Former Avis Headquarters
NASSAU, NEW YORK

Site Management Plan

NYSDEC Site Number: C130206

JULY 2014

Prepared for:

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Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date
1	May 29, 2015	Change criteria for remediation completion	June 26, 2015

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1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at the Former Avis Headquarters (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index#C130206-11-10 , , Site # C130206, which was executed on November 10, 2010.

1.1.1 General

Equity One (Northeast Portfolio) Inc., Equity One, Inc. (d/b/a Equity One New York) and Equity One Realty & Management FL, Inc. (collectively, Equity One) entered into a BCA with the NYSDEC to remediate a 22-acre property located in Garden City, Town of Hempstead, Nassau, New York. This BCA required the Remedial Party, Equity One, to investigate and remediate contaminated media at the Site. A figure showing the Site location and boundaries of this 22-acre "Site" or "area subject to this plan" is provided in Figure 2. The boundaries of the Site and the portions of the Site subject to the Environmental Easement (the Controlled Property) are more fully described in the metes and bounds descriptions included as Appendix A.

After completion of the remedial work described in the Interim Remedial Measures (IRM) Work Plan (IRMWP) and Remedial Action Work Plan (RAWP), detectable concentrations of tricholorothene (TCE) and tetrachloroethene (PCE) were unexpectedly measured in the soil vapor beneath the two stores labelled Retail D and Retail F (see Figure 2). Active soil vapor

remediation has been initiated to eliminate the residual soil vapor concentrations and these engineering controls are expected to operate for a limited period that will require an Site Management Plan (SMP) and easement, however, it is firmly expected that the Track 1 COC will be maintained. This SMP was prepared to manage remaining soil vapor contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Roux Associates, Inc. and Remedial Engineering, P.C. (collectively referred to hereafter as Roux Associates) , on behalf of Equity One, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the temporary Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.1.2 Purpose

The Site contains contamination left in soil vapor after completion of the remedial action. The residual soil vapor concentrations were unexpected after the completion of Track 1 cleanups in soil and groundwater. ECs have been incorporated into the Site remedy to control exposure to remaining contamination during the use of the Site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Nassau County Clerk, will require compliance with this SMP and all temporary ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all temporary ECs and ICs at the Site. 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.

This SMP provides a detailed description of all procedures required to address residual soil vapor contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all vapor mitigation systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of vapor mitigation systems.

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to 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 #C130206-11-10; Site #C130206) for the Site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. 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.

1.2 SITE BACKGROUND

Relevant Site background information is presented in this section.

1.2.1 Site Location and Description

The Site is located in Garden City, in the Town of Hempstead, County of Nassau, New York and is identified as Block 67 and Lots 26, 27, and 28 on the Nassau County Tax Map. The Site is an approximately 22-acre area bounded by Old Country Road to the north, commercial/industrial properties to the south, Zeckendorf Boulevard to the east, and East Gate Boulevard to the west (see Figure 1). The boundaries of the Site and the Controlled Property are more fully described in Appendix A – Metes and Bounds.

1.2.2 Site History

The Site was originally part of the former Roosevelt Airfield and formerly contained at least four airplane hangars. By the late 40s, the Site was occupied by the American Bosch Arma Corp., which conducted manufacturing and testing of sonar and defense systems guidance instrumentation. American Bosch Arma operated in the former buildings found at the Site (Avis, Cendant Storage and Manufacturing Buildings – Figure 2) until approximately 1968. American Machine and Foundry (AMF) operated at the site from 1970 to approximately 1980. From 1980 until 2001, Avis Rent-A-Car leased the property from the Simon Group for use as its world headquarters. The Site was vacant from 2001 until 2010, with the exception of a furniture store (Thomasville Home Furnishings) located in the northwest corner of the property that remained active until late 2011.

All former Site structures have been demolished and the Site has been redeveloped as a retail shopping center with two large buildings each subdivided into multiple retail spaces. The buildings occupy the western (Building A) and southern (Building B) sides of the Site (Figure 2), and several new smaller stand-alone slab-on-grade retail/commercial buildings are located along the northern Site boundary. There is a sub-grade parking structure beneath the entirety of Building B, with the exception of two slab-on-grade areas to the south of the building, on the eastern and western sides. The balance of the Site is paved parking areas, sidewalks, and landscaped medians.

In 2009, Phase I and Phase II Remedial Investigations of the Site were performed at the request of the previous owners. In 2010 and 2011, following a property transfer, and entry

into the BCP as a Volunteer, a Remedial Investigation was performed, the details of which were provided in the Remedial Investigation Report/ Alternatives Analysis Report/ Remedial Action Work Plan (RIR/AAR/RAWP) dated October 14, 2011. The IRM Work Plan was implemented in 2011 and achieved a Track 1 Unrestricted Use soil remedy. Details were provided in the Interim Remedial Measures Completion Report (IRMCR) dated October 25, 2011. Following completion of the Track 1 groundwater remedy and initiation of the soil vapor monitoring remedy, a Final Engineering Report (FER) was submitted on June 21, 2012. The quarterly soil vapor monitoring program began in March 2012. Elevated sub-slab soil vapor concentrations were detected in Retail D during the last three quarters of 2012 which led to the identification of the vapor issue in this store. A Track 1 Certificate of Completion (COC) was issued by NYSDEC on August 13, 2012.

1.2.3 Geologic Conditions

The Site is underlain by glacial deposits of fluvial sand and gravels. There were areas beneath the former buildings that had been raised above the former grade by the placement of fill material for construction. This fill material was removed during implementation of the IRM and redevelopment of the Site.

Groundwater depth ranges across the Site and is encountered between 21 and 22 feet below land surface. Groundwater flow is toward the southwest.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the site. The results of the RI are described in detail in the following reports:

- Remedial Investigation Report/ Alternatives Analysis Report/ Remedial Action Work Plan (RIR/AAR/RAWP), October 14, 2011; and
- Interim Remedial Measures Completion Report (IRMCR), October 25, 2011.

Generally, the RI determined that there were limited areas of soil, soil vapor and groundwater contamination present in several areas of the Site. The primary Areas of Concern (AOCs)

were soil near a former septic leaching pool network and parking lot drainage drywells, presumed historic fill material beneath the former building, and groundwater and soil vapor impacts in the south/southeastern portion of the Site.

Below is a summary of Site conditions when the RI was performed in 2010 and 2011:

Soil

Soil samples collected during the RI indicated the presence of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, pesticides, and polychlorinated biphenyls (PCBs) in concentrations above the Unrestricted Use Soil Cleanup Objectives (SCOs). As described in the following sections, all of these exceedances were successfully addressed through the IRM and Remedial Actions completed at the Site. All final post-excavation soil samples met Part 375 Unrestricted Use SCOs, and a Track 1 COC was received on August 13, 2012.

Site-Related Groundwater

Groundwater samples collected during the RI indicated limited areas of concern related to chlorinated VOCs in the south and southeast corner of the Site and a detection of hexavalent chromium at one central well (MW-2) that exceeded the Ambient Groundwater Quality Standards (AWQs). All of these exceedances were successfully addressed through an in-situ chemical injection program. A post-injection groundwater monitoring program was conducted for four quarters following the injections that verified all onsite groundwater met AWQs. The monitoring was discontinued in June 2013 with NYSDEC approval.

Site-Related Soil Vapor Intrusion

Soil vapor samples collected during the RI indicated the potential for impacts related to chlorinated VOCs in the southeast corner of the Site and one location beneath the former Cendant Building (Figure 3).

To address the location beneath the former Cendant Building, soil excavation to a depth of 10 feet was performed as part of the IRM. The NYSDEC-approved remedy for the

remainder of the soil vapor detections in the southeast corner of the Site was a soil vapor monitoring program to verify soil vapor intrusion was not occurring within any of the new buildings being constructed on the Site. Additionally, piping for possible use as a sub-slab depressurization system (SSDS) was installed beneath the new building slabs as shown on Plates 3, 4 and 5 in Appendix C. Monitoring data from March 2012 to January 2014 is shown on Figure 4. At present, the remedy for soil vapor is the only engineering control being implemented at the Site and is described in detail in the following sections.

Underground Storage Tanks

All underground storage tanks formerly used at the Site had been removed prior to the Volunteer's purchase of the Site.

1.4 SUMMARY OF REMEDIAL ACTIONS

The site was remediated in accordance with the NYSDEC-approved IRMWP, dated April 29, 2011, IRMWP Addendum, dated May 27, 2011, Remedial Action Work Plan, dated October 14, 2011, Soil Vapor Work Plan, dated March 11, 2013, and Soil Vapor Extraction (SVE) System Expansion Work Plan, dated January 22, 2014.

The following is a summary of the Remedial Actions performed at the Site:

1. Excavation of soil/fill exceeding Unrestricted Use SCOs resulting in a Track 1 COC received on August 13, 2012;
2. In-situ treatment of low concentration groundwater contamination, resulting in all groundwater samples meeting the AWQs and NYSDEC approval to terminate groundwater monitoring;
3. Implementation of a soil vapor monitoring program, which is ongoing and discussed further in this SMP;
4. Installation of an SVE system in Retail D of Building A, operation of which is ongoing and discussed further in this SMP;
5. Conversion of the passive sub-slab SSDS in Retail F to an active SSDS, operation of which is ongoing and discussed further in this SMP;
6. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any soil vapor contamination remaining at the site;

7. Development and implementation of a SMP for temporary management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting.

Remedial activities for soil were completed at the Site in January 2012. Remedial activities for groundwater were completed in June 2013. Remedial activities for soil vapor are ongoing.

1.4.1 Removal of Contaminated Materials from the Site

A Track 1 Cleanup was achieved for this Site and consisted of the excavation and offsite disposal of approximately 33,000 cubic yards (50,000 tons) of soil through an IRM conducted during the spring of 2011. A final drywell remediation in the northwest corner of the Site was completed in January 2012. All final post-excavation samples met the Part 375 Unrestricted Use SCOs. A figure showing areas where excavation was performed is shown in Figure 2.

1.4.2 Site-Related Treatment Systems

Groundwater was remediated through an in-situ injection program using temporary injection points that are no longer present at the Site. Locations where injections took place are shown on Figure 2.

As part of the redevelopment of the Site and the NYSDEC-approved RAWP, a 15-mil vapor barrier and a passive SSDS was installed beneath the new building concrete slabs-on grade during construction. The passive SSDS consists of a series of four-inch diameter perforated PVC collection pipes embedded in a 12-inch thick gravel layer.

After several quarters of soil vapor monitoring and repeated detections of elevated concentrations of TCE and PCE, an SVE system was installed in Retail Space D (May 2013) and additional SVE wells were added to this system in February 2014. The SVE system consists of a 2 Hp regenerative blower and knockout tank connected to the SVE wells and the 6-inch diameter steel discharge pipe of the passive SSDS installed below Retail Space D.

Similarly, following the detection of sub-slab concentrations of chlorinated VOCs in Retail F, the passive sub-slab piping was converted to an active SSDS (October 2013) through the installation and connection of a 2 Hp regenerative blower.

1.4.3 Remaining Contamination

As discussed above, a Track 1 Cleanup was achieved for this Site. Groundwater was remediated and NYSDEC approved termination of the post-injection groundwater monitoring program in June 2013. Limited soil vapor impacts remain beneath two retail spaces which are currently being addressed by an SVE system (Retail D) and an active SSDS (Retail F) (Figure 4), in conjunction with quarterly soil vapor and indoor air monitoring.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated soil vapor exists beneath the site, temporary Engineering Controls and Institutional Controls (EC/ICs) are being implemented to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A Health and Safety Plan (Appendix B); and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

2.2.1 Engineering Control Systems

2.2.1.1 SVE System (Retail D)

As discussed in Section 1.4.2, an SVE system has been installed in Retail Space D. The original SVE system consisted of three vertical SVE wells (VE-1 to VE-3) and was expanded by the addition of two additional vertical SVE wells (VE-4 to VE-5). Four of the SVE wells (VE-1 to VE-4) were installed to approximately 5 feet below the concrete slab and one SVE

well (VE-5) was installed to approximately 15 feet below the concrete slab. A 2-Hp regenerative blower was connected to the SVE wells via 4-inch diameter PVC piping installed underneath the concrete slab as shown in Appendix C. The blower is rated for 120 cubic feet per minute and 60 inches of water vacuum. The blower was installed in the telephone room behind the retail space. A knock-out tank was also installed at the inlet to the blower to prevent water from being drawn into the blower. The knock-out tank has a high level switch to shut down the blower if the knock-out tank fills with water. A dilution valve has been installed at the inlet to the blower to control the vacuum and flow rate. Vacuum gauges have been installed at the knock out tank and the inlet to the blower. A pressure gauge was installed on the discharge of the blower. The discharge from the blower was connected to the existing 6-inch diameter steel discharge pipe that was part of the passive SSDS installed during construction of the building. No vapor phase treatment was installed because the air sampling conducted during operation of the SVE demonstrated that no vapor treatment was required based on an NYSDEC Air Guide-1 analysis.

