues
    4. Change of Plans – approvals
- Change in level of PPE.
- Maintains contact with and coordination of Contractors.
- Determines upgrade or downgrade of PPE based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as manufacturer's suggested instructions determine.
- Submits and maintains health and safety field log books, daily safety logs, training logs, air monitoring result reports, weekly safety report.

2.4 Field Personnel and Subcontractors

- Report any unsafe or potentially hazardous conditions to the SSO.
- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.
- Comply with rules, regulations, and procedures as set forth in this HASP and any revisions, which are instituted.
- Prevent admittance to work Site by unauthorized personnel.

3.0 SITE LOCATION, DESCRIPTION, AND HISTORY

Descriptions of the Site and surrounding property usage are included in the following sections. The location of the Site is presented in Figure 1.

3.1 Property Location and Description

The Site consists of the building located at 650 Rockaway Avenue (a.k.a. 654, 658, 666, 670, 574 Rockaway Avenue and 327, 329, 331, 333, 335, 337, 339 Chester Avenue) within the Parcel identified on the New York City Tax Map as Tax Lot 11 of Tax Block 3575 in the Brownsville Section of Brooklyn, Kings County, City and State of New York. This Site is located at the southwest corner of the intersection of Dumont Avenue and Rockaway Avenue and comprises approximately 0.3 acres. The Site is bordered by Rockaway Avenue to the east, a multi-family residential unit to the west, Dumont Avenue to the north and a vacant lot to the south.

The Site is entirely comprised of one mixed-use commercial/residential building with a six unit, one-story commercial (retail) component located along Rockaway Avenue and a 55-unit, four-story residential component located immediately behind (west) of the commercial component. The first story of the building is divided into two separate parts by a passageway that leads through to a courtyard to the west. Some of the units in the commercial portion of the building are located over a basement, while others are slab-on-grade construction. Three of the six commercial units are currently vacant; the remaining three units are currently occupied by a grocer, a deli and a meat market. A Phase I Environmental Site Assessment (discussed below) identified one 275-gallon heating oil aboveground storage tank located in the basement of the northernmost unit of the commercial portion of the building.

3.2 Environmental History

Refer to Section 2.0 of the SMP.

4.0 WASTE DESCRIPTION/CHARACTERIZATION

4.1 General

The following information is presented in order to identify the types of materials that may be encountered at the Site. The detailed information on these materials was obtained from:

- SAX's Dangerous Properties of Industrial Materials – Lewis Eight Edition
- Chemical Hazards of the Workplace – Proctor/Hughes
- Condensed Chemical Dictionary – Hawley
- Rapid Guide to Hazardous Chemical in the Workplace – Lewis 1990
- NIOSH Pocket Guide to Chemical Hazards – 2005
- ACGIH TLV Values and Biological Exposure Indices
- OSHA 29 CFR 1910.1000

4.2 Chemical Data Sheets

Several chemicals that may potentially be present in soils, groundwater and soil vapor at the Site, based on previous soil and groundwater sampling results and historic operations conducted at the Site that have been identified. The Summary of Toxicological Data is found in Table 1 and is provided for review of chemicals that may be encountered. The Summary of Toxicological Data Sheets provides information such as the chemicals characteristics, health hazards, protection, and exposure limits.

4.2.1 Contaminants of Concern

Soil, groundwater and soil vapor contaminants that may be encountered during Site management activities include both organic and inorganic compounds. Prior investigations at the Site have indicated detection of Volatile Organic Compounds (VOCs), however, sampling for other potential contaminants (for example semi-volatile organic compounds [SVOCs] and metals) was not conducted.

The toxicological, physical, and chemical properties of potential contaminants are presented in Table 1.

5.0 HAZARD ASSESSMENT

Incidents resulting from hazards, including those described in this section, should be reported in accordance with the Incident Notification Flow Chart provided in Appendix A.

The potential to encounter chemical hazards is dependent upon the work activity performed (intrusive versus non-intrusive), and the duration and location of the work activity. Such hazards could include inhalation and/or skin contact with chemicals/gases that could cause acute and chronic adverse health effects including dermatitis, skin burns, being overcome by vapors or asphyxiation, organ failures, cancer, etc.

Physical hazards that may be encountered during Site work include; heat and cold stress, exposure to excessive noise, loss of limbs, being crushed, head injuries, punctures, cuts, falls, electrocution, and bruises, structural integrity of buildings, asbestos and lead paint exposure, and other physical hazards due to motor vehicle operation, heavy equipment and power tools.

Biological hazards may exist during Site activities. These hazards include exposure to insect bites/stings, animals and animal wastes, mold and bloodborne pathogens.

Prior to the beginning of each new phase of Site management work, a Job Safety Analysis (JSA) will be prepared by the SSO with assistance from the CHSM. The analysis will address the hazards for each activity performed in the phase and will present the procedures and safeguards necessary to eliminate the hazards or reduce the risk. The JSA Sheets are located in Appendix B.

5.1 Chemical Hazards

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Sampling activities
- Decontamination Activities

For chronic and acute toxicity data, refer to Summary of Toxicological Data Sheets in Table 1 for further details on compound characteristics.

5.1.1 Exposure Pathways

Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of VOCs and SVOCs, dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross-contamination activities.

Inhalation of contaminated dust particles (VOCs, SVOCs, and inorganics) can occur during adverse weather conditions (high or changing wind directions). Dust control measures such as applying water to roadways and boreholes will be implemented where visible dust is generated. Where dust control measures are not feasible or effective, respiratory protection will be used when necessary (see Section 9.2.2 for monitoring procedures and action levels).

5.1.2 Operational Action Levels

A decision-making protocol for an upgrade in levels of protection and/or withdrawal of personnel from an area based on atmospheric hazards is outlined in Table 2.

5.1.3 Additional Precautions

Dermal absorption or skin contact with chemical compounds is possible during intrusive activities at the Site. The use of PPE in accordance with Section 8.2 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote, when good hygiene practices are used.

5.2 Physical Hazards

A variety of physical hazards may be present during Site activities. These hazards include typical construction activities: operation of motor vehicles, the use of power and hand tools, walking on objects, tripping over objects, working on surfaces which have the potential to promote falling, skin burns, crushing of fingers, toes, limbs, head injuries caused by falling objects, temporary loss of one's hearing and/or eyesight. The referenced hazards are not unique and are generally familiar to most hazardous waste site workers at construction sites. Task specific safety requirements for each phase will be covered during safety briefings. JSA summaries are contained in Appendix B.

5.2.1 Noise

Noise is a potential hazard associated with operation of power tools, pumps, and generators. High noise equipment operators will be evaluated at the discretion of the SSO. Employees with an 8-hour time weighted average exposure exceeding 85 dBA will be included in the hearing conservation program in accordance with 29 CFR 1910.95 and 1926.52.

It is mandated that employees working around heavy equipment or using power tools that produce noise levels exceeding 90 dBA are to wear hearing protection that shall consist of earplugs or protective earmuffs.

5.2.2 Heat Stress

Heat stress is a significant potential hazard, associated with the use of protective equipment in a hot weather environment. The human body is designed to function at a certain internal temperature. When metabolism or external sources (fire or hot summer day) cause the body temperature to rise, the body seeks to protect itself by triggering cooling mechanisms. The SSO will monitor the air temperature (as described later in this section) to determine potential adverse effects the weather can cause on-site personnel. Excess heat is dissipated by two means:

- Changes in blood flow to dissipate heat by convection, which can be seen as "flushing" or reddening of the skin in extreme cases.
- Perspiration is the release of water through skin and sweat glands. While working in hot environments, evaporation of perspiration is the primary cooling mechanism.

Protective clothing worn to guard against chemical contact effectively stops the evaporation of perspiration. Thus the use of protective clothing increases heat stress problems.

The major disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms, which occur in the skeletal muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the bodies lost salts or electrolytes. Drinking water while continuing to lose salt tends to dilute the body's extracellular fluids. Soon water seeps by osmosis into active muscles and causes pain. Muscles fatigued from work are usually most susceptible to cramps.

Extreme weakness or fatigue, dizziness, nausea, and headache characterize heat exhaustion. In serious cases, a person may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and body temperature normal or slightly higher than normal. Treatment is rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment; severe cases may require care for several days. There are no permanent effects.

Heat stroke is a very serious condition caused by the breakdown of the body's regulating mechanisms. The skin is very dry and hot with red mottled or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. As first aid treatment, the person should be moved to a cool place. Body heat should be reduced artificially, but not too rapidly, by soaking the person's clothes in water and fanning them.

Steps that can be taken to reduce heat stress are:

- Acclimate the body. Allow a period of adjustment to make further heat exposure endurable.
- Drink more liquids to replace the body water lost during sweating.
- Rest is necessary and should be conducted under the direction of the SSO.
- Wear personal cooling devices. These are two basic designs; units with pockets for holding frozen packets and units that circulate fluid from a reservoir through tubes to different parts of the body. Both designs can be in the form of a vest, jacket, or coverall. Some circulating units also have a cap for cooling the head.
- Wear long cotton underwear under chemical protective clothing. The cotton will absorb perspiration and will hold it close to the skin. This will provide the body with the maximum cooling available from the limited evaporation that takes place beneath chemical resistant clothing. It also allows for rapid cooling of the body when the protective clothing is removed.

Heat stress is a significant hazard associated with using protective equipment in hot weather environments. Local weather conditions may produce conditions, which will require restricted work schedules in order to protect employees.

Appendix C, which contains the Heat and Cold Stress Guidelines, provides additional information.

5.2.3 Cold Stress

Cold temperatures are a significant potential hazard. Examples of cold temperature hazards are frostbite and hypothermia.

Frostbite is the most common injury resulting from exposure to cold. The extremities of the body are most often affected. The signs of frostbite are:

- The skin turns white or grayish-yellow.
- Pain is sometimes felt early but subsides later. Often there is no pain.
- The affected parts feel intensely cold and numb.

Hypothermia is characterized by shivering, numbness, drowsiness, muscular weakness, and a low internal body temperature when the body feels extremely warm. This can lead to unconsciousness and death. With both frostbite and hypothermia, the affected areas need to be warmed quickly. Immersion in warm water is an effective means of warming the affected areas quickly. In such cases, medical assistance will be sought.

To prevent these effects from occurring, persons working in the cold should wear adequate clothing and reduce the time spent in the cold area. The field SSO is responsible for determining appropriate time personnel should spend in adverse weather conditions and will monitor this.

Appendix C, which contains the Heat and Cold Stress Guidelines, provides additional information.

5.2.4 Asbestos

Asbestos is a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Depending on the chemical composition, fibers may range from course to silky. The properties that make asbestos fibers valuable to industry are its high-tensile strength, flexibility, heat and chemical resistance, and good frictional properties. Asbestos is a common naturally occurring group of fibrous minerals. Asbestos fibers have been used in a variety of building materials; generally, most asbestos is found in pipe insulation, doors, textures paints and plasters, structural fireproofing, and floor tiles. Friable asbestos (that is, material that contains more than 0.1% asbestos by weight and can be crumbled by hand) is a potential hazard because it can release fibers

into the air if damaged. Roux Associates' personnel will not disturb any suspected asbestos-containing material.

5.2.5 Structural Integrity

The structural integrity of a building and the safety of the individuals inside depend on meeting and maintaining national and local building codes. Structural integrity can range from minor defects such as loose floorboards and roof leaks to major defects such as floors and walls sagging and collapsed roofs. Numerous other structural defects can exist with or without consequence to the occupants. If Roux Associates personnel detect a problem, they should notify their supervisor, who in turn, should seek the opinion of a qualified structural engineer to offer and opinion regarding the integrity of the building. If in the opinion of the qualified engineer it is unsafe, no work can proceed until a solution to rectify the situation has been performed.

5.2.6 Lock-Out/Tag-Out

Roux Associates and all Site contractors will develop a lock-out/tag-out (LO/TO) plan in the event of the repair of electrical, pneumatic, hydraulic, mechanical systems, per OSHA requirements under 29 CFR 1910.147.

5.3 Biological Hazards

The biological hazards, which have the potential to cause adverse health effects, are from exposure to domestic flies, mosquitoes, insects, animals and animal wastes, mold and bloodborne pathogens. The JSA (Appendix B) suggests controls for various hazards to be potentially encountered on-site.

5.3.1 Insect Stings

Stings from insects are often painful, cause swelling and can be fatal if a severe allergic reaction such as anaphylactic shock occurs. If a sting occurs, the stinger should be scraped out of the skin, opposite of the sting direction. The area should be washed with soap and water followed by application of an ice pack.

If the victim has a history of allergic reaction, he should be taken to the nearest medical facility. If the victim has medication to reverse the effects of the sting, it should be taken immediately.

If the victim experiences a severe reaction, a constricting band should be placed between the sting and the heart. The bitten area should be kept below the heart if possible. A physician should be contacted immediately for further instructions.

5.3.2 Animals and Animal Wastes

Due to many of the on-site structures being vacant for several years, there lies the potential for various wildlife to reside within the structures, including, but not limited to, pigeons, bats, mice, rats, squirrels, raccoons, and feral cats. Certain animals can represent significant sources (vectors) of disease transmission. Precautions to avoid or minimize potential contact with (biting) animals (such as some of the above listed) or animal waste and/or deceased animals should be considered prior to all field activities. Rats, squirrels, raccoons, feral cats, and other wild animals can inflict painful bites which can also cause disease (as in the case of rabid animals). Site personnel should avoid contact with any of the above.

If contact occurs, be sure to clean the area thoroughly with soap and water as soon as possible. If a bite occurs, the area should be cleaned thoroughly immediately with soap and water and medical attention should be sought.

5.3.3 Mold

Although mold affects individuals differently and to different degrees, the following are some of the most common adverse health effects:

- Respiratory problems – wheezing, difficulty breathing;
- Nasal and sinus congestion;
- Eyes – burning, watery, reddened, blurry vision, light sensitivity;
- Dry, hacking cough;
- Sore throat;
- Nose and throat irritation;
- Shortness of breath and lung disease;
- Chronic fatigue;
- Skin irritation;

- Central nervous system (headaches, loss of memory, and mood changes);
- Aches and pains;
- Fever;
- Headaches;
- Diarrhea; and
- Immune suppression.

Decisions about removing individuals from an affected area must be based on the results of a medical evaluation, and be made on a case-by-case basis.

Workers that discover the visible presence of mold in excess of 10 sq. feet need to notify the SSO for consultation. If a worker smells mold and feels that he/she is experiencing symptoms of exposure, he/she should retreat and report the symptoms to the SSO.

5.3.4 Bloodborne Pathogens

The majority of the occupational tasks on-site will not involve a significant risk of exposure to blood, blood components, or body fluids. The highest risk of acquiring any bloodborne pathogen for employees on-site will be following an injury. When administering first aid care, there are potential hazards associated with bloodborne pathogens that cause diseases such as Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Hepatitis A (HAV), Hepatitis C (HCV), or the Herpes Simplex Virus (HSV). An employee who has not received the appropriate certification should never execute first aid and/or CPR.

In order to minimize any potential pathogen exposure, all employees should use the hand washing facilities on a regular basis. Additionally, the following universal precautions should be followed to prevent further potential risk:

- Direct skin or mucous membrane contact with blood should be avoided.
- Open skin cuts or sores should be covered to prevent contamination from infectious agents.
- Body parts should be washed immediately after contact with blood or body fluids that might contain blood, even when gloves or other barriers have been used.

- Gloves and disposable materials used to clean spilled blood shall be properly disposed of in an approved hazardous waste container.
- First aid responders shall wear latex or thin mil nitrile gloves when performing any procedure risking contact with blood or body substances.
- Safety glasses will be worn to protect the eyes from splashing or aerosolization of body fluids.
- A CPR mask will be worn when performing CPR to avoid mouth-to-mouth contact.
- Work gloves will be worn to minimize the risk of injury to the hands and fingers when working on all equipment with sharp or rough edges.
- Never pick up broken glass or possible contaminated material with your unprotected hands.
- Never handle wildlife (living or deceased) encountered on-site.

5.3.5 Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless, and toxic gas, which is predominately produced by incomplete combustion of carbon-containing materials. Incomplete combustion occurs when insufficient oxygen is used in the fuel (hydrocarbon) burning process. Common sources of CO may include: motor vehicle exhausts, fuel burning furnaces, coal burning power plants, small gasoline engines including electric generators, demolition equipment, chain saws, lawn mowers and power washers, marine engines, fuel powered forklifts, propane or kerosene-powered heaters, and fuel burning water heaters.

Exposure to CO impedes the blood's ability to carry oxygen to body tissues and vital organs. When CO is inhaled, it combines with hemoglobin (an iron-protein component of red blood cells), producing carboxyhemoglobin, which greatly diminishes hemoglobin's oxygen-carrying capacity. Hemoglobin's binding affinity for CO is 300 times greater than its affinity for oxygen. As a result, small amounts of CO can dramatically reduce hemoglobin's ability to transport oxygen.

Common symptoms of CO exposure are headache, nausea, rapid breathing (i.e., shortness of breath), weakness, exhaustion, dizziness, and confusion (i.e., light headedness). Hypoxia (severe oxygen deficiency) due to acute CO poisoning may result in reversible neurological effects, or it

may result in long-term (and possibly delayed) irreversible neurological (brain damage) or cardiological (heart damage) effects.

CO exposure can be dangerous during pregnancy for both the mother and the developing fetus. Please contact CDC-INFO (800-232-4636) if you have any questions regarding CO exposure during pregnancy.

5.4 Hazard Assessment

Task	Hazards	Risk of Exposure
Decontamination	Inhalation/Skin Contact	Low
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate
	Noise	Low
Sampling	Inhalation/Skin Contact	Low
	Heat Stress/Cold Stress	Moderate
	Noise	Moderate
	Physical Injury	Moderate
	CO Exposure	Moderate (if working in enclosed basement with CO producing equipment)

6.0 TRAINING

6.1 General Health and Safety Training

In accordance with Roux Associates' corporate policies, and pursuant to 29 CFR 1910.120, during Site management work, hazardous waste site workers shall, at the time of the job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training will not be allowed to work in any Site activities in which they may be exposed to hazards (chemical or physical).

Completion of a 40-hour Health and Safety Training Course for Hazardous Waste Operations or an approved equivalent will fulfill the requirements of this section.

In addition to the required initial training, each employee shall have received 3 days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

Roux Associates' SSO has the responsibility of ensuring that personnel assigned to this project comply with these requirements.

6.2 Annual Eight-Hour Refresher Training

Annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The following topics will be reviewed; toxicology, respiratory protection, including air purifying devices and self-contained breathing apparatus (SCBA), medical surveillance, decontamination procedures, and personal protective clothing. In addition, topics deemed necessary by Roux Associates' Health and Safety Director may be added to the above list.

6.3 Site-Specific Training

Site personnel will receive training that will specifically address the activities, procedures, monitoring, and equipment for Site operations. It will include Site and facility layout, hazards, first aid equipment locations and emergency services at the Site, and will highlight all provisions

contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

6.4 On-site Safety Meetings

Daily safety meetings will be presented each morning to discuss potential safety concerns for the upcoming activities, review JSAs, and complete Roux Tailgate Safety Meeting documentation (see Appendix E).

The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits by Roux Associates or other involved parties.

6.5 First Aid and CPR

The SSO will identify those individuals having first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the Emergency Care and Safety Institute. Certification and appropriate training documentation will be kept with the Site personnel records.

6.6 Additional Training

The OHSM or CHSM may require additional or specialized training throughout the project. Such training shall be in the safe operation of heavy or power tool equipment or hazard communication training or other topic deemed Site appropriate.

6.7 Subcontractor Training

All subcontractor personnel working on the Site shall have completed the 40-hour training requirement and meet the medical surveillance requirements found in Section 7.1. Subcontractor training shall be performed in accordance with 29 CFR 1910.120 and HASP specifications. In certain unique situations (e.g., mechanical failure of equipment), the non-trained individual performing emergency repairs may be allowed, at the discretion of the SSO, to perform repairs when no intrusive activities are being performed, and provisions have been made to mitigate potential exposure.

7.0 MEDICAL SURVEILLANCE PROCEDURES

7.1 General

A Medical Surveillance Program has been established as part of this plan. Roux Associates and subcontractor personnel performing field work at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f). A physician's medical release for work will be confirmed by the SSO before an employee can begin Site activities. Such examinations shall include a statement as to the worker's present health status, the ability to work in a hazardous environment (including any required PPE, which may be used during temperature extremes), and the worker's ability to wear respiratory protection.

In the event of a medical emergency involving employees of any subcontractor, where a medical provider must obtain personal medical information, each employer is responsible for providing medical information regarding its employees in accordance with their own policies. In the event of a medical emergency involving a Roux Associates employee, where a medical provider must obtain personal medical information, the medical provider should contact Roux Associates' Human Resources Director, Jennine Zezima (631-232-2600), and Corporate Health and Safety Manager, Joseph Gentile, CHSM, who will coordinate obtaining the necessary information.

8.0 SITE CONTROL, PERSONAL PROTECTIVE EQUIPMENT, AND COMMUNICATIONS

A modified Site control approach may be utilized since activities will be limited to site inspection and sampling during the Site management phase. If remedial work is necessary, the following four-zone approach will be used.

8.1 Site Control

Based on the Site history and operations, a potential for the presence of hazardous material does exist. During sampling, work areas will be delineated with high visibility cones and/or caution tape. A dedicated decontamination area will be established to decontaminate all equipment used for sampling.

In the unlikely event that ground intrusive activities are required during the Site management phase, a four-zone approach will be employed in order to prevent the spread of contamination from the disturbed areas on-site. The four zones include: the Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), Contamination Reduction Corridor (CRC) and the Support Zone (SZ). A stepped remedial approach will be managed, and the zones modified as the work progresses. Each of the areas will be defined through the use of control barricades and/or construction/hazard fencing. A clearly marked delineation between the SZ and the remaining three zones, the CRZ and CRC and the EZ will be maintained. The preferred method will utilize high visibility orange fencing and hand driven metal posts, or orange cones. Signage will be posted to further identify and delineate these areas.

8.1.1 Support Zone

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold stress.

8.1.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE;
- Medical authorization;
- Training certification; and
- A need to be in the zone.

8.1.3 Exclusion Zone

The area where contamination exists is considered to be the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be clearly delineated by orange high visibility fencing. Safety tape may be used as a secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The SSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy (co-worker);
- Appropriate PPE;
- Medical authorization;
- Training certification; and
- A need to be in the zone.

8.2 Personal Protective Equipment

8.2.1 General

The level of protection worn by field personnel will be enforced by the SSO. Levels of protection for general operations are provided below and are defined in this section. Levels of protection

may be upgraded at the discretion of the SSO. All decisions on the level of protection will be based upon a conservative interpretation by the SSO of the information provided by air monitoring results, environmental results and other appropriate information. Any changes in the level of protection shall be recorded in the health and safety field logbook.

8.2.2 Personal Protective Equipment Specifications

The initial level of personal protective equipment is Level D. It is not anticipated that either Level B or Level C protection will be necessary.

Although not anticipated, any tasks requiring Level B PPE will require additional training, and utilize the following equipment:

- Positive pressure, full facepiece, self-contained breathing apparatus (SCBA) or positive pressure, supplied air respirator with escape SCBA (NIOSH approved)
- Disposable coveralls (Tyvek, Poly-coated Tyvek, or Saranex)
- Gloves, inner: cut-resistant, latex, or nitrile
- Gloves, outer: nitrile or neoprene
- Chemical resistant boots over the work boots
- Steel or composite-toe, ASTM-F2413 rated work boots
- Hard hat
- Hearing protection (as needed)
- Boot covers (as needed)

For tasks requiring Level C PPE, additional training will be required to utilize equipment which may include any combination of the following:

- Full-face, air purifying, canister-equipped respirators (NIOSH approved) utilizing Organic Vapor/Acid Gas and P-100 filters (half-face if approved by SSO)
- Disposable coveralls (Tyvek, Poly-coated Tyvek, or Saranex) as required
- Gloves, inner: cut-resistant, latex, or nitrile as required
- Gloves, outer: nitrile or neoprene as required
- Chemical resistant boots over ASTM F-2413 rated, safety-toe, work boots as required

- Steel or composite-toe ASTM-F2413 rated work boots
- Hard hat
- Hearing protection (as needed)
- Safety glasses (if half-mask is utilized)
- Boot covers (as needed)

The Minimum level of PPE for entry onto the Site is Level D. The following equipment shall be used:

- Work uniform (long pants, sleeved shirt)
- Outer gloves: cut-resistant, leather, cotton, neoprene or nitrile (as required)
- Inner gloves: latex or nitrile (doubled) as required
- Hard hat
- Steel or composite-toe, ASTM-F2413 rated work boots
- Safety glasses
- Boot covers (as needed)
- Hearing protection (as needed)
- Reflective safety vest (as needed)

Modified Level D PPE consists of the following:

- Regular Tyvek coveralls (Poly-coated Tyvek as required)
- Outer gloves: cut-resistant, leather, cotton, neoprene or nitrile (as required)
- Inner gloves: latex or nitrile (doubled) as required
- Chemical resistant boots over work boots (as required)
- Steel or composite-toe, ASTM-F2413 rated work boots
- Hard hat
- Safety glasses
- Hearing protection (as needed)
- Reflective safety vest

8.2.3 Initial Levels of Protection

Levels of protection for the proposed scope of work may be upgraded or downgraded depending on direct-reading instruments or personnel monitoring. The following are the initial levels of protection that shall be used for each planned RI field activity:

Activity	Initial level of PPE
Mobilization/Demobilization	D
SSDS Monitoring	D
Decontamination	D
Groundwater/Vapor Sampling	D

8.3 Communications

If working in level C/B respiratory protection is required, personnel may find that communication becomes a more difficult task and process to accomplish. Distance and space further complicate this. In order to address this problem, electronic instruments, mechanical devices, or hand signals will be used as follows:

Telephones – Mobile telephones will be carried by designated personnel for communication with emergency support services/facilities, but are not to be used in EZ or CRZ work areas.

Radios – Two-way radios will be utilized on-site for communications between field personnel in areas where visual contact cannot be maintained and where hand signals cannot be employed.

Air Horn – Available as posted in the Site trailer or support zone to alert field personnel to an emergency situation. The emergency signal will be the sharp blasts of the air horn.

Hand Signals – This communication method will be employed by members of the field team along with use of the buddy system. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before Site operations commence, and will be reinforced and reviewed during site-specific training.

Signal	Meaning
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; Unable to understand you, I'm not all right

9.0 MONITORING PROCEDURES

9.1 General

A Community Air Monitoring Plan ("CAMP") will be implemented on-site, in which VOCs and particulates will be monitored in the work area during ground intrusive activities, if any. The CAMP can be found in Appendix D. VOCs and particulates will be monitored as a precautionary measure. The design of the CAMP is intended to provide a measure of protection for the on-site workers not directly involved with the subject work activities from potential airborne contaminant releases as a direct result of remedial work activities. Monitoring will be performed to verify the adequacy of the Level D respiratory protection, to aid in Site layout, and to document monitoring results. If air monitoring in the work areas indicates the presence of potentially hazardous materials, control measures will be implemented. All monitoring instruments shall be operated by qualified personnel only and will be calibrated prior to use daily or more often, as necessary. The SHSO is responsible for ensuring that appropriate monitoring, levels of protection, and safety procedures are followed.

9.2 Exclusion Zone Monitoring

9.2.1 Instrumentation

The following monitoring instruments will be available for use during field operations as necessary:

- Photoionization Detector (PID) with 10.6 EV probe or Flame Ionization Detector (FID) or equivalent.
- Multi-gas meter capable of measuring Lower Explosive Limit (LEL), H_2S, O_2, and CO when working in the basement areas using potential CO generating equipment.
- Dust/Particulate Monitor (DM), MIE Miniram, or equivalent.

A PID organic vapor meter shall be used to monitor VOCs in active work areas during the soil intrusive activities. When working in the basement areas where there is potential CO generating equipment, engineering control measures will be taken to exhaust CO vapors outside and downwind of the building. Additionally, properly calibrated, direct reading air monitoring instruments will be employed to verify that combustion gases potentially containing CO have not re-entered the building in either areas where work is being conducted, or other locations where public access can occur.

Calibration records shall be documented and recorded daily and included in the daily Health and Safety Briefing Form (Appendix E) or Site designated field notebook.

9.2.2 Action Levels

Action levels for the upgrading of PPE requirements in the HASP will apply to all Site work during investigation and remediation activities at the Site. Action levels are for known contaminants using direct reading instruments in the Breathing Zone (BZ) for VOCs and particulates, and at the source for combustible gases. The BZ will be determined by the SSO, but is typically 3 to 5 feet above the work area surface or elevation.

At work sites where carbon-containing fuels are used, such as in internal combustion engines and generators, the exhausts from these units can contain significant concentrations of CO. In situations where the exhausts create exposure to CO, the exhausts of these units should be extended via appropriate hoses/piping to well ventilated exterior areas (i.e., outside and downwind of structures). Where the concentrations of CO exceed the "action levels" listed in Table 2, SSO shall notify the Project Manager and immediately implement the corresponding actions to mitigate exposure.

The action levels to be utilized for the Site are found in Table 2.

9.2.3 Monitoring During Field Activities

Intrusive Operations – Continuous Personnel Breathing Zone Air Monitoring will be performed by the SSO during drilling activities, if any. Real-time monitoring for all on-site activities will be accomplished as follows:

- Monitoring of VOCs in the work zones where intrusive activities are occurring, and both the Site perimeter up and downwind areas as specified in the CAMP.
- Monitoring for CO using a multigas meter capable of measuring CO when working in the basement areas using potential CO generating equipment.
- Monitoring for particulates in the work zones where intrusive activities are occurring, and both the Site perimeter up and downwind areas as specified in the CAMP.

The frequency of monitoring may be modified by the SSO, after consultation with the Project Manager. The rationale for any modification must be documented in the HASP.

10.0 SAFETY CONSIDERATIONS

10.1 General

In addition to the specific requirements of this HASP, common sense should be used at all times.

The following general safety rules and practices will be in effect at the site.

- All open holes, trenches, and obstacles will be properly barricaded in accordance with local Site needs and requirements. Proximity to traffic ways, both pedestrian and vehicular, and location of the open hole, trench, or obstacle will determine these needs.

- All excavation and other Site work will be planned and performed with consideration for underground lines.

- Smoking and ignition sources in the vicinity of potentially flammable or contaminated material are strictly prohibited.

- Smoking is prohibited in the EZ, CRZ, and SZ except where specifically designated as acceptable.

- When working in areas where flammable vapors may be present, particular care shall be exercised with tools and equipment that may be sources of ignition. All tools and equipment provided must be properly bonded and/or grounded.

- Approved and appropriate safety equipment (as specified in this HASP), such as eye protection, hard hats, hand protection (nitrile, leather and/or cut resistant gloves as necessary), foot protection, and respirators, must be worn in areas where required. In addition, eye protection must be worn when sampling soil or water that may be contaminated.

- All site personnel may be called upon to use respirator protection in some situations. Fit testing will be necessary for all persons using respirators. The criteria for facial hair will be determined by the SSO. In general, the guideline is that facial hair cannot impede the fit of the respirator.

- No smoking, eating, chewing tobacco, gum chewing or drinking will be allowed outside the SZ.

- Contaminated tools and hands must be kept away from the face.

- Personnel must use personal hygiene safe guards (washing up) at the end of the shift.

- Each sample must be treated and handled as though it were contaminated.

- Persons with long hair and/or loose-fitting clothing that could become entangled in power equipment must take adequate precautions.

- Horseplay is prohibited in the work area.

- Work while under the influence of intoxicants, narcotics, or controlled substances is strictly prohibited.

10.2 Traffic Control

A vehicular traffic area is any area where a vehicle may legally travel including, but not limited to, a roadway, roadway shoulder, driveway, or parking area. Site management activities for this site will generally not be in vehicular traffic areas, however, it is possible that work may be conducted in sidewalks adjacent to public roadways and within Site access roads.

Traffic control procedures should be implemented if activities at the Site are conducted within proximity of a public roadway or an on-Site access roadway. These measures should be implemented to protect personnel working in these areas as well as to alert roadway users of necessary precautions.

When performing activities on or adjacent to on-Site or public roads, the following traffic safety procedures must be followed.

- High visibility clothing and/or Class 2 reflective vests and hard hats, as well as any other applicable PPE specified in the HASP or JSAs, must be worn at all times.
- The worker's vehicle should be positioned, to the fullest extent possible, to form a barrier between the worker(s) and oncoming traffic. In addition, each work vehicle will be equipped with a minimum of four high visibility traffic cones. All traffic cones will be placed as necessary to alert traffic of ongoing activities.
- In high volume traffic areas or areas with unpredictable traffic patterns, a traffic watchman or police detail should be utilized. The traffic watchman must be equipped with a warning flag and remain alert, focused on traffic conditions at all times and have no other assigned duties. The need for a traffic watchman or police detail should be discussed with the PM and client prior to deployment.
- Notify the local police of the work location, dates of work, and the anticipated work times when work is to be conducted in a public roadway.
- Additional requirements of local transportation, highway, public safety, and police departments must also be followed when work is performed in a public roadway.
- Any time work is initiated or there is a change in the type of work or location of work, the SHSO should consider the potential traffic safety hazards. If appropriate, implement protective measures in addition to those described above.

- Daily safety briefings should include a discussion of traffic safety as it relates to the activities planned for that day.

- All Roux Associates' subcontractors performing work at the Site must also adhere to the above safety procedures.

10.3 Sample Handling

Personnel responsible for handling of samples will wear the prescribed level of protection. Samples are to be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions shall be noted. Laboratory personnel and all field personnel shall be advised of sample hazard levels and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling in order to assure that the practices are appropriate for the suspected contaminants in the sample.

10.4 Heavy Equipment Safety

The use of heavy equipment during Site management activities is not anticipated, however, if required, this section applies. The SHSO will be present on-Site during all invasive operations and will provide health and safety monitoring to ensure that appropriate levels of protection and safety procedures are followed by Roux Associates personnel.

Typical machinery that could potentially be used include drill rigs, compressors, generators, portable lighting systems, pneumatic tools (drum openers), and trucks. From a safety standpoint, it is always important to be continually aware of the equipment around you. It poses a serious hazard if not operated properly, or if operators cannot see personnel near machinery. In particular, the following heavy equipment hazards are common and need to be considered from a safety standpoint.

- Hazards associated with truck traffic – Be sure to observe and comply with posted speed limits and traffic signs. Use caution when traveling within the facility limits, as well as when entering and exiting the Site.

- Interaction/contact with heavy equipment contractors – Heavy equipment (i.e., drill rig, etc.) operators may not be aware of your presence. Be sure that the operator is aware of your presence before approaching any heavy equipment. Delineate the heavy equipment exclusion zone (HEEZ) as per Roux Associates SOP 1.13 (Appendix F) around heavy equipment using traffic control devices and rigid barricades or fencing that excludes all

Site personnel unless the machine / vehicle / equipment operator disengages controls and displays a "show-of-hands" verifying that no movement can occur. Ensure that associated Heavy Equipment Operation JSA(s) specify the HEEZ radius for the machines being operated. Inform operators of your planned activities in the area prior to them beginning their activities.

- All equipment should be chocked when stationary in accordance with the Roux Associates SOP 1.11 Wheel Chocking Policy (Appendix F).

10.4.1 Inspection

Each piece of potentially hazardous equipment (i.e., drill rigs, power tools,) will be inspected for proper and safe operation prior to its use.

- All mechanical and rigging equipment will be inspected by the operators prior to beginning this work effort, and at least daily thereafter to ensure proper operating capability. Defective equipment must be repaired or replaced prior to continued use/operation.
- Inspect all cables, sheaves, slings, chains, hooks, and eyes prior to use.
- Secure equipment firmly or be sure it is supported.
- Be sure all power lines are inactivated, removed, or at a safe distance.
- Always use proper loading for capacity at lifting radius.
- Keep all equipment lubricated and maintained.
- Employ signal persons whenever needed.
- Make certain that signals are understood and observed.

10.4.2 Exclusion Zones for Equipment and Materials Movement / Operation

Exclusion zones must be established, maintained, and documented on applicable JSAs during activities involving the movement/ operation of heavy equipment as per Roux Associates SOP 1.13 (Appendix F).

11.0 DECONTAMINATION AND DISPOSAL PROCEDURES

11.1 Contamination Prevention

Contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure that there are no cuts or tears on PPE.
- Fasten all closures in suits; cover with tape, if necessary.
- Particular care should be taken to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, cosmetics, gum, etc., into contaminated areas.