Procedures for operating and maintaining the SVE system are documented in the Operation and Maintenance Plan (Section 4 of this SMP). Procedures for monitoring the system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the site, occurs.

2.2.1.2 Sub-Slab Depressurization System (SSDS) (Retail F)

As discussed in Section 1.4.2, the passive SSDS in Retail Space F was converted to an active SSDS by installing a 2-Hp regenerative blower to the existing passive SSDS 6-inch steel diameter discharge piping. The 6-inch diameter steel discharge piping has a manual valve that was closed. The inlet to the blower was installed below the manual valve (to allow for the vacuum to be applied to the sub-slab perforated pipe) and the outlet of the blower was installed above the valve as part of the conversion to an active SSDS. The blower is rated for 120 cubic feet per minute and 60 inches of water vacuum. The blower was installed in the domestic water supply closet behind the retail space. A knock-out tank was also installed at the inlet to the blower to prevent water from being drawn into the blower. The knock-out

tank has a high level switch to shut down the blower if the knock-out tank fills with water. A dilution valve has been installed at the inlet to the blower to control the vacuum and flow rate. Vacuum gauges have been installed at the knock out tank and the inlet to the blower. A pressure gauge was installed on the discharge of the blower. No vapor phase treatment was installed because the air sampling conducted during operation of the SVE demonstrated that no vapor treatment was required based on an NYSDEC Air Guide-1 analysis.

Procedures for operating and maintaining the SSDS system are documented in the Operation and Maintenance Plan (Section 4 of this SMP). Procedures for monitoring the system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the site, occurs.

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2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

The ECs will be terminated upon a determination by NYSDEC and New York State Department of Health (NYSDOH) that the remedial objectives for soil vapor have been met (i.e., there have been three (3) consecutive quarters of soil vapor sampling result in a "no further action or monitor" scenario based on the matrices set forth in the "Guidance for Evaluating Vapor Intrusion in the State of New York" NYSDOH Guidance).

2.2.2.1 Soil Vapor Extraction (SVE) System (Retail D)

SVE system operation will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the SVE system is no longer required, a proposal to permanently discontinue the system will be submitted by the property owner to the NYSDEC. Conditions that warrant permanently discontinuing the SVE system include: (1) three quarters of vapor intrusion monitoring as follows:

Quarter	System Status	Sample Result
Quarter 1	2 mos. operation, shut down 1 mo. prior to sampling	NFA or Monitor
Quarter 3	Shut down	NFA or Monitor
Quarter 4	Shut down	NFA or Monitor

(2) monitoring data have become asymptotic to a low level over an extended period of time as accepted by the NYSDEC, or (3) the NYSDEC has determined that the SVE system has reached the limit of its effectiveness.

The system will remain in place and operational until permission to discontinue use is granted in writing by the NYSDEC.

2.2.2.2 Sub-slab Depressurization System (SSDS) (Retail F)

Active SSDS operation will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the active SSDS is no longer required, a proposal to permanently discontinue the SSDS will be submitted by the property owner to the NYSDEC and the NYSDOH. Conditions that warrant permanently discontinuing the SSDS include: (1) three quarters of vapor intrusion monitoring as follows:

Quarter	System Status	Sample Result
Quarter 1	2 mos. operation, shut down 1 mo. prior to sampling	NFA or Monitor
Quarter 3	Shut down	NFA or Monitor
Quarter 4	Shut down	NFA or Monitor

(2) monitoring data have become asymptotic to a low level over an extended period of time as accepted by the NYSDEC, or (3) the NYSDEC has determined that the SSDS has reached the limit of its effectiveness.

The system will remain in place and operational until permission to discontinue use is granted in writing by the NYSDEC.

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2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the site to Unrestricted uses only. Since a Track 1 Unrestricted Use cleanup was achieved for soil, and groundwater was successfully remediated to AWQs, the ICs discussed in this Site Management Plan pertain to remaining soil vapor contamination only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. These ICs are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP;
- Soil vapor and other environmental or public health monitoring must be performed as defined in this SMP; and
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP.

ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

Adherence to these ICs is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The property may only be used for existing commercial use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;

- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area noted on Figure, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the property are prohibited;
- The site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Soil Vapor Intrusion Evaluation

A soil vapor intrusion (SVI) mitigation system (SSDS piping) was installed as an element of the building foundations beneath Building A on the eastern portion of the Site, and beneath the slab-on-grade portion of Retail F in Building B. An SVE system was installed in Retail D in May 2013, and the passive sub-slab depressurization system piping in Retail F was converted to an active SSDS in October 2013 in accordance with NYSDEC approved work plans and the NYSDOH Guidance.

Soil vapor monitoring results, evaluations, and follow-up actions are summarized in Letter Reports submitted to NYSDEC following each sampling event.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. 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;
- Sampling and analysis of appropriate media during monitoring events;
- If site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system.

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Brownfield Cleanup Agreement (BCA), 6NYCRR Part 375, and/or Environmental Conservation Law.
- 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 shall be submitted to the NYSDEC within

45 days and shall describe and document 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 has been provided with a copy of the Brownfield Cleanup Agreement (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.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to Craig A. Werle, of Roux Associates, Inc. These emergency contact lists must be maintained in an easily accessible location at the site.

Table 1: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline:	(800) 457-7362

Table 2: Contact Numbers

Craig A. Werle, Roux Associates, Inc.	631-232-2600
Joseph Cava, Equity One, Inc.	516-821-0445

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 900 Old Country Road, Garden City, New York

Nearest Hospital Name: Winthrop University Hospital

Hospital Location: 259 First Street, Mineola, New York

Hospital Telephone: 516-663-2727

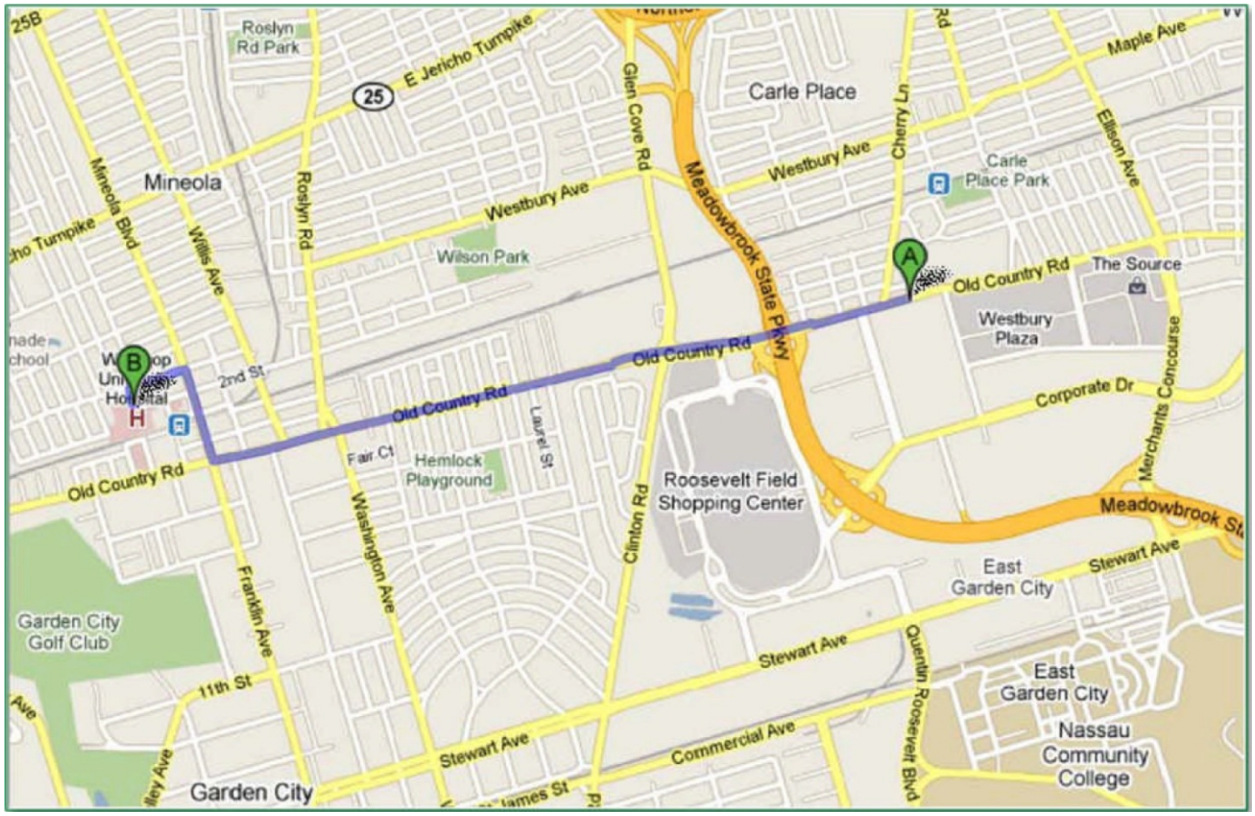
Directions to the Hospital:

1. Turn left (west) onto Old Country Road (1.8 miles)
2. Turn right onto Mineola Boulevard (0.2 miles)
3. Turn left onto First Street (0.2 miles)
4. Arrive at Winthrop University Hospital on the left

Total Distance: 2.2 miles

Total Estimated Time: 5 minutes

Map Showing Route from the site to the Hospital:



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 1). The list will also be posted prominently at the Site and made readily available to all personnel at all times.

2.5.4 Spills Procedure

Water adsorbent pads will be stored in the rooms housing the blowers and knockout tanks, in the case of a water spill. The water adsorbent pads will be used to remove any spilled water. The used water absorbent pads will be properly disposed of.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate residual soil vapor contamination at the site. Monitoring of the ECs themselves is described in Chapter 4, Operation and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of indoor air, and soil vapor;
- Assessing compliance with the NYSDOH Guidance;
- Assessing achievement of the remedial performance criteria;
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the soil vapor monitoring activities.

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

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (SVE well logs);
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- SVE well decommissioning procedures; and
- Annual inspection and periodic certification.

Quarterly monitoring of the performance of the remedy and overall reduction in soil vapor contamination on-site will be conducted. Trends in contaminant levels in indoor air, and soil vapor in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. The monitoring program is summarized in Table 3 and outlined in detail in Section 3.2 below.

Table 3: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Soil Vapor	Quarterly	Soil Vapor/Indoor Air	TO-15

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 MEDIA MONITORING PROGRAM

3.2.1 Indoor Air and Soil Vapor Monitoring

Indoor air and soil vapor monitoring will be performed on a quarterly basis to assess the performance of the remedy.

The network of soil vapor monitoring points has been installed to monitor soil vapor concentrations beneath newly constructed Buildings A and B at the Site. The network of on-site soil vapor monitoring points has been designed based on the soil vapor sample results obtained during the RI and the location of the new buildings. The soil vapor monitoring point locations are shown on Figures 2 and 4.

A detail of a typical soil vapor monitoring point is included in Appendix C.

The soil vapor monitoring program consists of the quarterly collection of soil vapor samples from the three soil vapor monitoring points located in Retail D (SVD-1), and Retail F (SVF-1 and SVF-2), along with the collection of a concurrent indoor air sample from each Retail space and one outdoor ambient air sample. The sampling frequency may be modified with the approval of NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC. Deliverables for the indoor air and soil vapor monitoring program are specified below.

3.2.1.1 Sampling Protocol

All vapor sampling activities will be recorded in a field book and a soil vapor sampling log presented in Appendix D. Other observations (e.g., well integrity, notable tenant activities, etc.) will be noted on the well sampling log. The soil vapor sampling log will serve as the inspection form for the soil vapor monitoring point network. An Indoor Air Quality Questionnaire and Building Inventory form (Form OSR-3 in the NYSDOH Guidance) will be completed for each sampling event and for each area that is sampled.Approximately one month prior to the next sampling event (anticipated May 2014), the SSDS (Retail F) and SVE system (Retail D) will be shut down to allow for the collection of representative samples. Following sample collection, the system at each location will be restarted and resume normal operation. If the sample results from the next round of sampling indicate NFA per the NYSDOH Guidance, the system will be shut down approximately two months prior to the next subsequent sampling event (anticipated August 2014). If the sample results again indicate NFA per the NYSDOH Guidance, the system will remain shut down and vapor intrusion monitoring will be continued for two more quarters (anticipated November 2014 and February 2015).

To sample the soil vapor monitoring points, six-liter, lab-certified-clean SUMMA canisters fitted with an eight-hour flow controller and an in-line filter will be affixed to the soil vapor point tubing. Prior to collection of the samples, the vapor points will be purged of a minimum of one well volume. A tracer gas (i.e., laboratory grade helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the efficacy of the seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. The vacuum present within the canister will extract the soil vapor from the subsurface into the canister. Based on a volume of six liters and a sample time of eight hours, soil vapor will be extracted at a flow rate of approximately 0.01 liters per minute. [Note: As per the NYSDOH Guidance, since these are permanent monitoring points, tracer gas testing was performed at each soil vapor point during initial rounds of sample collection, and currently is performed on at least one monitoring point (minimum of 10% of sample locations) per sample event].

Indoor air quality samples and an outdoor ambient sample will be collected concurrent with the sub-slab samples and will be collected in accordance with procedures specified by NYSDOH guidance. This will include the use of six liter, lab-certified-clean, SUMMA canisters fitted with an eight hour flow controller. The canister will be placed four to five feet above the ground in the normal breathing zone.

Following collection of the soil vapor and indoor air quality samples, the samples will be shipped following proper chain-of-custody procedures to an NYSDOH ELAP-certified laboratory for analysis of volatile organic compounds (VOCs) in accordance with EPA Method TO-15.

3.2.1.2 Soil Vapor Monitoring Point Repairs, Replacement And Decommissioning

Soil vapor monitoring points will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the soil vapor monitoring point 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 soil vapor monitoring points for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent letter report. Soil vapor monitoring point decommissioning without replacement will be done only with the prior approval of NYSDEC. Soil vapor monitoring point abandonment will be performed in accordance with NYSDOH Guidance. Soil vapor monitoring points that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.3 SITE-WIDE INSPECTION

System inspections will be performed on a regular schedule at a minimum of once a year. System 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 (Appendix E). 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;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that Site records are up to date.

3.4 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the following the Quality Assurance Project Plan (QAPP) prepared for the site (Appendix F). Main Components of the QAPP include:

- All soil vapor and indoor air samples will be analyzed by a New York State Environmental Laboratory Approval Program (ELAP) certified laboratory.
- Sub-slab Soil Vapor and Indoor Air Sampling Program:
  - Sample containers will be properly washed, and decontaminated prior to their use by the analytical laboratory.
  - Sample holding times will be in accordance with the NYSDEC ASP requirements.
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sub-slab Soil Vapor and Indoor Air Samples will be transported to the laboratory using proper Chain of Custody procedures.
- Calibration Procedures:
  - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.

- Analytical Procedures include analysis via EPA Method TO-15, with detection limits in Indoor and Outdoor Air samples for all Matrix 1 compounds at a minimum of 0.25 µg/m^3, and detection limits in Sub-slab vapor samples for all Matrix 1 compounds at a minimum of 5 µg/m^3, as required in the NYSDOH Guidance.
- Internal QC and Checks.
- QA Performance and System Audits.
- Preventative Maintenance Procedures and Schedules.
- Corrective Action Measures.

3.5 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP. All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report to NYSDEC will also be prepared, subsequent to each sampling event. The letter report will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of 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;
- Indoor Air Quality Questionnaire and Building Inventory Form; and

- A determination as to whether soil vapor conditions have changed since the last reporting event.

Data will be reported in digital format per the current procedure. A summary of the monitoring program deliverables are summarized in Table 4 below.

Table 4: Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Sample Results Letter Summary Report	Quarterly
Periodic Review Report	Annual

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the SVE and SSDS being operated at the Site. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS and SVE systems;
- Includes an operation and maintenance contingency plan; and
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSDS and SVE systems are operated and maintained.

A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 ENGINEERING CONTROL SYSTEM OPERATION AND MAINTENANCE

This section describes the operation and maintenance activities that have been and will be performed at the Site. These activities include:

- Performance monitoring of the SVE system and SSDS; and
- Inspection and maintenance of the SVE system and SSDS.

4.2.1 Scope

The operation and maintenance requirements include guidelines for general O&M practices and procedures that will be used to control the equipment performance and reliability.

4.2.2 System Start-Up and Testing

4.2.2.1 SVE System Start-Up

The SVE system was originally started on May 9, 2013. A vacuum of approximately 10 in. w.c. was measured at the blower inlet (dilution valve 100% closed). The vacuum readings measured

at eight existing Gore-sorber locations (Figure 1A in Appendix C) during start-up are as follows:

A1 = 0.04 inches of water (in. of w.c.)

A2 = 0.04 in. of w.c.

A4 = 0.4 in. of w.c.

B1 = 0.001 in. of w.c.

B2 = 0.18 in. of w.c.

B3 = 0.32 in of w.c.

C2 = 0.03 in. of w.c.

C3 = 0.5 in. of w.c.

Please note that Gore-sorber locations A3, C1 and C4 were converted to SVE wells VE-2, VE-1 and VE-3, respectively.

The expanded SVE system was started on February 28, 2014. A vacuum of approximately 8 in. w.c. was measured at the blower inlet (dilution valve 100% closed). The vacuum readings measured at five existing Gore-sorber locations during start-up are as follows:

A1 = 0.002 inches of water (in. of w.c.)

A2 = 0.023 in. of w.c.

A4 = 0.43 in. of w.c.

B1 = 0.001 in. of w.c.

B2 = 0.125 in. of w.c.

Gore- sampler location B4 was converted to a SVE well (VE-4) and Gore-sorber locations B3, C1, and C2 were lost during trenching and installation of the SVE piping.

4.2.2.2 Active SSDS Start-up

The active SSDS was started on October 2, 2013. A vacuum of approximately 8 in. w.c. was measured at the blower inlet (dilution valve 100% closed). As the soil vapor monitoring points are located in an active retail store, only the blower inlet vacuum was measured during start-up.

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

4.2.3 System Operation: Routine Operation Procedures

Routine operation procedures of the SVE system and SSDS consist of monthly monitoring the vacuum at the blower inlet and dilution valve setting (i.e., 50% open), and PID readings of the blower effluent.

4.2.4 System Operation: Routine Equipment Maintenance

The routine maintenance activities include monthly visual inspections, operating data collection and general maintenance. Visual inspection is the routine part of the SVE system and SSDS operator's activities. The system operator will note any conditions which present a potential hazard or could cause future system shutdown on an Operating Log (Appendix F). 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 will be performed in accordance with manufacturer's instructions. Specific routine maintenance tasks are outlined below:

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

4.2.5 System Operation: Non-Routine Equipment 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 will be performed in accordance with

manufacturer's instructions and will be recorded on a Non-routine Maintenance Form (Appendix F). Specific non-routine maintenance tasks are outlined below:

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

If water accumulates in a knockout tank, the high level float switch will shutdown the blower. A manual drain has been provided on the bottom of each knockout tank. The water in the knockout tank will be sampled for disposal purposes. Following receipt of the water sample results, a hose will be attached to the manual drain and the manual drain valve will be opened and the knockout water will be gravity drained to a 55-gallon drum and properly disposed of off-site.

4.3 ENGINEERING CONTROL SYSTEM PERFORMANCE MONITORING

To ensure that the SVE system and SSDS perform as designed, a sampling and monitoring plan has been implemented. Soil vapor samples will also be collected from the sub-slab monitoring points to evaluate the performance and effectiveness of the SVE system and SSDS in mitigating the sub-slab soil vapor using 6-liter Summa Canisters and analyzed for USEPA TO-15. During the initial start-up of the SVE system and SSDS, an air sample was collected using a 6-liter Summa Canister and was analyzed for USEPA TO-15.

The results of the air samples were used to determine the need for vapor phase treatment by performing a Division of Air Resources (DAR-1) Air Guide analysis on the air sample results. The calculations are presented in Table 1 in Appendix C. The Air Guide calculations generated Maximum Annual Impact concentrations which are compared to allowable impacts. The calculated and allowed values are as follows: PCE (actual 0.0004 ug/m3 vs allowed1.0 ug/m3) and TCE (actual 0.00026 ug/m3 vs. 0.5 ug/m3 allowed). Additionally, Short Term Impact concentrations were also calculated and compared to allowable impacts as follows: PCE (actual 0.023 ug/m3 vs 1,000.00 ug/m3 allowed) and TCE (actual 0.02 ug/m3 vs. 14,000.00 ug/m3 allowed). Based on the Air Guide analysis that shows the maximum annual impact concentrations for both PCE and TCE are four orders of magnitude below the allowable limit

and the maximum short term concentrations for both compounds are seven orders of magnitude below the allowed limit, routine performance monitoring of the effluent following start up of the blowers will be monitored with a PID. Any increase in PID concentrations above the starting baseline will result in the collection of a summa sample to verify compliance.

In addition, system monitoring will be performed by collecting operating data such as flow rates, vacuums and pressures from the treatment system components and measuring vacuum in the sub-slab vapor monitoring points.

4.3.1 Monitoring Schedule

The SVE system and SSDS will be monitored on a monthly basis. Sub-slab vapor samples will be collected per the monitoring schedule discussed in Section 3.2.1.

Inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the SVE system and/or SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SVE system and SSDS are specified later in this Plan.

4.3.2 General Equipment Monitoring

A visual inspection of the SVE system and SSDS will be conducted during each monitoring event. SVE system and SSDS components to be monitored include, but are not limited to, the following:

- Vacuum/pressure and air flow readings at the blower;
- Vacuum readings at the sub-slab vapor monitoring points; and
- PID readings of the blower effluent.

A complete list of components to be checked is provided in the Inspection Checklist, presented in Appendix E. If any equipment readings are not within their typical 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 are required immediately, and the system restarted.

4.3.3 System Monitoring Devices and Alarms

The SVE system and the SSDS have a float switch for the knockout tank to indicate a high liquid level in the knockout tank that will shut down the system. The blower for each system has an overload relay that will shut down the blower for too high voltage or current.

In the event that the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SVE system and/or SSDS restarted. Operational problems will be noted in the subsequent Letter Report.

4.3.4 Sampling Event Protocol

All SVE system and SSDS monitoring sampling activities will be recorded in a field book and a monitoring log. The sub-slab vapor monitoring point sampling protocol will follow the procedures discussed in Section 3.2.1. The air samples collected during the initial start-up of the SVE and SSDS will follow the procedures discussed in Section 3.2.1.

4.4 MAINTENANCE AND PERFORMANCE MONITORING REPORTING REQUIREMENTS

Maintenance reports and any other information generated during regular operations at the site will be kept on-file. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in the Section 5 of this SMP.

4.4.1 Routine Maintenance Reports

Checklists or forms (Appendices E and F) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the following information:

- Date;
- Name, company, and position of person(s) conducting maintenance activities;

- Maintenance activities conducted;
- 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).

4.4.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form (Appendix F) will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/ repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- 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).

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms which are contained in Appendices D, E and F. Additionally, a general site-wide inspection form will be completed during the site-wide inspection (see Appendix E). These forms are subject to NYSDEC revision.

Applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items; and
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare the following certification:

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

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

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

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the Department every year, beginning fifteen months after the Certificate of Completion is issued. The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also 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 inspection forms and other records generated for the site during the reporting period in electronic format;
- 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), 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 electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific 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 Plan for the media being monitored;

  - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; 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 was run for the reporting period;
  - The average, high, and low flows per day;
  - The contaminant mass removed;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation.

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

5.4 CORRECTIVE MEASURES 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 IC or EC, a corrective measures 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 plan until it is approved by the NYSDEC.