Sampling/Monitoring

- When required by the SSO, cover instruments with clear plastic, leaving openings for sampling ports.
- Bag sample containers prior to emplacement of sample material.

Heavy Equipment (not anticipated)

- Care should be taken to limit the amount of contamination that comes in contact with heavy equipment (tires, contaminated augers).
- If contaminated tools are to be placed on non-contaminated equipment for transport to a decontamination area, plastic should be used to keep the equipment clean.
- Dust control measures including water misting will be used on roads inside the Site boundaries.

11.2 Personnel Decontamination

A field-wash station and designated disposal container for equipment and PPE shall be set up and maintained at the CRZ for all persons exiting the EZ. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. As necessary, equipment and facilities will be available for personnel to wash their hands, arms, neck, and face.

11.3 Equipment Decontamination

All potentially contaminated equipment used at the Site will be decontaminated to prevent the spread of contamination, and its egress from the Site. The CRZ decontamination area will provide for the containment of all wastewater generated during the decontamination process. Respirators and any other PPE that comes in contact with contaminated materials shall pass through a field-wash in the CRZ decontamination area, and thorough decontamination at the end of the day. All decontamination rinse water will be collected and managed in accordance with all applicable regulations.

11.4 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or omitted. The Site SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary and as consistant with Roux Associates Injury and Illness Management Program. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and/or medical personnel. Outer garments are then removed at the medical facility. No attempt will be made to wash or rinse the victim, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems (ambulatory) or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately. Unless the victim is obviously contaminated, decontamination should be omitted or minimized, and treatment begun immediately.

11.5 Disposal Procedures

A system of segregating all waste will be developed by the SSO.

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials (e.g., clothing, gloves, etc.,) will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as domestic waste.

12.0 EMERGENCY PLAN

Should an emergency situation occur, the emergency plan, outlined in this section, shall be known by Roux Associates and all Subcontractors prior to the start of work. The emergency plan will be available for use at all times during Site work. The plan provides the phone numbers for the fire, police, ambulance, nearest hospital, occupational health clinic (for non-emergencies), poison control centers, and directions to the hospital and occupational health clinic from the Site. The plan provides the pictorial directions showing the respective routes to the hospital (Figure 2) and occupational health clinic (Figure 3) from the Site. This information is to be found in Section 1.2 of the HASP.

Various individual Site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a Site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of Site release of vapors, which could affect the surrounding community.

The Project Manager will assume the role of emergency coordinator should the need arise, and shall implement the contingency plan whenever conditions at the Site warrant such action. In cases where the Project Manager is not available, the SSO shall serve as the alternate emergency coordinator. The coordinator will be responsible for coordination of the evacuation, emergency treatment and transport of Site personnel as necessary, and notification of emergency response units and the appropriate management staff.

The SSO during an emergency will perform air monitoring as needed, as well as lend assistance and provide health and safety information to responding emergency personnel.

Site Personnel will endeavor to keep non-essential personnel away from the incident until the appropriate emergency resources arrive. At that time, the responders will take control of the Site. Site personnel may be asked to lend assistance to emergency personnel such as during evacuations, help with the injured, etc.

12.1 Evacuation

Evacuation procedures will be discussed prior to the start of work and periodically during safety meetings. In the event of an emergency situation, such as fire, or explosion, an air horn, automobile horn, or other appropriate device will be sounded for three (3) long blasts indicating the initiation of evacuation procedures. The emergency evacuation route shall be known by all site workers. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SSO or project manager must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. All Site personnel will assemble in the designated nearest safe location. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency.

12.2 Personnel Injury

Emergency first aid shall be applied on-site as appropriate. Non-emergency injuries can be transported to the occupational health clinic listed in Section 1.2. Directions to the occupational health clinic are included on Figure 3.

If necessary, the individual shall be decontaminated and transported to the nearest hospital. The SSO will coordinate with medical personnel for any additional necessary information that is needed and will complete the accident/incident reports in accordance with Section 13.4 of the HASP.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. Since some situations may require transport of an injured party by other means, however, the injured person shall be escorted to the hospital. A map to this facility is shown in Figure 2.

12.3 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone: (Direct contact, no phone messages).

			Office:	**Cell:**
1.	Project Director:	Joseph Duminuco	631-232-2600	631-921-6279
2.	Corporate Health and Safety Manager:	Joe Gentile	856-423-8800	610-844-6911
3.	Office Health and Safety Manager:	Joseph Gavin	631-630-2393	516-754-6671
4.	Site Health and Safety Officer:	TBD	631-232-2600	TBD

5. The employer of any injured worker, if not a Roux Associates employee.

Written confirmation of verbal reports is to be submitted within 24 hours. The report form entitled "Accident Report Form" (Appendix G) is to be used for this purpose. All representatives contacted by telephone are to receive a copy of this report. If the employee involved is not a Roux Associates employee, his employer shall receive a copy of the report. In addition to filling out the Accident Report and Investigation Form, if a Roux employee is involved in a vehicle accident, the employee must also complete the Acord form (Appendix H).

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill or exposure to hazardous materials (radioactive materials, toxic materials, explosive or flammable materials), fire, explosion, property damage, or potential occurrence (i.e., near miss) of the above.

Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information, which is released by patient consent, is to be filed in the individual's medical record and treated as confidential.

12.4 Personnel Exposure

Skin Contact:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination.
Inhalation:	Move to fresh air and/or, if necessary, decontaminate/transport to hospital.
Ingestion:	Decontamination and transport to emergency medical facility.
Puncture Wound or Laceration:	Decontamination and transport to emergency medical facility.

12.5 Adverse Weather Conditions

In the event of adverse weather conditions, the SSO or project manager will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related conditions.
- Limited visibility.
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lightning. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

13.0 LOGS, REPORTS AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for this project.

13.1 Medical and Training Records

The employer keeps medical and training records. The subcontractor employer must provide verification of training and medical qualifications to the SSO. The SSO will keep a log of personnel meeting appropriate training and medical qualifications for Site work. The log will be kept in the project file. Roux Associates will maintain medical records in accordance with 29 CFR 1910.20.

13.2 On-site Log

The SSO or project manager will keep a log of on-site personnel daily in the designated field book.

13.3 Exposure Records

Any personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept by Roux Associates in accordance with 29 CFR 1910.20.

13.4 Accident/Incident Reports

An accident/incident report must be completed following procedures given in Appendix G. The originals will be sent to Roux Associates for maintenance and a copy will be kept in the project file. Copies will be sent to the employer of the employees involved.

13.5 OSHA Form 300

An OSHA Form 300 (Log of Occupational Injuries and Illnesses) (Appendix I) will be kept at the Site. All reportable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to Roux Associates for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form.

13.6 Daily Safety Logs

The Daily Health and Safety Briefing/Tailgate Meeting form in Appendix E will be completed daily by the SSO and submitted to the project manager.

14.0 FIELD TEAM REVIEW

Each Roux Associates employee or subcontractor shall sign this section after site-specific training is completed and before being permitted to work at the Site.

I have read and reviewed the Site Health and Safety Plan prepared for this Site. I understand and will comply with the provisions contained therein.

Site/Project: Marcus Garvey Apartments
650 Rockaway Avenue (a.k.a. 654, 658, 666, 670, 574 Rockaway Avenue and 327, 329, 331, 333, 335, 337, 339 Chester Avenue)
Brooklyn, New York

Date	Name	Signature	Company

SSO CERTIFICATION OF HOSPITAL DIRECTIONS

Name of Roux Associates SSO:

Date:_____

This is to certify that on _____, I personally drove the route to Kings County Hospital Center as listed in the HASP. The Map Routing and Directions were/were not as listed in the plan. Listed below were conditions that resulted in different directions.

_____
Roux Associates Site Health and Safety Officer

TABLES

1. Toxicological, Physical and Chemical Properties of Compounds Potentially Present at the Site
2. Action Levels for Worker Breathing Zone

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,1,1-Trichloroethane	71-55-6	TWA 350 ppm STEL 440 ppm C 440 ppm	C 350 ppm (1900 mg/m^3) [15-minute]	TWA 350 ppm (1900 mg/m^3)	700 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias;	Eyes, skin, central nervous system, cardiovascular system, liver	Colorless liquid with a mild, chloroform-like odor. BP: 165°F UEL: 12.5% LEL: 7.5%
1,1,2-Trichloroethane	79-00-5	TWA 10 ppm	Ca TWA 10 ppm (45 mg/m^3) [skin]	TWA 10 ppm (45 mg/m^3) [skin]	Ca [100 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eyes, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, chloroform-like odor. BP: 237°F UEL: 15.5% LEL: 6%
1,1-Dichloroethane	75-34-3	TWA 100 ppm	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system	Colorless, oily liquid with a chloroform-like odor. BP: 135°F Fl.P: 2°F UEL: 11.4% LEL: 5.4%
1,1-Dichloroethene	75-35-4	TWA 5 ppm	Ca (lowest feasible concentration)	TWA 1ppm	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor. BP: 89°F Fl.P: -2°F UEL: 15.5% LEL: 6.5% Class IA Flammable Liquid
1,2,4-Trimethylbenzene	95-63-6	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 337°F FL.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable liquid
1,2,4-Trimethylbenzene	95-63-6	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 337°F Fl.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m^3)	C 50 ppm (300 mg/m^3)	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F Fl.P: 151°F UEL: 9.2% LEL: 2.2% Class IIIA Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m^3) STEL 2 ppm (8 mg/m^3)	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F Fl.P: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790 m	TWA 200 ppm (790 mg/m^3)	TWA 200 ppm (790 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor BP: 118-140°F Fl.P: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
1,3,5-Trimethylbenzene	108-67-8	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 329°F FL.P: 122°F Class II Flammable liquid
1,3,5-Trimethylbenzene	108-67-8	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 329°F Fl.P: 122°F Class II Flammable Liquid
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m^3)	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F Fl.P: 150°F LEL: 2.5% Combustible Solid
2,4-Dimethylphenol	105-67-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system, mouth, throat, stomach; dizziness, weakness, fatigue, nausea, headache; systemic damage; moderate to severe eye injury.	Skin, CVS, eyes, CNS	Clear, colorless liquid with a faint ether or chloroform-like odor BP: 178°F

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
2-Butanone (MEK)	78-93-3	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor. BP: 175°F Fl.P: 16°F UEL(200°F): 11.4% LEL(200°F): 1.4% Class IB Flammable Liquid
Acenaphthene	83-32-9	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Brown solid
Acetone	67-64-1	TWA 200 ppm STEL 500 ppm	TWA 250 ppm (590 mg/m^3)	TWA 1000 ppm (2400 mg/m^3)	2500 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F Fl.P: 0°F UEL: 12.8% LEL: 2.5% Class IB Flammable Liquid
Anthracene	65996-93-2	TWA 0.2 mg/m^3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
Antimony	7440-36-0	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	50 mg/m^3 (as Sb	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder. BP: 2975°F
Arsenic (inorganic)	7440-38-2 (metal)	TWA 0.01 mg/m3	Ca C 0.002 mg/m3 [15-min]	TWA 0.010 mg/m3	Ca [5 mg/m3 (as As)]	Inhalation; ingestion; skin absorption; skin and/or eye contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic sys	Metal: sliver-gray or tin-white, brittle, odorless solid BP: sublimes
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m3	TWA 0.1 fiber/cm3	Ca [IDLH value has not been determined]	Inhalation; ingestion; skin and/or eye contact	Asbestosis (chronic exposure), dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation eyes, [potential occupational carcinogen]	Respiratory system, eyes,	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite), fibrous, odorless solids. BP: decomposes
Asphalt fumes	8052-42-4	TWA 0.5 mg/m^3(fumes)	Ca C 5 mg/m3 [15 min]	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; skin and/or eye contact	Irritation eyes, resp sys	Eyes, respiratory system	Black or dark brown cement-like substance Combustible solid
Barium	7440-39-3	TWA 0.5 mg/m3	None established	TWA 0.5 mg/m3	None established	Inhalation, ingestion, skin contact	Irritation skin, respiratory system, (	Skin, eyes, respiratory system	Yellow white powder BP: 1640 C
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm STEL 1 ppm	TWA 1 ppm STEL 5 ppm	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F] BP: 176°F Fl.Pt = 12°F LEL: 1.2% UEL: 7.8% Class B Flammable liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Benzo[a]anthracene	56-55-3	None established	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS	Skin	Pale Yellow crystal, solid BP: 438 C
Benzo[a]pyrene	50-32-8	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	POISON. This material is an experimental carcinogen, mutagen, tumorigen, neoplastigen and teratogen. It is a probable carcinogen in humans and a known human mutagen. IARC Group 2A carcinogen. It is believed to cause bladder, skin and lung cancer. Exposure to it may damage the developing foetus. May cause reproductive damage. Skin, respiratory and eye irritant or burns.	Skin, eye, bladder, lung, reproductive	Yellow crystals or powder [found in cigarette smoke, coal tar, fuel exhaust gas and in many other sources] BP: 495 C
Benzo[b]fluoranthene	205-99-2	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin and/or eye contact	No data were identified on the toxicity of benzo[b]fluoranthene to humans. Based on results of studies in animals, IARC concluded that benzo[b]fluoranthene is possibly carcinogenic to humans	Respiratory system, skin, bladder, kidneys	Off-white to tan powder
Benzo[k]fluoranthene	207-08-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, gastrointestinal; fatal if swallowed, inhaled, absorbed through the skin; vomiting, nausea, diarrhea	Lungs, respiratory system	Yellow crystals BP: 480 C
Beryllium	7440-41-7 (metal)	TWA 0.002 mg/m^3	Ca C 0.0005 mg/m^3	TWA 0.002 mg/m^3 C 0.005 mg/m^3 (30 minutes) with a maximum peak of 0.025 mg/m^3	Ca [4 mg/m^3 (as Be)]	inhalation, skin and/or eye contact	Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]	Eyes, skin, respiratory system	Metal: A hard, brittle, gray-white solid. BP: 4532°F
Bis(2-ethylhexyl) phthalate	117-81-7	TWA 5 mg/m^3	TWA 5 mg/m^3 STEL 10 mg/m^3 (do not exceed during andy 15-minute work period)	TWA 5 mg/m^3	None established	inhalation, skin and/or eye contact	Irritation eyes, skin, nose, throat; affect the nervous system and liver; damage to male reproductive glands	Eyes, skin, nose, respiratory system, nervous system, reproductive system, liver	Colorless to light colored, thick liquid with slight odor
Butane	106-97-8	TWA 1000 ppm	TWA 800 ppm (1900 mg/m^3)	None established	None established	inhalation, skin and/or eye contact (liquid)	Drowsiness, narcosis, asphyxia; liquid: frostbite	central nervous system	Colorless gas with a gasoline-like or natural gas odor. BP: 31°F UEL: 8.4% LEL: 1.6% Flammable Gas

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Cadmium	7440-43-9 (metal)	TWA 0.01 mg/m^3	Ca	TWA 0.005 mg/m^3	Ca [9 mg/m^3 (as Cd)]	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	respiratory system, kidneys, prostate, blood	Metal: Silver-white, blue-tinged lustrous, odorless solid. BP: 1409°F
Carbon Monoxide	630-08-0	TWA 25 ppm	TWA 35 ppm C 200ppm	TWA 50 ppm	1,200 ppm	Inhalation	Carboxyhemogloemia	Blood	Colorless, odorless gas
Carbon Disulfide	75-15-0	TWA 1 ppm	TWA 1 ppm (3 mg/m^3) STEL 10 ppm (30 mg/m^3) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. BP: 116°F Fl.P: -22°F UEL: 50.0% LEL: 1.3% Class IB Flammable Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	None established	TWA 75 ppm (350 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond-like odor BP: 270°F Fl.P: 82°F UEL: 9.6% LEL: 1.3%
Chloroethane	75-00-3	TWA 100ppm	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m^3)	3800 ppm [10%LEL]	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. BP: 54°F Fl.P: NA (Gas) -58°F (Liquid) UEL: 15.4% LEL: 3.8% Flammable Gas
Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m^3) [60-minute]	C 50 ppm (240 mg/m^3)	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F
Chromium	7440-47-3	TWA 0.5 mg/m^3 (metal and Cr III compounds) TWA 0.05 mg/m^3 (water-soluble Cr IV compounds) TWA 0.01 mg/m^3 (insoluble Cr IV compounds)	TWA 0.5 mg/m^3	TWA 1 mg/m^3	250 mg/m^3 (as Cr)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. BP: 4788°F

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Chrysene; Phenanthrene; Pyrene; Coal tar pitch volatiles	65996-93-2	TWA 0.2 mg/m3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
cis-1,2-Dichloroethene	158-59-2	TWA 200 ppm	TWA 200 ppm	TWA 200 ppm	None established	inhalation, skin absorption, ingestion	Harmful if swallowed, inhaled, or absorbed through skin. Irritant. Narcotic. Suspected carcinogen	Skin	Colorless liquid BP: 60 C Fl.P: 4 C UEL: 12.8% LEL: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m^3 (fume) 1 mg/m^3 (dusts and mists)	TWA 1 mg/m^3	TWA 1 mg/m^3	100 mg/m^3 (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing	Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)	Noncombustible Solid in bulk form, but powdered form may ignite. BP: 4703°F
Dibenzo[a,h]anthracene	53-70-3	None established	None established	None established	None established	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin	Eyes, skin; skin photosensitization.	Colorless crystalline powder BP: 524°C
Diesel Fuel #2	68476-34-6	None established	None established	Designated as an OSHA Select Carcinogen	None established	ingestion, skin and/or eye contact	Kidney damage; potential lung damage; suspected carcinogen; irritation of eyes, skin, respiratory tract; dizziness, headache, nausea; chemical pneumonitis (from aspiration of liquid); dry, red skin; irritant contact dermatitis; eye redness, pain.	Eyes, skin, kidneys	Clear yellow brown combustible liquid; floats on water; distinct diesel petroleum hydrocarbon odor. BP: 356-716°F Fl.P: 154.4-165.2°F LEL: 0.6% UEL: 7.0%
Ethylbenzene	100-41-4	TWA 100 ppm STEL 125 ppm	TWA 100 ppm (435 mg/m^3) STEL 125 ppm (545 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F Fl.P: 55°F UEL: 6.7% LEL: 0.8% Class IB Flammable Liquid
Fluoranthene	206-44-0	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible burns; heart and liver injury, pulmonary edema, respiratory arrest, gastrointestinal disturbances.	Heart, liver, lungs.	Yellow needles.
Fluorene	86-73-7	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation skin, digestive tract	Skin	White crystals BP: 563°F
Fuel Oil #2	68476-30-2	TWA 100mg/m^3 (aerosol and vapor, as total hydrocarbons)	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS effects; nausea, vomiting, headache, cramping, dizziness, weakness, loss of coordination,, drowsiness; kidney, liver damage	Eyes, skin, CNS	Clear or yellow to red oily liquid, kerosene-like odor BP: 347 - 689 °F UEL:5-6% LEL: 0.7-1.0%

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Gasoline	8006-61-9	TWA 300 ppm STEL 500 ppm	Carcinogen	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; ingestion; skin and/or eye contact	Eyes and skin irritation, mucous membrane; dermatitis; headache; listlessness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis; possible liver, kidney damage [Potential occupational carcinogen]	Eyes, skin, respiratory system, CNS, Liver, Kidneys	Clear liquid with a characteristic odor, aromatic Fl.Pt = -45°F LEL = 1.4% UEL = 7.6% Classs 1B Flammable Liquid
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m^3) [skin]	None established	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys	Clear, colorless liquid with a mild, turpentine-like odor. BP: 419°F
Hydrogen Sulfide	7783-06-4	TWA (10 ppm) STEL (15 ppm) (adopted values for which changes are proposed in the NIC)	C 10 ppm (15 mg/m^3) [10-minute]	C 20 ppm 50 ppm [10-minute maximum peak]	100 ppm	inhalation, skin and/or eye contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	Colorless gas with a strong odor of rotten eggs. BP: -77°F UEL: 44.0% LEL: 4.0% Flammable Gas
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impariment of blood forming tissue	Skin	Fluorescent green-yellow crystalline solid BP: 536 C
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impariment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m^3) [skin]	TWA 50 ppm (245 mg/m^3) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F Fl.P: 96°F UEL: 6.5% LEL: 0.9%
Kerosene	8008-20-6	TWA 200 mg/m^3	TWA 100 mg/m^3	None established	IDLH value has not been determined	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system	Colorless to yellowish, oily liquid with a strong, characteristic odor. BP: 347-617°F Fl.P: 100-162°F UEL: 5% LEL: 0.7% Class II Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Lead	7439-92-1	TWA 0.05 mg/m^3	TWA (8-hour) 0.050 mg/m^3	TWA 0.050 mg/m^3	100 mg/m^3 (as Pb)	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. BP: 3164°F Noncombustible Solid in bulk form
Manganese	7439-96-5 (metal)	TWA 0.2 mg/m^3	TWA 1 mg/m^3 STEL 3 mg/m^3	C 5 mg/m^3	500 mg/m^3 (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. BP: 3564°F
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 C 0.04 mg/m^3	2 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects	Eyes, skin, central nervous system, peripheral nervous system, kidneys	Appearance and odor vary depending upon the specific (organo) alkyl mercury compound
Mercury compounds [except (organo) alkyls] (as Hg) Mercury	7439-97-6	TWA 0.025 mg/m^3 (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m^3 [skin] Other: C 0.1 mg/m3 [skin]	TWA 0.1 mg/m^3	10 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.] BP: 674°F
Methyl tert-butyl ether (MTBE)	1634-04-4	TWA 50 ppm	No established REL	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane, respiratory; dizziness, nausea, headache, intoxication	Eyes, skin, mucous membrane, respiratory system, central nervous system	Colorless liquid BP: 55.2 C
Methylene Chloride	75-09-2	TWA 50 ppm, A3 - suspected human carcinogen	Ca	TWA 25 ppm STEL 125 ppm	Ca [2300 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor BP: 104°F UEL: 23% LEL: 13%

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Metals Remediation Compound (MRC): Glycerol Tripolylactate Sorbitol Cysteinate Lactic Acid Glycerol	201167-72-8 444618-64-8 50-21-5 56-81-5	None established	None established	None established	None established	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, skin, respiratory tract	Behavioral (headache), gastrointestinal tract, reproductive system	Viscous amber gel/liquid; strong amine/sulfur odor
Naphtha (coal tar)	8030-30-6	None established	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	1000 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Reddish-brown, mobile liquid with an aromatic odor BP: 320-428°F Fl.P: 100-109°F Class II Combustible Liquid
Naphthalene	91-20-3	TWA 2 ppm STEL 15 ppm	TWA 10 ppm (50 mg/m^3) STEL 15 ppm (75 mg/m^3)	TWA 10 ppm (50 mg/m^3)	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system	Colorless to brown solid with an odor of mothballs. BP: 424°F Fl.P: 174°F UEL: 5.9% LEL: 0.9%
n-Butylbenzene	104-51-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS depression, lung damage; nausea, vomiting, headache, dizziness, weakness, loss of coordination, blured vision, drowsiness, confusion, disorientation	Eyes, skin,repiratory system, central nervous system	Colorless liquid with a sweet odor BP: 183 C Fl.P: 59 C UEL: 5.8% LEL: 0.8%
Nickel	7440-02-0 (Metal)	TWA 1.5 mg/m^3 (elemental) TWA 0.1 mg/m^3 (soluble inorganic compounds) TWA 0.2 mg/m^3 (insoluble inorganic compounds) TWA 0.1 mg/m^3 (Nickle subsulfide)	Ca TWA 0.015 mg/m^3	TWA 1 mg/m^3	Ca [10 mg/m^3 (as Ni)]	inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Metal: Lustrous, silvery, odorless solid. BP: 5139°F
Nitrobenzene	98-95-3	TWA 1 ppm	TWA 1 ppm (5 mg/m^3) [skin]	TWA 1 ppm (5 mg/m^3) [skin]	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system	Yellow, oily liquid with a pungent odor like paste shoe polish. BP: 411°F Fl.P: 190°F LEL(200°F): 1.8%
n-Propylbenzene	103-65-1	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Harmful if swallowed, Irritation eyes, skin, digestive tract, respiratory tract, central nervous system	Eyes, skin, central nervous system, respiratory system	colorless or light yellow liquid BP: 159 C Fl.P: 47 C UEL: 6% LEL: 0.8%

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Petroleum hydrocarbons(Petroleum distillates)	8002-05-9	None established	TWA 350 mg/m^3 C 1800 mg/m^3 [15 min]	TWA 500 ppm (2000 mg/m^3)	1,100 [10% LEL]	Inhalation; ingestion; skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness, headache, nausea; dried/cracked skin; chemical pneumonitis	CNS, eyes, respiratory system, skin	Colorless liquid with a gasoline or kerosene-like odor BP: 86-460°F Fl. Pt = -40 to -86°F UEL: 5.9% LEL: 1.1% Flammable liquid
Phenol	108-95-2	TWA 5 ppm	TWA 5 ppm (19 mg/m^3) C 15.6 ppm (60 mg/m^3) [15-minute] [skin]	TWA 5 ppm (19 mg/m^3) [skin]	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light-pink, crystalline solid with a sweet, acrid odor. BP: 359°F UEL: 8.6% LEL: 1.8%
p-Isopropyltoluene	99-87-6	None established	None established	None established	None established	inhalation, skin absorption, eye contact	Irritation skin	CNS, skin	Colorless, clear liquid, sweetish aromatic odor BP: 350.8°F Class III Flammable liquid
Regenox Part A: Sodium Percarbonate Sodium Carbonate Monohydrate Silicic Acid Silica Gel	15630-89-4 5968-11-6 7699-11-6 63231-67-4	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation respiratory tract, mucous membranes, nose, throat, eyes, skin; gastrointestinal disturbance	Respiratory system, eyes, skin	Odorless, white, powder [Note: Self-accelerating decomposition with oxygen release starts at 50° C]
Regenox Part B: Silicic Acid, Sodium Salt, Sodium Silicate; Silica Gel; Ferrous Sulfate; Water	1344-09-8 63231-67-4 7720-78-7 7732-18-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation respiratory tract, mucous membranes, nose, throat, eyes, skin, mouth, esophagus and stomach	Respiratory system, eyes, skin, gastrointestinal tract	Odorless, Blue/Green, liquid [Note: Oxides of carbon and silicon may be formed when heated to decomposition]
sec-Butylbenzene	135-98-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, upper airway; central nervous system, headache, dizziness; gastrointestinal disturbance	Respiratory system, central nervous system, eyes, skin;	Colorless liquid BP: 344°F Fl.P: 126 °F UEL: 6.9% LEL: 0.8% Combustible liquid
Selenium	7782-49-2	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	1 mg/m^3 (as Se)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] BP: 1265°F
Silver	7440-22-4 (metal)	TWA 0.1 mg/m^3 (metal, dust, fumes) TWA 0.01 mg/m^3 (Soluble compounds, as Ag)	TWA 0.01 mg/m^3	TWA 0.01 mg/m^3	10 mg/m^3 (as Ag)	inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	Metal: White, lustrous solid BP: 3632°F

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Slop Oil	69029-75-0	None established	None established	None established	None established	Inhalation; ingestion	Irritation eyes, skin, gastrointestinal tract	Eyes, skin, gastrointestinal tract	Clear light to dark amber liquid, with mild hydrocarbon odor. BP: >500°F Fl.P : 250°F
Sulfuric Acid	7664-93-9	TWA 0.2 mg/m^3	TWA 1 mg/m^3	TWA 1 mg/m^3	15 mg/m^3	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis	Eyes, skin, respiratory system, teeth	Colorless to dark-brown, oily, odorless liquid. BP: 554°F Noncombustible Liquid
tert-Butylbenzene	98-06-6	None established	None established	None established	None established	inhalation, skin absorption, ingestion,	Eye and respiratory irritant; CNS depression; liver or kidney damage	Respiratory system, central nervous system, eyes, liver, kidney	Colorless liquid with an aromatic odor BP: 168 - 169 C Fl.P: 34 C UEL:5.6 % LEL: 0.8 %
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm (STEL) listed as A3, animal carcinogen	Ca Minimize workplace exposure concentrations	TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor. BP: 250°F Noncombustible Liquid
Toluene	108-88-3	TWA 20 ppm	TWA 100 ppm (375 mg/m^3) STEL 150 ppm (560 mg/m^3)	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F Fl.P: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid
trans-1,2-Dichloroethene	156-60-5	TWA 200 ppm	None established	TWA 200 ppm STEL 250 ppm (skin)	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Narcotic. Irritation eyes, skin, respiratory tract, mucous membrane; CNS depression.	Respiratory tract, mucous membrane, eyes, skin, CNS	Colorless liquid with a fruity pleasant odor BP: 48°C Fl.P 6C UEL: 12.8% LEL: 9.7%
Trichloroethene	79-01-6	TWA 10 ppm STEL 25 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	Ca [1000 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor. BP: 189°F UEL(77°F): 10.5% LEL(77°F): 8%
Vinyl Chloride	75-01-4	TWA 1 ppm	Carcinogen	TWA 1 ppm C 5 ppm [15-minute]	Ca [IDLH value has not been determined]	inhalation, skin, and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Liver, central nervous system, blood, respiratory system, lymphatic system	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. BP: 7°F UEL: 33.0% LEL: 3.6% Flammable Gas

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 100 ppm (435 mg/m^3) STEL 150 ppm	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	900 ppm	Skin absorption, inhalation, ingestion, skin, and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Classs C Flammable Liquid
Zinc	7440-66-6	TWA 10 mg/m3 (Inhalable fraction)	None established	TWA 10 mg/m3 (for zinc oxide fume)	None established	skin and/or eye contact, inhalation, ingestion	Irritation eyes, skin, respiratory tract; gastrointestinal disturbances	Eyes, skin, respiratory system	Bluish gray solid BP: 1664.6°F Flammable

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 650 Rockaway Avenue, Brooklyn, New York

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Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists.
BP – boiling point at 1 atmosphere, °F
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.
Ca - considered by NIOSH to be a potential occupational carcinogen
CAS# Chemical Abstracts Service registry number which is unique for each chemical.
Fl. Pt. – Flash point
IDLH - Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature)
mg/m^3 – Milligrams of substance per cubic meter of air
NIOSH -National Institute for Occupational Safety and Health.
OSHA – Occupational Safety and Health Administration
PEL - OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.
ppm – parts per million
REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week
STEL – Short-term exposure limit
TLV -ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).
TWA – 8-hour, time-weighted average
UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)

TABLE 2

ACTION LEVELS FOR WORKER BREATHING ZONE

Instrument	Action Level *	Level of Respiratory Protection/Action
PID	0 to <5 ppm (one minute sustained)	Level D *
PID	>5 to <50 ppm (one minute sustained)	Utilize APR (Level C)
PID	>50 to <100 ppm (one minute sustained)	Level B
PID	>100 ppm	Stop work** (ventilate, apply foam)
CGI/H2S Meter	<5 ppm	Level D
CGI/H2S Meter	>5% to <25 ppm	Level B
CGI/H2S Meter	>25 ppm	Stop work**
CGI/CO Meter	>25 ppm	Ventilate, insp. source for leaks monitor cont.
CGI/CO Meter	>50 ppm	Stop work** (ventilate area)
CGI/O2 Meter	<10% LEL, in excavation 19.5% oxygen – 23.5%	Level D Level D
CGI/O2 Meter	>10% LEL, in excavation <19.5% or >23.5% oxygen	Allow to vent, apply foam** Stop work, Oxygen Deficient or Enriched ATM**
CGI/CO Meter	>25 to <35 ppm (five minutes sustained) >35 ppm	Allow to vent ** (five minutes sustained) Stop work **
DM	> 5 mg/ cu. m	Stop work, apply dust suppression (water)

Note:

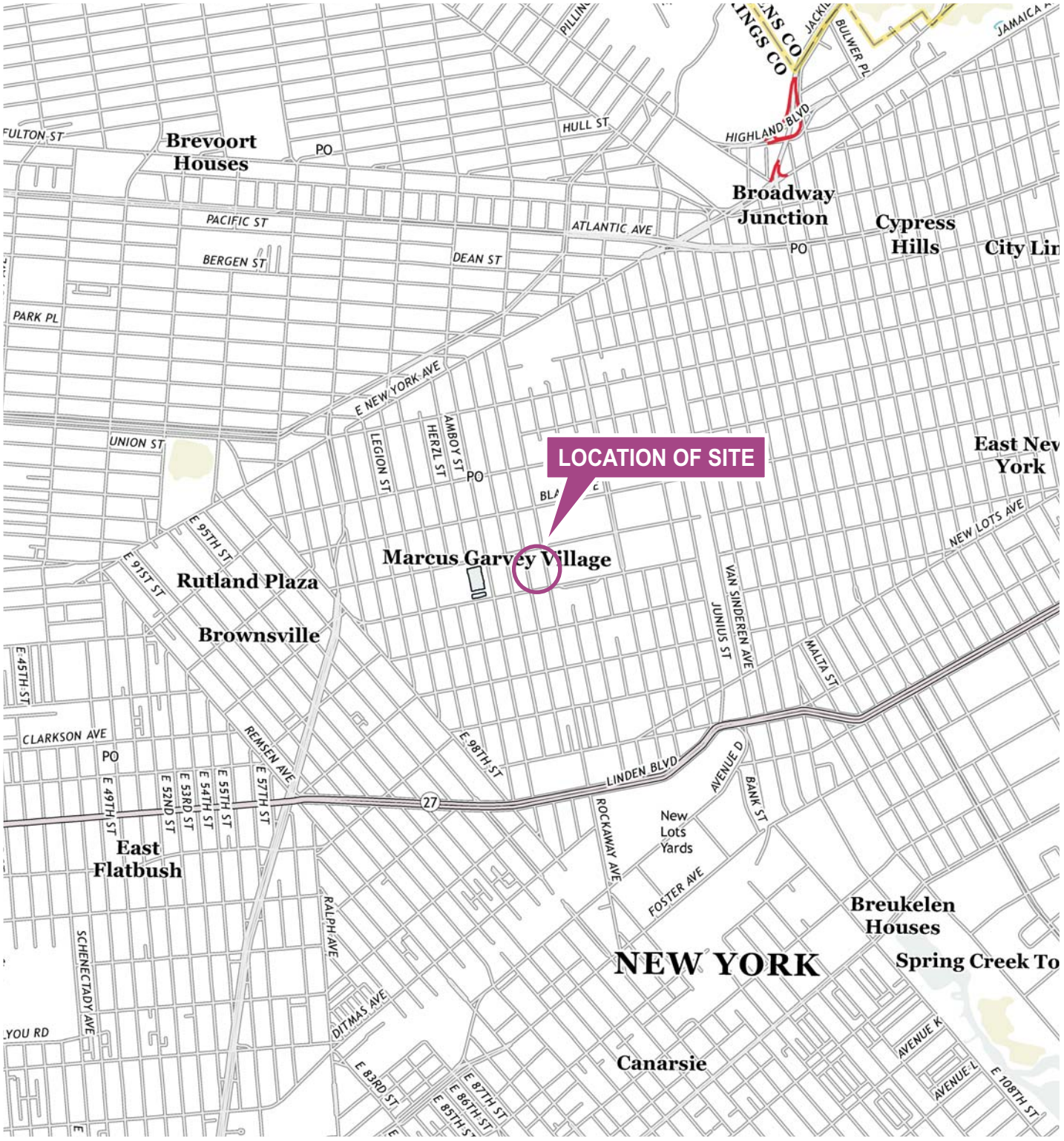
Action levels are based on above background levels.

* Instrument readings will be taken in the breathing zone of the workers, unless otherwise indicated.

** Suspend work in immediate area. Conduct air monitoring periodically to determine when work can continue. Implement mitigative measures.

FIGURES

1. Site Location Map
2. Hospital Route Map
3. Occupational Health Clinic Route Map (Non-Emergencies)



QUADRANGLE LOCATION

SOURCE:
USGS; 2013, Brooklyn, NY
7.5 Minute Topographic Quadrangle

N

0 2000’

Title:

SITE LOCATION MAP

HEALTH AND SAFETY PLAN
MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVENUE, BROOKLYN, NEW YORK

Prepared for:
MARCUS GARVEY PRESERVATION, LLC

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: R.M.	Date: 23JUL14	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr.: R.K.	Project No.: 2158.0002Y000	
File: 2158.0002Y107.01.CDR		

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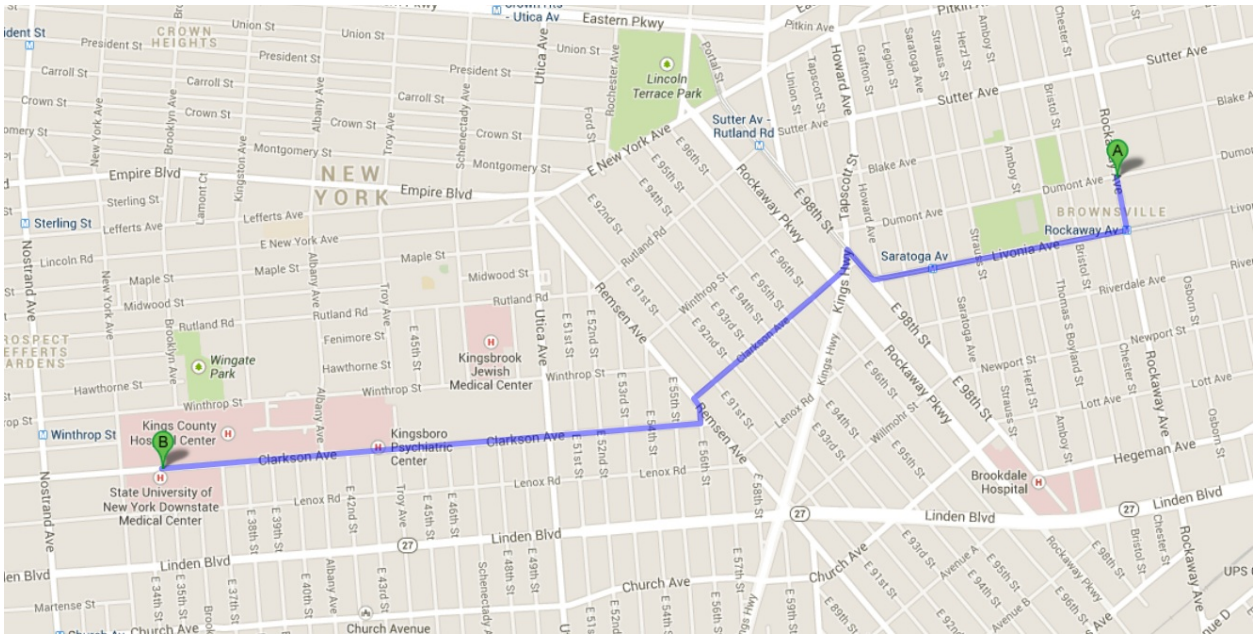
FIGURE 2

Directions to: Kings County Hospital Center – 450 Clarkson Avenue, Brooklyn, New York

From: Marcus Garvey Village – 650 Rockaway Avenue, Brooklyn, New York



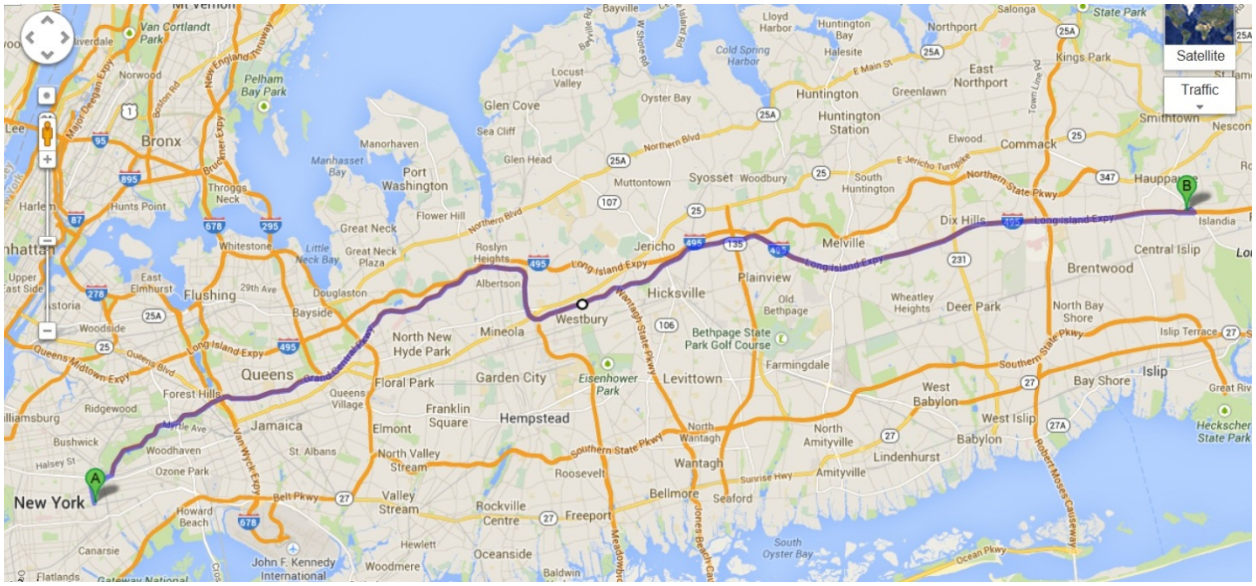
- Head South on Rockaway Avenue toward Livonia Avenue (0.1 miles)
- Take 1st right onto Livonia Avenue (0.5 miles)
- Turn right onto East 98th Street (417 feet)
- Slight right onto Clarkson Avenue, (0.4 miles)
- Turn left onto Remsen Avenue, (279 feet)
- Take 1st right onto Clarkson Avenue (1.1 miles)
- Destination will be on the left

Emergency Room Telephone Number (718) 245-4616

FIGURE 3

Directions to: HealthSure Medical Services
3001 Express Drive North Islandia, New York

From: Marcus Garvey Village – 650 Rockaway Avenue, Brooklyn, New York



- Head north on Rockaway Avenue towards Dumont Avenue (0.6 miles)
- Turn right onto East New York Avenue (0.7 miles)
- Continue onto Jamaica Avenue (0.2 miles)
- Turn left onto Jackie Robinson Parkway East (5.4 miles)
- Merge onto Grand Central Parkway (6.8 miles)
- Merge onto Northern State Parkway (15.1 miles)
- Take exit 37A for 495 East (14.7 miles)
- Take Exit 57 NY-454/Commack/Patchogue
- Turn left onto NY 454 West (0.1 miles)
- Take 1st left onto Long Island Expressway North Service Road (0.2 miles)
- Destination will be on the right

HealthSure Telephone Number: (631) 435-0110

APPENDICES

A. Incident Notification Flow Chart

B. Job Safety Analysis

C. Heat and Cold Stress Guidelines

D. Community Air Monitoring Plan

E. Health and Safety Briefing/Tailgate Meeting Form

F. Standard Operating Procedures

G. Accident Report and Health & Safety Lessons Learned Investigation Forms

H. Acord Form

I. OSHA 300

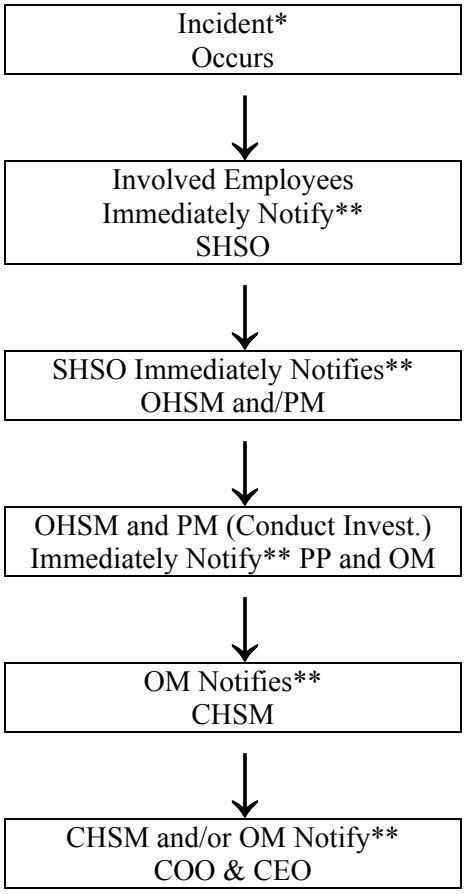
J. Job Safety and Health Protection Poster

APPENDIX A

Incident Notification Flow Chart

HEALTH AND SAFETY NEAR/LOSS – LOSS (INCIDENT)*

Notification Flow Chart



* Incident – any work or site-related occurrence that resulted in, or could potentially have resulted in, the need for medical care or in property damage (i.e., all injuries or illnesses, exposure to toxic materials or any other significant occurrence resulting in property damage or in a "near loss")

** Verbal Notification

Initial Incident Report (written) to SHSO, OHSM, OM and CHSM within 24 hours.

Follow-up Report within one week.

(Reference: Corporate H&S Standard Operating Procedure, Incident Investigation and Reporting, SOP #1.8, dated March 2000)

APPENDIX B

Job Safety Analysis

JOB SAFETY ANALYSIS	Ctrl. No. GEN-004	DATE 12/6/2012	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Drilling**	**Direct Push Soil Borings / Well Installation**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Jeffrey Wills	Project Hydrogeologist	Curtis Taylor	Health and Safety Officer
		Michael Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing, Long Sleeve Shirt	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Geoprobe or Truck-Mounted Direct Push Drill Rig, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Macrocore liners, Liner Opening Tool, 20 lb. Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs, Water

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Exclusion Zone Policy – All non-essential personnel will maintain a distance of 10' feet from drilling equipment while moving/engaged.

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	1a. **CONTACT**: Equipment/property damage.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving the drill rig. If personnel move into the path of the drill rig, the drill rig will be stopped until the path is again clear. Use a spotter for all required backing operations. 1a. Set-up the work area and position equipment in a manner that eliminates or reduces the need for backing of support trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1a. Drill rig should have a minimum **exclusion zone of 10 feet** for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation.
	1b. **FALL**: Slip/trip/fall hazards.	1b Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground.
2. Raising tower/derrick of drill rig	2a. **CONTACT**: Overhead hazards.	2a. Prior to raising the tower/derrick, the area above the drilling rig will be inspected for wires, tree limbs, piping, or other structures, that could come in contact with the rig's tower and/or drilling rods or tools. 2a. Maintain a safe distance from overhead structures.
	2b. **CONTACT**: Pinch Points when raising the rig and instability of rig	2b. Inspect the equipment prior to use and avoid pinch points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower/derrick. 2b. If the rig needs to be mounted, be sure to use three points of contact.
3. Advancement of drilling equipment and well installation	3a. **CONTACT**: Flying debris	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.

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[2] A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

3. Advancement of drilling equipment and well installation (Continued)	3b. **EXPOSURE**: Noise and dust.	3b. Wet borehole area with sprayer to minimize dust. 3b. Stand upwind and keep body away from rig. 3b. Dust mask should be worn if conditions warrant. 3b. Wear hearing protection when the drill rig is in operation.
	3c. **CAUGHT**: Limb/extremity pinching; abrasion/crushing.	3c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 3c. Inspect the equipment prior to use for potential pinch points. Keep hands away from being between pinch points and use of tools is preferable compared to fingers and hands. 3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy. 3c. Spinning rods/casing have an **exclusion zone of 10 feet** while in operation.
	3d. **CONTACT**: Equipment imbalance during advancement of drill equipment.	3d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 3d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred. 3d. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (**minimum exclusion zone of 10 feet**).
	3e. **EXPOSURE**: Inhalation of contamination/vapors.	3e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically to monitor the breathing zone of the work area. 3e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional precautions in accordance with the site specific health and safety plan.
	3f. **FALL**: Slip/trip/fall hazards.	3f. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3f. See 1b.
	3g. **EXERTION**: Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.	3g. Keep back straight and bend at the knees. 3g. Utilize team lifting for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.
4. Decontaminate equipment.	4a. **EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).	4a. Wear chemical-resistant disposable gloves and safety glasses. 4a. Contain decontamination water so that it does not spill. 4a. Use an absorbent pad to clean spills, if necessary. 4a. See 3b.
	4b. **EXPOSURE:** To chemicals in cleaning solution including ammonia.	4b. See 4a. Review MSDS to ensure appropriate precautions are taken and understood.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

JOB SAFETY ANALYSIS Ctrl. No. GEN-005	DATE 12/~~10/2012~~10/20 13	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Gauging and Sampling**	**Gauging and Sampling**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Gina Masciello	Project Scientist	Curtis Taylor	SHSM
Louis Goldstein	Staff Engineer	Michael Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Knee pads, Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

42 inch Safety Cones, Caution Tape, Interface Probe and/or Water Level Meter, 20 lb. Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization to monitoring well(s).	1a. **FALL:** Personal injury from slip/trip/fall due to uneven terrain and/or obstructions. 1b. **CONTACT:** With traffic/third parties. 1c. **EXPOSURE:** To biological hazards.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure, ground and avoid steep hills or uneven terrain. 1b. Identify potential traffic sources and delineate work area with 42 inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 1c. Inspect work area for bees and insects. 1c. Use insect/tick repellent as necessary.
2. Open/close well.	2a. **OVEREXERTION:** Muscle strain. 2b. **CAUGHT:** Pinch points associated with removing/replacing manholes and working with hand tools. 2c. **CAUGHT:** Pinch points associated with placing J-plug back onto PVC pipe. 2d. **EXPOSURE:** To potential hazardous vapors.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well. 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover. 2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap 2d. No open flames/heat sources. 2d. To minimize exposure to vapors allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind, if possible, to avoid vapors.
3. Gauge well.	3a. **CONTACT:** With contamination (e.g. contaminated groundwater). 3b. **CONTACT:** With traffic.	3a. Wear chemical-resistant disposable gloves and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe. 3b. See 1b.
4. Purge and sample well.	4a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.	4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives. 4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling. 4a. Fill sample containers over purge container to avoid spilling water onto the ground. 4a. Use an absorbent pad to clean spills. 4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards. 4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater. 4a. When using a tubing valve always remove the valve slowly after sample

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

		collection to release any pressure and avoid pressurized splash hazards 4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.)away from face and body
Assess **[1]JOB STEPS**	**Analyze** **[2]POTENTIAL HAZARDS**	**Act** **[3]CRITICAL ACTIONS**
4. Purge and sample well (Continued).	4b. **CONTACT:** Personal injury from cuts, abrasions, or punctures by glassware or sharp objects. 4c. **EXERTION:** Muscle strain while carrying equipment. 4d. **CONTACT:** With traffic. 4e. CONTACT: Pinch points with groundwater pump components (i.e. wheel, line, clamps) 4f. EXERTION: Muscle strain from repetitive motion of bailing and sampling a well	4b. To avoid spills or breakage, place sample ware on even surface. 4b. Do not over tighten caps on glass sample ware. 4b. ~~Wear cut-resistant (i.e., Kevlar) gloves and chemical-resistant disposable gloves~~ Wear chemical-resistant nitrile disposable gloves over cut-resistant (i.e. Kevlar) gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools. 4c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50lbs or heavier. 4c. Make multiple trips to carry equipment. 4d. See 1b. 4e. Wear leather gloves when working with groundwater pumps 4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations 4e. Use correct the correct mechanisms, such as a pump reel, to lower pump into well 4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing. 4f. See 4c. 4f. Include a stretch break when repetitive motions are part of the task.
5. Management of purge water.	5a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). 5b. **EXERTION:** Muscle strain from lifting/carrying and moving containers.	5a. Do not overfill container and pour liquids in such a manner that they do not splash. 5a. Properly dispose of used materials/PPE in appropriate container in designated storage area. 5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.). 5b. Do not overfill container(s).
6. Decontaminate equipment.	6a. **EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). 6b. **CAUGHT:** Pinch points associated with handling hand tools	6a. Work on the upwind side, where possible, of decon area. 6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Use an absorbent pad to clean spills. 6b. See 2b. 6b. Inspect hand tools for sharp edges before decontaminating

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

JOB SAFETY ANALYSIS	Ctrl. No. GEN-006	DATE 7/23/2014	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
Generic	**Surveying**	**Elevation Surveying**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Bjorn Wespestad	Project Engineer	Curtis Taylor	Health and Safety Officer
		Michael Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut-resistant or leather
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel-toe boots		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Surveying equipment (i.e., leveling rod/measuring ruler, tripod and scope).

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Locate surveying position for instrument and rod and set-up work area	1a. **FALL:** Slip/trip hazards. 1b. **CONTACT:** Traffic (surveying locations could potentially be located in parking areas and sidewalks). 1c. **OVEREXERTION:** Hazard due to carrying, lifting, and bending while transporting equipment. 1d. **CAUGHT/CONTACT:** Pinch Points / sharp edges associated with setting up the tripod.	1a. Inspect area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to setting up at the survey location. 1b. Be aware of oncoming traffic. Utilize a flagman / spotter for locations in streets or high-traffic areas. 1b. Place 42 inch cones around the work area, and delineate work zone with caution tape, if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective safety vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 1c. Use proper body positioning and lifting techniques; keep back straight, lift with legs, keep load close to body, and never reach with a load. 1c. Avoid carrying too much equipment at one time and team-lift equipment that is more than 50lb. 1d. Wear cut resistant gloves when handling the tripod. Don't carry tripod by the pointed ends.
2. Open / close manhole cover to well that is being surveyed (if necessary).	2a. **OVEREXERTION:** Muscle strain 2b. **CAUGHT:** Pinch points associated with removing / replacing manholes and working with hand tools. 2c. **EXPOSURE:** To potentially hazardous vapors. 2d. **CONTACT:** With traffic.	2a. See 1c. Bend knees when reaching to open well. Use manhole lifting hook or pry bar to avoid bending. 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and crowbar or pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover. 2c. No open flames/heat sources. 2c. To minimize exposure to vapors allow well to vent after opening it and before survey activities begin. 2c. Work on the upwind side of well. 2d. See 1b.

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

[2] A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Perform survey.	3a. **FALL:** Slip/trip hazards 3b. **CONTACT:** Traffic (surveying locations could be potentially located in parking areas and sidewalks)	3a. See 1a. 3b. See 1b. 3b. Personnel using the scope will be devoting most of their attention to the surveying activity. Personnel holding the measuring stick should be extra vigilant of survey personnel and communicate any potential hazards to the instrument person via handheld radio or similar means. Ensure reflective safety vest is worn.
4. Break down work area.	4a. **CONTACT:** Traffic (surveying locations can potentially be located in parking areas and sidewalks). 4b. **EXERTION:** Hazard due to carrying, lifting, and bending while transporting equipment	4a. See 1b. 4b. See 1c.

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[2] A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN 007	DATE: 1/16/2014	☐ NEW ☒ REVISED	PAGE 1 of 1

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
Site Specific **Site: Greenpoint**	**O&M**	**Movement of 55-Gallon Drums/Drum Handling with Mobile Carrier**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
		Curtis Taylor	SHSM
Michael Smith	Senior Technician	Ray Greenidge	Project Engineer

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut-resistant gloves
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER:
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or composite toe		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Mobil Drum Carrier, forklift, safety cones, and caution tape

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A 10' exclusion zone will be maintained around forklift.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Secure Work Area, Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts for tightness	1a. **FALL:** Tripping/falling due to uneven surface terrain	1a. Inspect walking path for uneven terrain, weather-related hazards (i.e. debris, puddles, etc.), and other obstructions prior to accessing work area. 1a. Use established pathways and walk on stable, secure ground. 1a. Secure work area and coordinate and communicate the planned work activities with other personnel working in the area. 1a. Delineate work area with 42" safety cones.
	1b. **CONTACT/EXPOSURE:** Drums could potentially be damaged and contain hazardous material	1b. Prior to inspecting drums don cut- resistant gloves. If drum is not properly labeled, do not open and cease all drum transport activities. Immediately contact project manager and inform him/her of drum situation. 1b. Do not continue drum transport activities until further actions are determined by the project manager. 1b. If the drum is properly labeled, but leaking, improperly sealed or in poor condition, place drum in an over-pack drum.
	1c. **EXERTION/CAUGHT:** Potential pinching/exertion hazards while securing ring/ tightening bolts	1c. Keep back straight and knees slightly bent while securing drum ring/tightening bolt. Wear cut-resistant gloves.
2. Position drum clamp in between drum ribs, securing drum clamp to drum with chain	2a. **CAUGHT:** Pinching fingers between drum clamp and handle/chain.	2a. Attach drum clamp with chain and tighten until snug. Do not place hands between drum clamp and drum as the chain is tightened; wear cut resistant gloves. 2a.
3. Disengage safety latches on handle, pull handle down until drum is lifted off ground and safety latches are reengaged; slightly suspending drum off of the ground	3a. **EXERTION/ CONTACT:** Potential muscle strain associated with lifting/engaging drum/handle. Drum could shift/slip downward and crush toes.	3a. Ascertain whether the drum is overweight; if it is then two people are needed to lower handle while drum is secured with clamp so that safety latches can be engaged. Keep body out of the line of fire of the handle (do not position head above handle) as it is being pushed down. Do not allow feet/toes to be positioned under the drum as it is being lifted; wear steel/composite toe boots.
	3b. **CAUGHT:** Fingers could be pinched while engaging/disengaging safety latches on handle	3b. Wear cut-resistant gloves while disengaging/reengaging safety latches.
4. Transport drums to designated location and disengage drum clamp (repeat Step 3 in reverse order)	4a. **FALL:** Tripping/ falling due to obstructions and uneven terrain. Potential for drum to fall during transport.	4a. Ensure transport path is free of potential obstructions that may cause the drum/carrier to become unstable. Position drum clamp between the ribs on the drum to prevent possible slipping.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

JOB SAFETY ANALYSIS	Cntrl. No. GEN-009	DATE: 12//31/2012	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Hand Tools**	**Pre-Clearing activities, including Air Knifing and Soil Vacuuming**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Alyssa Lau	Staff Engineer	Curtis Taylor	SHSM
		Mike Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Nitrile and cut resistant
☒ HARD HAT	☒ FACE SHIELD (while air knifing)	☐ SUPPLIED RESPIRATOR	
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION (as needed)	☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ OTHER: Dust mask (as needed)
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or composite toed		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Air Knife, Vactor Truck (Vac Truck), Compressor, Hand Tools, Photoionization Detector, Multi-Gas Meter, Traffic Cones, 20 lb. Fire Extinguisher, "Work Area" and/or "Exclusion Zone" Signs

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A 10 foot exclusion zone will be maintained around air knife and/or soil vacuum operations.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Verify pre-clearance protocol.	1a. **CONTACT**: Underground utility damage; property damage; personal injury. See Site Walk Inspection JSA for potential hazards.	1a. Confirm that local utility companies were contacted prior to drilling. 1a. Walk the Site to evaluate utility markings and review maps (**See Site Walk Inspection JSA for critical actions**). 1a. Review pre-clearing checklist form and sub-surface clearance form. Pre-clearing protocol indicates that clearance must be conducted to a minimum of 5 vertical feet below ground surface or 8 vertical feet below ground surface in the critical zone using hand tools.
2. Mobilize/demobilize and establish work area.	2a. **See Mobilization / Demobilization JSA for potential hazards.**	2a. **See Mobilization / Demobilization JSA for critical actions.**
3. Pre-clear with air knife and soil vacuum, and/or clearance with hand tools	3a. **CONTACT**: Flying debris.	3a. **Maintain 10 foot exclusion zone.** Only (air knife/vac truck) operator and designated helper shall remain within exclusion zone while air knife/vac truck is active. Use the required PPE, including (at a minimum), cut resistant gloves, safety glasses with side shields, and long sleeved shirt. 3a. Wear a face shield to protect face from flying debris when using air knife. 3a. Aim air knife tip away from self and others, so to avoid line-of-fire hazards. 3a. Use anti-whip devices on compressor hoses.
	3b. **EXPOSURE/ENERGY SOURCE**: Inhalation/exposure to hazardous vapors; inhalation/exposure to dust; electrocution.	3b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux Project Manager of the condition. The Roux Project Manager will then recommend additional precautions. 3b. Wear dust masks as needed. 3b. Ensure no open flames/heat sources are present within the work area. 3b. Ensure vac truck is properly grounded prior to use. 3b. Do not use metal dig bar; use fiberglass or equivalent.
	3c. **CONTACT:** Damage to unknown/known utility with air knife.	3c. Avoid contacting utilities directly with the high pressure air stream and using the air knife tip as a physical digging tool. 3c. Keep the air knife tip constantly moving to reduce direct pressure on a potential utility. 3c. Increase the distance between air knife tip and soil/utility. 3c. Continually remove soil slurry from hole with vacuum, which may have an abrasive effect on utility casings.
	3d.**OVEREXERTION**: Poor body positioning when handling equipment and materials.	3d. Use proper body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep

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		load close to body, and never reach with a load.
3. Pre-clearing with air knife and soil vacuum, and/or clearance with hand tools (continued)	3d. **OVEREXERTION**: (continued) Poor body positioning when handling equipment and materials.	3d. Ensure that loads are balanced to reduce the potential for muscle strain. 3d. Two people or a mechanical lifting aid are required when lifting objects over 50 lb. or when the shape makes the object difficult to lift.
	3e. **FALL**: Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site.	3e. Inspect walking path for uneven terrain, weather-related hazards (e.g., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 3e. Walk around any stored materials/equipment; do not climb over. Practice good housekeeping. 3e. Use established pathways and walk on stable, secure ground. 3e. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e., tools should not be propped against walls or nearby equipment or vehicles). 3e. Equipment and tools that are not anticipated to be used will be returned to a storage area that is out of the immediate work area. 3e. Ensure power cords/hoses are grouped when used within the work area. Mark out cords/hoses that cross pathways with traffic cones. 3e. Ensure all Site personnel and equipment stay a minimum of 2 feet from an open hole. Mark out open holes with traffic cones/caution tape, etc. 3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard.
	3f. **CAUGHT**: Pinch points associated with the equipment and vacuum hose.	3f. Always wear cut-resistant gloves when making connections and using hand tools. 3f. Inspect the equipment prior to use for potential pinch points. 3f. Test all emergency shutdown devices prior to using equipment. 3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3f. **All non-essential personnel shall maintain a 10 foot exclusion zone**; position body out of the line-of-fire of equipment. 3f. **Drillers and helpers will understand and use the "Show Me Your Hands Policy".**
	3g. **EXPOSURE**: Noise from vac truck and/or air compressor.	3g. Wear hearing protection when vac truck and air compressor are in operation. Otherwise, if sound levels exceed 85 dB, don hearing protection.
4. Move drum to staging area using drum cart.	4a. **EXPOSURE/CONTACT**: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil).	4a. Wear chemically resistant gloves (i.e., Nitrile; worn in addition to cut resistant gloves). 4a. Do not overfill drums. Ensure that the drum lids are attached securely. 4a. Stage all drums in the designated storage area (per Roux Project Manager) and ensure they are labeled.
	4b. **EXERTION**: Muscle strain while maneuvering drums with drum cart/lift gate.	4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums or drum cart to transport drums.
	4c. **CAUGHT**: Pinch points associated with handling drum lid.	4c. Ensure that fingers are not placed under the lid of the drum. Wear cut-resistant gloves. Use 15/16" ratchet while sealing drum lid.
5. Decontaminate equipment and tools.	5a. **EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).	5a. See 4a. 5a. Contain decontamination water (closed lid) so that it does not spill. 5a. Use an absorbent pad to clean spills, if necessary. 5a. Store all impacted materials/PPE in a designated storage container (per Roux Project Manager) and ensure the container is labeled.
	5b. **EXPOSURE**: To chemicals in cleaning solution.	5b. See 4a.

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-010	DATE: 1/14/2014	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Site Recon**	**Mobilization/Demobilization**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jared Lefkowitz	Staff Assistant Scientist	Curtis Taylor	SHSM
		Mike Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION (as needed) ☒ SAFETY SHOES: Steel Toe or composite toe	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest of high-visibility clothing; long sleeve shirt; long pants	☐ GLOVES: Leather, nitrile, and cut resistant (as needed) ☐ OTHER

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment:

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A minimumexclusion zone of 10' will be maintained around moving equipment (if necessary)

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilize/demobilize and establish work area	**1a. FALL:** Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.	1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle. 1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways.Walk on stable/secure ground. 1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area. 1a. Wear boots with adequate treads. 1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.
	1b. CONTACT: Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.	1b. Observe and maintain the posted speed limits. 1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities. Ensure that short-service employees (SSE) are identified. 1b. Identify potential traffic sources. 1b. Wear PPE including high visibility clothing or reflective vest. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing when unnecessary. 1b. Maintain a minimum 10' exclusion zone when vehicles are in motion. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers. 1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area. 1b. Position largest vehicle to protect against oncoming traffic. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.
	1c. CAUGHT: Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.	1c. Make sure driver has engaged parking brake and placed wheel chocks in a position to prevent movement. Be sure that vehicle is parked in front/down gradient of work area. 1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass. 1c. Keep body parts away from line-of-fire of equipment. 1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure. 1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure.

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Assess **[1]JOB STEPS**	**Analyze** **[2]POTENTIAL HAZARDS**	**Act** **[3]CRITICAL ACTIONS**
	1d. OVEREXERTION: Muscle strains while lifting/carrying equipment.	1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load. 1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either unwieldy or over 50 lbs.
	1e. EXPOSURE: Personal injury from exposure to biological and environmental hazards.	1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.). 1e. Wear long sleeved clothes treated with permethrin, apply insect repellant containing DEET, and inspect clothes and skin for ticks during and after work. 1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected.
	1f. EXPOSURE: Heat and cold related injuries.	1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 1f. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers). 1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work.
	1g. EXPOSURE: Personal injury from noise hazards.	1g. Wear hearing protection if sound levels exceed 85 (if you must raise your voice for normal conversation).

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-011	DATE: 1/14/2014	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Site Recon**	**Site Walk and Inspection**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Chelsea Willett	Staff Geologist	Curtis Taylor	SHSM
		Mike Ritorto	Project Hydrogeologist
		Joe Gentile	CHSM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Leather/cut-resistant/chemical resistant
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☒ OTHER: tyvek and rubber boots as necessary, dust mask as necessary
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION: ear plugs as necessary	☒ PPE CLOTHING: High-visibility vest or high-vis outerwear, long sleeves	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or composite toed		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Site map and/or guide familiar with Site, operating cell phone or walkie-talkie if Site allows.

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE (EZ): A minimum 10' exclusion zone will be maintained around equipment.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Check in with Site manager.	**1a. CONTACT/EXPOSURE/FALL:** Lack of communication could result in H&S incident.	1a. Inform Site personnel of work scope, timeline and location(s). 1a. Inquire about hazards and other activities taking place at the Site.
2. Traversing the Site and setting up at work locations.	**2a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites.	2a. Maintain speed limit of 5 mph on-site. 2a. All equipment must be stowed and secured prior to moving. Use wheel chocks on all construction vehicles when not in motion. 2a. Drive on established roadways. 2a. Yield to all pedestrians. 2a. Do not back up vehicle without spotter where visibility is limited; use pull-through spots or back into parking spots; use an audible signal (horn/back-up alarm) when backing up vehicles. 2a. Wear high visibility clothing/safety vest. If working at remote Site, add orange hat or accessories during hunting season.
	2b. FALL: Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone.	2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2b. Use established pathways and walk on stable, secure ground.
	2c. OVEREXERTION: Muscle strain while carrying equipment.	2c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use mechanical assistance or make multiple trips to carry equipment. 2c. Two people or a mechanical lifting device are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift.
	2d. EXPOSURE: Biological hazards - ticks, bees/wasps, poison ivy, insects, etc. (Ticks are most active any time the temperature is above freezing, typically from March to November.)	2d. Inspect area to avoid contact with biological hazards. 2d. Ticks: • Treat outer clothing including pants, shirts, socks, boots and hats the evening before use with Permethrin (allowing at least two hours before use). • Apply DEET to exposed skin before travelling to the Site and reapply after two hours. • Check for ticks during and after work. 2d. Bees: Use bee spray to remove nests. Protect exposed skin with insect repellent. 2d. Poison Ivy: • Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas. • If skin comes in contact with poison ivy, wash skin thoroughly with soap and water.
	2e. EXPOSURE: Sun, possibly causing sunburn.	2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Define and secure the work area.	**3a. CONTACT:** Personal injury or property damage from other vehicles on-site.	3a. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 3a. Look both ways in high traffic areas. 3a. Position vehicle to protect against oncoming traffic. 3a. Use 42" traffic cone and caution tape to delineate work area. Use a spotter in high traffic areas. 3a. Wear high visibility clothing/safety vest.
4. Walking near heavy equipment and machinery.	**4a. CONTACT:** Personal injury from Site and roadway traffic. Personal injury from flying debris.	4a. See 3a. 4a. Place traffic cones to re-direct traffic flow around work area and to alert others as to activity taking place. Evaluate possible need for police detail and request as needed. 4a. Maintain a minimum exclusion zone of 10 feet from all equipment. Task specific JSAs should be referenced to determine the actual exclusion zone for the piece of equipment being used. 4a. Keep body parts out of the line of fire of pinch points. 4a. Routinely inspect work area and be aware of location of all Site personnel. Make eye contact with spotter, if provided, or operator prior to entering the work area. 4a. Wear safety glasses at all times.
	4b. OVEREXERTION: Personal injury from lifting/moving/rotating equipment.	4b. See 2c.
	4c. EXPOSURE: Hearing damage from excavation activities. Inhalation/exposure to hazardous vapors and or dust.	4c. Monitor air quality with multi-gas meter and dust meter, if necessary. Use water to suppress dust, if necessary. Wear dust mask, if necessary. 4c. Wear hearing protection if >85 dBA. 4c. Always wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects, glassware or cutting tools.
	4d. EXPOSURE: Working in a remote area.	4d. Use the "buddy system" whenever possible. If working alone, contact PM upon arrival/departure, as well as during work activities prior to commencing work. 4d. Always carry a communication (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) device when traversing remote areas.
5. Working in adverse weather conditions.	**5a. EXPOSURE:** Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	5a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 5a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 5a. Wear appropriate rain gear as needed. 5a. Take frequent breaks if tired, wet, or cold/hot. Drink water. 5a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
6. Departing Site.	**6a. EXPOSURE:** Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.	6a. Sign out or notify Site personnel of your departure.

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JOB SAFETY ANALYSIS	Cntrl#: GEN-015	DATE 1/17/14	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
GENERIC	**Drilling**	**Well Development**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Amy Hoffman	Staff Geologist	Mike Ritorto	Project Hydrogeologist
Ron Lombino		Curtis Taylor	SHSM

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Leather, Nitrile and cut resistant
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☒ OTHER: Insect repellant, sunscreen (as needed)
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION (as needed)	☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Composite-toe or steel toe boots		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment as needed: Truck Rig or support truck, Trailer, 42 inch Safety cones and flags, Caution Tape, Interface Probe, Power Source, Submercible Pump, Surge Block/Plunger, 20 lb. Fire Extinguisher, Holding Tanks and/or Buckets, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key.