FIGURES

1. Site Location Map
2. Remedial Investigation Soil Vapor Monitoring Data
3. Soil Vapor Monitoring Data March 2012 – January 2014
4. Remedial Action Work Plan Elements

N

0 1000' 2000'

Title:

SITE LOCATION MAP

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NY 11530

Prepared for:

EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: B.H.	Date: 12MAR14	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: C.W.	Project No.: 1924.0001Y000	
File: 1924.0001Y208.01.CDR		

\1924Y0001Y208\1924 0001Y208 01 CDR

OLD COUNTRY ROAD

FORMER THOMASVILLE FURNITURE BUILDING

FORMER AVIS BUILDING

BUILDING A

Retail A

Retail B

Retail C

Retail D

Retail E

FORMER CENDANT BUILDING

BUILDING B

Retail I

Retail H

Retail G

Retail F

Underground Parking Garage

FORMER STORAGE BUILDING

FORMER MANUFACTURING BUILDING

SEPTIC TANK

TO NASSAU COUNTY RECHARGE BASIN

PROPERTY BOUNDARY

Metal Reductive Compound (MRC) Injection Points

Active SVE System

Peroxide-Based Injection Points

Active SSDS

Peroxide-Based Injection Points

DW-21 MW-6 DW-19 DW-20 DW-1 DW-2 MW-3 B-1 DW-14 DW-16 DW-15 MW-4 B-2 MW-5 B-3 CB-3 DW-22 CB-5 CB-4 CB-6 MW-1 MW-15 MW-2 CB-12 LP-29 CB-17 MW-7 CB-7 LP-1 LP-2 DW-23 MW-18 B-5 MW-19 LP-3 LP-4 CB-8 LP-5 LP-6 LP-8 LP-10 LP-12 LP-14 LP-16 LP-18 CB-10 MW-13 MW-11 MW-11R MW-12AR MW-12R2 MW-11R2 LP-23 LP-25 LP-24 LP-26 MW-9 MW-9A MW-9R2 LP-27 MW-8 MW-20 MW-17A MW-17 MW-16 CB-18

LEGEND

- MW-20 — EXISTING MONITORING WELL INSTALLED BY ROUX ASSOCIATES
- MW-8 — FORMER MONITORING WELL
- LP-25 — FORMER LEACH POOL
- CB-3 — FORMER CATCH BASIN
- DW-1 — FORMER DRY WELL
- FORMER BUILDING LINE
- TEMPORARY INJECTION POINT
- SUB SLAB VAPOR MONITORING POINT
- BUILDING FOOT PRINT
- AREA WITH SUB SLAB DEPRESSURIZATION SYSTEM PIPING
- LIMITS OF EXCAVATION

N

100' 0 100'

Title: **REMEDIAL ACTION WORK PLAN ELEMENTS**

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NY 11530

Prepared For:
EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: W.M.	Date: 03APR14	FIGURE 2
Prepared by: B.H.C.	Scale: AS SHOWN	
Project Mgr: C.W.	Project: 1942.0001Y000	
File: 1924.0001Y208.02.DWG		

V:\CAD\PROJECTS\1924Y\0001Y\208\1924.0001Y208.02.DWG

AMB-021011	2/10/11
VOCs	
Carbon tetrachloride	0.41
Tetrachloroethene	2.2

V-6	2/10/11
VOCs	
Tetrachloroethene	4.2

V-5	2/10/11
VOCs	
Tetrachloroethene	2.8

V-9	2/10/11
VOCs	
Tetrachloroethene	4.8
Trichloroethene	93

V-8	2/10/11
VOCs	
No Exceedances	

V-7	2/10/11
VOCs	
No Exceedances	

V-4	2/10/11
VOCs	
Tetrachloroethene	84
1,1,1-Trichloroethane	5.3

V-3	2/10/11
VOCs	
Tetrachloroethene	64
1,1,1-Trichloroethane	7.3

V-2	2/10/11
VOCs	
Tetrachloroethene	420
1,1,1-Trichloroethane	3.1

V-1	2/10/11
VOCs	
Tetrachloroethene	75
1,1,1-Trichloroethane	4.3

AMB-021011 V-5 V-6 V-9 V-8 V-7 V-4 V-3 V-2 V-1

THOMASVILLE FURNITURE

AVIS BUILDING

CENDANT BUILDING

STORAGE

MANUFACTURING

PROPERTY BOUNDARY

LEGEND

V-1 SOIL VAPOR SAMPLE

FUTURE BUILDING FOOT PRINT

TYPICAL DATA BOX CONTENT

SAMPLE I.D.

AMB-021011	2/10/11
VOCs	
Carbon tetrachloride	0.41
Tetrachloroethene	2.2

ANALYTES — SAMPLE DATE — CONCENTRATION

N

100' 0 100'

Title:
REMEDIAL INVESTIGATION SOIL VAPOR SAMPLE RESULTS - FEBRUARY 2011

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NY 11530

Prepared For:
EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting and Management

Compiled by: W.M.	Date: 12MAR14	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	3
Project Mgr: C.W.	Project: 1942.0001Y000	
File: 1924.0001Y208.03.DWG		

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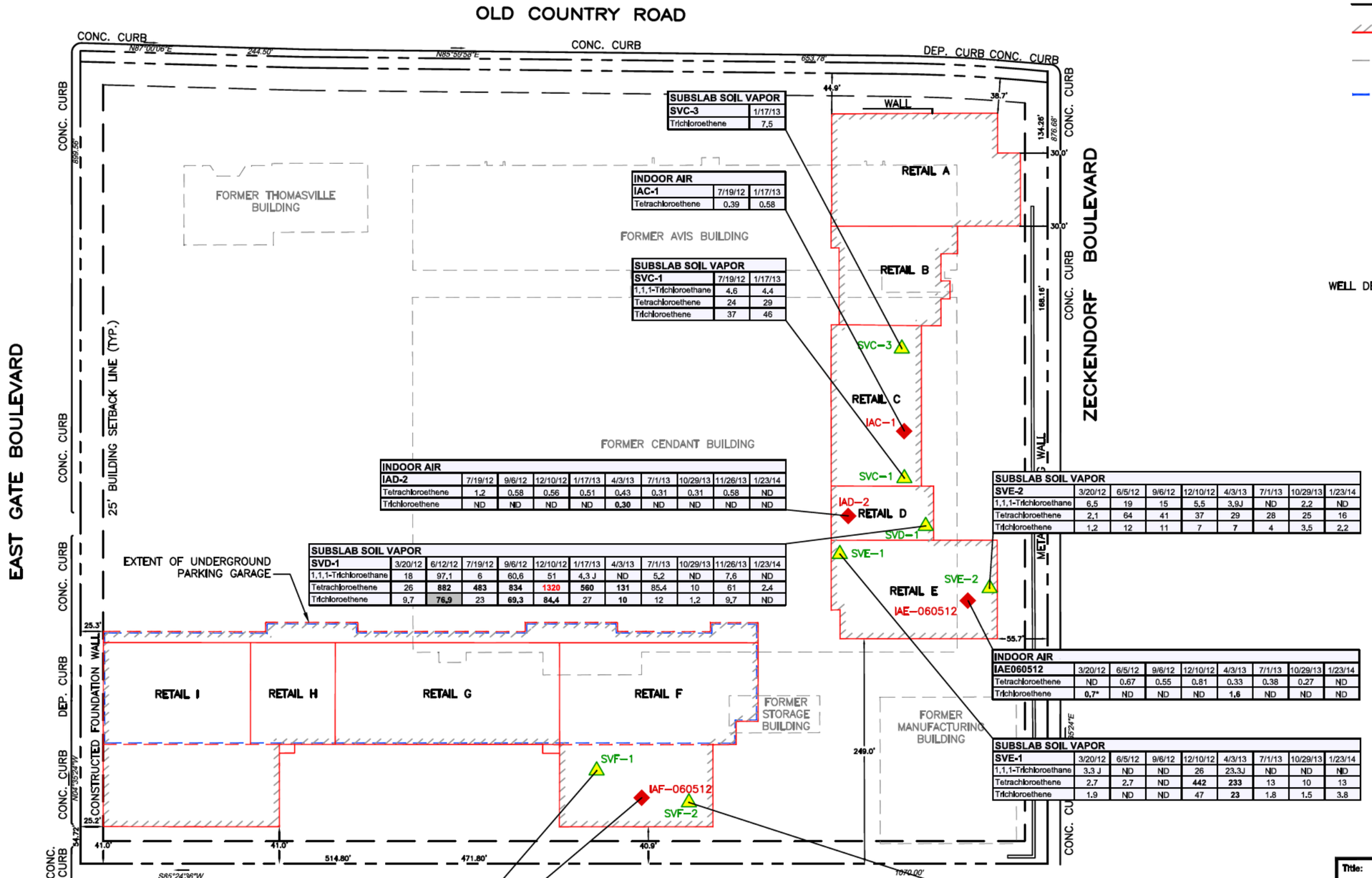


SUBSLAB SOIL VAPOR	
SVC-3	1/17/13
Trichloroethene	7.5

INDOOR AIR		
IAC-1	7/19/12	1/17/13
Tetrachloroethene	0.39	0.58

SUBSLAB SOIL VAPOR		
SVC-1	7/19/12	1/17/13
1,1,1-Trichloroethane	4.6	4.4
Tetrachloroethene	24	29
Trichloroethene	37	46

INDOOR AIR									
IAD-2	7/19/12	9/6/12	12/10/12	1/17/13	4/3/13	7/1/13	10/29/13	11/26/13	1/23/14
Tetrachloroethene	1.2	0.58	0.56	0.51	0.43	0.31	0.31	0.58	ND
Trichloroethene	ND	ND	ND	ND	**0.30**	ND	ND	ND	ND

SUBSLAB SOIL VAPOR									
SVD-1	3/20/12	6/12/12	7/19/12	9/6/12	12/10/12	1/17/13	4/3/13	7/1/13	10/29/13	11/26/13	1/23/14
1,1,1-Trichloroethane	18	97.1	6	60.6	51	4.3 J	ND	5.2	ND	7.6	ND
Tetrachloroethene	26	**882**	**483**	**834**	**1320**	**560**	**131**	85.4	10	61	2.4
Trichloroethene	9.7	**76.9**	23	**69.3**	**84.4**	27	**10**	12	1.2	9.7	ND

SUBSLAB SOIL VAPOR									
SVF-1	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
cis-1,2-Dichloroethene	0.71 J	ND	ND	ND	ND	ND	1.6	ND	
Tetrachloroethene	0.3	11	14	18	18	27	16	12	
Trichloroethene	2.7	49	**76.9**	**96.2**	**88.7**	**73.7**	32	30	
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	

INDOOR AIR									
IAF-1	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
Carbon tetrachloride	ND	ND	0.63 J	ND	ND	ND	ND	ND	
Tetrachloroethene	1.6	0.35	0.95	1.2	0.24J	2.2	0.36	ND	
Trichloroethene	**0.33***	ND	ND	0.2 J	ND	**0.7**	ND	ND	
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	

SUBSLAB SOIL VAPOR									
SVE-2	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
1,1,1-Trichloroethane	6.5	19	15	5.5	3.9J	ND	2.2	ND	
Tetrachloroethene	2.1	64	41	37	29	28	25	16	
Trichloroethene	1.2	12	11	7	**7**	4	3.5	2.2	

INDOOR AIR									
IAE060512	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
Tetrachloroethene	ND	0.67	0.55	0.81	0.33	0.38	0.27	ND	
Trichloroethene	**0.7***	ND	ND	ND	**1.6**	ND	ND	ND	

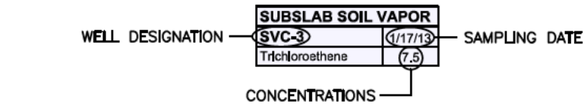
SUBSLAB SOIL VAPOR									
SVE-1	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
1,1,1-Trichloroethane	3.3 J	ND	ND	26	23.3J	ND	ND	ND	
Tetrachloroethene	2.7	2.7	ND	**442**	**233**	13	10	13	
Trichloroethene	1.9	ND	ND	47	**23**	1.8	1.5	3.8	

SUBSLAB SOIL VAPOR									
SVF-2	3/20/12	6/5/12	9/6/12	12/10/12	4/3/13	7/1/13	10/29/13	1/23/14	
Tetrachloroethene	1.8	5.3	2.2	11	24	17	20	**669**	
Trichloroethene	2.1	ND	ND	ND	ND	1.3	0.86	42	
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	3.2J	

LEGEND

- PROPERTY LINE
- EXISTING BUILDING LINE AT GROUND LEVEL
- FORMER BUILDING LINE PER REF. #1
- UNDERGROUND PARKING GARAGE
- SVE-1 — SUB SLAB VAPOR MONITORING POINT
- IAD-032012 — INDOOR AIR/AMBIENT AIR SAMPLE LOCATION

TYPICAL DATABOX INFORMATION



DATA COMPARED TO THE NYSDOH SOIL VAPOR INTRUSION GUIDANCE MATRICES (1 AND 2)

BOLD DATA INDICATES PARAMETER DETECTED ABOVE MONITOR THRESHOLD

RED DATA INDICATES PARAMETER DETECTED ABOVE MITIGATION THRESHOLD

BOLD/SHADED DATA INDICATES PARAMETER DETECTED ABOVE MONITOR/MITIGATE THRESHOLD

* – INDICATES THAT PARAMETER DETECTED ABOVE TAKE REASONABLE AND PRACTICAL ACTIONS TO IDENTIFY SOURCE(S) AND REDUCE EXPOSURES THRESHOLD

NYSDOH – NEW YORK STATE DEPARTMENT OF HEALTH

ND – NOT DETECTED

J – ESTIMATED VALUE

NOTES

1. BASE MAP DAPTED FROM GALLAS SURVEYING GROUP "MONITORING WELL LOCATION PLAN" 2/24/2012.
2. PROPERTY KNOWN AND DESIGNATED AS LOTS 26, 27 & 28, BLOCK 67, SECTION 44 AS DESIGNATED ON THE OFFICIAL TAX MAP FOR THE TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK.

120' 0 120'

REFERENCES

BOUNDARY & TOPOGRAPHIC SURVEY, EQUITY ONE, LLC, OLD COUNTRY ROAD @ EAST GATE & ZECKENDORF BOULEVARD, LOTS 26, 27 & 28, BLOCK 67, SECTION 44, GARDEN CITY, TOWN OF HEMPSTEAD, NASSAU COUNTY, STATE OF NEW YORK, PREPARED BY CONTROL POINT ASSOCIATES, INC., REVISED 3/08/2011.