COMMITMENT TO LPS - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

Maintain a 20 Foot Exclusion Zone During Development Activities

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization / Demobilization (**Review Mobilization and Demobilization JSA**)	1a. **CONTACT:** Equipment/property damage.	1a. The truck rig's tower/derrick will be lowered and secured prior to mobilization. 1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 1a. All non-essential personnel should **maintain an exclusion zone of 20 feet**. 1a. Beep horn twice before backing up. 1a. When backing up with an attached trailer use a spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. Stay away from the line-of-fire. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed.
	1b. **FALL:** Slip/trip/fall hazards.	1b Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Store equipment at lowest potential energy.
2. Open/close well.	2a. **OVEREXERTION:** Muscle strain (some wells have large vault covers).	2a. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Two people are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift.
	2b. **CAUGHT:** Pinch points associated with removing/replacing manholes and working with hand tools.	2b. Wear leather gloves when working with well vault/cover and hand tools. Do not put fingers under well vault/cover. 2b. Use ratchet and pry bar for well cover and inspect before use.
	2c. **EXPOSURE:** Potentially hazardous vapors.	2c. No open flames/heat sources. 2c. Allow well to vent after opening it and before starting development activities to minimize exposure to vapors. Air monitoring must be performed prior to set up and during the well development activities. Work on upwind side of well.
	2d. **CONTACT:** Traffic.	2d. Wear required PPE including high visibility clothing or reflective vest. 2d. Delineate work area with 42" safety cones and/or other barriers. Position vehicle to protect against oncoming traffic. 2d. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Develop well (mechanical surging).	3a. **CAUGHT:** Cut hazards and finger pinch points. 3b. **CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors). 3c. **OVEREXERTION:** Muscle strain from lifting equipment. 3d. **CONTACT:** Injury while handling wench line/cable, or with active surging equipment	3a See 2b. 3a. Use required PPE including leather/cut-resistant gloves when handling development equipment. Identify finger/hand pinch points. Keep hands away from active surge equipment. 3a. All non-essential personnel should **maintain an exclusion zone of 20 feet**. 3b. See 2c. 3b. Wear Nitrile gloves and safety glasses. Insert and remove surge block/plunger and line/cable slowly to avoid splashing at the surface. 3b. Use an absorbent pad to clean any spills. 3c. See 2a. 3c. Use mechanical device to insert and remove surge block/plunger if greater than 50lb. 3d. If using a drill rig, inspect all wench lines/cables for any kinks or if frayed prior to use. Replace any damaged lines/cables. Review **Drill Rig checklist prior to development activities**. . 3d. See 3a.
4. Purging well (pumping water to holding tanks/drums/buckets).	4a. **CAUGHT:** Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses. 4b. **FALL:** Using side mounted ladder when attaching hose to tank. Slip, trip, fall from lines/hoses 4c. **CONTACT:** Contamination (e.g., SPH, contaminated groundwater). 4d. **EXERTION:** Muscle strain from lifting/carrying equipment. 4e.**FALL:** Spilled purge water.	4a. See 3a. 4a. Ensure that fingers are not placed near coupling when attaching and securing hose(s). Do not place fingers under pump/hoses. Wear leather or cut-resistant gloves when handling pump/hose(s). 4a. Keep hands clear from any line of fire. 4b. Inspect ladder steps make sure steps are not bent/damaged and free of debris/fluid. 4b. Use three points of contact at all times when using ladder. 4b. Utilize anti-whip cords on all compressed hoses. Keep hoses and lines coiled and organized out of designated walking paths around the work zone. 4c. Secure water hose. 4c. Do not overfill tanks, and purge/transfer liquids in such a manner that they do not splash. (See 3b). 4c. Dispose of used materials/PPE in the designated impacted PPE container. 4d. Use lifting techniques to minimize muscle strain when carrying equipment. When possible, use mechanic means to lift equipment. 4d. Use two people to lift any equipment or material that is over 50 lbs. 4e. Clean up any spills using absorbent pads or spill kits.
5. Decontaminate equipment	5a. **CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors). 5b. **EXPOSURE/CONTACT:** Chemicals in cleaning solution	5a. See 3b. 5b. Decontaminate equipment in well-ventilated area. Wear nitrile gloves to avoid skin contact with cleaning solutions.

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JOB SAFETY ANALYSIS	Cntrl. No. GEN-017	DATE: 10/9/12	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Construction – Concrete & Asphalt**	**Concrete Sidewalk Flag / Well Pad Replacement**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Ron Lombino	Staff Assistant Geologist	Curtis Taylor	SHSM
		Mike Ritorto	Project Hydrogeologist

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYINGRESPIRATOR	☒ GLOVES: Cut Resistant and/or Leather
☒ HARD HAT	☒ FACE SHIELD: (When Jackhammering)	☐ SUPPLIED RESPIRATOR	☒ OTHER: Dust Mask
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION: (While Compressor is Running)	☒ PPE CLOTHING: High visibility long sleeved shirt/ Safety vest	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or Composite toe		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Concrete-Truck, Concrete Mixer, Jack Hammer, Air Saw or Gas Powered Saw, Compressor, Hand Tools, Wheel Barrel, Multi-Gas Meter, 42 Inch Safety Cones, Caution Tape, 20 lb. Fire Extinguisher, "Work Area" Signs, Pressurized Water Sprayer, Flush-Mounted Curb Boxes

Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE: A 10 foot exclusion zone will be maintained while jackhammering.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Verify pre-clearance protocol and mobilize/demobilize.	1a. **CONTACT:** Property damage, personal injury, or underground utilities.	1a. Confirm that local utility companies were contacted prior to sidewalk flag / concrete pad replacement. 1a. Walk the Site to evaluate utility markings and review maps and subsurface clearance form.
	1b. **CONTACT:** With traffic (including any unintended movement of the work truck), contact / interference with other site activities.	1b. Identify potential traffic hazards. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing up when unnecessary. Use additional spotters if necessary. 1b. 1b. Ensure that truck has wheel chocks when parked and compressor has wheel chocks if detached from truck. 1b. Delineate work area with cones, flags, caution tape, and/or other barriers. Construct pedestrian walkway, if needed. Use truck to barricade if possible 1b. Maintain an exclusion zone of 10 feet for workers and pedestrians. 1b. Position "Men at work" signs at site entrances or on either side of exclusion zone. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route; wear bright colored clothing/safety vest.
2. Concrete saw cutting and jackhammering.	2a. **CONTACT:** Flying debris and hoses.	2a. Wear PPE (especially hand, eye, ear and respiratory protection). 2a. Use anti-whip devices on compressor hoses. 2a. Maintain a minimum exclusion zone of 10 feet.
	2b. **EXPOSURE:** Inhalation/exposure to hazardous vapors and/or concrete dust, noise.	2b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings. 2b. Wet concrete while using saw to minimize dust. If possible, use Vactron as dust suppression in freezing weather conditions. 2b. Stand upwind and keep body behind saw. 2b. No open flames/heat sources. 2b. Wear hearing protection when saw, jackhammer or air compressor is in operation.
	2c. **EXERTION:** Poor body positioning and use or from handling equipment and materials.	2c. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use buddy system over 50 lbs or a mechanical lifting device.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
2. Concrete saw cutting and jackhammer (Continued).	2d. **FALL:** Tripping/falling due to uneven terrain, weather conditions, and materials /equipment stored at the Site, broken up concrete.	2d. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2d. Equipment and tools will be staged in a designated-convenient, stable, and orderly manner. Stored at the lowest point of potential energy and out of the walkway and immediate work area. 2d. Ensure power cords and water lines are grouped when used within the work area. 2d. Concrete flag and flush-mounted curb box will be finished flush to grade so that not presenting a slip/trip hazard. 2d. Place concrete chunks in drum(s).
	2e. **CAUGHT:** Pinch points associated with the equipment and vacuum hose.	2e. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 2e. Inspect the equipment prior to use for potential pinch points. 2e. Test all emergency shutdown devices prior to performing task. 2e. Inspect saw blade for worn surface or missing teeth; switch blade if damaged or blunt. 2e. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 2e. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. Maintain established exclusion zone distance. 2e. Drillers and helpers will use the **"Show Me Your Hands"** Policy.
3. Mixing/Pouring concrete and installing manhole.	3a. **CONTACT:** Burn from handling/pouring concrete.	3a. Wear required PPE (including Nitrile gloves, long sleeved shirts, safety glasses) when handling dry/wet concrete and forming concrete flags. 3a. Inspect all transfer equipment (Concrete-Truck, wheel barrel, etc.) prior to pouring concrete. 3a. All non-essential personnel should stay away from the immediate work area; position body out of line-of-fire of equipment and concrete flow. Maintain established exclusion zone distance.
	3b. **EXERTION:** Poor body positioning and use or from handling equipment and materials.	3b. See 2c.
	3c. **FALL:** Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the site.	3c. See 2d.
	3d. **EXPOSURE:** Concrete silicates pose dermal and inhalation hazard.	3d. Nitrile {inner} gloves and long sleeve shirt to mitigate dermal contact. 3d. Dust mask must be worn for personnel mixing concrete.
4. Move drum to designated staging area.	4a. **Refer to Drum Handling JSA for Potential Hazards.**	4a. **Refer to Drum Handling JSA for Critical Actions.**
5. Decontaminate equipment	5a. **EXPOSURE:** Wet concrete and dust.	5a. Wear chemical-resistant disposable gloves and safety glasses. 5a. Use an absorbent pad to clean spills.
	5b. **EXPOSURE:** Chemicals in cleaning solution including ammonia.	5b. See 3a.

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APPENDIX C

Heat and Cold Stress Guidelines

Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment (PPE) in hot weather environments.

Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat cramps are as follows:

- severe muscle cramps, usually in the legs and abdomen;
- exhaustion, often to the point of collapse; and
- dizziness or periods of faintness.

First aid treatment includes moving to a shaded area, rest, and fluid intake. Normally, the individual should recover within one-half hour. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to a hospital for medical attention.

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat. The circulatory system of the individual fails as blood collects near the skin in an effort to rid the body of excess heat. The signs and symptoms of heat exhaustion are as follows:

- rapid and shallow breathing;
- weak pulse;
- cold and clammy skin with heavy perspiration;
- skin appears pale;
- fatigue and weakness;
- dizziness; and
- elevated body temperature.

First aid treatment includes cooling the victim, elevating the feet, and replacing fluids and electrolytes. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to the hospital for medical attention.

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a **MEDICAL EMERGENCY**, requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- dry, hot, red skin;
- body temperature approaching or above 105°F;
- large (dilated) pupils; and
- loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility.

Heat stress (heat cramps, heat exhaustion, and heat stroke) is a significant hazard if any type of protective equipment (semi-permeable or impermeable) which prevents evaporative cooling is worn in hot weather environments. Local weather conditions may require restricted work schedules in order to adequately protect personnel. The use of work/rest cycles (including working in the cooler periods of the day or evening) and training on the signs and symptoms of heat stress should help prevent heat-related illnesses from occurring. Work/rest cycles will depend on the work load required to perform each task, type of protective equipment, temperature, and humidity. Below is a table of the recommended Threshold Limit Values for Hot Environments from the American Conference of Industrial Hygienists (ACGIH)

Work Load			
Work-Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous Work	86 °F	80 °F	77 °F
75% Work 25% Rest, each hour	87 °F	82 °F	78 °F
50% Work 50% Rest, each hour	89 °F	85 °F	82 °F
25% Work 75% Rest, each hour	90 °F	88 °F	86 °F

Note: These TLV's are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4° F). They are also based on the assumption that the Wet Bulb Globe Temperature Index (WBGT) of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used (consult the ACGIH 1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (1992).

These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLV's must be reduced.

In addition, potable water and fluids containing electrolytes (e.g., Gatorade) will be available to replace lost body fluids.

Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 40°F. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. Training on the signs and symptoms of cold stress should prevent cold-related illnesses from occurring. The signs and symptoms of cold stress include the following:

- severe shivering;
- abnormal behavior;
- slowing of body movement;
- confusion;
- weakness;
- stumbling or repeated falling;
- inability to walk;
- collapse; and/or
- unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks, and encourage activity, such as walking wrapped in a blanket.

Below is a table of the recommended Threshold Limit Values for Cold Environments from the American Conference of Industrial Hygienists (ACGIH):

<table>
<tr><th>Air Temperature</th><th colspan="2">No Wind</th><th colspan="2">5 mph wind</th><th colspan="2">10 mph wind</th><th colspan="2">15 mph wind</th><th colspan="2">20 mph wind</th></tr>
<tr><td>Degrees Fahrenheit °F</td><td>max. work period</td><td># of breaks</td><td>max. work period</td><td># of breaks</td><td>max. work period</td><td># of breaks</td><td>max. work period</td><td># of breaks</td><td>max. work period</td><td># of breaks</td></tr>
<tr><td>-15 to -19 °F</td><td colspan="2">(normal breaks) 1</td><td colspan="2">(normal breaks) 1</td><td>75 min.</td><td>2</td><td>55 min.</td><td>3</td><td>40 min.</td><td>4</td></tr>
<tr><td>-20 to -24 °F</td><td colspan="2">(normal breaks) 1</td><td>75 min.</td><td>2</td><td>55 min.</td><td>3</td><td>40 min.</td><td>4</td><td>30 min.</td><td>5</td></tr>
<tr><td>-25 to -29 °F</td><td>75 min.</td><td>2</td><td>55 min.</td><td>3</td><td>40 min.</td><td>4</td><td>30 min.</td><td>5</td><td colspan="2" rowspan="4">Non-emergency work should cease</td></tr>
<tr><td>-30 to -34 °F</td><td>55 min.</td><td>3</td><td>40 min.</td><td>4</td><td>30 min.</td><td>5</td><td colspan="2" rowspan="3">Non-emergency work should cease</td></tr>
<tr><td>-35 to -39 °F</td><td>40 min.</td><td>4</td><td>30 min.</td><td>5</td><td colspan="2" rowspan="2">Non-emergency work should cease</td></tr>
<tr><td>-40 to -44 °F</td><td>30 min.</td><td>5</td><td colspan="2" rowspan="2">Non-emergency work should cease</td></tr>
<tr><td>-45 °F and below</td><td colspan="2">Non-emergency work should cease</td></tr>
</table>

Notes:

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up breaks of ten (10) minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4 hour work period in a warm location. For light to moderate work (limited physical movement), apply the schedule one step lower.
2. Table applies only if workers are wearing dry clothing and doing moderate to heavy work activity. For light to moderate work activity, move down one line to decrease maximum work period and increase the number of breaks.

APPENDIX D

Community Air Monitoring Plan

APPENDIX D

C360129 HASP, May 2013
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.

APPENDIX E

Health and Safety Briefing/ Tailgate Meeting Form

DAILY SITE SAFETY CHECKLIST

Job Name: _____ **Date(s)** _____

Location: _____ **Client Site #** _____

Weather: **M-** **T-** **W-** **TR-** **F-**

•"On the Job" interactive meeting held before work starts	•Provide details of work planned for the day
•Conducted at least once per day	•Review the Job Safety Analysis (JSA) and work hazards
•Involves everyone working at the Site	•Required PPE for the planned work
•Should familiarize everyone with work area & vicinity	•SPSAs are discussed
•Work permit procedures	•HASP is reviewed
•Emergency access/exits & "rally" point	•Ensure safety equipment is on Site
•Emergency contacts/phone #s, hospital route	•Test required safety equipment (such as emergency stop controls)
•Should be interactive	•Can also include inspection of tools and equipment to be used

Instructions: Please only use form for Monday through Friday of one calander week. All attending must initial in boxes below.

#	CHECKLIST ITEM	DATE				
		M-	T-	W-	TR-	F-
1	The HASP (including emergency phone #s) has been reviewed & signed by Roux staff & subcontractors.					
2	Personnel are LPS and OSHA-40 (as applicable) trained and SSE are identified and have an on-site mentor.					
3	Emergency meeting point known, First Care facility and ER identified.					
4	Applicable JSAs have been identified and approved by Roux management. (JSAs Reviewed?)					
5	Roux personnel & subcontractors have discussed hazards associated with Site-specific work.					
6	Any potential slips, trips or fall hazards have been identified.					
7	All workers have appropriate PPE, including long sleeves and have signed in for the day (2nd Page).					
8	No person on-Site has the appearance of being under the influence of motor skill altering substances and are familiar with D&A policy.					
9	Critical equipment on-Site is noted and is in safe working order.					
10	Site control has been established and exclusion zone is identified (using safety cones or barricades to mark out work area).					
11	Appropriate permits has been obtained and potential ignition sources were identified if applicable for Hot Permits					
12	If applicable, all third party permits to construct are on hand and access is permissible.					
13	Lock Out / Tag Out procedures have been followed where applicable, for electric and water.					
14	Electrical power operated tools shall be properly grounded and used with a GFCI.					
15	Traffic Safety Control measures have been put in place where applicable.					
16	All vessels containing flammable/corrosive material are labeled and MSDSs are available for all chemicals.					
17	Subsurface work : Drilling, trenching, etc. conducted according to required Protocol, including pre-field preparations, utility mark-out and "hand" clearing					
18	Excavated soils are properly stored; excavations are properly shored/sloped and barricaded.					
19	Good housekeeping procedures are meet; food and beverages are consumed outside of the work area.					
20	A first aid kit, eye wash bottle/station, and fire extinguishers are available for use.					
21	No smoking signs are visibly posted in areas of potential flammable vapors.					
Initial on right to verify that these actions have taken place						

Comments and Exceptions _____

_____

NOTE: THIS IS A TWO-SIDED FORM; PLEASE COMPLETE BOTH SIDES

DAILY TAILGATE HEALTH & SAFETY MEETING LOG

Job Name _____ **Date(s)** _____

Location: _____ **Client Site #** _____

SUBCONTRACTOR: _____

Activities Planned _____

_____

_____

JSAs Utilized	

Potential Hazards *NOT IN JSA*	Mitigative Measures
LPO Scheduled for:	

PLEASE COMPLETE BOTH SIDES

Meeting Attendance

Name	Company	Mon.	Tue.	Wed.	Thur.	Fri.

Initial in Boxes

APPENDIX F

Standard Operating Procedures

FINAL

STANDARD OPERATING PROCEDURE 1.13

HEAVY EQUIPMENT EXCLUSION ZONE POLICY

CORPORATE HEALTH AND SAFETY MANAGER	:	Joseph W. Gentile
EFFECTIVE DATE	:	February 2014
REVISION NUMBER	:	1

Objective

The purpose of the Exclusion Zone Policy is to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or other equipment entering the Exclusion Zone while the equipment is in operation/moving to ensure that Roux and Subcontractor employees are not unnecessarily exposed to the hazards of the equipment.

A. Definition

For the purpose of this policy, heavy equipment includes, but is not necessarily limited to: excavation equipment, drill rigs, vacuum trucks, forklifts, lull telehandlers, man lifts, bobcats, delivery trucks, etc.

B. Requirements

1. Exclusion Zones must be established and maintained during activities involving the movement/operation of heavy equipment. The Exclusion Zone requirements apply to all personnel on the site but are primarily focused on those personnel who are required to be working in the vicinity of the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (ex. movement of an arm or bucket of an excavator, rotation of an auger, lifting of a load with a forklift, raising/lowering of a man lift, etc.).

2. The Exclusion Zone must meet the following minimum requirements:

- A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment; and
- Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment this may mean an exclusion zone distance larger than 20 feet);
- Greater than the tip-over distance of the heavy equipment; and
- Greater than the radius of blind spots.

3. The size of the Exclusion Zone will need to be determined on a task-specific basis considering the size of the heavy equipment in use and the task being performed. Prior to all heavy equipment operations, the Exclusion Zone(s) distance must be specifically identified in the Job Safety Analysis (JSA).

4. The spotter (or another individual) should be assigned responsibility for enforcing the Exclusion Zone. This spotter should be positioned immediately outside of the Exclusion Zone within a clear line of sight of the equipment operator. The spotter must signal the operator to stop work if anyone or anything has the potential to enter or compromise the Exclusion Zone. The operator should stop work if the spotter is not within his/her line of sight. If multiple pieces of equipment are being used, each piece of equipment must have its own Exclusion Zone and spotter. For large excavation and demolition projects the spotter should be in constant radio contact (not cell phone) with the machine driver.

5. If an individual must enter the Exclusion Zone, the designated Spotter must signal the Equipment Operator to stop the equipment. Once the equipment is no longer moving (ex. movement of an arm of an excavator is STOPPED, lifting of a load with a forklift STOPPED, raising/lowering of a man lift is STOPPED, etc.), the operator must **DISENGAGE THE CONTROLS and STOP and SIGNAL BY "SHOWING HIS HANDS"**. This signal will indicate

that it is safe for the personnel to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel have exited the limits of the Exclusion Zone and the designated Spotter has signaled by "SHOWING HIS HANDS" to the Equipment Operator that it is safe to resume.

6. When entering the limits of the Exclusion Zone, personnel must at a minimum:
   - Establish eye contact with the operator and approach the heavy equipment in a manner that is in direct line of sight to the Equipment Operator;
   - Never walk under any suspended loads or raised booms/arms of the heavy equipment; and
   - Identify a travel path that is free of Slip/Trip/Fall hazards.

7. The Exclusion Zone should be delineated using cones with orange snow fence or solid poles between the cones, barrels, tape or other measures. For work in rights-of-way rigid barriers, such as Jersey barriers or temporary chain link fence should be used. For certain types of wide-spread or moving/mobile equipment operations, such delineation may not be practicable around pieces of equipment or individual work areas. In such instances it is expected that the entire operation will be within a larger secure work area or that additional means will be utilized to ensure security of the work zone.

C. Exceptions

It is recognized that certain heavy equipment activities may require personnel to work within the limits of the Exclusion Zone as specified in this policy. Such activities may include certain excavation clearance tasks, drill crew activities or construction tasks. However, any such activity must be pre-planned with emphasis on limiting the amount and potential exposure of any activity required within the zone. The critical safety steps to mitigate the hazards associated with working within the Exclusion Zone must be defined in the JSA and potentially other project-specific plans (i.e., critical lift plans, etc.), and approved by the Roux Project Principal and client representative, if required, prior to implementation.

D. Responsibilities

1. Corporate Health and Safety Manager

   Overall responsibility for administration, implementation and auditing of this policy.

2. Office Managers

   Responsible for communicating this policy to all of their employees who perform or may perform field work involving heavy equipment.

3. Office Health and Safety Managers

   Providing training to office field staff in this policy.

4. Project Principals

   a. Responsible for ensuring their projects address heavy equipment exclusion zones.

   b. Approving exceptions to this policy.

5. Project Managers

    a. Responsible for incorporating this policy into their project HASPs and applicable procedures to include JSAs.

    b. Communicating to and enforcing the policy requirements for subcontractors who work on their projects.

6. Field Workers

    a. Attending training in the policy.

    b. Following the requirements of the policy.

E. Project and Site-Specific Orientation and Training

Many Roux projects have different requirements that are client-specific or site-specific in nature. It is the responsibility of the Project Principal (or Project Manager if delegated this responsibility by the Project Principal) to ensure that the workers assigned to his/her projects are provided orientation and training with respect to these client and/or site-specific requirements.

F. Subcontractors

All subcontractors who provide heavy equipment operations to field projects must implement a policy that meets or exceeds the expectations described above as well as any additional requirements that may be required on a client or site-specific basis.

STANDARD OPERATING PROCEDURE 1.11

MOTORIZED VEHICLES AND MOBILE EQUIPMENT WHEEL CHOCKING POLICY

CORPORATE HEALTH AND SAFETY MANAGER	:	Joseph W. Gentile
EFFECTIVE DATE	:	October 2007
REVISION NUMBER	:	0

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Motorized Vehicles and Mobile Equipment Wheel Chocking Policy

1.0 INTRODUCTION

Construction accident studies continue to reveal "rollaway" vehicle accidents as a common occurrence. These most often occur when the driver leaves the vehicle believing the vehicle transmission is in either Neutral or Park position and that the brakes have been set. The vehicle then rolls away and, in most instances, stops only after encountering some obstacle. Vehicular and other property damage are the result with the potential to include serious personal injuries and death.

2.0 SCOPE

This policy applies to the following:

A. All company owned, operated, leased, or contracted motorized vehicles and mobile equipment.

B. All projects managed or supervised by Roux.

C. All Roux company and subsidiary company employees and personnel operating motorized vehicles and mobile equipment.

D. All contractor and sub-contractor personnel performing work for and/or on behalf of Roux.

E. Leased equipment and lessor's operating personnel.

F. Personally owned vehicles.

3.0 PURPOSE

The purpose of this policy is to establish a uniform approach to address hazards associated with the unintended movement of cars, trucks, construction vehicles, and/or vehicle trailers while stopped, during loading, unloading, or other related activities. This policy is intended to provide protection to vehicle/mobile equipment operators, their passengers, pedestrians, forklift operators, and dockworkers through good parking practices and the effective use of wheel chocks.

4.0 PROCEDURAL GUIDELINES

This policy is applicable to Subcontractors as well as Roux employees.

A. Cars, SUVs, Pickups and Light Trucks

Park on level ground. Before exiting the vehicle, make sure the automatic transmission is in PARK with the emergency brake set. Check the brake twice.

B. All Other Motor Vehicles and Loading Dock Applications

Park on level ground. Before exiting the vehicle, make sure the automatic transmission is in PARK with the emergency brake set. Check the brake twice.

Do not leave a vehicle running without an operator seated in the driver's seat.

When stopped or parked on slopes/inclines, chock your wheels. When chocking, use specially designed wheel chocks of the appropriate size and material to securely hold the vehicle. Don't use lumber, cinder blocks, rocks, or other makeshift items to chock. Where applicable, lower hydraulic rams and check the security of the connection between the trailer and the vehicle.

Ensure chocks are easy to find. Store chocks inside trucks, other mobile equipment, and trailers.

Place "Chock Your Wheels" stickers above the wheels as reminders.

Keep chocks available at loading docks. Chain the chocks to the dock to prevent them from being misplaced.

To properly chock a freestanding vehicle, place chocks on the left and right rear axle wheels. It is safest to chock both the front and back wheels on both sides of a vehicle. Some vehicle wheels may also need to be chocked at the front and back of each tire.

Where trailers are loaded or unloaded at docks, ensure that trailers are firmly placed against the loading dock edges and prevent rollaways by using chocks. Positioning of chocks is important. Place chocks on the left and right wheels that are closest to the loading dock. This placement allows a forklift to push down on the trailer wheels and seat them more firmly against the chock. If only the front axle is chocked, a forklift could push the trailer forward and loosen the chock or cause the wheel to jump the chock. The driver, dock workers, and forklift drivers share the responsibility to ensure that the truck and trailer wheels are properly chocked.

Use extra caution when driving a forklift into a trailer from the dock edge. If the trailer rolls away from the dock edge, the forklift could fall into the gap, resulting in the potential for severe injuries or death. Never drive a forklift into a trailer until you make

sure that the wheels are properly chocked. Ensure that the trailer floor is in good condition and that it can support the weight of the forklift and its load.

Include wheel chocking in hazards assessments and other procedures. Project and job site hazards assessments shall consider energy releases from motorized vehicles and mobile equipment on all Roux projects and work sites. Site-specific health and safety plans (HASP's) and standard operating procedures shall address wheel chocking requirements. Lockout/Tagout programs and procedures shall include applications for wheel chocking.

5.0 TYPICAL WHEEL CHOCKING APPLICATIONS

1. When performing maintenance on passenger cars, pickups, and light duty trucks, including the changing of flat tires.

2. While performing maintenance on wheeled earth-moving equipment, such as dump trucks, front end loaders, backhoes and other excavating equipment.

3. Parked auxiliary wheeled equipment whether performing maintenance or in stationary position, to include:

   a. Portable air compressors that have been disconnected from the vehicle.

   b. Portable water pumps.

   c. Portable air-moving equipment.

   d. Soil screening equipment.

   e. Wheeled drilling equipment including Geoprobes.

   f. Truck-mounted welding and cutting equipment.

   g. Truck-mounted masts and cranes.

4. Chock truck/trailer while loading/unloading pipe onto a pipe trailer or to a truck-attached bed.

5. Chock truck/trailer while loading/unloading wheeled heavy equipment (i.e., backhoe, track hoe, dozer, and forklift) from a lowboy truck trailer onto ground or when loading onto trailer.

6. Chock and secure wheel and truck mobile equipment while such equipment is being transported by trailer.

7. Chock trailer when being disconnected from truck.

8. NON-VEHICULAR APPLICATIONS: Ensure pipe is properly chocked on pipe rack; ensure 55-gallon drums on horizontal drum racks are chocked; ensure loads are blocked to prevent shifting and falling.

6.0 SPECIAL NOTE ABOUT HYBRID VEHICLES

What is critical to be aware of with hybrid vehicles is that with the engine shut off, there is no sound coming from the engine compartment or the electric motor, just silence. With a hybrid vehicle, a silent car is no guarantee of a safe car. Consider that it is in a sort of "sleep mode." Make sure you are aware of this before the vehicle "wakes up" and catches you by surprise!

Chocking the wheels is critical for safety around a hybrid vehicle. Fortunately, Toyota and Honda engineers have designed an indicator light to show the status of the vehicle and its potential to drive away. Under certain conditions, when the Honda Insight stops, such as in traffic or as a result of a vehicle crash, it goes into the Auto Idle-Stop mode. A small green Auto Stop LED light at the base of the tachometer in the instrument panel illuminates. This indicates that the engine is not moving at all, and reminds the driver and others, such as emergency responders, that the car is still in the "on" mode.

APPENDIX G

Accident Report and Health and Safety Lessons Learned Investigation Forms

HEALTH & SAFETY LESSONS LEARNED
ROUX REPORT FORM

☐ **Roux Associates, Inc.** ☐ **Remedial Engineering, P.C.**
(Check applicable company name)

PART 1: ADMINISTRATIVE INFORMATION

Office: ☐ New York ☐ Massachusetts ☐ New Jersey ☐ Illinois ☐ CA - Los Angeles ☐ CA - San Francisco

Project Manager:	**Project Principal:**
Project Name:	**Project Location:**

PART 2: LESSONS LEARNED INCIDENT DETAILS

Date\Time Occurred (MM/DD/YYYY HH:MM)**:**	**Date\Time Submitted** (MM/DD/YYYY HH:MM)**:**

LESSONS LEARNED INCIDENT TYPE - What could have happened? - Select all that apply (1-7)

1. ☐ Fire / Explosion
2. ☐ Injury / Illness
3. ☐ Security (e.g, theft, trespassing, vandalism)
4. ☐ Environmental (spill, permit exceedance, etc.)
5. ☐ Transportation of personnel (vehicle accident)
6. ☐ Property/Equipment Damage
7. ☐ Business Interruption

Event Leading to Potential Injury/Illness:

Job Task*:	**Equipment Involved*:**

WHAT HAPPENED? Do not include individuals' names. Ensure photos, sketches, etc. are not personally identifiable unless written consent has been obtained.

Summary (1-2 sentences. Provide brief description of the incident. Provide facts only, no speculation or opinion)**:**

Incident Details (Brief factual details of what, where, when; include photos, sketches, etc. as attachments)**:**

Immediate Corrective Actions Taken:

SERIOUS INJURY OR FATALITY (SIF): IF AN ACTUAL SIF, USE EXISTING ROUX ACCIDENT REPORTING FORM

Could this have resulted in a SIF? ☐ **Yes** ☐ **No**

A potential SIF is defined as likely to have caused an injury resulting in significant physical body damage with probable long term and/or life altering complications.

INCIDENT INVOLVED:

Roux Employee: ☐ **Yes** ☐ **No** **Subcontractor Company Name:**

INVESTIGATION TEAM

NAME	JOB TITLE	NAME	JOB TITLE

PART 3: INCIDENT INVESTIGATION FINDINGS AND REPORT QUALITY REVIEW

Date Investigation Team Assigned (mm/dd/yyyy):

INVESTIGATION SUMMARY: Determine from list below what behaviors and/or conditions may have contributed to the H&S Lessons Learned Incident. Then, use the "Multiple-Why Technique" for each of these behaviors/conditions; provide a narrative for each that explains how the associated Root Cause(s) was determined. Do not include individuals' names.

ROOT CAUSES: HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING
Selection of RCs and solutions reflects the analysis of investigation team. It is not meant as a legally binding conclusion as to causal factors and/or solutions.

PERSONAL FACTORS:

A. LACK OF SKILL OR KNOWLEDGE

B. DOING THE JOB ACCORDING TO PROCEDURES OR ACCEPTABLE PRACTICES TAKES MORE TIME OR EFFORT

C. SHORT-CUTTING PROCEDURES OR ACCEPTABLE PRACTICES IS POSITIVELY REINFORCED OR TOLERATED

D. IN PAST, DID NOT FOLLOW PROCEDURES OR ACCEPTABLE PRACTICES AND NO INCIDENT OCCURRED

JOB FACTORS:

E. LACK OF OR INADEQUATE PROCEDURES

F. INADEQUATE COMMUNICATION OF EXPECTATIONS REGARDING PROCEDURES OR ACCEPTABLE STANDARDS

G. INADEQUATE TOOLS OR EQUIPMENT (available, maintained, etc.)

Behavior / Condition	Root Cause	Solution(s) (Must Match Root Cause)	Person Responsible for	Completion Target Date	Completion Actual Date

			Completion		

QUALITY REVIEW Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name: **Job Title:**

PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)

Date	Solution	Verifier / Validator Name and Job Title	**Details** (of I & V performed)

JOB TASK - Select the most appropriate one (primary job associated with incident-related work activity, avoid "Other" if possible)

1. Carbon Change
2. Construction
3. Demolition
4. Dewatering
5. Drilling (well install)
6. Excavation / Trenching
7. Gauging
8. Geoprobe / Direct Push
9. Mobil Remediation (includes vacuum event and chemical injection)
10. NAPL Recovery
11. O&M (remediation system)
12. Pavement Cutting
13. Pump Test
14. Sampling
15. Site Visit / Survey
16. Subsurface Clearance
17. System Install
18. System Startup
19. UST Removal (includes exposure and backfill)
20. Waste Management
21. Well Abandonment
22. Other:

EQUIPMENT INVOLVED THAT CONTRIBUTED TO H&S LESSONS LEARNED - Select all that apply

1. Air Stripper
2. API Separator
3. Automobile
4. Boom Material
5. Bulldozer
6. Cable
7. Carbon Drum / Vessel
8. Chain Block
9. Compressor, Air
10. Control Panel (local)
11. Crane (mobile)
12. Drill Rig
13. Drilling Equipment, Vacuum
14. Drum, Vertical
15. Dump Truck
16. Electric Heater
17. Electrical Power Supply
18. Engine, Combustion
19. Equipment Safety Grounding
20. Excavator / Power Shovel
21. Exclusion Zone Equipment
22 Fan / Blower
23 Fencing
24 Filter
25. Fire Extinguisher
26. Forklift
27. Front End Loader
28. Grader
29. Hammer
30. Knife
31. Non-Powered Equipment
32. Powered Equipment
33. Drill
34. Grinder
35. Hydraulic Torque Wrench
36. Powered Saw
37. Impact Wrench
38. Saw
39. Screwdriver
40. Shears
41. Shovel
42. Snip
43. Wrench
44. Hoist
45, Hook/Clamp/Buckle, etc.
46. Jack
47. Ladder, Extension
48. Ladder, Platform
49. Ladder, Step
50. Lock Out / Tag Out
51. Maintenance Tool, General
52. Manifold
53, Manlift/Basket/Cherry Picker
54. Motor, Electric
55. Oxidizer
56. Pallet
57. Piping
58. Piping, Hose
59. Piping, Injection/Mixing Point
60. Hydrojet
61. Centrifugal Pump
62. Diaphragm Pump
63. Reciprocating Pump
64. Regenerative Pump
65. Rotary Pump
66. Transfer Pump
67. Submersible Pump
68. Face Shield
69. Fall Protection
70. Gloves
71. Hard Hat / Helmet
72. Hearing Protection
73. Respiratory PPE (Chemical)
74. Respiratory PPE (Particulate)
75. Safety Glasses
76. Safety Goggles
77. Safety Shoes / Boots
78. Safety Vest / Clothing
79. Rope
80. Bailer
81. Geoprobe
82. Hand Auger
83. PID
84. Multi-Gas Meter
85. Sample Container
86. Split-Spoon Sampler
87. Sling
88. Snow Blower
89. Snow Plow
90. Space Heater
91. Air Sparging System
92. Carbon Treatment System
93. Chemical Oxidation System
94. Dual Phase Product Recovery System
95. Groundwater Pump and Treat System
96. POET System
97. Shed or Trailer
98. Vapor Extraction System
99. Vapor-Phase Treatment System
100. Other System, Type:_____
101. Surge Tank
102. Underground Tank
103. Telemetry System
104. Testing Devices
105. Tractor Trailer
106. Truck, Flatbed
107. Truck, Pickup
108. Truck, Tank Truck
109. Truck, Vacuum
110. Safety Valve
111. Block Valve
112. Extraction Well
113. Monitoring Well
114. Recovery Well
115. Winch
116. Wire Rope
117. No Equipment Involved
118. MPT – Traffic Control Devices
118. Not in List (describe):_____

APPENDIX H

Acord Form

AUTOMOBILE LOSS NOTICE

DATE (MM/DD/YYYY)

AGENCY	INSURED LOCATION CODE	DATE OF LOSS AND TIME
The Treiber Group AJ Gallagher Risk Mgmt Svcs 377 Oak Street Garden City, NY 11530		☐ AM ☐ PM
CONTACT NAME: Teresa Garzia	CARRIER: Great Divide Insurance Company	NAIC CODE: 25224
PHONE (A/C, No, Ext): 516.622.2418	POLICY NUMBER: BAP1549799-11	
FAX (A/C, No): 516.622.2618	POLICY TYPE: Commercial Automobile	
E-MAIL ADDRESS: teresa_garzia@ajg.com		
CODE: / SUBCODE:		
AGENCY CUSTOMER ID: ROUXASSO		

INSURED

NAME OF INSURED (First, Middle, Last)			INSURED'S MAILING ADDRESS
Roux Associates, Inc.			Susan Sullivan, General Counsel, Roux Associates, Inc. 209 Shafter Street Islandia, NY 11749
DATE OF BIRTH	FEIN (if applicable): 11-2579482	MARITAL STATUS / CIVIL UNION (if applicable)	
PRIMARY PHONE # ☐ HOME ☑ BUS ☐ CELL: 631.232.2600	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL		PRIMARY E-MAIL ADDRESS: LegalDept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to: 631.232.1525

CONTACT

☐ CONTACT INSURED

NAME OF CONTACT (First, Middle, Last)		CONTACT'S MAILING ADDRESS
Susan Sullivan, General Counsel		Susan Sullivan, General Counsel, Roux Associates, Inc. 209 Shafter Street Islandia, NY 11749
PRIMARY PHONE # ☐ HOME ☑ BUS ☐ CELL: 631.232.2600	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL	
WHEN TO CONTACT		PRIMARY E-MAIL ADDRESS: LegalDept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to: 631.232.1525

LOSS

LOCATION OF LOSS STREET:	POLICE OR FIRE DEPARTMENT CONTACTED
CITY, STATE, ZIP:	REPORT NUMBER
COUNTRY:	

DESCRIBE LOCATION OF LOSS IF NOT AT SPECIFIC STREET ADDRESS:

DESCRIPTION OF ACCIDENT (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

INSURED VEHICLE

VEH #	YEAR	MAKE:	BODY TYPE:	PLATE NUMBER	STATE
		MODEL:	V.I.N.:		

OWNER'S NAME AND ADDRESS ☐ (Check if same as insured)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:	
	SECONDARY E-MAIL ADDRESS:	
DRIVER'S NAME AND ADDRESS ☐ (Check if same as owner)	PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL	SECONDARY PHONE # ☐ HOME ☐ BUS ☐ CELL
	PRIMARY E-MAIL ADDRESS:	
	SECONDARY E-MAIL ADDRESS:	

RELATION TO INSURED (Employee, family, etc.)	DATE OF BIRTH	DRIVER'S LICENSE NUMBER	STATE	PURPOSE OF USE	USED WITH PERMISSION? (Y/N) ☐

DESCRIBE DAMAGE

1. WAS A STANDARD CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) INSTALLED IN THE VEHICLE AT THE TIME OF THE ACCIDENT?	☐ Y / N
2. WAS THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) IN USE BY A CHILD DURING THE TIME OF THE ACCIDENT?	☐ Y / N
3. DID THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) SUSTAIN A LOSS AT THE TIME OF THE ACCIDENT?	☐ Y / N

ESTIMATE AMOUNT:	WHERE CAN VEHICLE BE SEEN?:	WHEN CAN VEHICLE BE SEEN?:
OTHER INSURANCE ON VEHICLE - CARRIER:		POLICY NUMBER:

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OTHER VEHICLE / PROPERTY DAMAGED **NON - VEHICLE?** ☐ **AGENCY CUSTOMER ID:** ROUXASSO

VEH #	YEAR	MAKE:	BODY TYPE:	PLATE NUMBER	STATE
		MODEL:	V.I.N.:		

DESCRIBE PROPERTY (Other Than Vehicle) **OTHER VEH/PROP INS? (Y/N)** ☐

CARRIER OR AGENCY NAME	NAIC CODE	POLICY NUMBER

OWNER'S NAME AND ADDRESS

PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL **SECONDARY PHONE #** ☐ HOME ☐ BUS ☐ CELL

PRIMARY E-MAIL ADDRESS:

SECONDARY E-MAIL ADDRESS:

DRIVER'S NAME AND ADDRESS ☐ **(Check if same as owner)**

PRIMARY PHONE # ☐ HOME ☐ BUS ☐ CELL **SECONDARY PHONE #** ☐ HOME ☐ BUS ☐ CELL

PRIMARY E-MAIL ADDRESS:

SECONDARY E-MAIL ADDRESS:

DESCRIBE DAMAGE

ESTIMATE AMOUNT	WHERE CAN DAMAGE BE SEEN?	