Title:

SOIL VAPOR MONITORING DATA MARCH 2012 - JANUARY 2014

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NEW YORK 11530

Prepared For:

EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: W.M.	Date: 01APR14	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	4
Project Mgr: C.W.	Project: 1924.0001Y000	
File: 1924.0001Y208.04.DWG		

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APPENDICES

A. Metes and Bounds
B. Health and Safety Plan and Community Air Monitoring Plan
C. EC As-Built Drawings and Component Manual
D. Soil Vapor Sampling Log Form
E. EC System Inspection Checklist and General Site-wide Inspection Form
F. Quality Assurance Project Plan
G. EC Operating Log and Non-routine Maintenance Form
H. Field Sampling Plan

APPENDIX A

Metes and Bounds

Metes and Bounds Description

Lots 26, 27, and 28, Block 67, Section 44
Garden City, Town Of Hempstead
Nassau County, New York

Beginning at an iron bar with cap set at the intersection of the southerly sideline of Old Country Road (variable width) and the easterly sideline of East Gate Boulevard (formerly East Gate Boulevard North, 100 feet in width) running from said point of beginning along the southerly sideline of Old Country Road following three courses:

1. North 87 degrees 00 minutes 06 seconds East, 244.50 feet, to a point, thence;

2. North 85 degrees 59 minutes 58 seconds East, 653.78 feet, to a point of curvature, thence;

3. Along a curve to the right having a radius of 1950.00 feet, central angle of 05 degrees 03 minutes 32 seconds, an arc distance of 172.17 feet, bearing a chord of North 88 degrees 31 minutes 44 seconds East, a chord distance of 172.11 feet to an iron bar with cap set at the intersection of the southerly sideline of Old Country Road with the westerly sideline of Zeckendorf Boulevard, thence;

4. Along the westerly sideline of Zeckendorf Boulevard, South 04 degrees 35 minutes 24 seconds East, 876.68 feet to an iron bar with cap set, thence;

5. Along the dividing line between Lots 16 and 17 Block 67, with Lot 28, Block 67 South 85 degrees 24 minutes 36 seconds West, 1070.00 feet to the easterly sideline of East Gate Boulevard (F.K.A. East Gate Boulevard North), thence;

6. Along easterly sideline of East Gate Boulevard, North 04 degrees 35 minutes 24 seconds West, 899.56 feet to the point and place beginning.

Containing = 952,153 square feet or 21.858 acres

This description is written with reference to a title report prepared by Chicago Title Insurance Company, Title No. 3509-00219, with and effective date of August 17, 2009.

APPENDIX B

Health and Safety Plan and Community Air Monitoring Plan

September 30, 2011

HEALTH AND SAFETY PLAN

900 Old Country Road
Garden City, Town of Hempstead,
Nassau County, New York

Prepared for

EQUITY ONE (NORTHEAST PORTFOLIO) INC.
650 5th Avenue, 24th Floor
New York, New York 10019

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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(Continued)

TABLE OF CONTENTS

(Continued)

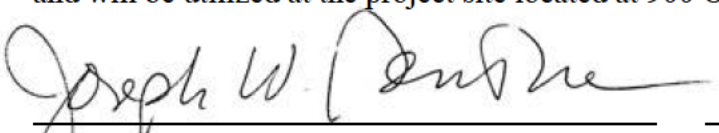
TABLES

FIGURES

APPENDICES

APPROVALS

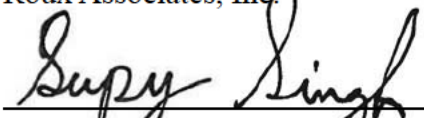
By their signature, the undersigned certify that this Health and Safety Plan (HASP) is approved and will be utilized at the project site located at 900 Old Country Road, Garden City, New York.



09/30/2011

Joseph Gentile
Corporate Health and Safety Manager
Roux Associates, Inc.

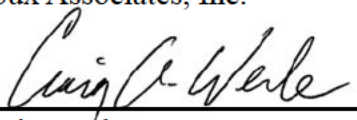
Date



09/30/2011

Subraham Singh
Site Health and Safety Officer
Roux Associates, Inc.

Date



09/30/2011

Craig Werle
Project Principal
Roux Associates, Inc.

Date

Note: This HASP was updated September 2011.

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 Remedial Investigation (RI) activities, Interim Remedial Measures (IRM), and Remedial Actions (RA) at 900 Old Country Road, Garden City, New York (Site) (Figure 1). The HASP will be implemented by the designated Site Health and Safety Officer (SSO) during 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 fieldwork or enter 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), 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. Mobilization activities not requiring intrusive activities (e.g., survey, equipment staging, etc.) or exposure to potentially impacted areas may only be performed if supervised by a competent Roux Associates employee.

1.1 Scope of Work

The Scope of Work activities will include the implementation of RI activities.

The Scope of Work activities are as follows:

1. Obtain necessary permits and approvals.
2. Preparation and implementation of an approved Health and Safety Plan (HASP).
3. Implementation of RI activities, consisting of site inspection/reconnaissance, geophysical survey, drilling, soil boring and sampling, groundwater sampling, and soil vapor sampling.
4. Implementation of the approved Field Sampling Plan (FSP).
5. Mobilization and demobilization.
6. Maintain good site housekeeping procedures at all times.
7. Identification, protection, and/or relocation of any utilities within the work area.
8. Construct a decontamination pad with proper containment and collection system, if necessary.

1.2 Emergency Numbers

1.2.1 Emergency Phone Numbers

Emergency Medical Service 911

Police: Nassau County Police Department (NCPD).....911

Fire: 911

Hospital: Winthrop University Hospital 516-663-0333

National Response Center.....800-424-8802

Poison Control Center.....800-222-1222

Chemtrec.....800-262-8200

Fire: Westbury Fire Department 516-334-7968

Center for Disease Control.....800-311-3435

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	Craig Werle	631-232-2600 Cell – 631-793-1535
Site Health and Safety Officer	Subraham Singh	631-232-2600
Corporate Health and Safety Manager	Joseph Gentile	856-423-8800 Cell – 610-844-6911

1.2.3 Other Important Phone Numbers

Nassau County Emergency Response Team 911

1.2.4 Directions to Winthrop University Hospital

See Figure 2 for street map.

- Start at 900 Old Country Road, Garden City, New York, take a Left onto Old Country Road
- Turn Right on Mineola Boulevard
- Turn Left on 1st Street
- Arrive at Winthrop University Hospital on your left

2.0 HEALTH AND SAFETY STAFF

This section briefly describes all site personnel and their health and safety responsibilities for the RI work to be implemented at the Site. All personnel are responsible for ensuring compliance with the HASP.

2.1 Project Principal (PP) – Craig Werle – 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 Health and Safety Manager (CHSM) – Joe Gentile – Roux Associates

- Implements the HASP.
- 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) – Subraham Singh – Roux Associates

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment.
- Conducts initial onsite 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 Investigation Forms.
- Notifies PP and CHSM 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 personal protective equipment (PPE).
- Maintains contact with Contractors.
- Determines upgrade or downgrade of personal protective equipment (PPE) based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as manufacturers 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 is located at 900 Old Country Road, Garden City, Town of Hempstead, Nassau County, New York. According to the information provided by Equity One (Northeast Portfolio) Inc., the Site is comprised of a 21.858-acre parcel located on the south side of Old Country Road, between East Gate Boulevard and Zeckendorf Boulevard. Northern and eastern sections of the site contain a one story active retail furniture store/warehouse, a three story former office building, a one and a half story former office/warehouse building, a one story former Manufacturing building and a one story former storage building. The buildings are surrounded by paved areas with a minimally landscaped area to the north of the former office building and surrounding the parking areas on Old Country Road.

The building, erected in the mid-1940's, is constructed with concrete block and brick walls, steel frame and roof on a concrete slab. A former boiler room is located north of the northeast corner of the Cendant building. With the exception of a small landscaped area to the north of the former office building and minimal landscaping around the northern parking area along Old Country Road, the land surrounding the building is paved with parking areas to the north, west, and south. Two loading and unloading bays are located along the Cendant building, one on the east side of the building and one along the south side of the building. There are several points of access/egress available for the former office and Cendant buildings.

The interior space of the buildings is partitioned into office and warehouse areas. Interior finishes in office spaces consist primarily of carpeted and vinyl tiled floors, gypsum wallboard interior partitions, and suspended acoustical ceiling tile. Interior finishes in the manufacturing/warehouse space include concrete floors and painted walls. All four unoccupied buildings are in severe disrepair with leaking roofs and no utility service.

The Site is currently owned by Equity One (Northeast Portfolio) Inc. and only one building is currently occupied by Thomasville Home Furnishings in the northwestern portion of the site.

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 and groundwater at the Site, based on previous soil, soil vapor 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 and groundwater contaminants that may be encountered during drilling and sampling activities include both organic and inorganic compounds. Prior investigations at the site have indicated detection of Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), metals, and polychlorinated biphenyls (PCBs).

The toxicological, physical, and chemical properties of potential contaminants are presented in Table 1.

5.0 HAZARD ASSESSMENT

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: dermatitis, skin burns, being overcome by vapors or asphyxiation.

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 work, an activity hazard analysis 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 Activity Hazard Analysis Sheets are located in Appendix A.

5.1 Chemical Hazards

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Drilling Activities
- *In situ* Chemical Injection 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. The Material Safety Data Sheets for the injection chemicals are also included in Appendix A.

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) or during operations that may generate airborne dust such as excavation and loading of contaminated soils. Dust control measures such as applying water to roadways and excavations 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 or *in situ* chemical injections 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 and heavy equipment operation, the use of power and hand tools, the use of pressurized pumps for *in situ* injections, roping and rigging of steel sheeting, 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. Activity Hazard Analysis summaries are contained in Appendix A.

5.2.1 Noise

Noise is a potential hazard associated with operation of heavy equipment, 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 affects the weather can cause onsite 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 B contains procedures for heat stress; these will be used as a guideline and to provide 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 B, 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 to 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 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.

It is presently known that the majority of the onsite buildings have been unoccupied since approximately 2001 and site work performed by various parties has provided reports of severe disrepair, including roof collapse, to large areas of certain buildings on the property. As such, personnel will take this into consideration during the initial site visits and communicate this potential hazard during the safety tailgate meetings to all workers entering the site.

5.2.6 Lockout/Tagout

Roux Associates and all Site contractors will develop a lockout/tagout 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 Activity Hazard Analysis (Appendix A) suggests controls for various hazards to be potentially encountered onsite.

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 most of the onsite structures being abandoned 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

The various states of disrepair of the majority of the onsite structures have led to leaking roofs and the collection of water which may have led to the growth of mold within the buildings.

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 onsite 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 onsite 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 onsite.

5.4 Hazard Assessment

Task	Hazards	Risk of Exposure
Decontamination	Inhalation/Skin Contact	Moderate
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate
	Noise	Low
In situ Injections	Inhalation/ Skin Contact	Moderate
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate
	Noise	Low/Moderate
Drilling/Sampling	Inhalation/ Skin Contact	Moderate
	Heat Stress/Cold Stress	Moderate
	Noise	Moderate/High
	Physical Injury	Moderate

6.0 TRAINING

6.1 General Health and Safety Training

In accordance with Roux Associates' corporate policies, and pursuant to 29 CFR 1910.120, 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 Onsite Safety Meetings

Daily safety meetings will be presented each morning to discuss potential safety concerns for the upcoming activities.

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 American Red Cross Association. Certification and appropriate training documentation will be kept with the Site personnel records.

6.6 Additional Training

The 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 and is included in Appendix C. 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.

Appendix C, "Medical Data Sheet," will be completed by all permanent, onsite personnel and will be kept in Roux Associates offices during the conduct of Site operations. Completion is required in addition to compliance with Roux Associates' Health and Safety Program. This data sheet will be available through the Roux Associates Human Resources Department if medical assistance is needed or if transport to hospital facilities is required.

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/geophysical survey, drilling and sampling only during this phase of work. 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 drilling and 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.