INJURED

NAME & ADDRESS	PHONE (A/C, No)	PED	INS VEH	OTH VEH	AGE	EXTENT OF INJURY
		☐	☐	☐		
		☐	☐	☐		
		☐	☐	☐		
		☐	☐	☐		

WITNESSES OR PASSENGERS

NAME & ADDRESS	PHONE (A/C, No)	INS VEH	OTH VEH	OTHER (Specify)
		☐	☐	
		☐	☐	
		☐	☐	

REPORTED BY	REPORTED TO

REMARKS (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

APPLICABLE IN ALASKA

A person who knowingly and with intent to injure, defraud, or deceive an insurance company files a claim containing false, incomplete, or misleading information may be prosecuted under state law.

APPLICABLE IN ARIZONA

For your protection, Arizona law requires the following statement to appear on this form. Any person who knowingly presents a false or fraudulent claim for payment of a loss is subject to criminal and civil penalties.

APPLICABLE IN ARKANSAS, DELAWARE, KENTUCKY, LOUISIANA, MAINE, MICHIGAN, NEW JERSEY, NEW MEXICO, NORTH DAKOTA, PENNSYLVANIA, RHODE ISLAND, SOUTH DAKOTA, TENNESSEE, TEXAS, VIRGINIA, AND WEST VIRGINIA

Any person who knowingly and with intent to defraud any insurance company or another person, files a statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact, material thereto, commits a fraudulent insurance act, which is a crime, subject to criminal prosecution and civil penalties. In LA, ME, TN, and VA, insurance benefits may also be denied.

APPLICABLE IN CALIFORNIA

For your protection, California law requires the following to appear on this form: Any person who knowingly presents a false or fraudulent claim for payment of a loss is guilty of a crime and may be subject to fines and confinement in state prison.

APPLICABLE IN COLORADO

It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policy holder or claimant for the purpose of defrauding or attempting to defraud the policy holder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

APPLICABLE IN THE DISTRICT OF COLUMBIA

Warning: It is a crime to provide false or misleading information to an insurer for the purpose of defrauding the insurer or any other person. Penalties include imprisonment and/or fines. In addition, an insurer may deny insurance benefits, if false information materially related to a claim was provided by the applicant.

APPLICABLE IN FLORIDA

Pursuant to S. 817.234, Florida Statutes, any person who, with the intent to injure, defraud, or deceive any insurer or insured, prepares, presents, or causes to be presented a proof of loss or estimate of cost or repair of damaged property in support of a claim under an insurance policy knowing that the proof of loss or estimate of claim or repairs contains any false, incomplete, or misleading information concerning any fact or thing material to the claim commits a felony of the third degree, punishable as provided in S. 775.082, S. 775.083, or S. 775.084, Florida Statutes.

APPLICABLE IN HAWAII

For your protection, Hawaii law requires you to be informed that presenting a fraudulent claim for payment of a loss or benefit is a crime punishable by fines or imprisonment, or both.

APPLICABLE IN IDAHO

Any person who knowingly and with the intent to injure, defraud, or deceive any insurance company files a statement of claim containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN INDIANA

A person who knowingly and with intent to defraud an insurer files a statement of claim containing any false, incomplete, or misleading information commits a felony.

APPLICABLE IN KANSAS

Any person who, knowingly and with intent to defraud, presents, causes to be presented or prepares with knowledge or belief that it will be presented to or by an insurer, purported insurer, broker or any agent thereof, any written statement as part of, or in support of, an application for the issuance of, or the rating of an insurance policy for personal or commercial insurance, or a claim for payment or other benefit pursuant to an insurance policy for commercial or personal insurance which such person knows to contain materially false information concerning any fact material thereto; or conceals, for the purpose of misleading, information concerning any fact material thereto commits a fraudulent insurance act.

APPLICABLE IN MARYLAND

Any person who knowingly and [or]* willfully presents a false or fraudulent claim for payment of a loss or benefit or who knowingly and [or]* willfully presents false information in an application for insurance is guilty of a crime and may be subject to fines and confinement in prison. * [or] effective 01-01-2013

APPLICABLE IN MINNESOTA

A person who files a claim with intent to defraud or helps commit a fraud against an insurer is guilty of a crime.

APPLICABLE IN NEVADA

Pursuant to NRS 686A.291, any person who knowingly and willfully files a statement of claim that contains any false, incomplete or misleading information concerning a material fact is guilty of a felony.

APPLICABLE IN NEW HAMPSHIRE

Any person who, with purpose to injure, defraud or deceive any insurance company, files a statement of claim containing any false, incomplete or misleading information is subject to prosecution and punishment for insurance fraud, as provided in RSA 638:20.

APPLICABLE IN NEW YORK

Any person who knowingly and with intent to defraud any insurance company or other person files an application for commercial insurance or a statement of claim for any commercial or personal insurance benefits containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, and any person who in connection with such application or claim knowingly makes or knowingly assists, abets, solicits or conspires with another to make a false report of the theft, destruction, damage or conversion of any motor vehicle to a law enforcement agency, the Department of Motor Vehicles or an insurance company, commits a fraudulent insurance act, which is a crime, and shall also be subject to a civil penalty not to exceed five thousand dollars and the value of the subject motor vehicle or stated claim for each violation.

APPLICABLE IN OHIO

Any person who, with intent to defraud or knowing that he/she is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

APPLICABLE IN OKLAHOMA

WARNING: Any person who knowingly and with intent to injure, defraud or deceive any insurer, makes any claim for the proceeds of an insurance policy containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN WASHINGTON

It is a crime to knowingly provide false, incomplete, or misleading information to an insurance company for the purpose of defrauding the company. Penalties include imprisonment, fines and denial of insurance benefits.

APPENDIX I

OSHA 300

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 _____

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

You must record information 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 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.

Form approved OMB no. 1218-0176

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:					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(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	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M) Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
								Job transfer or restriction	Other record-able cases								
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
				Page totals		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
(1)	(2)	(3)	(4)	(5)	(6)

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

Summary of Work-Related Injuries and Illnesses

Year _____

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

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of…	(M)		(M)
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

_____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

____ ____ ____ ____

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

____ ____ ____ ____ ____ ____

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

_____ _____
Phone Date

OSHA's Form 301
Injuries and Illnesses Incident Report

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.

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

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Repor* t is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone _____ Date _____

Information about the employee

1) Full Name _____

2) Street _____

City _____ State _____ Zip _____

3) Date of birth _____

4) Date hired _____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional

_____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ Zip _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the Log _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness _____

12) Time employee began work _____ AM/PM

13) Time of event _____ AM/PM ☐ Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt", "pain", or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

18) **If the employee died, when did death occur?** Date of death

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

APPENDIX J

Job Safety and Health Protection Poster

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • **Occupational Safety and Health Administration** • **OSHA 3165**

APPENDIX G

Quality Assurance Project Plan

October 25, 2016

QUALITY ASSURANCE PROJECT PLAN

Marcus Garvey Preservation Project
650 Rockaway Avenue
Brooklyn, New York

Prepared for:

MARCUS GARVEY PRESERVATION, LLC
1765 Palmer Avenue, Suite 203
Larchmont, New York 10538

Remedial Engineering, P.C.
Environmental Engineers

and ROUX ASSOCIATES, INC.

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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1. Standard Operating Procedures

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared to describe the measures that will be taken to ensure that the data generated during the Site management phase at the Marcus Garvey Apartments Site, located at 650 Rockaway Avenue (a.k.a. 654, 658, 666, 670, 674 Rockaway Avenue and 327, 329, 331, 333, 335, 337, 339 Chester Street) in Brownsville, Brooklyn, New York are of quality sufficient to meet project-specific data quality objectives (DQOs). This QAPP also includes the elements of a Field Sampling Plan (FSP). Marcus Garvey Apartments LLC is a Volunteer in the Brownfield Cleanup Program (BCP). Site management activities will be conducted under the New York State Department of Environmental Conservation (NYSDEC) BCP (Site No. C224198). This QAPP includes a Field Sampling Plan. The QAPP was prepared in accordance with the guidance provided in New York State Department of Environmental Conservation (NYSDEC) Technical Guidance DER-10 (Technical Guidance for Site Investigation and Remediation), the Brownfield Cleanup Program Guide and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G-4).

1.1 Purpose

The QAPP describes in detail the field sampling and quality assurance/quality control (QA/QC) methods to be used during soil waste characterization, backfill material and groundwater sampling tasks performed during the Marcus Garvey Apartments Site management phase. Please note groundwater sampling is the only regularly performed task; soil waste characterization and backfill material sampling are covered in this QAPP in the event of ground intrusive work and existing soil needing to be replaced.

This QAPP was prepared in accordance with the NYSDEC's May 2010, DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) and provides guidelines and procedures to be followed by field personnel during performance of sampling during the Marcus Garvey Apartments Site management phase. Information contained in this QAPP relates to:

- sampling objectives (Section 2);
- project organization (Section 3);
- sample media, sampling locations, analytical suites, sampling frequencies and analytical laboratory (Section 4);

- field sampling procedures (Section 5);
- sample handling, sample analysis and quality assurance/quality control (Section 6); and
- site control procedures and decontamination (Section 7).

2.0 SAMPLING OBJECTIVES

The sampling program is designed to meet the DQOs set forth in the DER-10. Specifically, analytical parameters selected for each sample, as described in Section 4, are comprehensive, and are intended to meet the following objectives:

- Analyze soil designated for offsite disposal for parameters required by the selected disposal facility.
- Analyze offsite backfill to evaluate its suitability for use as backfill that meets the lower of the restricted residential use criteria for human health or the criteria for protection of groundwater presented in Table 6.8 (b) of the latest revision of Title 6 of New York Code of Rules and Regulations (NYCRR) Part 375 (Part 375).
- Analyze groundwater samples to evaluate levels of volatile organic compounds (VOCs), which were the constituents of concern identified during the Remedial Investigation (RI).

Sampling procedures are discussed in Section 5 of this QAPP. A discussion of the DQOs and quality assurance/quality control is provided in Section 6.

3.0 PROJECT ORGANIZATION

A general and generic summary of the overall management structure and responsibilities of project team members are presented below.

Project Manager

The Project Manager will be determined prior to the start of the Work. The Project Manager is responsible for defining project objectives, and bears ultimate responsibility for the successful completion of the work. This individual will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation.

Field Team Leader

The Field Team Leader will be determined prior to the start of the Work. The Field Team Leader bears the responsibility for the successful execution of the field program. The Field Team Leader will direct the activities of the technical staff in the field, as well as all subcontractors. The Field Team Leader will also assist in the interpretation of data and in report preparation. The Field Team Leader reports to the Project Manager.

Laboratory Project Manager

The Laboratory Project Manager will be determined prior to the start of the Work. The Laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Field Team Leader.

4.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled may include fill materials and groundwater. Sampling locations, analytical suites, and frequency vary by the type of media to be sampled (i.e., soil waste characterization samples, backfill samples and groundwater samples). A discussion of the sampling for each type of media is provided below. Specifics regarding the collection of samples for each type of media are provided in Section 5 of this QAPP.

4.1 Waste Characterization Sampling

One composite sample (comprised of a minimum of three grab samples) per 600 cubic yards (cy), or other frequency required by the selected disposal facility, will be collected from the stockpiled soil for waste characterization (VOC samples will be collected as a grab). Alternatively, composite samples may be collected in situ. The sample will be analyzed for the following (unless additional parameters are required by the selected disposal facility):

- VOCs and semivolatile organic compounds (SVOCs) according to USEPA Methods SW-846 8260 and 8270 for full list compounds, respectively;
- Reduced target analyte list (TAL) metals by USEPA Method SW-846 6010 (includes cadmium, chromium, lead, nickel, selenium, thallium and vanadium) and USEPA Method SW-846 7471 for mercury;
- Polychlorinated biphenyls (PCBs);
- Full list of toxicity characteristics leaching procedure (TCLP) analyses;
- Corrosivity;
- Reactivity; and
- Ignitability.

Total petroleum hydrocarbons (TPH) for gasoline and diesel range organics (broken down into two ranges, C10 and C18 and above C18) to comply with disposal facility TPH sampling frequency requirements, assumed to be one sample per 100 cy.

Other parameters may be analyzed as required by the selected disposal facility. QA/QC samples are not required for waste characterization samples.

4.2 Offsite Backfill Sampling

For offsite fill materials requiring chemical testing, the following samples shall be collected:

- One sample for pre-qualification chemical testing at the source location, including the following:

  1. Chemical testing shall be performed at a minimum for the parameters listed in Table 375-6.8(b) of the latest revision of Part 375. Samples will be analyzed by the following analytical methods: Herbicides by USEPA method SW-846 8151A; Pesticides and PCBs by USEPA methods SW-846 8081A/8082; VOCs by USEPA method SW-846 8260; SVOCs by USEPA method SW-846 8270; Arsenic, barium, beryllium, cadmium, copper, cyanide, lead, manganese, nickel, selenium, silver, and zinc by USEPA method SW-846 6010B; Total mercury by USEPA method SW-846 7471; Total chromium, hexavalent chromium, and trivalent chromium by USEPA method SW-846 7196A.

  2. Backfill materials excluding those materials that do not require sampling as described below, shall meet the lower of the restricted residential use criteria for human health or the criteria for protection of groundwater presented in the latest revision of Part 375.

  3. Backfill materials that exceed the lower of the restricted residential use criteria for human health or the criteria for protection of groundwater presented in the latest revision of Part 375 shall not be imported to the Site without prior approval of the NYSDEC.

  4. The backfill material will be free of extraneous debris or solid waste.

  5. If the NYSDEC agrees that the material originated from a virgin source, then a minimum of one sample (i.e., the pre-qualification sample) will be collected and analyzed per source.

- If the source is not virgin, the sampling frequency will comply with DER-10 Table 5.4(e)10 shown below:

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

The source of the offsite fill must be documented by the supplier, including the location where the fill was obtained and a brief history of the site that is the source of the fill.

Samples of offsite backfill will be analyzed for the following parameters:

- Herbicides by USEPA method SW-846 8151A.
- Pesticides and PCBs by USEPA methods SW-846 8081A/8082.
- VOCs by USEPA method SW-846 8260.
- SVOCs by USEPA method SW-846 8270.
- Arsenic, barium, beryllium, cadmium, copper, cyanide, lead, manganese, nickel, selenium, silver, and zinc by USEPA method SW-846 6010B.
- Total mercury by USEPA method SW-846 7471.
- Total chromium, hexavalent chromium, and trivalent chromium by USEPA method SW-846 7196A.

The parameters to be sampled are listed on Table 375-6.8(b) of the latest revision of Part 375. QA/QC samples are not required for backfill samples.

The following materials may be imported, without chemical testing, to be used as backfill beneath pavement, buildings or as part of the site cover, provided that it contains less than 10 percent by weight material that would pass through a size 80 sieve and consists of:

- gravel, rock or stone, consisting of virgin material from a permitted mine or quarry; or
- recycled concrete or brick from a NYSDEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the 2002 New York State Department of Transportation Standard Construction and Materials Volume 1.

4.3 Groundwater Sampling

Groundwater monitoring will take the form of periodic monitoring events. Samples will be collected from onsite and offsite monitoring wells using low-flow purging and sampling procedures during each sampling event, which will continue for seven quarterly rounds after the Certificate of Completion is issued. Groundwater sampling will be completed utilizing the USEPA's low-flow (minimal drawdown) procedures. At the completion of eight rounds of

post-injection monitoring, a proposal to discontinue the monitoring will be submitted for review and approval by the NYSDEC.

Groundwater samples will be analyzed for VOCs. QA/QC samples will be collected for groundwater samples.

5.0 FIELD SAMPLING PROCEDURES

This section provides a discussion of the field procedures to be used for sampling of fill materials and groundwater. Standard Operating Procedures (SOPs) relevant to the sampling are included in Attachment 1.

5.1 Fill Material Sampling

All fill material samples will be collected using pre-cleaned stainless steel sampling tools (i.e., trowels, spatulas, etc.). As noted above, waste characterization samples will be collected as required by the selected disposal facility. In general, where composite samples are required waste characterization or offsite fill material samples, composite samples will be collected from a minimum of three locations across the stockpiled materials. The exception is for VOC samples, which will be collected as grab samples.

5.2 Groundwater Sampling

Prior to sample and data collection, the monitoring wells will be gauged and then purged via low-flow means using a submersible or peristaltic pump. Samples and parameter readings will be collected using a low flow-through cell to prevent sample contact with atmospheric air. All well sampling activities will be recorded in a field book and a well sampling log. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log.

6.0 SAMPLE HANDLING AND ANALYSIS

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples, as well as sample packaging, shipping procedures, and QA/QC.

6.1 Field Sample Handling

A discussion of the proposed number and types of samples to be collected during each task, as well as the analyses to be performed, can be found in Section 4.0 of this QAPP. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 1.

6.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis (and return of unused sample portion, if applicable).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels should be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the field work and to decide if additional samples are required.

All samples being shipped offsite for analysis must be accompanied by a properly completed chain of custody form. The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

6.3 Sample Shipment

Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below.

All samples will be shipped within 24 hours of collection and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment:
   - tape drain(s) of cooler shut;
   - affix “This Side Up” arrow labels and “Fragile” labels on each cooler; and
   - place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material approximately at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed in packaging material.
9. Ice cubes should be repackaged in Zip-lock™ bags and placed on top of the packaging material.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to courier as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Zip-lock™ bag and tape to inside cover of cooler. Retain copies of all forms.

12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to overnight delivery service as appropriate. Retain air bill receipt for project records. (Note: All samples will be shipped for "NEXT A.M." delivery).

6.4 Quality Assurance/Quality Control

All sample analyses will be performed in accordance with the NYSDEC ASP using USEPA SW-846 methods. Only a laboratory with NYSDOH ELAP certification for each of the analyses listed in Section 4.0 will be selected to analyze the field samples collected.

The primary DQO is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value, and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called "field blanks").

Table 2 lists the field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised.

Laboratory data requiring validation (i.e., confirmation and documentation soil samples and groundwater samples) are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). Waste characterization and backfill characterization laboratory data are to be reported in NYSDEC ASP Category A deliverables, as they do not require validation.

A third party data validator will be responsible for validation of any sampling data as required by the NYSDEC. Data validation will not be conducted for backfill or waste characterization samples. The data reviewer will conduct a systematic review of the anomalous data for compliance with the established QC criteria based upon the spike, duplicate and blank results provided by the laboratory. A Data Usability Summary Report will be prepared by a party independent from the laboratory performing the analysis in accordance with Appendix 2B of DER-10.

The data reviewer will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based upon the extent of the deficiencies and their importance in the overall context of the project.

7.0 SITE CONTROL PROCEDURES

Personnel should review this section in the unlikely event that ground intrusive activities are required or heavy equipment is used during the Site management phase.

Site control procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at Marcus Garvey Apartments. In order to accomplish this objective, the QAPP addresses three main considerations:

- the establishment of discrete work zones during performance of the Work;
- the decontamination of field equipment; and
- the disposal of all waste.

All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of a Site-Specific Health and Safety Plan (HASP). The HASP is included as Appendix F to the Site Management Plan.

7.1 Field Work Zones

Field work zones will be limited to areas where excavation, stockpiling and soil sampling is being conducted. Access to these areas will be limited in accordance with the HASP. Control of work zone access will be the responsibility of the individual(s) designated as a Site Health and Safety Manager. At the completion of each work day, all loose equipment (e.g., sampling equipment, coolers, etc.) will be secured. Equipment will remain onsite within an established, secured zone.

7.2 Decontamination

In an attempt to avoid the spread of contamination, all sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux Associates' SOPs for the Decontamination of Field Equipment, which is provided in Attachment 1. The location of the decontamination area will be determined prior to the start of field operations.

7.3 Waste Handling and Disposal

All waste materials (purge water, excavated soil, personal protective equipment, decontamination water, etc.) generated during the sampling will be consolidated, and stored in appropriate labeled bulk containers (drums, covered rolloff containers etc.), and temporarily staged at a designated storage area onsite for final disposal at a later date.

TABLES

1. Preservation, Holding Times, and Sample Containers
2. Field and Laboratory QC Summary

Table 1. Preservation, Holding Times, and Sample Containers

Analysis	Media	Bottle Type	Preservation[a]	Holding Time[b]
Soil Samples (Waste Characterization and Backfill)				
Volatile Organic Compounds (VOCs) SW-846 8260B		2 oz. wide-mouth glass w/teflon lined cap	Cool to 4°C	48 hours to laboratory (no preservative)/14 days
Semivolatile Organic Compounds (SVOCs) SW-846 8270C		Wide-mouth glass w/teflon lined cap	Cool to 4°C	14 days to extract 40 days for analysis
Total Petroleum Hydrocarbons - Diesel Range Organics (DRO) SW-846 8015B		Wide-mouth glass w/teflon lined cap	Cool to 4°C	14 days
Total Petroleum Hydrocarbons - Gasoline Range Organics (GRO) SW-846 8015B		Wide-mouth glass w/teflon lined cap	Cool to 4°C	14 days
Metals SW-846 6010/7471		Wide-mouth plastic or glass	Cool to 4°C	6 months, except mercury (28 days)
Total Chromium/Hexavalent Chromium/Trivalent Chromium SW-846 7196A		4 oz. wide-mouth glass w/teflon lined cap	Cool to 4°C	28 days
Total Cyanide SW-846 9012B		4 oz. wide-mouth glass w/ teflon lined cap	Cool to 4°C	14 days
Pesticide and PCB Organic Compounds SW-846 8081A/8082		4 oz. wide-mouth glass w/ teflon lined cap	Cool to 4°C	14 days to extract 40 day for analysis
Herbicides SW-846 8151A		4 oz wide-mouth glass	Cool to 4°C	14 days to extract 40 days for analysis

Table 1. Preservation, Holding Times, and Sample Containers

Analysis	Media	Bottle Type	Preservation[(a)]	Holding Time[(b)]
TCLP SW-846 1311 Acid Extractables Base Neutrals Herbicides Metals Pesticides Volatiles		Wide-mouth plastic or glass; 2 oz. wide-mouth glass w/teflon lined cap	Cool to 4°C	14 days: except metals (6 months) and mercury (28 days)
RCRA Characteristics Ignitibility SW-846 1020 Reactive Cyanide SW-846 7332 Reactive Sulfide SW-846 7342 Corrosivity SW-846 9045C		Wide-mouth glass w/teflon lined cap	Cool to 4°C	N/A
Groundwater Samples				
VOCs; SW-846 8260B		Three 40 mL VOA vials	Cool to 4°C; HCL to pH < 2	14 days

[(a)] All samples to be preserved in ice during collection and transport

[(b)] Days from date of sample collection.

Table 2. Field and Laboratory QC Summary

QC Check Type[1]	Minimum Frequency	Use
Field QC		
Duplicate	1 per matrix per 20 samples	Precision
Trip Blank	1 per VOC cooler	Sensitivity
Equipment Rinse Blank	1 per day	Sensitivity
Laboratory QC		
Laboratory Control Sample	1 per matrix per SDG[2]	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate[3]	1 per matrix per SDG	Accuracy/Precision
Surrogate Spike	All organics samples	Accuracy
Laboratory Duplicate	1 per matrix per SDG	Precision
Method Blank	1 per matrix per SDG	Sensitivity

Notes:

1 QC samples will be collected for groundwater samples only. QA/QC samples are not required for waste characterization soil samples or backfill soil samples.

2 SDG - Sample Delivery Group - Assumes a single extraction or preparation

3 Provided to lab by field sampling personnel

ATTACHMENT 1

1. Standard Operating Procedures

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to explain the quality control (QC) measures taken to ensure the integrity of the samples collected and to establish the guidelines for the collection of QC samples. The objective of the QC program is to ensure that water-quality data of known and reliable quality are developed.

Because valid water-chemistry data are integral to a hydrogeologic investigation that characterizes water-quality conditions, the data will be confirmed by QC samples. Without checks on the sampling and analytical procedures, the potential exists for contradictory or incorrect results. The acceptance of water-quality data by regulatory agencies and in litigation-support investigations depends heavily on the proper QC program to justify the results presented. The QC sampling requirements must be determined by the project manager and be clearly defined in the work plan. If data validation (for in-house purposes or for compliance with the United States Environmental Protection Agency [USEPA] regulations) is stipulated as part of the hydrogeologic investigation, QC sampling must be conducted.

2.0 QUALITY CONTROL SAMPLES

2.1 Samples taken for analysis of compounds require the use of quality control samples to monitor sampling activities and laboratory performance. Types of quality control samples may include replicate and/or replicate split, trip blank, field equipment blank, matrix spike and matrix spike duplicate, and fortification. A discussion pertaining to each quality control sample follows:

a. Replicate and Replicate Split - Replicate sample analysis is done to check on the reproducibility of results either within a laboratory or between laboratories. A replicate sample is called a split sample when it is collected with or turned over to a second party (e.g., regulatory agency, consulting firm) for an independent analysis. Replicate samples are aliquots (equal portions) from a sample in a common container.

To collect a replicate sample, water from the bailer or pump will be distributed first to fill one container and then to fill the second container. Adequate water should be available to fill the bottles completely before they are capped. If the water is insufficient to fill all the bottles at once, then incrementally fill each bottle with water from two or more bailer volumes or pump cycles.

For some test substances, water may have to be accumulated in a common container and then decanted slowly into the sample bottles. The work plan should be checked for a description of how replicate samples are to be

collected. Additionally, in the case of wells that recover slowly and produce insufficient water to fill all the replicate sample containers, the containers should be filled incrementally and kept on ice in the cooler in between filling periods.

b. Trip Blank - A trip blank sample is a sample bottle that is filled with "clean" (e.g., distilled/deionized) water in the laboratory, and travels unopened with the sample bottles. (The USEPA now uses the phrase "demonstrated analyte free water.") It is opened in the laboratory and analyzed along with the field samples for the constituent(s) of interest to detect if contamination has occurred during field handling, shipment, or in the laboratory. Trip blanks are primarily used to check for "artificial" contamination of the sample caused by airborne volatile organic compounds (VOCs) but may also be used to check for "artificial" contamination of the sample by a test substance or other analyte(s). One trip blank per cooler containing VOC samples, or test substance of other analyte(s) of interest would accompany each day's samples.

c. Field Equipment Blank - A field equipment blank (field blank) sample is collected to check on the sampling procedures implemented in the field. A field blank is made with "clean" (e.g., distilled/deionized/demonstrated analyte free) water by exposing it to sampling processes (i.e., the clean water must pass through the actual sampling equipment). For example, if samples are being collected with a bailer, the field blank would be made by pouring the clean water into a bailer which has been decontaminated and is ready for sampling, and then pouring from the bailer into the sample containers. If a metals equipment blank is to be made, and the water was filtered, then the sample must be filtered (i.e., exposed to the sampling process). One equipment blank would be incorporated into the sampling program for each day's collection of samples and analyzed for the identical suite of constituents as the sample. In some situations one equipment blank will be required for each type of sampling procedure (e.g., split-spoon, bailer, hand auger).

A special type of field blank may be needed where ambient air quality may be poor. This field blank sample would be taken to determine if airborne contaminants will interfere with constituent identification or quantification. This field blank sample is a sample bottle that is filled and sealed with "clean" (e.g., distilled/deionized/demonstrated analyte free) water in the analytical laboratory, and travels unopened with the sample bottles. It is opened in the field and exposed to the air at a location(s) to check for potential atmospheric interference(s). The field blank is resealed and shipped to the contract laboratory for analysis.

d. Matrix Spike and Matrix Spike Duplicate - Spikes of compounds (e.g., standard compound, test substance, etc.) may be added to samples in the

laboratory to determine if the ground-water matrix is interfering with constituent identification or quantification, as well as a check for systematic errors and lack of sensitivity of analytical equipment. Samples for spikes are collected in the identical manner as for standard analysis, and shipped to the laboratory for spiking. Matrix spike duplicate sample collection, and laboratory spiking and analysis is done to check on the reproducibility of matrix spike results.

e. Fortification - A fortification, which is performed in the field, is used to check on the laboratory's ability to recover the test substance (analyte) added as well as its stability between fortification and analysis.

A field fortification (spike) is prepared by filling the container(s) with field or distilled/deionized/demonstrated analyte free water (as specified by the laboratory) to a predetermined volume (as specified by the laboratory) and adding the spike (supplied by the laboratory). The predetermined volume of water is measured with a clean (decontaminated) graduated cylinder. Field spikes will be prepared following the collection, labeling, and sealing of nonspiked samples in a separate cooler. The spike is kept at a safe distance from the sampling point (e.g., in the hotel room).

2.2 The work plan must be referred to for details regarding the type of QC samples to be collected and the QC sample collection method.

3.0 PROCEDURE

3.1 Implement QC sampling as outlined above, depending on the type of QC sample(s) specified in the work plan.

3.2 Ensure unbiased handling and analysis of replicate and blank QC samples by concealing their identity by means of coding so that the analytical laboratory cannot determine which samples are included for QC purposes. Attempt to use a code that will not cause confusion if additional samples are collected or additional monitoring wells are installed. For example, if there are three existing monitoring wells (MW-1, 2 and 3), do not label the QC blank MW-4. If an additional monitoring well were installed, confusion could result.

3.3 Label matrix spike and field fortification (spike) QC samples so that the analytical laboratory knows which samples are to be spiked in the laboratory and which samples were fortified (spiked) in the field, respectively. In certain situations, the field fortification will be "blind" or undisclosed to the laboratory to independently verify their analytical ability.

3.4 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," and placed in its appropriate container (holder) in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory. Consult the site work plan to

determine if a particular ice is specified as the preservative for transportation (e.g., the USEPA prefers the use of wet ice because they claim that blue ice will not hold the samples at 4° Centigrade/Celsius).

3.5 Document the QC samples on the appropriate field form and in the field notebook. On the chain-of-custody form, replicate and blank QC samples will be labeled using the codes (Number 3.2, above), and matrix spike and field fortification QC samples will be identified as such (Number 3.3, above).

3.6 Follow standard shipping procedures for samples (i.e., retain one copy of the chain-of-custody form, secure the cooler with sufficient packing tape and a custody seal, forward the samples via overnight [express] mail or hand deliver to the designated analytical laboratory preferably within 24 hours but no later than 48 hours after sampling). However, check the site work plan for information on the analyte(s), as some have to be analyzed immediately (e.g., CN).

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide procedures and standards for record keeping and maintenance, for all field activities conducted by Roux Associates, Inc. (Roux Associates).

Strict quality assurance/quality control (QA/QC) is necessary to properly and accurately document and preserve all project-related information. Quality assurance is implemented to corroborate that quality control procedures are followed. Quality control provides a means to monitor investigation activities (e.g., sampling and laboratory performance) as a check on the quality of the data.

Valid data and information are integral to all aspects of Roux Associates' field activities. These aspects include, but are not necessarily limited to, activities that involve: drilling; sediment, sludge, and soil sampling (lithologic, and soil-quality and analysis); well construction and development; aquifer testing and analysis; water-quality sampling and analysis (surface water and ground water); free-product sampling and analysis; air-quality sampling and analysis; geophysical testing; demolition activities; waste removal operations; engineering installations; etc. The data will be confirmed by QA/QC methods established and set forth in the work plan/scope of work. Without checks on the field and analytical procedures, the potential exists for contradictory results, and associated incomplete or incorrect results from the interpretation of potentially questionable data.

Documentation will be entered in the field notebook and must be transcribed with extreme care, in a clear and concise manner, as the information recorded will become part of the permanent legal record. Because field notes are the legal record of site activities, they must be taken in a standard and consistent manner. If abbreviations are used, then they must first be spelled out for clarity (i.e., to avoid ambiguity and misunderstanding). All entries must be dated and initialed, and the time (military time) of the entry included. Field notebooks and forms must be assigned to an individual project and properly identified (i.e., client name, project number, location and name of site, individual recording information, dates, times, etc.). Change of possession of field notebooks or forms must be documented with the date and time, and initialed by both individuals. Following each day's entries, the field notebook or form must be photocopied in the event that the original documentation is lost or stolen. All field notebooks must have the company name and address legibly printed in indelible ink along with the message "If found, then please forward to Roux Associates, Inc. at the above address - REWARD OFFERED."

Information must be recorded while onsite because it may be difficult to recall details at a later date. Furthermore, information must be documented immediately as it provides unbiased information which will be used for writing the report when the field activities are completed. Project-related documentation is an irreplaceable, important record for

other individuals who may become involved in the project, and provides the project manager with a complete history of project-related activities. Written information must be accompanied by maps, sketches, and photographs where appropriate, especially if these supplemental sources of information assist in the documentation process. A new page must be used in the field notebook for each new day's entries (i.e., unused portions of a previous page must have an "X" placed through it). The end of the day's records must be initialed and dated.

As part of record keeping and QA/QC activities, state and federal regulatory agencies should be contacted to check if special or different protocols are required and/or if particular or unconventional methods are required for the given field activity. Thus, the record keeping and QA/QC activities implemented by Roux Associates are based on technically sound standard practices and incorporate Roux Associates own, extensive experience in conducting hydrogeologic field activities.

2.0 MATERIALS

In order to track investigation activities, specific materials are required. These materials include the following:

a. A bound, waterproof field notebook.

b. Appropriate Roux Associates' forms (e.g., daily log, geologic log, monitoring well construction log, well sampling data form, location sketch, chain of custody, telephone conversation record, meeting notes, etc.).

c. Appropriate labels (e.g., sample, Roux Associates' Custody Seal, etc.)

d. Work plan/scope of work.

e. Health and safety plan (HASP).

f. Appropriate Roux Associates' SOPs.

g. Black pens, and indelible markers.

h. Camera and film.

3.0 DOCUMENTATION

3.1 Before the Roux Associates personnel leave the field, they must ensure that their field notes include comprehensive descriptions of the hydrogeologic conditions, and all investigation-related activities and results (onsite and offsite). This will safeguard against the inability to reconstruct and comprehend all aspects of the field investigation after its completion, and will serve to facilitate the writing of an accurate report. Properly documented information provides the QA/QC tracking (back-up) required for all Roux Associates' projects. General types of information

that must be recorded (where pertinent to the investigation being conducted) include, but may not necessarily be limited to, the following:

a. List of Roux Associates personnel on site.

b. Name, date, and time of arrival on site by Roux Associates personnel, including temporary departures from, and returns to, the site during the work day.

c. Client and project number.

d. Name and location of study area.

e. Date and time of arrival on site by non-Roux Associates personnel (names and affiliation) and equipment (e.g., subcontractors and facility personnel, and drilling equipment, respectively, etc.), including temporary departures from, and returns to, the site during the work day, and departure at the end of the work day.

f. List of non-Roux Associates personnel on site.

g. Weather conditions at the beginning of the day as well as any changes in weather that occur during the working day.

h. Health and safety procedures including level of protection, monitoring of vital signs, frequency of air monitoring, and any change (i.e., downgrade or upgrade) in the level of protection for Roux Associates and other on-site personnel (e.g., subcontractors, facility personnel, etc.).

i. Health and safety procedures not in compliance with the HASP (for all on-site personnel).

j. Site reconnaissance information (e.g., topographic features, geologic features, surface-water bodies, seeps, areas of apparent contamination, facility/plant structures, etc.).

k. Air monitoring results (i.e., photoionization detector [PID], etc. measurements).

l. Task designation and work progress.

m. Work-related and site-related discussions with subcontractors, regulatory agency personnel, plant personnel, the general public, and Roux Associates personnel.

n. Delays, unusual situations, problems and accidents.

o. Field work not conducted in accordance with the work plan/scope of work, and rationale and justification for any change(s) in field procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

p. QA/QC procedures not conducted in accordance with the QA/QC procedures established in the work plan/scope of work and rationale and justification for any change(s) in QA/QC procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

q. Equipment and instrument problems.

r. Decontamination and calibration procedures.

s. Activities in and around the site and work area by any and all on-site personnel which may impact field activities.

t. Sketches, maps, and/or photographs (with dates and times) of the site, structures, equipment, etc. that would facilitate explanations of site conditions.

u. Contamination evidenced as a result of work-related activities (e.g., visible contaminants [sheen] in drilling fluids or on drilling equipment; sheen on, or staining of, sediments; color of, or separate [nonaqueous] phase on, water from borehole or well; vapors or odors emanating from a borehole or well; etc.); make all observations as objectively as possible (e.g., grey-blue, oil-like sheen; black and orange, rust-like stain; fuel-like odor; etc.) and avoid using nontechnical or negative-sounding terms (e.g., slimy, goopy, foul-smelling).

v. Date and time of final departure from the site of all personnel at the end of the work day.

3.2 In addition to the general types of information that must be recorded (as presented in Section 3.1), task-specific information must also be properly documented. Task-specific information which is required is provided in each respective task-oriented SOP, and the documentation procedures outlined in each SOP must be followed.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. Thus, this SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity to as great an extent as possible. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample

characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples should be collected in the same type of vials or in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. The bottles must be carefully packed to prevent breakage during transport. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory. Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of blue

packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased. The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap", and "zip-lock" bags.

f. Overnight (express) mail forms and laboratory address.

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for using m-scopes. A m-scope is an electronic sounding device used to measure the depth to ground water below an established (surveyed) measuring point (MP). Measuring the depth to water (DTW) below the surveyed MP provides information for calculating ground-water elevations needed to construct ground-water elevation maps and determine the direction of ground-water flow.

M-scopes can be less accurate than a steel tape because the wire can kink, measurement increment marks can shift, and the tip may have been cut off and replaced without proper documentation. Thus, it is mandatory that a m-scope be calibrated before use.

2.0 DECONTAMINATION

The m-scope must be pre-cleaned (decontaminated) using a non-phosphate, laboratory-grade solution and rinsed with copious amounts of distilled or deionized water. This process is repeated before each measurement and following the final measurement.

3.0 CALIBRATION

The m-scope must be calibrated before being used to measure water levels. Calibration is accomplished by measuring the water level with the m-scope followed by a measurement using a steel tape. This dual measurement procedure is continued until the individual is confident that measurements taken using both devices are similar and the m-scope is reliable. The calibration procedure is documented in the field notebook or on an appropriate field form, and initialed and dated.

4.0 PROCEDURE

4.1 If the well is not vented, then remove the cap and wait several minutes for the water level to equilibrate. Take several measurements to ensure that the water level measured is in equilibrium with the aquifer (i.e., not changing substantially).

4.2 The manufacturer's model must be noted because some have switches, lights, beepers, or a combination of the above.

4.3 The 1-foot or 5-foot marked intervals on the electrical line must be checked to ensure that they have not shifted, and the bottom of the probe has not been cut. Check on a periodic basis that the cord has not kinked.

4.4 The water-level measurement is taken by lowering the probe into the well until the instrument-specific detection method (e.g., light, beeper, or both) is activated by contacting the water.

4.5 The electrical line is held at the MP and, using a ruler (e.g., carpenter's folding ruler) or an engineer's scale, the distance from the "held" point to the nearest marked interval is measured. The distance measured is added to, or subtracted from, the marked interval reading. The result is the DTW.

4.6 Measurements will be taken accurately and to the nearest 0.01 foot.

4.7 After measuring all wells in an area, always re-measure at least one well, preferably the first well measured, to see if the static water level has changed (e.g., due to pumping in the area, tidal effects, etc.). If a significant change has occurred, it may be necessary to re-measure other wells.

4.8 If there are previous water-level measurements available for the wells, then have these data available to compare the measurements with those just taken. Use these data to see if water levels are similar or if they have changed. If water levels have changed, then check if the changes are consistent (i.e., all up or all down) and make sense.

4.9 Water-level elevations are calculated by subtracting the DTW from the MP and a water-elevation map is constructed (contoured) on a well location map. This also provides a check to evaluate if the water levels make sense (or anomalies are evidenced). Re-measure the well(s) where anomalies are found as a check on the initial measurement(s).

4.10 If anomalies persist or water-level trends are different from the historical database, then check to see if hydrogeologic conditions and/or stresses have changed (e.g., discharge areas, pumping and/or injection wells, etc.).

4.11 All pertinent data will be documented in the field notebook, and initialed and dated.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for purging a well prior to the collection of a ground-water sample. Purging (evacuating) a well involves the removal of the standing column of water in the well to allow "fresh" (representative) formation water to enter the well. Two conventionally used methods for well purging include: 1) discharge of a specified number of casing volumes of water (which is more commonly used); and 2) pumping until specific indicator parameters (e.g., specific conductance, pH, temperature) stabilize. Wells must be purged prior to sampling to ensure the collection of representative formation ground water for water-quality analysis.

For accepted, existing sampling and analysis programs, the same purging method will be used each time to maintain consistency. For new sampling and analysis programs, the basis for the purging technique(s) will be site-specific field conditions, client input, the experience of Roux Associates, Inc. and regulatory agency(ies) guidelines (e.g., some states permit purging a low-yield well to dryness while others insist that some water remains in the well).

2.0 EQUIPMENT AND MATERIALS

2.1 The following equipment may be needed to purge a monitoring well before sampling:

a. Bailers.

b. Centrifugal pumps.

c. Electrical submersible pumps.

d. Peristaltic pumps.

e. Positive gas-displacement devices.

f. Bladder pumps.

g. Hand-operated diaphragm or bilge pump(s).

h. Teflon™ tape, electrical tape.

i. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (e.g., blue carpenter's) or m-scope.

j. Appropriate discharge hose and valves.

k. Appropriate discharge tubing (e.g., polypropylene) if using a peristaltic pump.

l. Appropriate compressed gas if using bladder-type or gas-displacement device.

m. Extension cord(s) or portable generator (and fuel) if using an electric submersible pump.

n. Non-absorbent cord (e.g., polypropylene, etc.), cotton (absorbent) cord.

o. Tripod(s).

p. Water Well Handbook.

q. Explosimeter.

r. Flow meter.

2.2 Bailers or centrifugal pumps are recommended for shallow, small diameter monitoring wells. For deep wells, or large diameter wells, a submersible pump is recommended.

3.0 DECONTAMINATION

Each piece of equipment that is used to evacuate wells (e.g., bailers, pumps, hoses) will be decontaminated thoroughly prior to the introduction of the equipment into the well and prior to leaving the site. Additionally, disposable items (e.g., cord, tubing) will be changed between each well purged and discarded in an appropriate manner.

4.0 PROCEDURE

4.1 The depth to water (DTW) is measured and subtracted from the sounded (total) depth of the well to calculate the length of the column of standing water in the well (in feet).

4.2 The volume of the standing water in the well is calculated by multiplying the length of standing water by a coefficient which equates the diameter of the well to gallons per linear foot. (Refer to the attached table from the Water Well Handbook for the coefficient or use the following equation [V=(7.48 gal/ft3)(r2h), where V is volume of water in gallons, r is the radius of the well casing in feet, and h is the height of the water column in the well in feet].)

4.3 If purging is performed by evacuating a specified number of casing volumes, then three to five volumes are purged (typical regulatory agency requirement).

4.4 If wells are screened in low permeability formations, then the well may go dry prior to removing the specified volume of water. If the recovery rate is fairly

rapid and time allows, then remove more than one casing volume; otherwise, the evacuation of one casing volume may suffice. (Refer to the site sampling and analysis plan [SAP] for details of purging a low-yield well.)

4.5 Evacuation will occur from the top of the water column in the well to ensure that "fresh" formation water enters the bottom of the well through the screen, moves up as standing water is removed from the top, and all standing water is removed (i.e., only representative formation water is in the well).

4.6 The volume of water purged from the well must be measured and can be calculated directly by discharging into containers of known volume or can be calculated by multiplying rate of flow by time.

4.7 If a submersible or centrifugal pump is used, then the intake is set just below the dynamic (pumping) water level in the well. The rate of flow in gallons per minute (gpm) can be measured using a calibrated bucket (e.g., 5-gallon) if the rate is relatively low, or a 55-gallon drum if the rate is relatively high, and a watch capable of measuring time in second intervals. A precalibrated flow meter may also be used if available.

4.8 After the specified number of casing volumes have been evacuated from the well, the pump intake is lifted slowly until it breaks suction to confirm that any standing water above the intake has been purged.

4.9 If a bailer is used, then the bailer is lowered only deep enough to remove water from the top of the water column and a 5-gallon bucket is used to measure the volume of water evacuated.

4.10 If purging is not executed by evacuating a specified number of well volumes, then purging is performed by pumping or bailing the well until specific indicator parameters (e.g., specific conductance, pH, temperature) stabilize. The volume of water removed is documented on an appropriate field form or in the field notebook.

4.11 Water purged from the well will be disposed of in accordance with the appropriate method outlined in the site SAP.

4.12 If historic site data indicate that explosive gases could be present and accumulate in the well, then an explosimeter will be used to check vapor concentrations in wells at the site prior to beginning the purging procedure. Vapor concentrations in a well that exceed the 25 percent lower explosive limit (LEL) will require specific precautionary measures to allow purging the well without danger of explosion or fire (e.g., use of cotton cord for bailers or lowering pumping devices, non-electric powered pumps). These conditions will be addressed in the site health and safety plan (HASP) and/or SAP.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling of ground-water monitoring wells for dissolved constituents. As part of the SOP for the sampling of ground-water monitoring wells, sample collection equipment and devices must be considered, and equipment decontamination and pre-sampling procedures (e.g., measuring water levels, sounding wells, and purging wells) must be implemented. Sampling objectives must be firmly established in the work plan before considering the above.

Valid water-chemistry data are integral to a hydrogeologic investigation that characterizes ground-water quality conditions. Water-quality data are used to evaluate both current and historic aquifer chemistry conditions, as well as to estimate future conditions (e.g., trends, migration pathways). Water-quality data can be used to construct ground-water quality maps to illustrate chemical conditions within the flow system, to generate water-quality plots to depict conditions with time and trends, and to perform statistical analyses to quantify data variability, trends, and cleanup levels.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample ground water from monitoring wells, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Bailers (Teflon™ or stainless steel).

b. Pumps (centrifugal, peristaltic, bladder, electric submersible, bilge, hand-operated diaphragm, etc.).

c. Gas-displacement device(s).

d. Air-lift device(s).

e. Teflon™ tape, electrical tape.

f. Appropriate discharge hose.

g. Appropriate discharge tubing (e.g., polypropylene, teflon, etc.) if using a peristaltic pump.

h. Appropriate compressed gas if using bladder-type or gas-displacement device.

i. Portable generator and gasoline or alternate power supply if using an electric submersible pump.

j. Non-absorbent cord (e.g., polypropylene, etc.).

k. Plastic sheeting.

l. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (blue carpenter's).

m. Electronic water-level indicators (e.g., m-scope, etc.) or electric water-level/product level indicators.

n. Non-phosphate, laboratory-grade detergent.

o. Distilled/Deionized water.

p. Potable water.

q. Paper towels, clean rags.

r. Roux Associates' field forms (e.g., daily log, well inspection checklist, sampling, etc.) and field notebook.

s. Well location and site map.

t. Well keys.

u. Stop watch, digital watch with second increments, or watch with a second hand.

v. Water Well Handbook.

w. Calculator.

x. Black pen and water-proof marker.

y. Tools (e.g., pipe wrenches, screwdrivers, hammer, pliers, flashlight, pen knife, etc.).

z. Appropriate health and safety equipment, as specified in the site health and safety plan (HASP).

aa. pH meter(s) and buffers.

bb. Conductivity meter(s) and standards.

cc. Thermometer(s).

dd. Extra batteries (meters, thermometers, flashlight).

ee. Filtration apparatus, filters, pre-filters.

ff. Plasticware (e.g., premeasured buckets, beakers, flasks, funnels).

gg. Disposable gloves.

hh. Water jugs.

ii. Laboratory-supplied sample containers with labels.

jj. Cooler(s).

kk. Ice (wet, blue packs).

ll. Masking, duct, and packing tape.

mm. Chain-of-custody form(s) and custody seal(s).

nn. Site sampling and analysis plan (SAP).

oo. Site health and safety plan (HASP).

pp. Packing material (e.g., bubble wrap)

qq. "Zip-lock" plastic bags.

rr. Overnight (express) mail forms.

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods, summaries for bailers and pumps are provided below). Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form and in the field notebook.

a. Decontaminate a bailer by: 1) wearing disposable gloves, 2) disassembling (if appropriate) and scrubbing in a non-phosphate, laboratory-grade detergent and distilled/deionized water solution, and 3) rinsing first with potable water and then distilled/deionized water.

b. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing the pump and discharge hose (if not disposable) first with a non-phosphate, laboratory-grade detergent and potable water solution in an appropriate

container (clean bucket, garbage can, or 55-gallon drum) and then with distilled/deionized water or potable water, and 3) wiping pump-related equipment (e.g., electrical lines, cables, discharge hose) first with a clean cloth and detergent solution and then rinsing or wiping with a clean cloth and distilled/deionized water or potable water.

3.2 Note that the decontamination procedures for bailers and pumps are the minimum that must be performed. Check the work plan to determine if chemicals specified by individual state regulatory agencies must also be used for decontamination procedures (e.g., hexane, nitric acid, acetone, isopropanol, etc.).

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment before use (e.g., thermometers, pH and conductivity meters, etc.). Refer to the specific SOP for field analysis for each respective piece of equipment. Document, and initial and date the calibration procedures on the appropriate field form, in the field notebook, and in the calibration log book.

5.0 PROCEDURE

5.1 Document, and initial and date well identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook as needed.

5.2 Inspect the protective casing of the well and the well casing, and note any items of concern such as a missing lock, or bent or damaged casing(s).

5.3 Place plastic sheeting around the well to protect sampling equipment from potential cross contamination.

5.4 Remove the well cap or plug and, if necessary, clean the top of the well off with a clean rag. Place the cap or plug on the plastic sheeting. If the well is not vented, allow several minutes for the water level in the well to equilibrate. If fumes or gases are present, then diagnose these with the proper safety equipment. Never inhale the vapors.

5.5 Measure the depth to water (DTW) from the measuring point (MP) on the well using a steel tape and chalk or an electronic sounding device (m-scope). Refer to the specific SOPs for details regarding the use of a steel tape or a m-scope for measuring water levels. Calculate the water-level elevation. Document, and initial and date the information on the appropriate field form and in the field notebook.

5.6 Measuring the total depth of the well from the MP with a weighted steel tape. Calculate and record the volume of standing water in the well casing on the appropriate field form and in the field notebook.

5.7 Decontaminate the equipment used to measure the water level and sound the well with a non-phosphate, laboratory-grade detergent solution followed by a distilled/deionized water rinse.

5.8 Purge the well prior to sampling (refer to the SOP for Purging a Well). The well should be pumped or bailed to remove the volume of water specified in the work plan. Usually three to five casing volumes are removed if the recharge rate is adequate to accomplish this within a reasonable amount of time.

If the formation cannot produce enough water to sustain purging, then one of two options must be followed. These include: 1) pumping or bailing the well dry, or 2) pumping or bailing the well to "near-dry" conditions (i.e., leaving some water in the well). The option employed must be specified in the work plan and be in accordance with regulatory requirements.

If the well is purged dry, then all the standing water has been removed and upon recovery the well is ready for sampling. However, depending on the rate of recovery and the time needed to complete the sampling round, one of the following procedures may have to be implemented: 1) the well may have to be sampled over a period of more than one day; 2) the well may not yield enough water to collect a complete suite of samples and only select (most important) samples will be collected; or 3) the well may not recover which will preclude sampling. Regardless of the option that must be followed, the sampling procedure must be fully documented. When preparing to conduct a sampling round, review drilling, development and previous sampling information (if available) to identify low-yielding wells in order to purge them first, and potentially allow time for the well to recover for sampling.

5.9 Record the physical appearance of the water (i.e., color, turbidity, odor, etc.) on the appropriate field form and in the field notebook, as it is purged. Note any changes that occur during purging.

5.10 If a bailer is used to collect the sample, then:

a. Flush the decontaminated bailer three times with distilled/deionized water.

b. Tie the non-absorbent cord (polypropylene) to the bailer with a secure knot and then tie the free end of the bailer cord to the protective casing or, if possible, some nearby structure to prevent losing the bailer and cord down the well.

c. Lower the bailer slowly down the well and into the water column to minimize disturbance of the water surface. If a bottom-filling bailer is used, then do not submerge the top of the bailer; however, if a top-filling bailer is used, then submerge the bailer several feet below the water surface.

d. Remove and properly discard one bailer volume from the well to rinse the bailer with well water before sampling. Again, lower the bailer slowly down the well to the appropriate depth depending on the bailer type (as discussed above in 5.11 c). When removing the bailer from the well, do not allow the bailer cord to rest on the ground but coil it on the protective plastic sheeting placed around the well. Certain regulatory agencies require that the first bailer volume collected be utilized for the samples.

5.11 If a pump is used to collect the sample, then use the same pump used to purge the well and, if need be, reduce the discharge rate to facilitate filling sample containers and to avoid problems that can occur while filling sample containers (as listed in Number 5.14, below). Alternately, the purge pump may be removed and a thoroughly decontaminated bailer can be used to collect the sample.

5.12 Remove each appropriate container's cap only when ready to fill each with the water sample, and then replace and secure the cap immediately.

5.13 Fill each appropriate, pre-labeled sample container carefully and cautiously to prevent: 1) agitating or creating turbulence; 2) breaking the container; 3) entry of, or contact with, any other medium; and 4) spilling/splashing the sample and exposing the sampling team to contaminated water. Immediately place the filled sample container in a ice-filled (wet ice or blue pack) cooler for storage. If wet ice is used it is recommended that it be repackaged in zip-lock bags to help keep the cooler dry and the sample labels secure. Check the work plan as to whether wet ice or blue packs are specified for cooling the samples because certain regulatory agencies may specify the use of one and not the other.

5.14 "Top-off" containers for volatile organic compounds (VOCs) and tightly seal with Teflon™-lined septums held in place by open-top screw caps to prevent volatilization. Ensure that there are no bubbles by turning the container upside down and tapping it gently.

5.15 Filter water samples (Procedure 4.6) collected for dissolved metals analysis prior to preservation to remove the suspended sediment from the sample. If water samples are to be collected for total metals analysis, then collect a second set of samples without field filtering.

In the event that the regulatory agency(ies) want unfiltered samples for metals analysis, a second set of filtered samples should also be collected. Because unfiltered samples are indications of total metals (dissolved and suspended) they are not representative of aquifer conditions because ground water does not transport sediment (except in some rare cases). Thus, the results for dissolved metals in ground water should be based on filtered samples even if both filtered and unfiltered sets are presented in a report.

5.16 Add any necessary preservative(s) to the appropriate container(s) prior to, or after (preferred), the collection of the sample, unless the appropriate preservative(s) have already been added by the laboratory before shipment.

5.17 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. Refer to the SOP for Collection of Quality Control Samples.

5.18 Conduct field analyses after sample collection is complete by measuring and recording the temperature, conductivity, pH, etc. (as called for in the work plan). Note and record the "final" physical appearance of the water (after purging and sampling) on an appropriate field form and in the field notebook.

5.19 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cover.

5.20 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," placed in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory.

5.21 Decontaminate bailers, hoses, and pumps as discussed in the decontamination SOP. Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard cords, rags, gloves, etc. in a manner consistent with site conditions.

5.22 Complete all necessary field forms, field notebook entries, and the chain-of-custody forms. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.23 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

END OF PROCUDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the field filtration of groundwater samples for dissolved metals analysis prior to sample preservation. Filtering is implemented when the water sample contains suspended fine-grained materials (fines) that cannot be prohibited from entering the water sample by well development or well design. However, as fines are not always distinctly visible in the water sample, all water samples to be analyzed for dissolved metals will undergo filtration. Groundwater samples from bedrock formations to be analyzed for dissolved metals must also be filtered.

It should be noted that filtration of groundwater for metals analysis has been a standard practice with the United States Geological Survey (USGS) for many years. However, it should also be noted that certain regulatory agencies insist that groundwater samples for metals analysis are not filtered. In this case, the analytical results are actually representative of total metals (i.e., dissolved and suspended). Nevertheless, in order to quantify the concentrations of dissolved metals in groundwater, filtration will be employed.

Within this framework, filtration refers to the filtering of water either directly or at the end of a filtration series through a 0.45 micrometer (micron) membrane filter. The presence of a large quantity of fines may require the prefiltering of the sample with a larger-size membrane filter prior to the 0.45 micron filter to avoid clogging the 0.45 micron filter and using an exorbitant amount of time to filter the sample.

Filtration must be done as soon as possible after a water sample is collected, preferably at the same time that the water is produced. If there is a delay between the time that the water sample is collected and the time that filtration occurs, then the time lag and reason for the delay must be documented. The filtering equipment and membrane must be suitable for the intended analysis. Where permitted by regulatory agencies, disposable in-line filters and disposable funnel-type filters may be used. Depending upon the sampling needs, sterile disposable filtering devices may be preferable since they eliminate the need for field decontamination. Materials known to adversely affect the analytical procedure must not be used. The site sampling and analysis plan (SAP) must be referred to for these and other site specific filtration conditions.

In the event that surface water is being analyzed for dissolved metals, the filtration process described below is also used.

2.0 MATERIALS AND EQUIPMENT

To field filter groundwater samples, specific equipment and materials are required. The equipment and materials listed below may be needed in addition to the materials and equipment listed in various sampling SOPs.

a. Non-phosphate, laboratory-grade detergent.

b. Distilled/Deionized water.

c. Potable water.

d. Field forms (e.g., daily log, sampling, etc.) and field notebook.

e. Filtration apparatus (e.g., disposable plastic filtering apparatus, disposable in-line filters, Gelman apparatus, Buchner funnel, etc.), filters, prefilters.

f. Plasticware (e.g., premeasured buckets, beakers, flasks, funnels).

g. Teflon™ tape.

h. Vacuum pump (e.g., hand-operated or electric).

i. Appropriate tubing and fittings.

j. Disposable gloves.

k. Sample jars with appropriate preservative (e.g., nitric acid) and labels.

3.0 DECONTAMINATION

3.1 Decontamination is not necessary if sterile, disposable plastic filtering equipment is utilized. If applicable, it may be useful to collect a distilled water field blank through a representative disposable filter to demonstrate proper "decontamination." If re-usable filtering equipment is being used, the following is the minimum decontamination procedure:

a. Wear disposable gloves while cleaning filtering equipment to avoid contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and distilled or deionized water in a bucket.

c. Remove vacuum tubing from flask.

d. Remove filter membrane from funnel.

e. Disassemble filtering apparatus (flask and funnel) and scrub each piece of equipment with a brush and solution.

f. Rinse with potable water.

g. Rinse with copious amounts of distilled or deionized water.

h. Allow to dry and wrap equipment with a suitable material (e.g., clean plastic bag) in preparation for the next use.

3.2 The decontamination procedure must consider regulatory agency(ies) specifications which must be provided in the site SAP, and may include decontamination variations such as nitric acid rinses, acetone rinses, etc.

4.0 PROCEDURE

4.1. Ensure that the filtering equipment is disposable and dedicated or is properly decontaminated before each use.

4.2. Assemble the filtering apparatus (funnel and flask), and connect the vacuum pump in case it is needed to augment gravity filtration.

4.3. Place a clean (new) 0.45-micron pore-size filter in the funnel. Use larger, pore-size filters if prefiltering is required (i.e., if significant suspended sediment is present that would quickly clog the 0.45-micron filter and prevent continuous filtration or result in excessive time for filtration).

4.4. Obtain the water sample using an appropriate, decontaminated sample-collection device (e.g., bailer, pump).

4.5. Pass the unpreserved water sample through the 0.45 micron filter into the flask. If the sample contains significant sediment, then pass it through a prefilter before using the 0.45 micron filter. Apply a vacuum using the vacuum pump if needed to facilitate filtering.

4.6. Transfer the filtered water sample to the appropriate, prelabeled sample container containing the preservative (e.g., nitric acid) being careful not to overfill the container and dilute the preservative.

4.7. Follow standard operating procedures for sample documentation, shipping, and tracking (i.e., record keeping).

4.8. Decontaminate all reusable filtering (and sampling) equipment that came in contact with the water sample. Properly disposal of all non-reusable equipment in a manner appropriate with site conditions.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for the collection of soil samples for laboratory analysis. This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, grab samples from stockpiled soils, surface samples, test pit samples, etc.

2.0 CONSIDERATIONS

Soil samples may be collected in either a random or biased manner. Random samples can be based on a grid system or statistical methodology. Biased samples can be collected in areas of visible impact or suspected source areas. Soil samples can be collected at the surface, shallow subsurface, or at depth. When samples are collected at depth the water content should be noted, since generally "soil sampling" is restricted to the unsaturated zone. Equipment selection will be determined by the depth of the sample to be collected. A thorough description of the sampling locations and proposed methods of sample collection should be included in the work plan.

Commonly, surface sampling refers to the collection of samples at a 0 to 6 inch depth interval. Certain regulatory agencies may define the depth interval of a surface sample differently, and this must be defined in the work plan. Collection of surface soil samples is most efficiently accomplished with the use of a stainless steel trowel or scoop. For samples at greater depths a decontaminated bucket auger or power auger may be needed to advance the hole to the point of sample collection. Another clean bucket auger should then be used to collect the sample. To collect samples at depths of greater than approximately six feet the use of a drill rig and split spoon samples will usually be necessary. In some situations, sample locations are accessed with the use of a backhoe.

3.0 MATERIALS/EQUIPMENT

a. A work plan which outlines soil sampling requirements.

b. Field notebook, field form(s), maps, chain-of-custody forms, and custody seals.

c. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).

d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

e. Stainless steel spoons or spatulas.

f. Disposable sampling gloves.

g. Laboratory-supplied sample containers with labels.

h. Cooler with blue or wet ice.

i. Plastic sheeting.

j. Black pen and indelible marker.

k. Zip-lock bags and packing material.

l. Tape measure.

m. Paper towels or clean rags.

n. Masking and packing tape.

o. Overnight (express) mail forms.

4.0 DECONTAMINATION

All reusable sampling equipment will be thoroughly cleaned according to the decontamination SOP. Where possible, thoroughly pre-cleaned and wrapped sampling equipment should be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and plastic sheeting will be changed after each use and discarded in an appropriate manner.

5.0 PROCEDURE

5.1 Prior to collecting soil samples, ensure that all sampling equipment has been thoroughly cleaned according to the decontamination SOP. If samples are to be collected at depth, then the boring must be advanced with thoroughly cleaned equipment to the desired sampling horizon and a different thoroughly cleaned sampler must be used to collect the sample.

5.2 Using disposable gloves and a pre-cleaned, stainless steel spatula or spoon, extract the soil sample from the sampler, measure the recovery, and separate the wash from the true sample. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

5.3 Place the sample in a laboratory-supplied, pre-cleaned sample container. This should be done as quickly as possible and this is especially important when sampling for volatile organic compounds (VOCs). Samples to be analyzed for VOCs must be collected prior to other constituents.

5.4 The sample container will be labeled with appropriate information such as, client name, site location, sample identification (location, depth, etc.), date and time of collection, and sampler's initials.

5.5 Using the remaining portion of soil from the sampler, log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, layering, grain size, etc.).

5.6 If soil samples are to be composited in the field, then equal portions from selected locations will be placed on a clean plastic sheet and homogenized. Alternately, several samples may be submitted to the laboratory for compositing by weight. The method used is dependent upon regulatory requirements. Specific compositing procedures shall be approved by the appropriate regulatory agency and described in the work plan. Samples to be analyzed for VOCs will not be composited unless required by a regulatory agency.

5.7 After the sample has been collected, labeled, and logged in detail, it is placed in a zip-lock bag and stored in a cooler at 4°C.

5.8 A chain-of-custody form is completed for all samples collected. One copy is retained and two are sent with the samples in a zip-lock bag to the laboratory. A custody seal is placed on the cooler prior to shipment.

5.9 Samples collected from Monday to Friday are to be delivered to the laboratory within 24 hours of collection. If Saturday delivery is unavailable, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if any analytes require a shorter delivery time.

5.10 The field notebook and appropriate forms should include, but not be limited to the following: client name, site location, sample location, sample depth, sample identification, date and time collected, sampler's name, method of sample collection, number and type of containers, geologic description of material, description of decontamination procedures, etc. A site map should be prepared with exact measurements to each sample location in case follow-up sampling is necessary.

5.11 All reusable sampling equipment must be thoroughly cleaned in accordance with the decontamination SOP. Following the final decontamination (after all samples are collected) the sampling equipment is wrapped in aluminum foil. Discard any gloves, foil, plastic, etc. in an appropriate manner that is consistent with site conditions.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for screening soil samples for volatile organic vapors using a portable photoionization detector (PID). This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, and grab samples from stockpiled soils.

2.0 CONSIDERATIONS

The primary objective of photoionization screening of soil samples is to obtain a qualitative understanding of the distribution of volatile organic compounds (VOCs) in soil. The proper design of an organic vapor screening program requires an understanding of site hydrogeology, potential source areas, and potential constituents of concern. Sample locations and frequency must be fully defined in the work plan. The work plan should outline the type of lamp to be utilized in the PID based on the ionization potentials and response factors of the constituents of concern. The work plan must also clearly describe the heating or equilibration procedures to be employed if they differ from those described in this SOP. Regardless of the specific equilibration procedure employed, it is imperative that each sample be treated identically to allow the photoionization results from different locations to be compared. Observations such as water, clay, and organic content should be noted to facilitate interpretation of the data. Every effort should be made to collect a representative portion of soil from the sampling device.

3.0 MATERIALS/EQUIPMENT

a. A work plan which outlines photoionization screening requirements.

b. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents [e.g., acetone, nitric acid, hexane, etc.], aluminum foil, plastic sheeting, etc.).

c. Field notebook, field form(s), maps, chain-of-custody forms.

d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

e. Stainless steel spoons or spatulas.

f. Disposable plastic spoons.

g. Plastic sheeting.

h. Aluminum foil.

i. Mason jars or driller's jars.

j. Water bath (hot plate, extension cord, water tray, thermometer).

k. Photoionization detector with charging unit.

l. Calibration gases with regulator.

m. Indelible marker.

n. Masking tape.

o. Disposable sampling gloves.

4.0 DECONTAMINATION

Where possible, thoroughly pre-cleaned and wrapped sampling equipment must be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and sample jars will be changed after each use and discarded in an appropriate manner. If only photoionization results are to be obtained, then split-spoon samples and hand augers may be cleaned with a soap and water wash and potable water rinse or steam cleaning, and a final distilled water rinse. However, if samples are to be collected concurrently for laboratory analytical results, then all reusable sampling equipment must be thoroughly decontaminated according to the SOP for decontamination of field equipment.

5.0 CALIBRATION

The PID must be calibrated according to the manufacturer's specifications at a minimum frequency of once per day prior to collecting photoionization readings. In addition, periodic checks (e.g., every 2 hours or every ten samples) with the standard gas will be conducted to confirm that the calibration has not drifted. The time, date, and calibration procedure must be clearly documented in the field notebook and the calibration log. If at any time the photoionization results appear erratic or inconsistent with field observations, then the unit must be recalibrated. If calibration is difficult to achieve, then the unit's lamp should be checked for dirt or moisture and cleaned, as necessary. During humid or wet conditions, the unit should be calibrated on a more frequent basis as determined by field personnel.

6.0 PROCEDURE

6.1 Extract the soil sample from the sampler, quickly measure the recovery, and separate the wash from the true sample by using a dedicated, stainless steel spatula. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

6.2 Place the sample in a pre-cleaned glass jar (as quickly as possible to avoid loss of VOCs) filling the jar half full. Place an aluminum foil seal between the glass and metal cap and screw tight.

6.3 Label jars with the boring number, depth of sample, date of collection and blow counts. In addition, the field personnel will ensure the following: samples are taken at appropriate depths; unrepresentative portions of the sample are discarded properly; that the sampler is decontaminated properly between use; and the driller uses proper methods during sample collection and does not use oil or grease on tools entering the borehole.

6.4 Log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, and layering).

6.5 After the sample has been collected, heat the sample under controlled conditions in a water bath for a 2 minute period.

6.6 Ensure that the PID has been calibrated and that the calibration information is documented in the field book. Pierce the aluminum foil seal with the probe from the PID and measure the relative concentration of VOCs in the headspace of the soil sample. The initial (peak) reading must be recorded.

6.7 Record the PID reading in the field notebook, on an appropriate field form, and on the base map, if appropriate.

6.8 Place any material not representative of the interval sampled in a pile with the other cuttings from the borehole.

6.9 If only photoionization results are to be obtained, then reusable sampling devices may be cleaned with a soap and water wash and a potable water rinse. The sampler will then be rinsed with distilled water, assembled and placed on plastic sheeting for reuse. A more rigorous decontamination procedure is required when samples are also being collected for laboratory analysis. Refer to the SOP for collection of soil samples for laboratory analysis for additional information.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for measuring the pH of water in the field. The pH is measured in the field using a pH meter which should have the ability to compensate for temperature (automatically or manually). The pH will be measured in standard units (SU) and can be recorded with or without the SU designation. The conventional means of recording a pH value is without a unit designation (e.g., 7.0); however, the SU designation may be used provided the term is defined as standard units when first referenced. The manufacturer's instrument manual for each particular pH meter, which is maintained with the instrument, will be referred to for calibration, use, repair, maintenance, or trouble-shooting operations.