If remedial activities are necessary, a four-zone approach will be employed in order to prevent the spread of contamination from the disturbed areas onsite. 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 personal protective equipment (PPE) will 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: latex or nitrile
- Gloves, outer: nitrile or neoprene
- Chemical resistant boots over the work boots
- Steel toe work boots
- Hard hat
- Hearing protection (as needed)
- Boot cover (as needed)

For tasks requiring Level C PPE, the following equipment may be used in any combination:

- 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: latex or nitrile as required
- Gloves, outer: nitrile or neoprene as required
- Chemical resistant boots over the work boots as required

- Steel toe 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 PPE. The following equipment shall be used:

- Work uniform (long pants, sleeved shirt)
- Hard hat
- Steel toe work boots
- Safety glasses
- Boot covers (as needed)
- Hearing protection (as needed)
- Reflective safety vest

Modified Level D PPE consists of the following:

- Regular Tyvek coveralls (Poly-coated Tyvek as required)
- Outer gloves: leather, cotton, neoprene or nitrile (as required)
- Inner gloves: latex or nitrile (doubled) as required
- Chemical resistant boots over work boots (as required)
- Steel toe 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 field activity:

Activity	Initial level of PPE
Mobilization/Demobilization	D
Site Inspection/Geophysical Survey	D
Decontamination	D
Drilling	D
In situ Chemical Injections	D
Groundwater 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.

Radios – Two-way radios will be utilized onsite 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

Monitoring will be performed to verify the adequacy of respiratory protection, to aid in Site layout, and to document worker exposure. If air monitoring in these 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 daily prior to use or, more often, as necessary. General monitoring during intrusive site activities will be performed in accordance with the Community Air Monitoring Plan included as Appendix D.

9.2 Exclusion Zone Monitoring

9.2.1 Instrumentation

The following monitoring instruments will be available for use during field operations as necessary. There will be a minimum of one of each piece of equipment on the Site at all times:

- Photoionization Detector (PID) with 10.6 EV probe or Flame Ionization Detector (FID) or equivalent.
- Dust/Particulate Monitor (DM), MIE Miniram, or equivalent.

A PID will be used to monitor VOCs in active work areas, during intrusive activities. VOCs shall also be measured upwind of the work areas to determine background concentrations.

A particulate monitor shall be used to measure concentrations of dust and particulate matter.

When deemed necessary, a CGI/O_2 meter shall be used to monitor for combustible gases and oxygen content during confined space entry or when the HSO deems necessary.

Calibration records shall be documented and recorded daily and included in the daily air monitoring report. This report will be specific to work area monitoring. All instruments shall be calibrated before and after each daily use in accordance with manufacturer's procedures (Appendix E).

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 4 to 5 feet above the work area surface or elevation. 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. Real-time monitoring for all onsite activities will be accomplished as follows:

- Monitoring of VOCs in and around the work zones.
- Monitoring for particulates in and around the work zones, when necessary.

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.

- Drilling, boring, and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment, and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; lights; canopies; buildings and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.

- 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

Traffic control methods and barricades will be used as needed when working in areas of vehicular traffic. Since the site is fenced off and the areas of investigation are not in current use, outside vehicular and pedestrian traffic is not considered to be an issue.

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.

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

- 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 for equipment and PPE shall be set up and maintained 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 contaminants from leaving the Site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators and any other PPE that comes in contact with contaminated materials shall pass through a field wash in the decontamination area, and a 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. 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 onsite. 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, hospital, poison control centers, and directions to the hospital 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 emergency coordinator shall implement the contingency plan whenever conditions at the Site warrant such action. 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.

In cases where the project manager is not available, the SSO shall serve as the alternate emergency coordinator.

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) sharp 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 onsite as appropriate. If necessary, the individual shall be decontaminated and transported to the nearest hospital. The SSO will supply medical data sheets to medical personnel and 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. However, since some situations may require transport of an injured party by other means, 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:	Craig Werle	631-232-2600	631-793-1535
2. Office Health and Safety Manager:	Joe Gentile	856-423-8800	610-844-6911
3. Site Health and Safety Officer:	Subraham Singh	631-232-2600	631-484-1168

4. The employer of any injured worker, if not a Roux Associates employee.

Written confirmation of verbal reports are to be submitted within 24 hours. The report form entitled "Accident Report and Investigation Form" (Appendix F) 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 G).

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 Onsite Log

The SSO or project manager will keep a log of onsite 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 F. The originals will be sent to Roux Associates for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

13.5 OSHA Form 300

An OSHA Form 300 (Log of Occupational Injuries and Illnesses) (Appendix H) 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 Safety Log form in Appendix E will be completed daily by the SSO and submitted to the project manager.

13.7 Weekly Safety Reports

The Weekly Safety Reports in Appendix I will be completed by the SSO and submitted to the designated Owner's representative, if requested.

13.8 Close-Out Safety Report

At the completion of the work, Roux Associates will submit a closeout Safety Report that will include all logs and reports generated during the project. The report will be signed and dated by the SSO and submitted to the Safety Manager and/or Owner's representative, if requested.

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: Equity One (Northeast Portfolio) Inc.
900 Old Country Road
Garden City, 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 Winthrop University Hospital 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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, 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 m	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
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

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790 n	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
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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Acetone	67-64-1	TWA 500 ppm STEL 50 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
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

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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
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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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%
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
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

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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%
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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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
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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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%
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

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Naphthalene	91-20-3	TWA 10 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%
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%

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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
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 %

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 900 Old Country Road, Garden City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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
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 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	>100ppm	Stop work** (ventilate, apply foam)
CGI/H_2S Meter	<5%	Level D
CGI/H_2S Meter	>5% to <25%	Level B
CGI/H_2S Meter	>25%	Stop work**
CGI/CO Meter	>25%	Level B
CGI/CO Meter	>50%	Stop work** (ventilate area)
CGI/O_2 Meter	<10% LEL, in excavation	Level D
	19.5% oxygen – 23.5%	Level D
CGI/O_2 Meter	>10% LEL, in excavation	Allow to vent, apply foam**
	>23.5% oxygen	Stop work, Oxygen Enriched ATM**
Dust Monitor	0 – 1.0 mg/m^3, 5-minutes average	Level D
Dust Monitor	>1.0 to 5.0 mg/m^3, 5-minutes average	Level D – Institute dust suppression measures
Dust Monitor	5.0 to >50 mg/m^3, 5-minute average	Level C – Institute dust suppression measures

Note: Action levels are based on above background levels.

* Instrument readings will be taken in the breathing zone (BZ) of the workers, unless otherwise indicated.

** Suspend work in immediate area. Conduct air monitoring periodically to determine when work can continue. Implement mitigative measures.

N

0 1000' 2000'

Title:

SITE LOCATION MAP

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NY 11530

Prepared for:

EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: B.H.	Date: 19JAN11	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	1
Project Mgr.: C.W.	Project No.: 1924.0001Y000	
File: 1924.0001Y106R.01.CDR		

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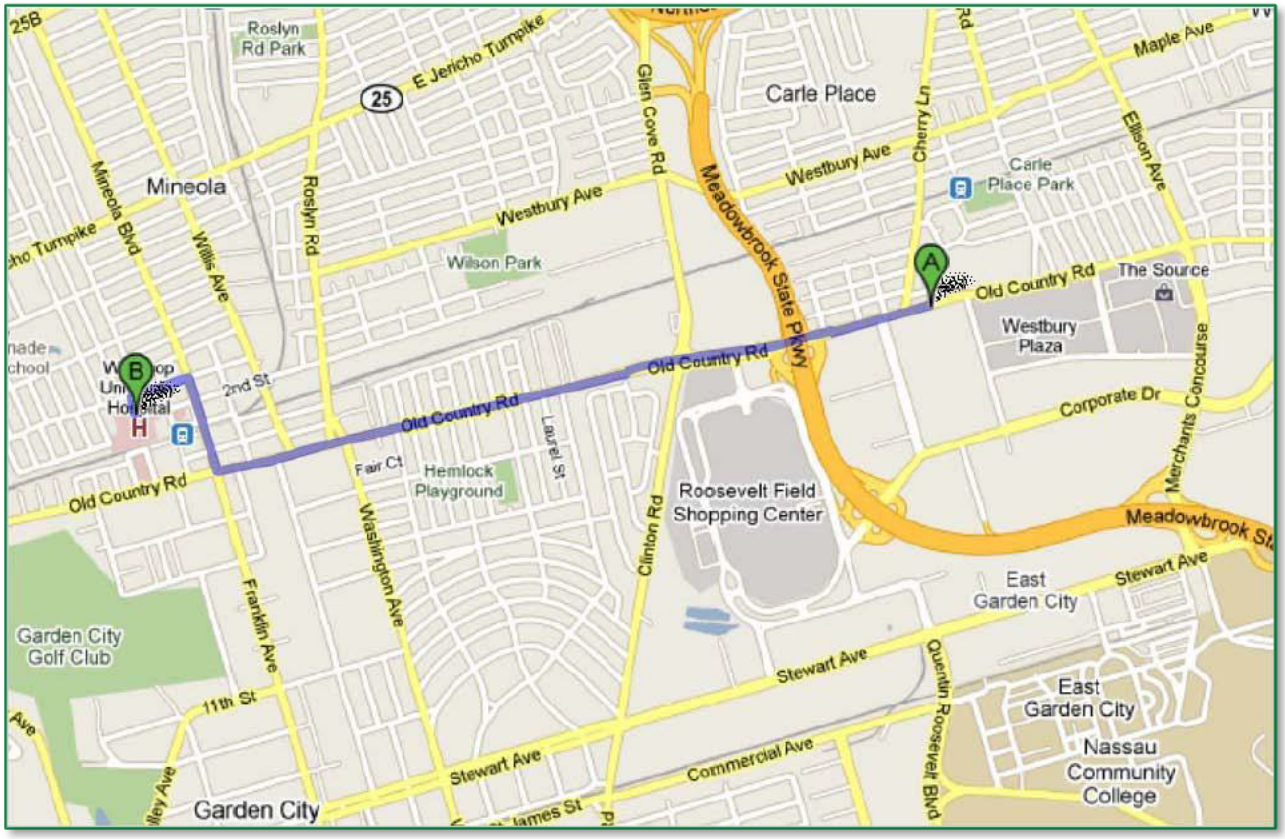
FIGURE 2

Directions to Winthrop University Hospital – 259 First Street, Mineola, New York 11501



APPENDIX A

Activity Hazard Analysis and Material Safety Data Sheets

ACTIVITY HAZARD ANALYSIS

ACTIVITY: Mobilization/Demobilization	**Analyzed by / Date:_____**	
Principal Steps	**Potential Hazards**	**Recommended Controls**
Temporary Facilities Set Up (Support and CRZ zones)	Noise	Ear plugs, ear muffs.
	Eyes	Safety glasses with side shields, safety visor or shield.
	Slips-Trips-Falls	Be sure footing is in a clear area free of loose material.
	Power Tools	Hard hats, work gloves.
	Heat Stress/Cold Stress	Follow heat stress/cold stress guidelines in HASP appendices.
	Cuts and Abrasions	Wear work gloves.
	Punctures	Wear puncture resistant steel toed boots, long sleeve shirts, work shirts or coveralls.
	Electrocution	Ground fault circuit interrupters, inspect power supply cords of equipment prior to use.
	Traffic Hazards	Wear orange safety vests and/or high visibility clothing.
	Insect Bites/Wildlife	Use insect repellent. Avoid contact with all wildlife.
	Sun exposure	Use sunscreen as needed, take breaks in shaded areas, drink ample fluids.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Power Tools (e.g., Drills, Saws) Hand Tools (e.g., Hammer, Shovel, Pry Bars) Trailers, Vehicles, Low Boy, Heavy Equipment	Daily inspections to insure personnel wear appropriate PPE during mobilization and demobilization and survey work. Inspect equipment for wear or damage, test emergency shut-off switches. Ensure all equipment on wheels is chocked per Wheel Chocking Policy.	Tool box safety meetings. Review heavy equipment safety guidelines. Review Wheel Chocking Policy.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Contaminated Soil Excavation	**Analyzed by / Date:_____**	
Principal Steps	**Potential Hazards**	**Recommended Controls**
Work Zone Delineations Decon Area Layout Personal/Perimeter Air Monitoring Removal of Contaminated Soil Verification of Soil Removal Loading Contaminated Soil for Disposal Decon/Demobilization	Noise	Ear plugs, ear muffs.
	Eyes	Safety glasses with side shields or upgrade to Level C full-face respirators.
	Electrocution	Inspect area for overhead and/or subsurface electrical lines. Follow Lock out/Tag out Procedures.
	Puncture	Steel toe/steel shank boots. Avoid direct handling of soil – use shovels, rakes or squeegees.
	Wildlife	Avoid contact with all animals.
	Hose Connections	Make sure all vacuum line connections are clamped and secured.
	Traffic – Vehicle	Cones and flagging to be used for vehicles parked on streets – if a lane is to be taken, flagmen to be used.
	Traffic – Pedestrian	All work zones to be delineated by SSO to be able to control area from curious onlookers.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Contaminated Soil Excavation	**Analyzed by / Date:_____**	
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Dump Truck(s) Rubber Tire Backhoe Miscellaneous Hand Tools Level D and Level C PPE Excavator	Prior to start of work daily - area for security - barriers in place - equipment inspection/proper wheel chocking PPE Inspections - before donning - buddy system to continually observe - upon de-suiting During Operations – that area remains secure Atmosphere - prior to entering confined space - continually during operations	40-Hour HAZWOPER 8-Hour Refresher Site Specific Training and Orientation Daily Safety Meetings

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Drilling Activities		**Analyzed by / Date:_____**
Principal Steps	**Potential Hazards**	**Recommended Controls**
Work Zone Delineations Decon Area Layout Personal Air Monitoring Installation of Soil Borings Installation of Monitoring Wells Installation of Soil Vapor Sampling Points Decon/Demobilization	Noise	Ear plugs, ear muffs.
	Eyes	Safety glasses with side shields or upgrade to Level C full-face respirators.
	Electrocution	Inspect area for overhead and/or subsurface electrical lines. Follow Lock out/Tag out Procedures.
	Puncture	Steel toe/steel shank boots. Avoid direct handling of soil – use shovels, rakes or squeegees. Leather and/or cut resistant work gloves as appropriate to protect hands.
	Wildlife/Insect Bites	Avoid contact with all animals, use insect repellent.
	Hose Connections	Make sure all vacuum line connections are clamped and secured.
	Traffic – Vehicle	Cones and flagging to be used for vehicles parked on streets – if a lane is to be taken, flagmen to be used.
	Traffic – Pedestrian	All work zones to be delineated by SSO to be able to control area from curious onlookers.
	Hands	Employ a "Show Hands Policy" between drillers and helpers.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Drilling Activities	**Analyzed by / Date:_____**	
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Drill Rig Support Truck Miscellaneous Hand Tools Level D and Level C PPE	Prior to start of work daily - area for security - barriers in place - equipment inspection, including emergency shut-off switch testing PPE Inspections - before donning - buddy system to continually observe - upon de-suiting During Operations - that area remains secure Atmosphere - prior to entering confined space - continually during operations	40-Hour HAZWOPER 8-Hour Refresher Site Specific Training and Orientation Daily Safety Meetings

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Miscellaneous Fill Placement		**Analyzed by / Date:_____**
Principal Steps	**Potential Hazards**	**Recommended Controls**
Grading Placement of Fill	Abrasions; heat stress; cold stress; cuts; slips; trips; falls; insects; rodents and stray animals; hazardous noise; puncture; struck by moving heavy equipment; loading and unloading of heavy equipment; crushed or pinned between machinery; and nuisance dust.	Hard hats; safety glasses/goggles; work gloves; puncture resistant steel toed, steel shank work boots; reflective vest and/or high visibility clothing. Hearing protection (muffs/plugs). Personnel should stand at least 10 feet from moving or swing radius of equipment. Personal protective equipment.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Bull dozer Grader Dump Trucks Water Truck Hand Tools (Shovels, etc.)	Periodic inspections to ensure site personnel wear the appropriate PPE. Daily site safety inspection check list. Heavy equipment/machinery must be inspected by SSHO & Operator, test emergency shutoff switches.	Tool box safety meetings. Review working around or near heavy equipment and review heavy equipment safety guidelines.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation	**Analyzed by / Date:_____**	
Principal Steps	**Potential Hazards**	**Recommended Controls**
Mobilization Equipment Set Up Unloading of Equipment Installation of Shoring/Sheeting Removal of Shoring Loading of Equipment Demobilization	Buried utilities and underground structures Truck traffic Slip / trip / fall Rigging to unload and handle materials Overhead hazards Workmen in the area Site control Equipment operation Sheeting installation and removal Demobilization of equipment Cold / heat stress Biological hazards Hearing protection / eye protection Hand protection Untrained personnel Electric powered hand tools Cutting torches	All trucks to be equipped with backup alarms – pedestrian traffic to have orange protective vests and/or high visibility clothing for visibility. All personnel are to be aware that the potential for slipping / tripping / falling exists at all times due to uneven terrain. Equipment being laid out and staged. Any person working at a height of greater than 6 feet must have a safety harness and shock absorbing lanyard. Sheeting being delivered to the site will have to be unloaded prior to this activity – all grips, slings, chains, clevises or grab hooks and any other lifting devices shall be inspected. A regular inspection of these items shall be made prior to their use for any lifting. Any equipment with frayed or broken components will be set aside and tagged and shall not be used until the appropriate repairs are made. Prior to the start of any activity, the area shall be checked for overhead hazards. Operators and spotters are to be aware of the potential for personnel and/or equipment to be in the work zone. No lifting and rigging shall go over a person or vehicle. During all phases of operations, the minimum personal protection will consist of hard hat, steel-toed and steel-shanked work boots, safety glasses. When handling wire rope, slings, chains, etc., appropriate hand protection will be used (leather or cut resistant work gloves). When working

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation		**Analyzed by / Date:_____**
Principal Steps	**Potential Hazards**	**Recommended Controls**
		around equipment, hearing protection shall be used. Extra care shall be taken to make sure no one's hands or feet are caught under or between metal objects when lifting or setting sheeting. Employ hand signals to give "all clear" approval. All personnel shall be trained and qualified to perform the task assigned them. Equipment operators are responsible to make sure their swing radius and work areas are clear. Operators are to be trained and competent with their equipment. During operations, a zone will be established outside of the swing radius and/or fall radius of the equipment and sheeting where control of persons entering and exiting can be safety maintained. The same type of control for vehicles will be maintained. Equipment will be in good working order, equipped with current protective devices and travel alarms, and chocked when not in use. A competent person shall have designed the sheeting/pile plan to meet the stress loads of the environment. This plan shall include all bracing, cross bracing, installation depths.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation		**Analyzed by / Date:_____**
Principal Steps	**Potential Hazards**	**Recommended Controls**
		Hydraulic and/or airlines used to power the vibratory sheeting drive/extractor shall be checked twice daily. Operators and spotters will have a clear plan of communications. All hand signals will be predetermined. There will only be one person spotting for the operator that gives directions. If two-way communications are to be used, the channel will remain undisturbed during lifting and setting operations by company personnel. Tag lines as appropriate will be used to erect and disassemble the sheeting. When loading shoring up to demobilize, there shall not be any lifts over a person or equipment. Potential exists for cold / heat stress. Follow the guidelines for cold / heat stress in the HASP. Replenish fluids and take breaks, as necessary. If there is a need to utilize electric power tools, all cords will be inspected. Ground Fault Interrupter (GFI) outlets will be used. No guards shall have been removed and no triggers will be wired open. If cutting torches are utilized, all lines, gauges, regulators and torches shall be inspected prior to use. Tanks will have current inspection and be inspected upon receipt at the site prior to their use. A 30-minute fire watch will be maintained after burning activity has stopped for the day.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation		**Analyzed by / Date:_____**
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Tractor Trailers Hydraulic Excavators and/or Cranes Interlocking Steel Sheeting/Shoring/Bracing Materials Miscellaneous Slings, Grips, chains, hooks, Clevises Miscellaneous Electric Power Tools Oxygen and Acetylene Torches Pile Drivers	Daily inspection of equipment as recommended by manufacturer. Inspection of work area and perimeters prior to start and during works operations. Twice daily inspection of cables, slings, etc., electric equipment, torches, regulators, gauges.	Current CDL license for tractor trailer operators. Competent person to develop shoring plan. Site specific HASP. Trained operations/laborers. Daily safety meetings.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: In-situ Chemical Injections	**Analyzed by / Date:_____**	
Principal Steps	**Potential Hazards**	**Recommended Controls**
Work Zone Delineations Decon Area Layout Personal Air Monitoring Mixing of Chemicals to be Injected Injection of Chemicals Decon/Demobilization	Noise	Ear plugs, ear muffs.
	Eyes	Safety glasses with side shields, safety visor or shield.
	Skin Contact/Irritation	Wear long sleeved shirts, have ample clean water supply in immediate vicinity of work zone to flush skin if needed.
	Slips-Trips-Falls	Be sure footing is in a clear area free of loose material.
	Power Tools	Hard hats, work gloves.
	Heat Stress/Cold Stress	Follow heat stress/cold stress guidelines in HASP appendices.
	Cuts and Abrasions	Wear work gloves.
	Punctures	Wear puncture resistant steel toed boots, long sleeve shirts, work shirts or cover alls.
	Electrocution	Ground fault circuit interrupters, inspect power supply cords of equipment prior to use.
	Traffic Hazards	Wear reflective safety vests and/or high visibility clothing.
	Insect Bites/Wildlife	Use insect repellent. Avoid contact with all wildlife.
	Sun exposure	Use sunscreen as needed, take breaks in shaded areas, drink ample fluids.

ACTIVITY HAZARD ANALYSIS

(Continued)

Equipment to be Used	Inspection Requirements	Training Requirements
Geoprobe [See Drilling Activity Hazard Analysis (AHA)]	Inspect drill rig for wear and tear and/or damage to rig or any pieces of the drill string or assembly. Test emergency shut offs. Ensure that drill rig is level and stable for injections to proceed. See Drilling AHA.	Competent drill rig operator. Identify subsurface utility lines prior to any drilling activities. (verify location with Site supervisor) Tool box safety meeting to review potential hazards.
Chemicals to be injected [Regenox Parts A and B; Metals Remediation Compound (MRC); Oxygen Releasing Compounds (ORC), etc.]	Store each chemical in the manner directed by manufacturer and per MSDS.	Review MSDS and manufacturer specifications and application procedures. Only required personnel should be near the chemicals, maintain distance from mixing and injection activities when possible.
Power Tools (e.g., Drills, Saws, Injection Pumps) Hand Tools (e.g., Hammer, Shovel, Pry Bars)	Daily inspections to insure personnel wear appropriate PPE during mobilization and demobilization and survey work. Inspect equipment for wear or damage, test emergency shut-off switches.	Tool box safety meetings.
Trailers, Vehicles, Low Boy, Heavy Equipment	Ensure all equipment on wheels is chocked per Wheel Chocking Policy.	Review heavy equipment safety guidelines. Review Wheel Chocking Policy.

Metals Remediation Compound (MRC®)
MATERIALS SAFETY DATA SHEET

Last Revised: August 31, 2007

Section 1 – Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Phone: **949.366.8000**
Fax: **949.366.8090**
E-mail: **info@regenesis.com**

Chemical Name:	**Propionic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxoproxy]-1,2,3-propoanetriyl ester**
Chemical Family:	**Organic Chemical**
Trade Name:	**MRC®, Glycerol Tripolylactate with Metal Control Agent**
Product Use:	**Used to remediate contaminated groundwater (environmental applications)**

Section 2 – Chemical Identification

CAS#	Chemcial
201167-72-8	**Glycerol Tripolylactate**
444618-64-8	**Sorbitol Cysteinate**
50-21-5	**Lactic Acid**
56-81-5	**Glycerol**

Section 3 – Physical Data

Melting Point:	**Not Available (NA)**
Boiling Point:	**Not Determined (ND)**
Flash Point:	**ND**
Density:	**1.3 g/cc**
Solubility:	**Acetone and DMSO**
Appearance:	**Viscous amber gel/liquid**
Odor:	**Strong Amine/Sulfur Smell**
Vapor Pressure:	**None**

Section 4 – Fire and Explosion Hazard Data

Extinguishing Media:	**Use Water Spray, Carbon Dioxide, Dry Chemical Powder or Appropriate Foam.**

Water May be used to keep exposed containers cool. For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 – Toxicological Information

Acute Effects:	**May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the glycerol tripolylactate have not been investigated. Listed below are the toxicological information for glycerol and lactic acid.**
RTECS#	**MA8050000** **Glycerol**

Section 5 – Toxicological Information (cont)

Irritation Data:	**SKN-RBT 500 MG/24H MLD** **EYE-RBT 126 MG MLD** **EYE-RBT 500 MG/24H MLD** **SKN-RBT 5MG/24H SEV** **EYE-RBT 750 UG SEV**	**85JCAE-,207,1986** **BIOFX* 9-4/1970** **85JCAE-,207,1986** **85JCAE -,656,86** **AJOPAA 29,1363,46**
Toxicity Data:	**ORL-MUS LD50:4090 MG/KG** **SCU-RBT LD50:100 MG/KG** **ORL-RAT LD50:12600 MG/KG** **LC50: > 570 MG/1H** **IHL-RATLC50:>570 MG/M3/1H** **IPR-RAT LD50: 4420 MG/KG** **IVN-RAT LD50: 5566 MG/KG** **IPR-MUS LD50: 8700 MG/KG** **SCU-MUS LD50: 91 MG/KG** **IVN-MUS LD50: 4250 MG/KG** **ORL-RBT LD50: 27 GM/KG** **SKN-RBT LD50:>10GM/KG** **IVN-RBT LD50: 53 GM/KG** **ORL-GPG LD50: 7750 MG/KG** **ORL-RAT LD50:3543 MG/KG** **SKN-RBT LD50:>2 GM/KG** **ORL-MUS LD50: 4875 MG/KG** **ORL-GPG LD50: 1810 MG/KG** **ORL-QAL LD50: >2250 MG/KG**	**FRZKAP (6),56,1977** **NIIRDN 6,215,1982** **FEPRA7 4,142,1945** **BIOFX* 9-4/1970** **RCOCB8 56,125,1987** **ARZNAD 26,1581,1976** **ARZNAD 26,1579,1978** **NIIRDN 6,215,1982** **JAPMA8 39,583,1950** **DMDJAP 31,276,1959** **BIOFX* 9-4/1970** **NIIRDN 6,215,1982** **JIHTAB 23,259,1941** **FMCHA2-,C252,91** **FMCHA2-,C252,91** **FAONAU 40,144,67** **JIHTAB 23,259,41** **FMCHA2-,C252,91**
Target Organ Data:	**Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).**	