The pH is measured in the field to provide the pH of the water under ambient (in situ) conditions. The pH is a measure of acidic (<7.0) or basic (>7.0) nature of the water and is used to assist in evaluating the mobility of contaminants. In addition, pH measurements can be used during well purging to help determine when sufficient ground water has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer). The determination is made when pH readings have achieved stabilization or near-stabilization.

2.0 CALIBRATION

2.1 Calibration of the pH meter is to be performed at the beginning and end of each day's use in accordance with the manufacturer's specific instructions. Usual procedures are given below.

2.2 Recalibration must occur if: 1) the pH of the samples being measured is outside the previous calibration range; 2) the procedure or use conditions warrant frequent calibrations; 3) four or more hours have elapsed; or 4) the instrument has been moved from one area to another (e.g., offsite or out of the study area).

2.3 Two buffer calibrations bracketing the expected pH range of samples are to be performed prior to its use in a study. Three pH buffers (4.0, 7.0, and 10.0) are read after standardization at pH of 7.0 to evaluate the linearity and electrodes.

2.4 The measurements of sample and buffers are made while stirring. The samples and buffers are measured at the same temperature; therefore, the pH meter must be temperature compensated. If not, then record the temperature.

2.5 The following information is documented in the calibration logbook at the time of calibration:

a. Date.
b. pH meter identification.

c. Calibration results using pH standards.
d. Initials of the individual performing calibration.

3.0 PROCEDURE

3.1 A warm-up period may or may not be necessary for the instrument, depending on instrument requirements. The manufacturer's instrument manual must be followed.

3.2 The pH electrodes must be kept in good working order as follows:

a. Proper levels of electrolyte solution are maintained. The electrolyte solution level should be at least 1 inch above the solution being measured.

b. The electrodes must be carefully rinsed with distilled or deionized water before each measurement.

3.3 The water sample (approximately 500 milliliters [ml]) is placed in a clean container and the temperature and pH are measured immediately.

3.4 The temperature of the sample is measured and the pH meter is compensated for the water temperature. If compensation is not possible, then record the temperature.

3.5 The electrodes are immersed in a water sample and stirred continuously until the pH reading equilibrates. The pH will be measured and recorded in increments of 0.1 or 0.1 SU.

3.6 Pertinent data are documented in the field notebook or appropriate field form, and initialed and dated.

3.7 The electrodes are rinsed with distilled or deionized water and the unit stored properly in accordance with the manufacturer's instructions (e.g., capping and storing in a buffer such as altex electrode storage solution). The electrodes are not to be stored in potable water, or distilled or deionized water.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for measuring the electrical conductance (conductivity) of water in the field. The conductivity is measured in the field using a conductivity meter which compensates for temperature (automatically or manually). Some conductivity meters measure directly in micromhos/ centimeter (µmhos/cm) while others have to be converted to this unit. Conductivity will be recorded in µmhos/cm. The manufacturer's instrument manual of each particular conductivity meter, which is maintained with the instrument, will be referred to for calibration, use, repair, maintenance, or trouble-shooting operations.

The specific conductivity is measured in the field as a measure of the total dissolved solids (TDS) in the ground water or surface water. TDS data can then be used as a qualitative measure of contamination and to assist in evaluating electrical resistivity and borehole geophysical data. In addition, specific conductivity measurements can be used during well purging to help determine when sufficient ground water has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer). The determination is made when conductivity readings have achieved stabilization or near-stabilization.

2.0 CALIBRATION

2.1 Calibration is in accordance with the manufacturer's specific directions.

2.2 Calibration of the conductivity meter is to be performed at the beginning and end of each day's use.

2.3 Recalibration must occur if: 1) the specific conductivity of samples being measured is outside the calibration standard solution range; or 2) the instrument has been moved from one area to another (e.g., offsite or out of the study area).

2.4 Choose a conductivity calibration solution that is near the conductivity of the water samples to be measured.

2.5 Select the appropriate conductivity calibration solution and adjust the span on the instrument to the conductivity calibration solution value.

2.6 Rinse the probe in distilled or deionized water and store the probe according to the manufacturer's specifications (e.g., distilled or deionized water, or a buffer solution).

2.7 The following information is documented in the calibration logbook:

a. Date.

b. Conductivity meter identification.

c. Initials of individual performing calibration.

d. Calibration results.

3.0 PROCEDURE

3.1 The conductivity electrodes must be kept in good working order as specified by the manufacturer.

3.2 The water sample is placed in a clean, appropriate container(s) and the temperature and conductivity are measured immediately.

3.3 The temperature of the sample is taken and the conductivity meter is compensated for the water temperature.

3.4 The probe is immersed in a water sample until the meter equilibrates.

3.5 In reading the conductivity meter scale, one or more of the following may have to be considered:

a. The reading may have to be multiplied appropriately (e.g., the reading is expressed in micromhos/centimeter).

b. If the conductivity meter is not capable of compensating for temperature differences, then note that the conductance measurements are not temperature compensated and document the temperatures.

c. If the conductivity meter can be compensated for temperature, then adjust the temperature control before reading the conductance measurement. (Some meters automatically compensate for temperature, and this should be documented.)

3.6 Conductivity measurements are recorded in the field notebook and on the appropriate field form, and initialed and dated. Units of µmhos/cm are used to represent conductivity.

3.7 The probe will be cleaned with distilled or deionized water after each use and will be stored according to the manufacturer's specifications (e.g., conductivity cells may have to be stored in distilled or deionized water, or a buffer solution).

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for measuring water temperature in the field. Temperature measuring devices may include thermometers, and pH and/or conductivity meters equipped with a temperature probe. The temperature measuring device must be rapidly equilibrating, precision-grade, and meet or exceed National Bureau of Standards (NBS) specifications for accuracy. Temperature will be measured and recorded in degrees Celsius/Centigrade (° C). If the temperature measuring device is a meter, then the manufacturer's instrument manual, which is maintained with the instrument, will be referred to for calibration, use, repair, maintenance, or trouble-shooting operations.

Temperature data is collected in the field to determine the temperature of the water sample under ambient (in situ) conditions. Temperature data can be used to evaluate the mobility of compounds in ground water and flow conditions. In addition, temperature measurements can be used during well purging to help determine when sufficient ground water has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer). The determination is made when temperature readings have achieved stabilization or near-stabilization.

2.0 CALIBRATION

2.1 Calibration of thermometers and temperature measuring meters will be performed before entering the field and checked upon return to the office.

2.2 Temperature measuring devices will be calibrated against a NBS-traceable thermometer.

2.3 If a thermometer is used to measure temperature, then the thermometer must read within 1° C to 1.5° C of the NBS-traceable thermometer. If the thermometer does not read within this range and the thermometer cannot be calibrated, then it will not be used for temperature measurements and will be disposed of in an appropriate manner. If the thermometer does not read within this range and the thermometer can be calibrated, then the thermometer will be calibrated to the NBS-traceable thermometer.

2.4 If a temperature measuring meter is used to measure temperature, then the meter must read within 1° C to 1.5° C of the NBS-traceable thermometer. If the meter does not read within this range and the meter cannot be calibrated, then it will not be used for temperature measurements and will be sent to the manufacturer for service and repair. If the meter does not read within this range and the meter can be calibrated, then the meter will be calibrated to the NBS-traceable thermometer.

2.5 The following information is documented in the calibration logbook at the time of calibration:

a. Date.

b. Thermometer and/or Meter identification.

c. Calibration results relative to NBS-traceable thermometer.

d. Initials of individual performing calibration.

3.0 PROCEDURE

3.1 The water sample (approximately 500 milliliters [ml]) is placed in a clean container and the temperature is measured immediately.

3.2 If a thermometer is used, then the thermometer is first rinsed with distilled or deionized water and is then immersed in water until the temperature equilibrates. The temperature is read in °C. The thermometer is rinsed again after measuring the temperature.

3.3 If a temperature measuring meter is used, then the probe is first carefully rinsed with distilled or deionized water. The probe is then immersed in water according to the manufacturer's specifications (e.g., specified submergence, stirred) until the temperature equilibrates. The temperature is read in °C. The probe is rinsed again after measuring the temperature.

3.4 Temperature data are recorded in the field notebook or appropriate field form, and initialed and dated.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during drilling, and soil and water sampling. The objective of decontamination is to ensure that all drilling, and soil-sampling and water-sampling equipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements and because of variability in the requirements of individual states. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

2.1 The rig and all associated equipment should be properly decontaminated by the contractor before arriving at the test site.

2.2 The augers, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with the soil, will be steam cleaned onsite prior to set up for drilling to ensure proper decontamination.

2.3 The same steam cleaning procedures will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the study.

2.4 All on-site steam cleaning (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc.

2.5 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.6 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federal procedures.

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.2 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.3 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.4 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.5 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.6 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.7 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.8 Reassemble the cleaned sampler, as necessary.

3.9 Transfer the sampler to the driller (or helper) making sure that this individual is also wearing clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil.

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble bailer (if applicable) and discard cord in an appropriate manner, and scrub each part of the bailer with a brush and solution.

d. Rinse with potable water and reassemble bailer.

e. Rinse with copious amounts of distilled or deionized water.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

h. Rinse bailer at least three times with distilled or deionized water before use.

4.2 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

APPENDIX H

Site Management Forms

Site Inspection Checklist, Marcus Garvey Apartments Site, 650 Rockaway Avenue, Brooklyn, NY

Date: _____

Completed By: _____

Description	Status			Actions Taken / Comments
	Ok	Action Req.	N/A	
Site Cover System				
1 Inspect site cover system for cracks and leaks.				
Sub-Slab Depressurization System Blower A (South Side of Building)				
A. Aboveground Piping on Roof				
1 Inspect aboveground piping for cracks, leaks and support issues.				
2 Inspect vacuum/pressure gauges and flowmeters for proper operation.				
B. Electrical				
1 Check that the electrical control panel is closed/secured.				
2 Confirm that the alarm light is functioning properly.				
C. Blower Enclosure				
1 Inspect condition of exhaust fan, thermostat and louver.				
D. Moisture Knock-out Tank				
1 Check condition of vacuum filter.				
2 Check dilution valve for noises or leaks.				
3 Check for presence of water in knockout tank.				
Sub-Slab Depressurization System BlowerB (North Side of Building)				
A. Aboveground Piping on Roof				
1 Inspect aboveground piping for cracks, leaks and support issues.				
2 Inspect vacuum/pressure gauges and flowmeters for proper operation.				
B. Electrical				
1 Check that the electrical control panel is closed/secured.				
2 Confirm that the alarm light is functioning properly.				
C. Blower Enclosure				
1 Inspect condition of exhaust fan, thermostat and louver.				
D. Moisture Knock-out Tank				
1 Check condition of vacuum filter.				
2 Check dilution valve for noises or leaks.				
3 Check for presence of water in knockout tank.				
Institutional Controls				
1 Confirm that the site usage is in compliance with the institutional controls.				
Site Records				
1 Inspect site records and confirm that they are up to date (e.g., Site Inspection Checklists and Sub-Slab Depressurization System and SVE Wells Operations Logs, sampling logs, etc.)				

BLOWER A (SOUTHERN) SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM

Site Name:	Marcus Garvey Apartments (BCP Site No. C224198)	Inspection Date:	
Street Address:	650 Rockaway Avenue		
Location:	Brownsville, NY	Inspection Personnel:	
System:	Active Mix Use Sub-Slab Depressurization System		
Blower:	Rotron EN858, 7.5 Hp (Blower A)		
Blower Range:	120 IWG pressure, 98 IWG vac, 400 cfm		

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Is the system operating normally?	___	___	_____
Are any warning lights on? (Please list those that are on)	___	___	_____
If there is an alarm condition, was it fixed and the system restarted?	___	___	_____
Is the blower enclosure in good condition?	___	___	_____
Are the valves (at blower and aboveground piping) in good condition?	___	___	_____
Is the vacuum filter in good condition?	___	___	_____
Does the knock-out tank need to be drained? (Record amount drained)	___	___	_____
Are aboveground piping free of cracks, leaks, and support issues?	___	___	_____
Are vacuum/pressure gauges at blower operating properly?	___	___	_____
Are interior piping free of cracks, leaks, and support issues?	___	___	_____

List maintenance activities that were performed or other comments about the system: _____

Blower Influent	Vacuum (in. w.c.)	Comments
INF-A1 (after knock-out tank)		
Knock-out Tank-A1		

Blower Effluent	Pressure (in. w.c.)	Comments
EFF-A1		

Soil Vapor Monitoring Point*	Vacuum (in. w.c.)	Comments
SVMP-A1		
SVMP-A2		

PERFORM THE FOLLOWING ONLY IF VACUUM READING AT SVMP-A1 OR SVMP-A2 IS LESS THAN 0.004 IN. W.C.

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Are interior vacuum gauges operating properly?	___	___	_____

Suction Point*	Vacuum (in. w.c.)	Comments
MG-A1		
MG-A2		
MG-A3		
MG-A4		
MG-A5		
MG-A6		
MG-A7		
MG-A8		
MG-A9		
MG-A10		
MG-A11		
MG-A12		
MG-A13		

in. w.c. - inches of water

* Refer to figure for locations of Soil Vapor Monitoring Points and Suction Points

BLOWER B (NORTHERN) SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM

Site Name:	Marcus Garvey Apartments (BCP Site No. C224198)	Inspection Date:	
Street Address:	650 Rockaway Avenue		
Location:	Brownsville, NY	Inspection Personnel:	
System:	Active Mix Use Sub-Slab Depressurization System		
Blower:	Rotron EN909 15 Hp (Blower B)		
Blower Range:	120 IWG pressure, 100 IWG vac, 600 cfm		

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Is the system operating normally?	___	___	_____
Are any warning lights on? (Please list those that are on)	___	___	_____
If there is an alarm condition, was it fixed and the system restarted?	___	___	_____
Is the blower enclosure in good condition?	___	___	_____
Are the valves (at blower and aboveground piping) in good condition?	___	___	_____
Is the vacuum filter in good condition?	___	___	_____
Does the knock-out tank need to be drained? (Record amount drained)	___	___	_____
Are aboveground piping free of cracks, leaks, and support issues?	___	___	_____
Are vacuum/pressure gauges at blower operating properly?	___	___	_____
Are interior piping free of cracks, leaks, and support issues?	___	___	_____
Are the valves on SVE wells 1 and 2 open?	___	___	_____

List maintenance activities that were performed or other comments about the system: _____

Blower Influent	Vacuum (in. w.c.)	Comments
INF-B1 (after knock-out tank)		
Knock-out Tank-B1		

Blower Effluent	Pressure (in. w.c.)	Comments
EFF-B1		

Soil Vapor Monitoring Point*	Vacuum (in. w.c.)	Comments
SVMP-B1		
SVMP-B2		

PERFORM THE FOLLOWING ONLY IF VACUUM READING AT SVMP-B1 OR SVMP-B2 IS LESS THAN 0.004 IN. W.C.

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Are interior vacuum gauges operating properly?	___	___	_____

Suction Point*	Vacuum (in. w.c.)	Comments
MG-B1		
MG-B2		
MG-B3		
MG-B4		
MG-B5		
MG-B6		
MG-B7		
MG-B8		
MG-B9		
MG-B10		
MG-B11		
MG-B12		
MG-B13		
MG-B14		
MG-B15		
MG-B16		
MG-B17		

in. w.c. - inches of water

* Refer to figure for locations of Soil Vapor Monitoring Points and Suction Points

Groundwater Sampling Log

Client: _____ **Project Number:** _____

Site Location: _____

Well No: _____ Weather: _____

Date: _____ Purge Water Disposal: _____

Sampled By: _____ Well Diameter / Type: _____

Depth of Well (ft): _____ Water Column (ft): _____

Depth to Water(ft): _____ Volume of Water in Well (gal) _____

Depth to Product (ft): _____ Volume of Water to Remove (gal): _____

well diameter:	1 in	2 in	4 in	6 in	8 in
gallons per foot:	0.041	0.163	0.653	1.469	2.611

Start Purging: _____ Purge Rate: _____

End Purging: _____ Volume of Water Removed (gal): _____

Method of Purge: _____ Method of Sampling: _____

Physical Appearance/ Comments: _____

Samples Collected: (analyses / no. bottles) _____

Sample Time: _____ Laboratory : _____

Duplicate Sample/Time: _____

Field Measurements: **Discharge Rate: 3.0** **Refill Rate: 8.0** **PSI: 15**

Time	**DTW** ft	**Flow Rate** ml/min	**ORP** mV (+/- 10 mV)	**Conductivity** **mS/cm** **(w/in 3%)**	**Turbidity** NTU (w/in %10)	**pH** SU (+/- 0.1)	**Temperature** **C°** **(w/in 3%)**	**Dissolved O_2** mg/L (w/in 10%)
End of Parameter Measurements								

APPENDIX I

Remedial System Optimization Table of Contents

REMEDIAL SYSTEM OPTIMIZATION FOR MARCUS GARVEY APARTMENTS

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- 1.3 Report Overview

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- 2.3 Clean-up Goals and Site Closure Criteria
- 2.4 Previous Remedial Actions
- 2.5 Description of Existing Remedy
  - 2.5.1 System Goals and Objectives
  - 2.5.2 System Description
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PLATES

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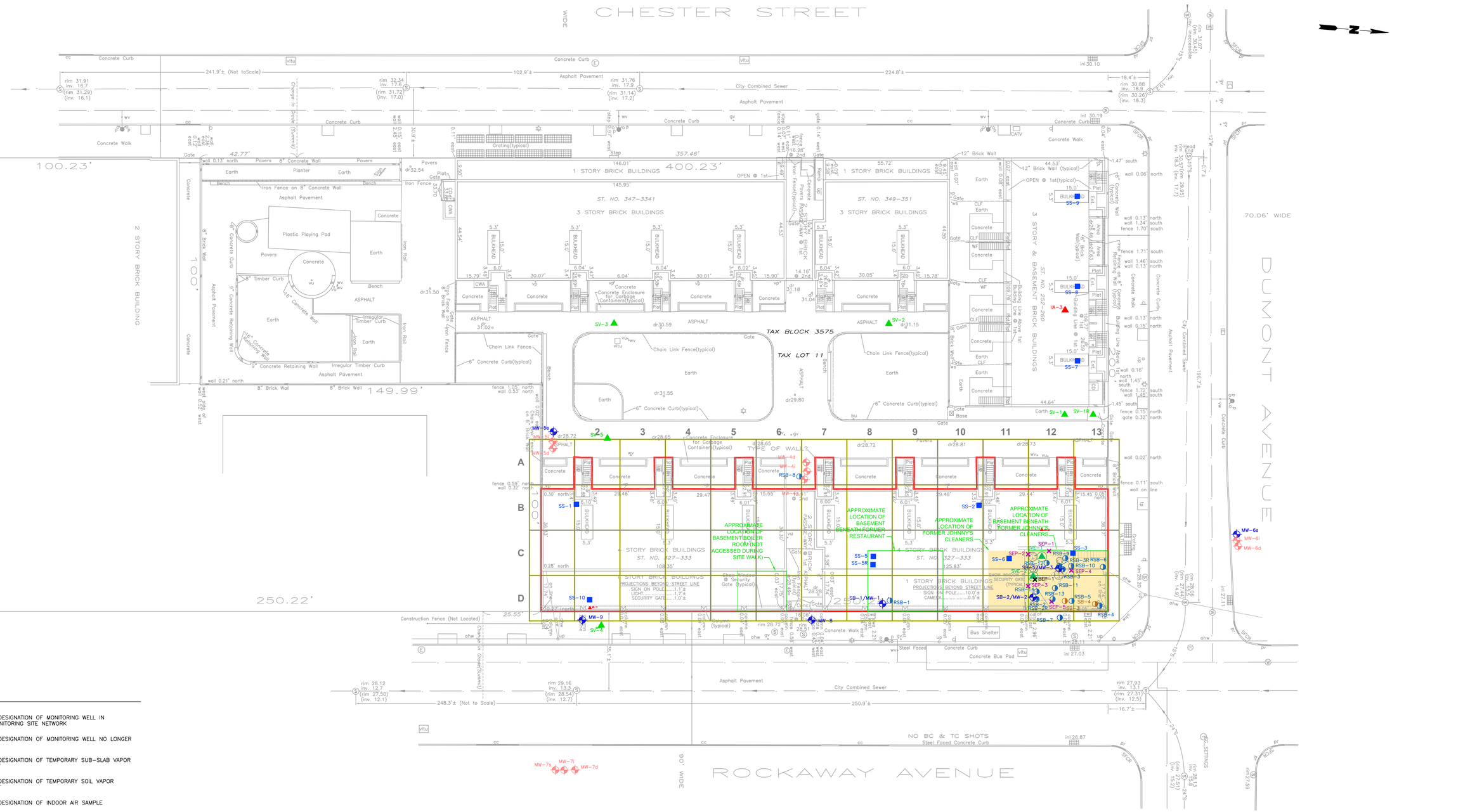
3. As-Built of Remedial Components Completed and Engineering and Institutional Controls
4. As-Built of Sub-Slab Depressurization System
5. Remaining Soil Sample Exceedances
6. Remaining Groundwater Sample Exceedances


CHESTER STREET
WIDE
ROCKAWAY AVENUE
90' WIDE
LIVONIA AVENUE
06' WIDE
DUMONT AVENUE
70.06' WIDE
TAX BLOCK 3575
TAX LOT 11
100.23'
42.77'
357.46'
400.23'
146.01'
145.95'
100'
149.99'
200'
250.22'
102.9'±
224.8'±
241.9'± (Not toScale)
248.3'± (Not to Scale)
250.9'±
1 STORY BRICK BUILDINGS
3 STORY BRICK BUILDINGS
2 STORY BRICK BUILDING
3 STORY & BASEMENT BRICK BUILDINGS
ST. NO. 347-3341
ST. NO. 349-351
ST. NO. 252-260
ST. NO. 327-333
APPROXIMATE LOCATION OF BASEMENT BENEATH FORMER RESTAURANT
APPROXIMATE LOCATION OF FORMER JOHNNY'S CLEANERS
APPROXIMATE LOCATION OF BASEMENT BENEATH FORMER JOHNNY'S CLEANERS
APPROXIMATE LOCATION OF BASEMENT/BOILER ROOM NOT ACCESSED DURING SITE WALK)
TYPE OF WALL 2
NO BC & TC SHOTS
Steel Faced Concrete Curb
Concrete Curb
Concrete Walk
Asphalt Pavement
City Combined Sewer
Concrete Bus Pad
Bus Shelter
Construction Fence (Not Located)
Change in Grade(Summit)
Chain Link Fence(typical)
6" Concrete Curb(typical)
Concrete Enclosure for Garbage Containers(typical)
Iron Fence(typical)
Security Gate (typical)
Grating(typical)
Plastic Playing Pad
Concrete Retaining Wall
Irregular Timber Curb
8" Timber Curb
6" Concrete Wall
Iron Rail
Planter
Bench
Earth
Concrete
Pavers
ASPHALT
CLF
WF
Gate
Step
Ramp
Plat
Ent.
Area
Bulkhead
Building Line Above 1st
Building Line @ 1st
Brick Wall(typical)
Concrete Wall(typical)
Iron Fence/Retaining Wall(typical)
Steel Faced
Concrete Bus Pad
SECURITY GATE (TYPICAL)
SHOW WINDOW
CAMERA
SIGN ON POLE
PROJECTIONS BEYOND STREET LINE
LIGHT
SECURITY GATE
Gate Base
Gate Post
Gate Hinge
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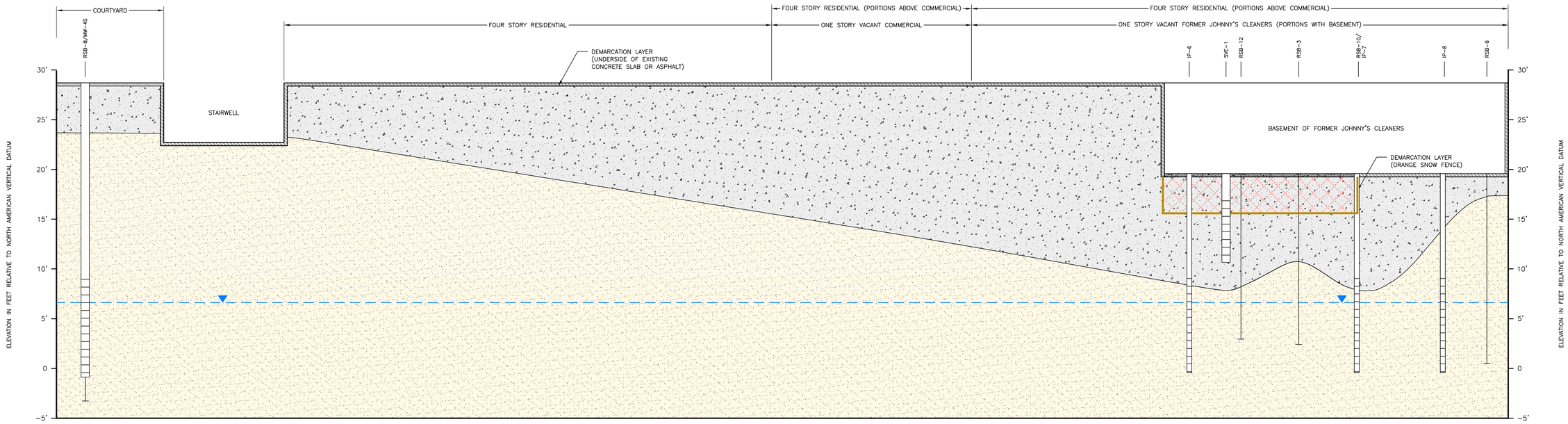
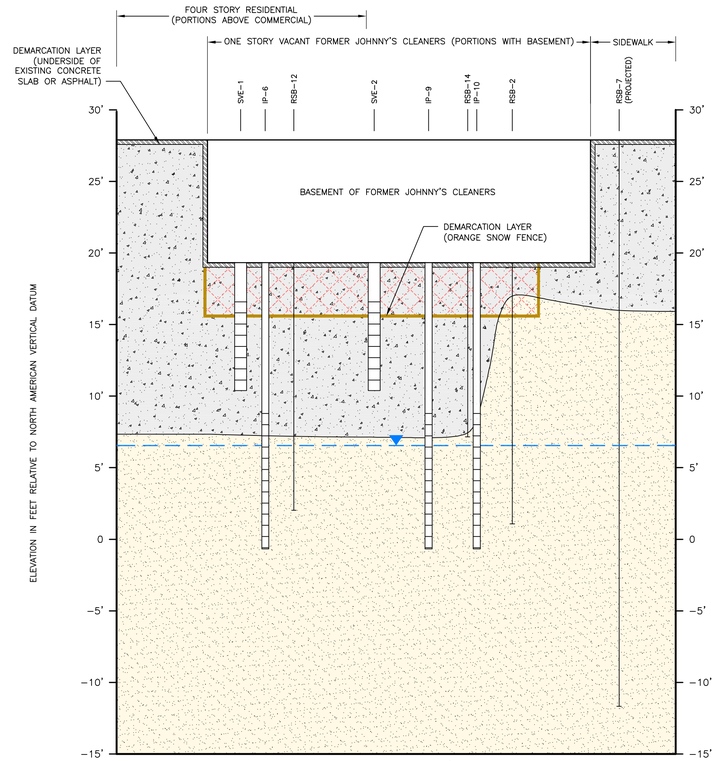
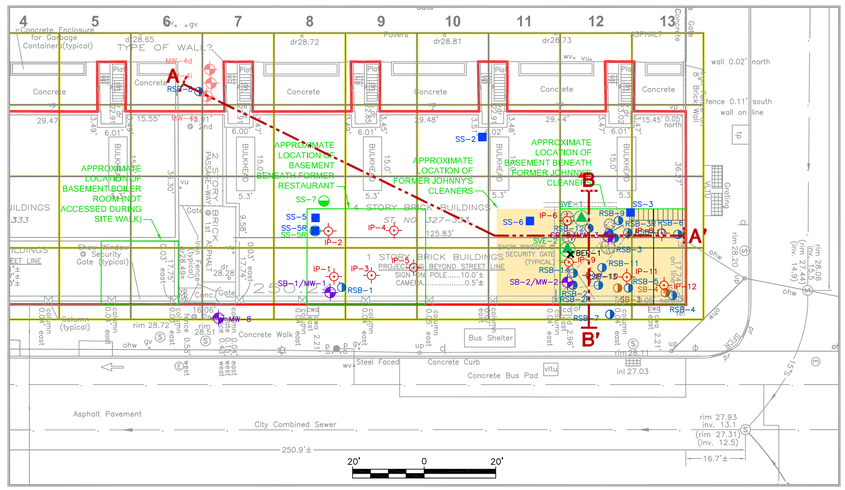


SECTION A–A'
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 5'



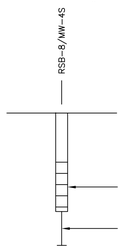
SECTION B–B'
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 5'



LEGEND

- NEW 4–INCH CONCRETE SLAB
- HOT SPOT EXCAVATION AND BACKFILL WITH CLEAN DGA TO 4 FEET BBS
- EXISTING FILL
- EXISTING NATIVE SOIL: PRIMARILY SAND WITH VARYING AMOUNTS OF SILT, GRAVEL AND COARSE SAND
- EXISTING CONCRETE
- EXISTING ASPHALT PAVEMENT
- INFERRED GROUNDWATER ELEVATIONS BASED ON GAUGING DATA COLLECTED ON AUGUST 18, 2016

DGA – DENSE GRADED AGGREGATE
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SVE – SOIL VAPOR EXTRACTION
IP – GROUNDWATER INJECTION POINT



NOTES

1. REFER TO PLATE 1 FOR LEGEND AND SYMBOLS SHOWN.
2. REFER TO PLATE 2 FOR AS–BUILT SITE COVER SYSTEM TYPES AND DETAILS.
3. REMAINING CONTAMINATION EXISTS BELOW THE VARIOUS DEMARCATION LAYERS SHOWN.
4. REFER TO PLATE 3 FOR AS–BUILT DETAIL OF THE SVE WELLS INSTALLED DURING THE REMEDIATION.
5. DGA BACKFILL, WHICH MET THE CRITERIA FOR IMPORT WITHOUT SAMPLING, WAS APPROVED BY NYSDEC PRIOR TO IMPORT.
6. GROUNDWATER MONITORING WELLS ARE 2–INCH DIAMETER; SVE WELLS ARE 4–INCH DIAMETER AND IPs ARE 1 INCH DIAMETER PVC.
7. POTASSIUM PERMANGANATE WAS DIRECTLY INJECTED AT IP–2 AND IP–4. INJECTION WELLS WERE NOT INSTALLED AT THESE LOCATIONS.

AS-BUILT

NO.	DATE	REVISION DESCRIPTION	INT.

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DESIGNED BY:	N.C.	CHECKED BY:	W.K.
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DRAWING DATE:	15NOV16	PRINT TYPE:	COLOR
OFFICE:	NY	PAPER SIZE:	ARCH D
PROJECT NO.:	2158.0002Y002		
DRAWING FILE:	2158.0002Y142.01.DWG		

Remedial
REMEDIAL ENGINEERING, P.C.
209 Shafter Street
Islandia, New York 11749 (631) 232–2600

PROJECT NAME:
MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

PROJECT FOR:
MARCUS GARVEY PRESERVATION LLC

TITLE:
AS-BUILT GENERALIZED HYDROGEOLOGIC CROSS SECTIONS AND ELEVATION OF REMAINING CONTAMINATION

PLATE
2

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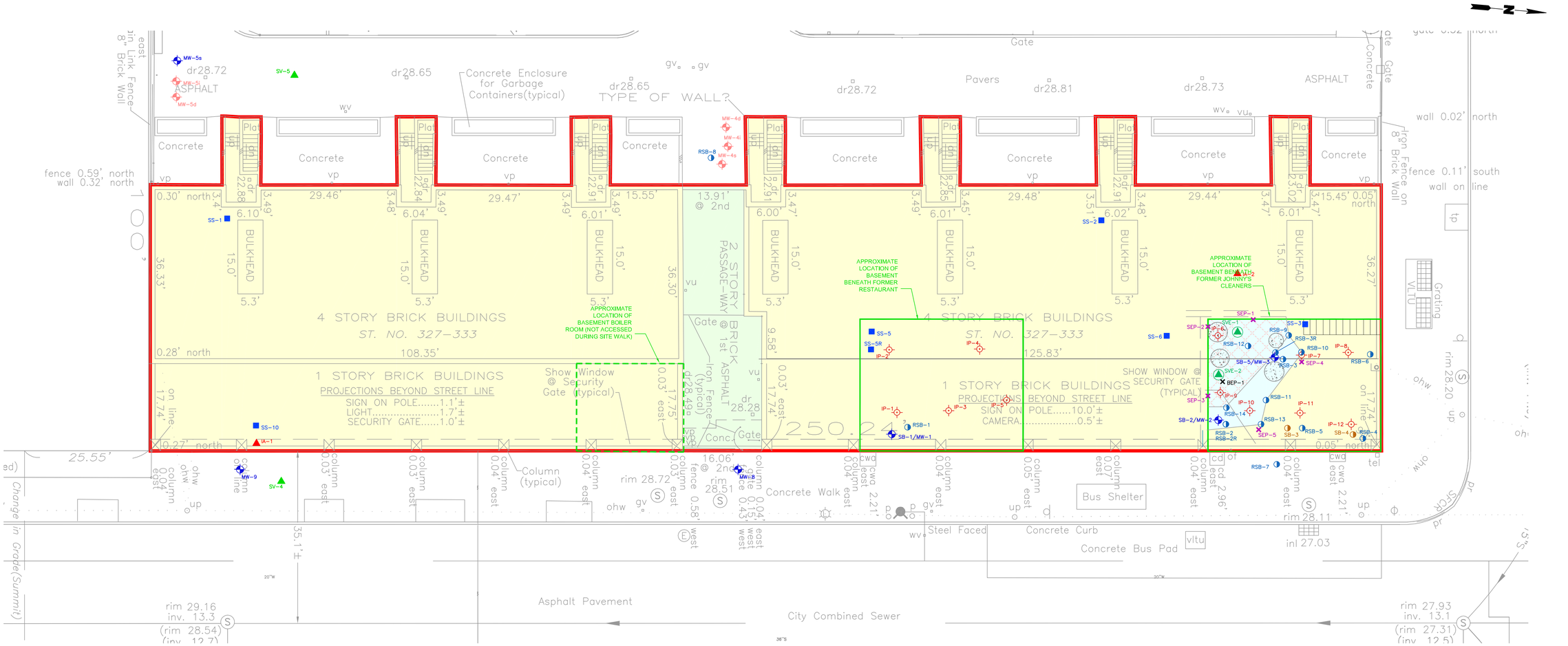


LEGEND

- MW-4 — LOCATION AND DESIGNATION OF MONITORING WELL IN LONG-TERM MONITORING SITE NETWORK
- MW-1 — LOCATION AND DESIGNATION OF MONITORING WELL NO LONGER IN USE
- SS-1 — LOCATION AND DESIGNATION OF TEMPORARY SUB-SLAB VAPOR SAMPLING POINT
- SV-1 — LOCATION AND DESIGNATION OF TEMPORARY SOIL VAPOR SAMPLING POINT
- IA-1 — LOCATION AND DESIGNATION OF INDOOR AIR SAMPLE
- SVE-1 — LOCATION AND DESIGNATION OF SOIL VAPOR EXTRACTION WELL
- SEP-3 — LOCATION AND DESIGNATION OF SIDEWALL DOCUMENTATION SAMPLE
- BEP-3 — LOCATION AND DESIGNATION OF BOTTOM DOCUMENTATION SAMPLE
- RSB-1 — LOCATION AND DESIGNATION OF SOIL BORING
- SB-4 — LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY ECOSYSTEMS STRATEGIES, INC.
- IP-1 — LOCATION AND DESIGNATION OF IN SITU CHEMICAL OXIDATION POINT
- LIMITS OF HOT SPOT EXCAVATION, DISPOSAL AS F-LISTED HAZARDOUS WASTE AND BACKFILL WITH CLEAN DGA TO 4 FEET BBS AND CONCRETE SLAB REMOVAL AND REPLACEMENT
- LIMITS OF HOT SPOT EXCAVATION, DISPOSAL AS NON HAZARDOUS WASTE AND BACKFILL WITH CLEAN DGA TO 4 FEET BBS AND CONCRETE SLAB REMOVAL AND REPLACEMENT
- SITE COVER SYSTEM COMPRISED OF EXISTING CONCRETE SLAB
- SITE COVER SYSTEM COMPRISED OF EXISTING ASPHALT PAVEMENT
- BCP SITE/ENVIRONMENTAL EASEMENT BOUNDARY
- APPROXIMATE LOCATION OF BASEMENT (DASHED LINE INDICATES BASEMENT NOT ACCESSED DURING SITE WALK)
- FORMER COLUMN FOOTING REMOVED DURING REMEDIATION

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991-1D).
2. BASEMENT ELEVATION IS APPROXIMATELY 10 FEET BELOW LAND SURFACE.
3. IN SITU GROUNDWATER TREATMENT CONSISTED OF POTASSIUM PERMANGANATE INJECTIONS INTO 12 CHEMICAL INJECTION POINTS (10 TEMPORARY WELLS AND 2 DIRECT INJECTION POINTS IP-2 AND IP-4). ADDITIONAL INJECTION ROUNDS MAY BE REQUIRED DEPENDING UPON POST-INJECTION GROUNDWATER SAMPLING RESULTS.
4. REFER TO DETAILS FOR SITE COVER SYSTEM TYPES.
5. THE SUB-SLAB DEPRESSURIZATION SYSTEM AND SVE WELLS INSTALLED AT THE SITE IS SHOWN ON PLATE 3.
6. EXCAVATION WAS BACKFILLED WITH DGA, WHICH MET THE CRITERIA FOR IMPORT WITHOUT SAMPLING. BACKFILL WAS APPROVED BY NYSDEC PRIOR TO IMPORT.
7. REFER TO PLATE 6 FOR CROSS SECTIONS SHOWING THE ELEVATION OF REMAINING CONTAMINATION.

FT BLS – FEET BELOW LAND SURFACE

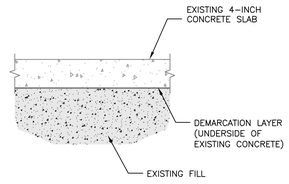
FT BBS – FEET BELOW BASEMENT SLAB (SEE NOTE 2)

SEP – SIDEWALL ENDPOINT SAMPLE

BEP – BOTTOM ENDPOINT SAMPLE

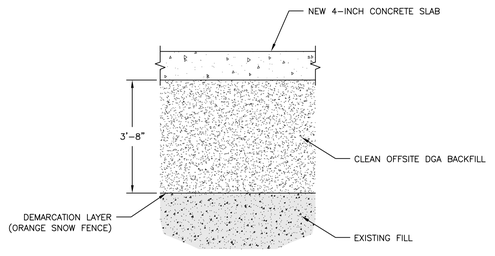
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DGA – DENSE GRADED AGGREGATE



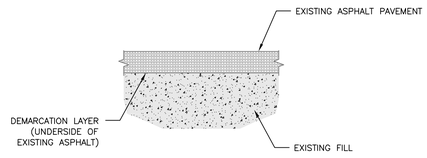
1 SITE COVER SYSTEM: EXISTING CONCRETE

SCALE: NOT TO SCALE



2 SITE COVER SYSTEM: REPAIRED CONCRETE (IN HOT SPOT AREA)

SCALE: NOT TO SCALE



3 SITE COVER SYSTEM: EXISTING ASPHALT PAVEMENT

SCALE: NOT TO SCALE

AS-BUILT

10' 0 10'

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DRAWING DATE: 28OCT16		PRINT TYPE: COLOR	
OFFICE: NY		PAPER SIZE: ARCH D	
PROJECT NO.: 2158.0002Y002			
DRAWING FILE: 2158.0002Y142.01.DWG			

Remedial

REMEDIAL ENGINEERING, P.C.

209 Shafter Street
Islandia, New York 11749 (631) 232-2600

PROJECT NAME:
MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

PROJECT FOR:
MARCUS GARVEY PRESERVATION LLC

TITLE:
AS-BUILT OF REMEDIAL COMPONENTS COMPLETED AND ENGINEERING AND INSTITUTIONAL CONTROLS

PLATE
3

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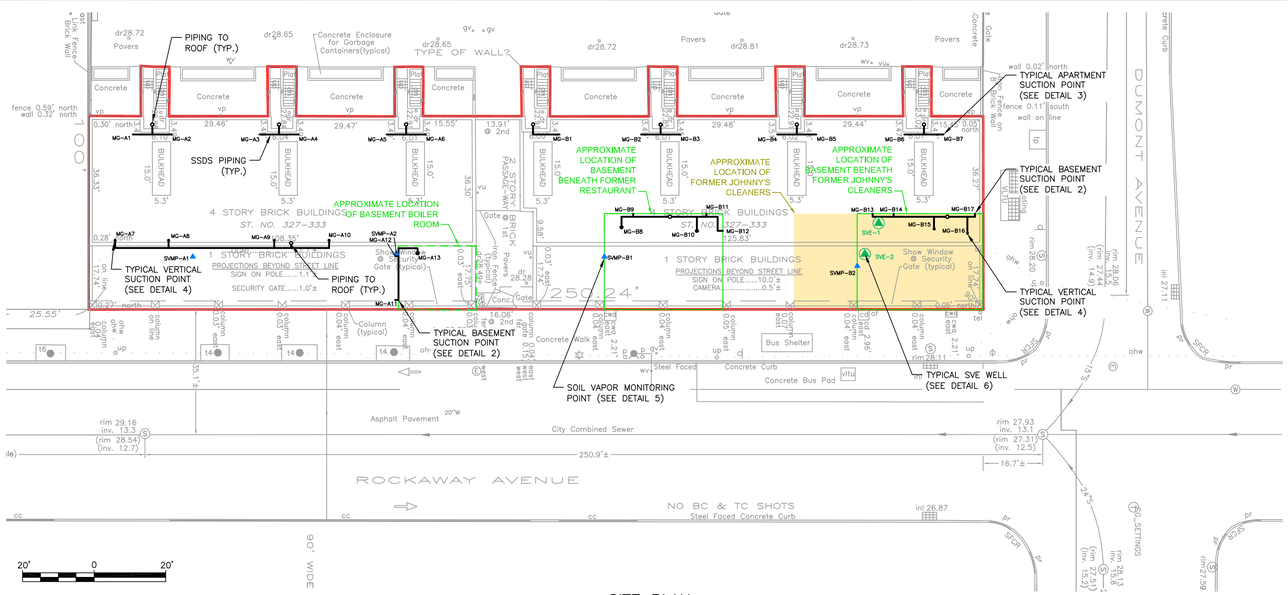


SITE PLAN

SCALE: 1"=20'

LEGEND

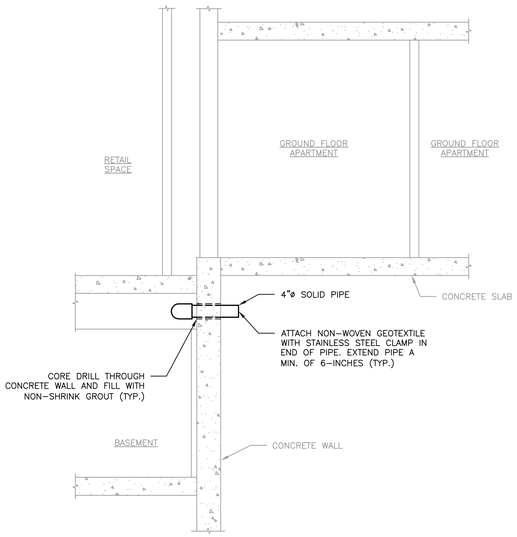
- APPROXIMATE FOOTPRINT OF FORMER JOHNNY'S CLEANERS
- BCP SITE BOUNDARY
- APPROXIMATE LOCATION OF BASEMENT
- SVE-1 LOCATION AND DESIGNATION OF SOIL VAPOR EXTRACTION WELL

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991-1D)
2. NOT ALL SSDS PIPING IS SHOWN FOR CLARITY REASONS.

SVE – SOIL VAPOR EXTRACTION

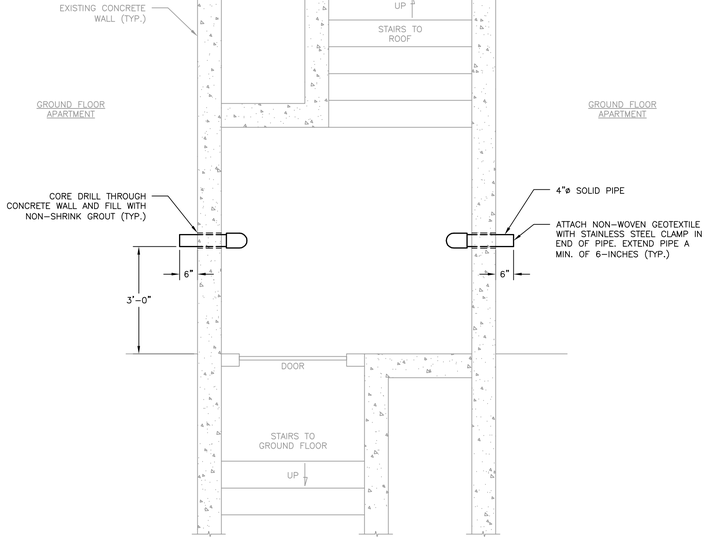
SVMP – SOIL VAPOR MONITORING POINT



SECTION VIEW

2 TYPICAL BASEMENT SUCTION POINT DETAIL

SCALE: NOT TO SCALE



PLAN VIEW

3 TYPICAL APARTMENT SUCTION POINT DETAIL

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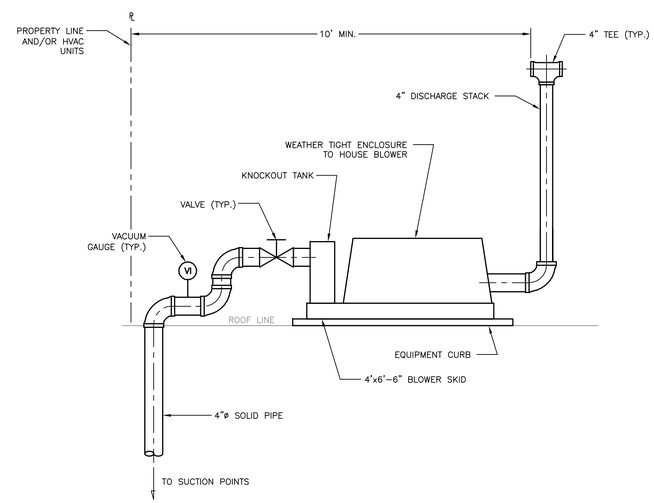


1 TYPICAL BLOWER DETAIL

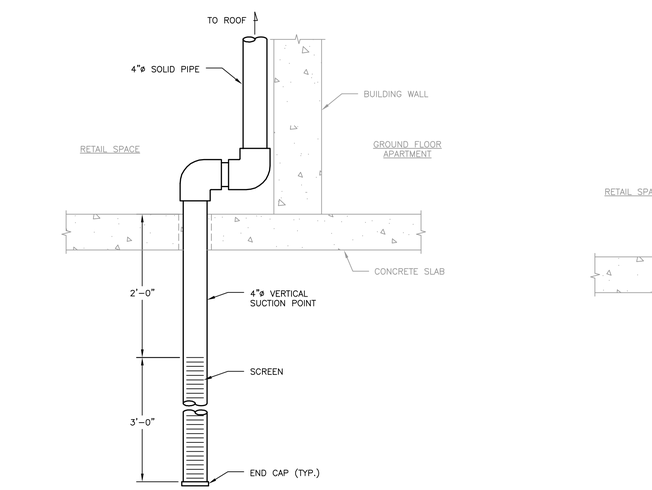
SCALE: NOT TO SCALE

BLOWER NOTES

1. ELECTRICAL CONDUIT PROVIDED TO LOCATION OF THE BLOWERS ON THE ROOF.
2. ELECTRICAL CONDUIT ARE SIZED FOR 230/460, THREE PHASE, 100 AMPS FOR EACH BLOWER MOTOR.
3. THE BLOWERS ARE AS FOLLOWS:

   BLOWER A FOR SSDS LOCATED SOUTH OF THE PASSAGE WAY IS AMETEK ROTRON MODEL NO. EN858BA72WL.

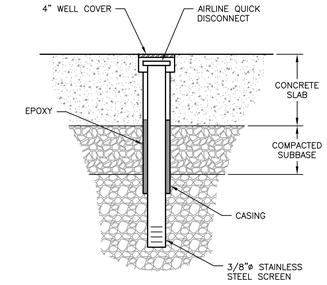
   BLOWER B FOR SSDS LOCATED NORTH OF THE PASSAGE WAY IS AMETEK ROTRON MODEL NO. EN909BG72WL.
4. BLOWER SKID A INCLUDES WEATHER TIGHT ENCLOSURE, AMETEK ROTRON MODEL MS350BS KNOCKOUT TANK (WITH HIGH LEVEL ALARM), VACUUM RELIEF VALVE, GAUGES AND INTERCONNECTING PIPING/FITTINGS (INCLUDING A MANUAL DILLUTION VALVE).
5. BLOWER SKID B INCLUDES WEATHER TIGHT ENCLOSURE, AMETEK ROTRON MODEL MS500BS KNOCKOUT TANK (WITH HIGH LEVEL ALARM), VACUUM RELIEF VALVE, GAUGES AND INTERCONNECTING PIPING/FITTINGS (INCLUDING A MANUAL DILLUTION VALVE).
6. REMOTE ALARM AND WARNING LIGHTS ARE PROVIDED FOR EACH BLOWER TO NOTIFY BUILDING SUPERINTENDENT IF BLOWERS ARE SHUT DOWN.



SECTION VIEW

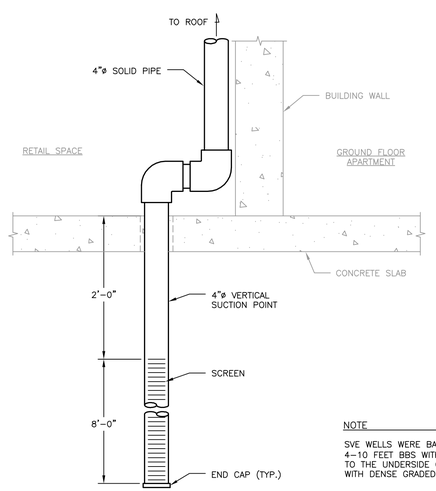
4 TYPICAL VERTICAL SUCTION POINT DETAIL

SCALE: NOT TO SCALE



5 TYPICAL SOIL VAPOR MONITORING POINT DETAIL

SCALE: NOT TO SCALE



SECTION VIEW

NOTE

SVE WELLS WERE BACKFILLED FROM 4-10 FEET BBS WITH #2 SAND AND TO THE UNDERSIDE OF THE SLAB WITH DENSE GRADED AGGREGATE.

6 TYPICAL SOIL VAPOR EXTRACTION WELL DETAIL

SCALE: NOT TO SCALE

AS-BUILT

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DRAWING DATE:	15NOV16	PRINT TYPE:	COLOR
OFFICE:	NY	PAPER SIZE:	ARCH D
PROJECT NO.:	2158.0002Y002		
DRAWING FILE:	2158.0002Y142.05.DWG		

Remedial
REMEDIAL ENGINEERING, P.C.
209 Shafter Street
Islandia, New York 11749 (631) 232-2600

PROJECT NAME:
MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

PROJECT FOR:
MARCUS GARVEY PRESERVATION LLC

TITLE:
AS-BUILT OF SUB-SLAB DEPRESSURIZATION SYSTEM

DRAWING NO.
4

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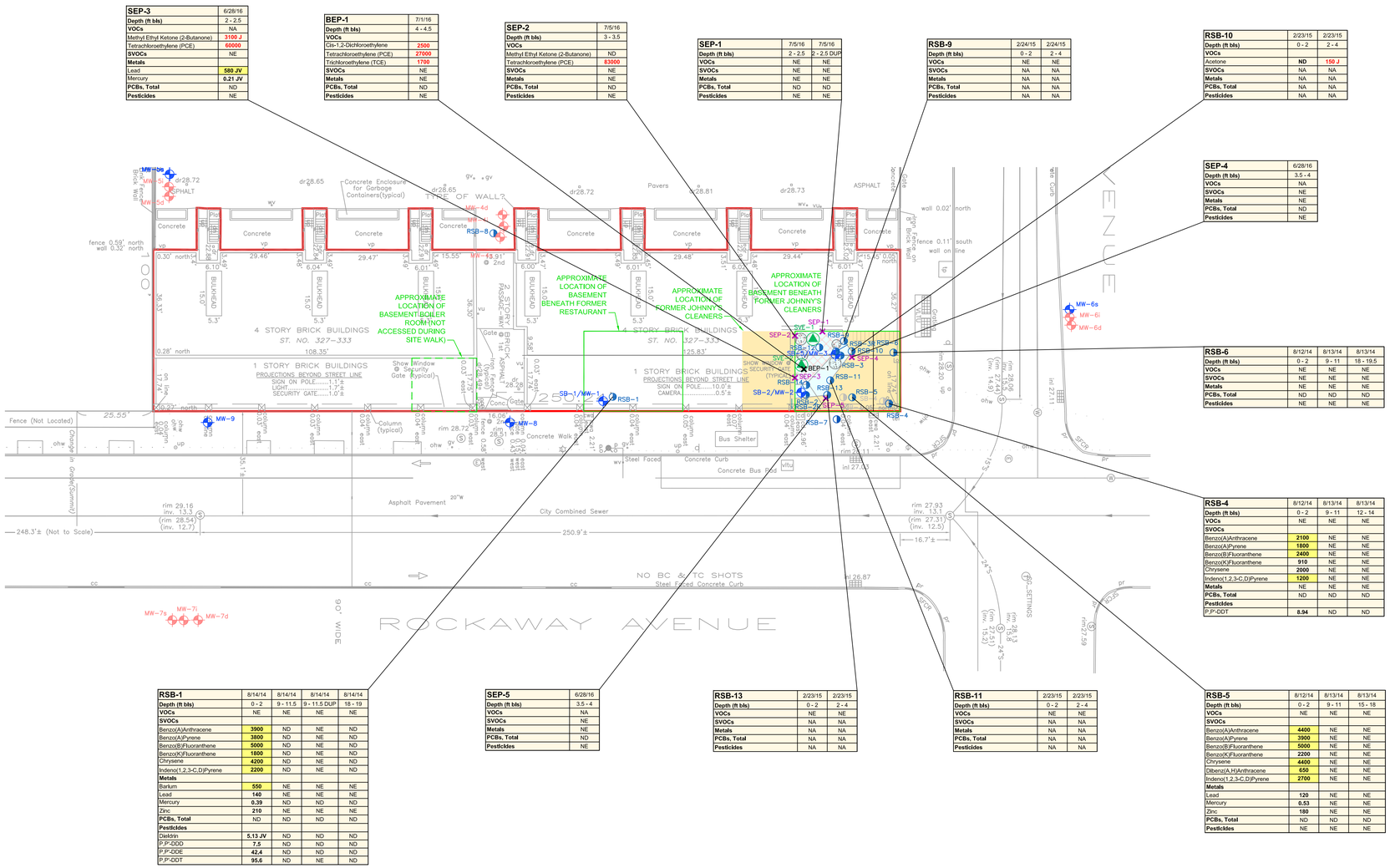

SEP-3	6/28/16
Depth (ft bls)	2 - 2.5
VOCs	NA
Methyl Ethyl Ketone (2-Butanone)	**3100 J**
Tetrachloroethylene (PCE)	**60000**
SVOCs	NE
Metals	
Lead	**580 JV**
Mercury	**0.21 JV**
PCBs, Total	ND
Pesticides	NE

BEP-1	7/1/16
Depth (ft bls)	4 - 4.5
VOCs	
Cis-1,2-Dichloroethylene	**2500**
Tetrachloroethylene (PCE)	**27000**
Trichloroethylene (TCE)	**1700**
SVOCs	NE
Metals	NE
PCBs, Total	ND
Pesticides	NE

SEP-2	7/5/16
Depth (ft bls)	3 - 3.5
VOCs	
Methyl Ethyl Ketone (2-Butanone)	ND
Tetrachloroethylene (PCE)	**83000**
SVOCs	NE
Metals	NE
PCBs, Total	ND
Pesticides	NE

SEP-1	7/5/16	7/5/16
Depth (ft bls)	2 - 2.5	2 - 2.5 DUP
VOCs	NE	NE
SVOCs	NE	NE
Metals	NE	NE
PCBs, Total	ND	ND
Pesticides	NE	NE

RSB-9	2/24/15	2/24/15
Depth (ft bls)	0 - 2	2 - 4
VOCs	NE	NE
SVOCs	NA	NA
Metals	NA	NA
PCBs, Total	NA	NA
Pesticides	NA	NA

RSB-10	2/23/15	2/23/15
Depth (ft bls)	0 - 2	2 - 4
VOCs		
Acetone	**ND**	**150 J**
SVOCs	NA	NA
Metals	NA	NA
PCBs, Total	NA	NA
Pesticides	NA	NA

SEP-4	6/28/16
Depth (ft bls)	3.5 - 4
VOCs	NA
SVOCs	NE
Metals	NE
PCBs, Total	ND
Pesticides	NE

RSB-6	8/12/14	8/13/14	8/13/14
Depth (ft bls)	0 - 2	9 - 11	18 - 19.5
VOCs	NE	NE	NE
SVOCs	NE	NE	NE
Metals	NE	NE	NE
PCBs, Total	ND	ND	ND
Pesticides	NE	NE	NE

RSB-4	8/12/14	8/13/14	8/13/14
Depth (ft bls)	0 - 2	9 - 11	12 - 14
VOCs	NE	NE	NE
SVOCs			
Benzo(A)Anthracene	**2100**	NE	NE
Benzo(A)Pyrene	**1800**	NE	NE
Benzo(B)Fluoranthene	**2400**	NE	NE
Benzo(K)Fluoranthene	**910**	NE	NE
Chrysene	**2000**	NE	NE
Indeno(1,2,3-C,D)Pyrene	**1200**	NE	NE
Metals	NE	NE	NE
PCBs, Total	ND	ND	ND
Pesticides			
P,P'-DDT	**8.94**	ND	ND

RSB-1	8/14/14	8/14/14	8/14/14	8/14/14
Depth (ft bls)	0 - 2	9 - 11.5	9 - 11.5 DUP	18 - 19
VOCs	NE	NE	NE	NE
SVOCs				
Benzo(A)Anthracene	**3900**	ND	NE	ND
Benzo(A)Pyrene	**3800**	ND	NE	ND
Benzo(B)Fluoranthene	**5000**	ND	NE	ND
Benzo(K)Fluoranthene	**1800**	ND	NE	ND
Chrysene	**4200**	ND	NE	ND
Indeno(1,2,3-C,D)Pyrene	**2200**	ND	NE	ND
Metals				
Barium	**550**	NE	NE	NE
Lead	**140**	NE	NE	NE
Mercury	**0.39**	ND	ND	ND
Zinc	**210**	NE	NE	NE
PCBs, Total	ND	ND	ND	ND
Pesticides				
Dieldrin	**5.13 JV**	ND	ND	ND
P,P'-DDD	**7.5**	ND	ND	ND
P,P'-DDE	**42.4**	ND	ND	ND
P,P'-DDT	**95.6**	ND	NE	ND

SEP-5	6/28/16
Depth (ft bls)	3.5 - 4
VOCs	NA
SVOCs	NE
Metals	NE
PCBs, Total	ND
Pesticides	NE

RSB-13	2/23/15	2/23/15
Depth (ft bls)	0 - 2	2 - 4
VOCs	NE	NE
SVOCs	NA	NA
Metals	NA	NA
PCBs, Total	NA	NA
Pesticides	NA	NA

RSB-11	2/23/15	2/23/15
Depth (ft bls)	0 - 2	2 - 4
VOCs	NE	NE
SVOCs	NA	NA
Metals	NA	NA
PCBs, Total	NA	NA
Pesticides	NA	NA

RSB-5	8/12/14	8/13/14	8/13/14
Depth (ft bls)	0 - 2	9 - 11	15 - 18
VOCs	NE	NE	NE
SVOCs			
Benzo(A)Anthracene	**4400**	NE	NE
Benzo(A)Pyrene	**3900**	NE	NE
Benzo(B)Fluoranthene	**5000**	NE	NE
Benzo(K)Fluoranthene	**2200**	NE	NE
Chrysene	**4400**	NE	NE
Dibenz(A,H)Anthracene	**650**	NE	NE
Indeno(1,2,3-C,D)Pyrene	**2700**	NE	NE
Metals			
Lead	**120**	NE	NE
Mercury	**0.53**	NE	NE
Zinc	**180**	NE	NE
PCBs, Total	ND	ND	ND
Pesticides	NE	NE	NE

Parameter (Concentrations in µg/kg)	Standards* (µg/kg)	Standards** (µg/kg)	Standards*** (µg/kg)
VOCs			
Acetone	**50**	**50**	**--**
Cis-1,2-Dichloroethylene	**250**	**250**	**--**
Methyl Ethyl Ketone (2-Butanone)	**120**	**120**	**--**
Tetrachloroethylene (PCE)	**1300**	**1300**	**--**
Trichloroethylene (TCE)	**470**	**470**	**--**
SVOCs			
Benzo(A)Anthracene	**1000**	**--**	**1000**
Benzo(A)Pyrene	**1000**	**--**	**1000**
Benzo(B)Fluoranthene	**1000**	**--**	**1000**
Benzo(K)Fluoranthene	**800**	**--**	**3900**
Chrysene	**1000**	**--**	**3900**
Dibenz(A,H)Anthracene	**330**	**--**	**330**
Indeno(1,2,3-C,D)Pyrene	**500**	**--**	**500**
Metals			
Barium	**350**	**--**	**400**
Lead	**63**	**--**	**400**
Mercury	**0.18**	**--**	**0.81**
Zinc	**109**	**--**	**10000**
PCBs, Total	NE	**--**	NE
Pesticides			
Dieldrin	**5**	**--**	**200**
P,P'-DDD	**3.3**	**--**	**13000**
P,P'-DDE	**3.3**	**--**	**8900**
P,P'-DDT	**3.3**	**--**	**7900**

CONCENTRATIONS IN µg/kg

– RESULTS SHOWN IN BLACK TYPE EXCEED NYSDEC PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES

– RESULTS SHOWN IN RED TYPE EXCEED NYSDEC PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVES

– RESULTS WITH YELLOW BACKGROUND EXCEED NYSDEC PART 375 RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVES

LEGEND

- MW–4 — LOCATION AND DESIGNATION OF MONITORING WELL IN LONG–TERM MONITORING SITE NETWORK
- MW–1 — LOCATION AND DESIGNATION OF MONITORING WELL NO LONGER IN USE
- SVE–1 — LOCATION AND DESIGNATION OF SOIL VAPOR EXTRACTION WELL
- SEP–3 — LOCATION AND DESIGNATION OF SIDEWALL DOCUMENTATION SAMPLE
- BEP–3 — LOCATION AND DESIGNATION OF BOTTOM DOCUMENTATION SAMPLE
- RSB–1 — LOCATION AND DESIGNATION OF SOIL BORING
- SB–4 — LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY ECOSYSTEMS STRATEGIES, INC.
- APPROXIMATE FOOTPRINT OF FORMER JOHNNY'S CLEANERS
- LIMITS OF HOT SPOT EXCAVATION, DISPOSAL AS F–LISTED HAZARDOUS WASTE AND BACKFILL WITH CLEAN DCA TO 4 FEET BBS AND CONCRETE SLAB REMOVAL AND REPLACEMENT
- LIMITS OF HOT SPOT EXCAVATION, DISPOSAL AS NON HAZARDOUS WASTE AND BACKFILL WITH CLEAN DCA TO 4 FEET BBS AND CONCRETE SLAB REMOVAL AND REPLACEMENT
- BCP SITE/ENVIRONMENTAL EASEMENT BOUNDARY
- APPROXIMATE LOCATION OF BASEMENT (DASHED LINE INDICATES BASEMENT NOT ACCESSED DURING SITE WALK)
- SEP — SIDEWALL ENDPOINT SAMPLE
- BEP — BOTTOM ENDPOINT SAMPLE
- FORMER COLUMN FOOTING REMOVED DURING REMEDIATION

TYPICAL DATA BOX INFORMATION

SAMPLE ID →	RSB-6	8/12/14	← SAMPLE DATE
	Depth (ft bbs)	0 - 2	
	VOCs	NE	
	SVOCs		
ANALYTES →	Benzo[b]fluoranthene	1400	← CONCENTRATIONS
	Indeno[1,2,3-cd]pyrene	750	
	Metals	NE	
	Pesticides/Herbicides	ND	

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991–1D).
2. BASEMENT SLAB ELEVATION IS APPROXIMATELY 10 FT BELOW LAND SURFACE.
3. NO PCBs WERE DETECTED.

µg/kg – MICROGRAMS PER KILOGRAM

mg/kg – MILLIGRAMS PER KILOGRAM

* – NYSDEC PART 375 UNRESTRICTED USE SCOs

** – NYSDEC PART 375 PROTECTION OF GROUNDWATER SCOs

*** – NYSDEC PART 375 RESTRICTED RESIDENTIAL SCOs

SCOs – SOIL CLEANUP OBJECTIVES

NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

– – NYSDEC PART 375 SOIL CLEANUP OBJECTIVES NOT APPLICABLE FOR THESE PARAMETERS AT THIS SITE

J – ESTIMATED VALUE

DUP – DUPLICATE SAMPLE

VOCs – VOLATILE ORGANIC COMPOUNDS

SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS

PCBs – POLYCHLORINATED BIPHENYLS

NE – NO EXCEEDANCE

ND – NO DETECTION

NA – NOT ANALYZED FOR BY LABORATORY

FT BLS – FEET BELOW LAND SURFACE

FT BBS – FEET BELOW BASEMENT SLAB (SEE NOTE 2)

AS-BUILT

20' 0 20'

Title:

REMAINING SOIL SAMPLE EXCEEDANCES

MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

Prepared For:
MARCUS GARVEY PRESERVATION LLC

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.C.	Date: 28OCT16	PLATE
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: W.K.	Project: 2158.0002Y002	5
File: 2158.0002Y142.01.DWG		

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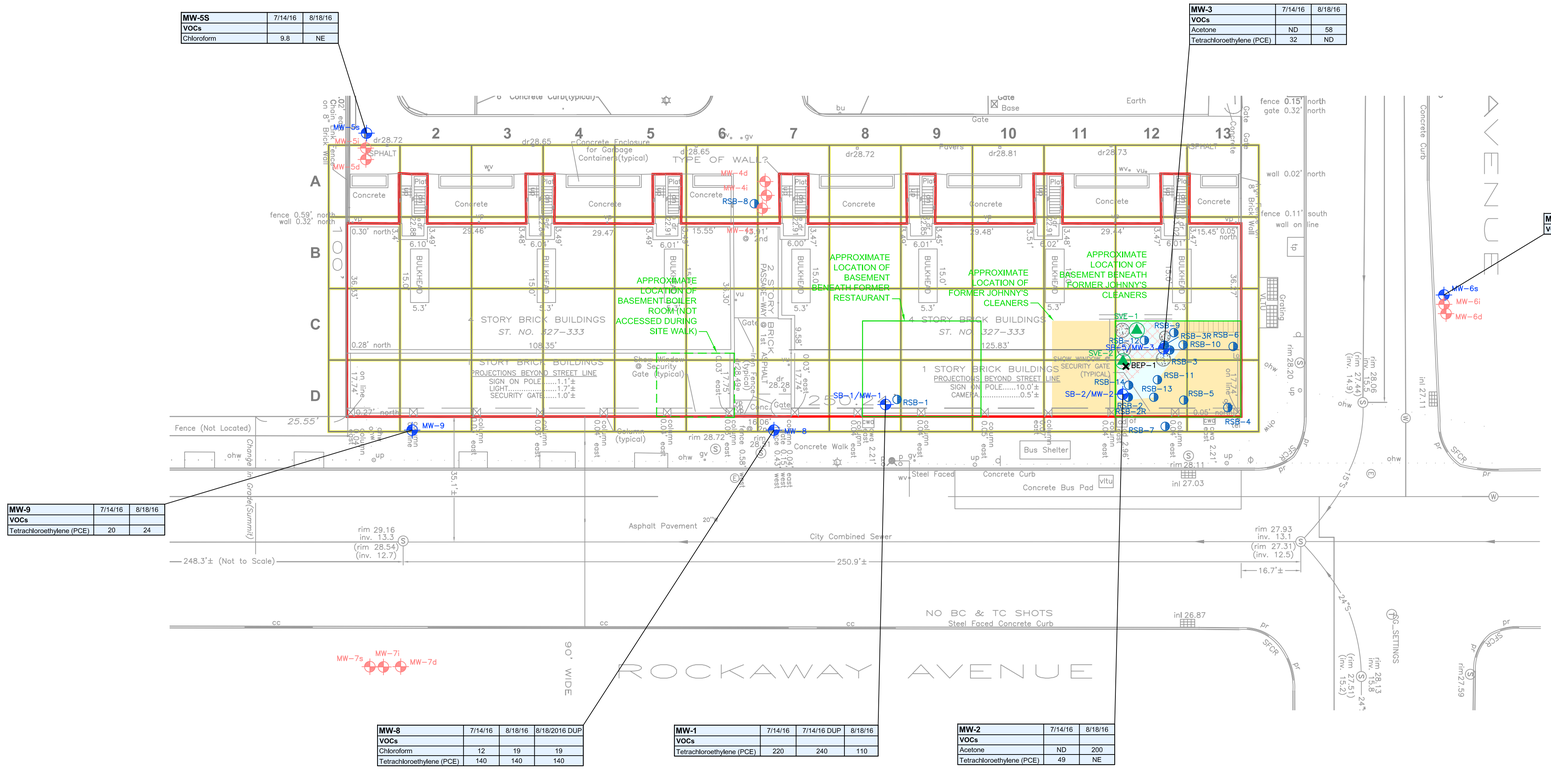

LEGEND

- MW-4 — LOCATION AND DESIGNATION OF MONITORING WELL IN LONG–TERM MONITORING SITE NETWORK
- MW-1 — LOCATION AND DESIGNATION OF MONITORING WELL NO LONGER IN USE
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- SEP — SIDEWALL ENDPOINT SAMPLE
- BEP — BOTTOM ENDPOINT SAMPLE
- FORMER COLUMN FOOTING REMOVED DURING REMEDIATION

TYPICAL DATA BOX INFORMATION

SAMPLE ID →	MW-1	7/14/16	7/14/16 DUP	8/18/16 ← SAMPLE DATE
	VOCs			
ANALYTE →	Tetrachloroethylene (PCE)	220	240	110 ← CONCENTRATION (µg/L)

Parameter	Standards* (µg/L)
VOCs	
Acetone	50
Chloroform	7
Tetrachloroethylene (PCE)	5

CONCENTRATIONS IN µg/L

µg/L – MICROGRAMS PER LITER

* – NYSDEC AWQSGVs

NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

B – FOUND IN LABORATORY BLANK

E – EXCEEDS CALIBRATION LIMIT

D – DILUTION

J – ESTIMATED VALUE

DUP – DUPLICATE SAMPLE

VOCs – VOLATILE ORGANIC COMPOUNDS

NE – NO EXCEEDANCES

ND – NO DETECTION

NOTES

1. SITE PLAN ADAPTED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP (SURVEY NO. 64991–1D).
2. ONLY EXCEEDANCES OF NYSDEC AWQSGVs ARE SHOWN.
3. NO EXCEEDANCES OF SVOCs, PCBs, PESTICIDES, AND HERBICIDES WERE DETECTED.

AS-BUILT

20' 0 20'

Title:

REMAINING GROUNDWATER SAMPLE EXCEEDANCES

MARCUS GARVEY APARTMENTS
650 ROCKAWAY AVE., BROOKLYN, NY

Prepared For:
MARCUS GARVEY PRESERVATION LLC

ROUX ASSOCIATES, INC.
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Project Mgr: W.K.	Project: 2158.0002Y002	
File: 2158.0002Y142.01.DWG		

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