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Section 6 – Health Hazard Data

Handling:	**Avoid continued contact with skin. Avoid contact with eyes.**

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation:	**Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.**
Ingestion:	**No effects expected. Do not give anything to an unconscious person. Call a physician immediately.**
Skin Contact:	**Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.**
Eye Contact:	**Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.**

Section 7 – Reactivity Data

Conditions to Avoid:	**Strong oxidizing agents, bases and acids**
Hazardous Polymerization:	**None known.**
Further Information:	**Hydrolyses in water to form Lactic Acid and Glycerol.**

Section 8 – Spill, Leak or Accident Procedures

After Spillage or Leakage:	**Neutralization is not required. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber.**
Disposal:	**Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.**

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 – Special Protection or Handling

Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves:	**Vinyl or Rubber**
Eyes:	**Splash Goggles or Full Face Shield** **Area should have approved means of washing eyes.**
Ventilation:	**General exhaust.**
Storage:	**Store in cool, dry, ventilated area. Protect from incompatible materials.**

Section 10 – Other Information

This material will degrade in the environment by hydrolysis to lactic acid and glycerol. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.

RegenOx® – Part A (Oxidizer Complex)

Material Safety Data Sheet (MSDS)

Last Revised: June 24, 2010

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H_2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.
Chemical Family:	Inorganic Chemicals
Trade Name:	RegenOx® – Part A (Oxidizer Complex)
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical	Percentage
15630-89-4	Sodium Percarbonate	60 -100 %
5968-11-6	Sodium Carbonate Monohydrate	10 – 30 %
7699-11-6	Silicic Acid	< 1 %
63231-67-4	Silica Gel	< 1 %

Section 3 – Physical Data

Form:	Powder
Color:	White
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA

Section 3 – Physical Data (cont)

Flammability/Flash Point:	NA
Vapor Pressure:	NA
Bulk Density:	0.9 – 1.2 g/cm^3
Solubility:	Min 14.5g/100g water @ 20 ºC
Viscosity:	NA
pH (3% solution):	≈ 10.5
Decomposition Temperature:	Self-accelerating decomposition with oxygen release starts at 50 ºC.

Section 4 – Reactivity Data

Stability:	Stable under normal conditions
Conditions to Avoid/Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
Hazardous Decomposition Products:	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

Section 5 – Regulations

TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No
WHMIS Classification:	C, D2B
Canadian Domestic Substance List:	Appears

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:

Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 °C.

Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers.

Protect from moisture. Do not store near combustible materials. Keep containers well sealed.

Store separately from reducing materials. Avoid contamination which may lead to decomposition.

Handling:

Avoid contact with eyes, skin and clothing. Use with adequate ventilation.

Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area.

Label containers and keep them tightly closed when not in use.

Wash hands thoroughly after handling.

Personal Protective Equipment (PPE)

Engineering Controls:

General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.

Respiratory Protection:

For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.

Hand Protection:

Wear chemical resistant gloves (neoprene, rubber, or PVC).

Section 6 – Protective Measures, Storage and Handling (cont)

Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
Other:	Eye wash station.
Protection Against Fire & Explosion:	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes slight irritation.
Ingestion:	May be harmful if swallowed (vomiting and diarrhea).

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage:	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
Extinguishing Media:	Water

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **Do Not** induce vomiting.

Section 8 – Measures in Case of Accidents and Fire (cont)

Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water.

Section 9 – Accidental Release Measures

Precautions:

Cleanup Methods:	Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

Section 10 – Information on Toxicology

Toxicity Data

LD50 Oral (rat):	2,400 mg/kg
LD50 Dermal (rabbit):	Min 2,000 mg/kg
LD50 Inhalation (rat):	Min 4,580 mg/kg

Section 11 – Information on Ecology

Ecology Data

Ecotoxicological Information:	NA

Section 12 – Disposal Considerations

Waste Disposal Method

Waste Treatment:	Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T. Shipping Name:	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.]
UN Number:	1479
Hazard Class:	5.1
Labels:	5.1 (Oxidizer)
Packaging Group:	III

Section 14 – Other Information

HMIS® Rating	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

RegenOx® – Part B (Activator Complex)

Material Safety Data Sheet (MSDS)

Last Revised: June 4, 2010

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium silicate solution, silica gel and ferrous sulfate
Chemical Family:	Inorganic Chemicals
Trade Name:	RegenOx® – Part B (Activator Complex)
Product Use:	Used for environmental remediation of contaminated soils and groundwater

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel
7720-78-7	Ferrous Sulfate
7732-18-5	Water

Section 3 – Physical Data

Form:	Liquid
Color:	Blue/Green
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA
Flammability/Flash Point:	NA
Vapor Pressure:	NA

Section 3 – Physical Data (cont)	
Specific Gravity	1.39 g/cm^3
Solubility:	Miscible
Viscosity:	NA
pH (3% solution):	11
Hazardous Decomposition Products:	Oxides of carbon and silicon may be formed when heated to decomposition.

Section 4 – Reactivity Data	
Stability:	Stable under normal conditions.
Conditions to Avoid:	None.
Incompatibility:	Avoid hydrogen fluoride, fluorine, oxygen difluoride, chlorine trifluoride, strong acids, strong bases, oxidizers, aluminum, fiberglass, copper, brass, zinc, and galvanized containers.

Section 5 – Regulations	
TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 302/303 (40 CFR Part 355) – Emergency Planning and Notification	
Extremely Hazardous Substance:	No
SARA, Title III, Sections 311/312 (40 CFR Part 370) – Hazardous Chemical Reporting: Community Right-To-Know	
Hazard Category:	Acute
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in a tightly closed container (steel or plastic) and store in a cool, well ventilated area away from all incompatible materials (acids, reactive metals, and ammonium salts). Store in a dry location away from heat above 60 degrees C and colder than 10 degrees C. Do not store in aluminum, fiberglass, copper, brass, zinc or galvanized containers.
Handling:	Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Use with adequate ventilation. Do not use product if it is brownish-yellow in color.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Safety shower and eyewash station should be within direct access.
Respiratory Protection:	Use NIOSH-approved dust and mist respirator where spray mist exists. Respirators should be used in accordance with 29 CFR 1910.134.
Hand Protection:	Wear chemical resistant gloves.
Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Gloves and protective clothing should be worn during use.
Other:	
Protection Against Fire & Explosion:	Product is non-explosive and non-combustible.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes irritation. Symptoms include redness, itching and pain.
Ingestion:	May cause irritation to mouth, esophagus, and stomach.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage (small):	Mop up and neutralize liquid, then discharge to sewer in accordance with local, state and federal regulations.
After Spillage/Leakage (large):	Keep unnecessary personnel away; isolate hazard area and do not allow entrance into the affected area. Do not touch or walk through spilled material. Stop leak if possible without risking injury. Prevent runoff from entering into storm sewers and ditches that lead to natural waterways. Isolate the material if at all possible. Sand or earth may be used to contain the spill. If containment is not possible, neutralize the contaminated area and flush with large quantities of water.
Extinguishing Media:	Material is compatible with all extinguishing media.
Further Information:	

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Give artificial respiration if individual is not breathing. If breathing is difficult, give oxygen. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **DO NOT** induce vomiting.
Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water. Remove contaminated clothing and shoes.

Section 9 – Accidental Release Measures

Precautions:

PPE:	Wear chemical goggles, body-covering protective clothing, chemical resistant gloves, and rubber boots (see Section 6).
Environmental Hazards:	Sinks and mixes with water. High pH of this material may be harmful to aquatic life. Only water will evaporate from a spill of this material.
Cleanup Methods:	Pick-up and place in an appropriate container for reclamation or disposal. US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

Section 10 – Information on Toxicology

Toxicity Data

Sodium Silicate:	When tested for primary eye irritation potential according to OECD Guidelines, Section 405, a similar sodium silicate solution produced corneal, iridal and conjunctival irritation. Some eye irritation was still present 14 days after treatment, although the average primary irritation score has declined from 29.7 after 1 day to 4.0 after 14 days. When tested for primary skin irritation potential, a similar sodium silicate solution produced irritation with a primary irritation index of 3 to abraded skin and 0 to intact skin. Human experience confirms that irritation occurs when sodium silicates get on clothes at the collar, cuffs, or other areas where abrasion may exist. The acute oral toxicity of this product has not been tested.
Ferrous Sulfate:	LD50 Oral (rat): 319 mg/kg not a suspected carcinogen.

Section 11 – Information on Ecology

Ecology Data

Ecotoxicological Information:	Based on 100% solid sodium silicate, a 96 hour median tolerance for fish of 2,320 mg/l; a 96 hour median tolerance for water fleas of 247 mg/L; a 96 hour median tolerance for snail eggs of 632 mg/L; and a 96 hour median tolerance for Amphipoda of 160 mg/L.

Section 12 – Disposal Considerations

Waste Disposal Method

Waste Treatment:	Neutralize and landfill solids in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T.	This product is not regulated as a hazardous material so there are no restrictions.

Section 14 – Other Information

HMIS® Rating	Health – 2 (moderate)	Reactivity – 0 (none)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat
	Contact – 1 (slight)	

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

APPENDIX B

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. In general, when the temperature exceeds 88°F, a 15 minute rest cycle will be initiated once every two hours. 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.

APPENDIX C

Medical Data Form

MEDICAL DATA SHEET

This form must be completed by all onsite personnel prior to the commencement of activities, and shall be kept by the Site Health and Safety Officer during site activities. This form must be delivered to any attending physician when medical assistance is needed.

(This form should be typed or printed legibly.)

Site: _____

Name: _____ Home Telephone: _____
(Area Code/Telephone Number)

Address: _____

Date of Birth: _____ Height: _____ Weight: _____

Emergency Contact: _____ Telephone: _____
(Area Code/Telephone Number)

Drug Allergies or Other Allergies: _____

_____

Previous Illnesses or Exposures to Hazardous Substances: _____

_____

_____

Current Medication (Prescription and Non-Prescription): _____

_____

_____

Medical Restrictions: _____

_____

Name, Address and Telephone Number of Person Physician: _____

_____

APPENDIX D

Community Air Monitoring Plan

January 18, 2011

COMMUNITY AIR MONITORING PLAN

900 Old Country Road
Garden City, Nassau County, New York

Prepared for

EQUITY ONE (NORTHEAST PORTFOLIO) INC.
650 Fifth Avenue, 24th Floor
New York, New York 10019

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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TABLES

ATTACHMENT

1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) has developed a project-specific Community Air Monitoring Plan (CAMP) to implement real time monitoring at the Former Avis Headquarters Site, 900 Old Country Road, Garden City, New York (Site) during the Remedial Investigation (RI) work, Interim Remedial Measure (IRM) planned for the remediation activities (limited excavation and offsite disposal) and the demolition activities at the Site. Remedial activities will be performed following the completion of the RI scheduled for early 2011. Previous investigation results indicate that inorganic compounds (metals), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs) are present in soil across the Site. Since the IRM includes excavation, soil stockpiling, and backfill activities, particulates will be monitored. Multiple previous investigations at the site have documented the absence of volatile organic compounds (VOCs) in Site soils, therefore, limited VOC monitoring is included as part of this CAMP.

The monitoring program will monitor for particulates at the downwind perimeter of the work area during ground intrusive activities. The design of the CAMP is intended to provide a measure of protection for the downwind community and onsite workers not directly involved with the subject work activities from potential airborne contaminant releases as a direct result of remedial work and demolition activities. This plan is consistent with the New York State Department of Environmental Conservation's (NYSDEC) Fugitive Dust Suppression and Particulate Monitoring Program and the New York State Department of Health's (NYSDOH's) Generic Community Air Monitoring Plan guidance documents included in DER-10.

Roux Associates will be responsible for the implementation of the CAMP during the RI, IRM and demolition activities and will have direct and constant communication with all components of the remediation team in order to effectively and instantaneously initiate the necessary Site controls to prevent and/or minimize any work stoppages related to CAMP issues.

The specifics of the CAMP are presented in the following six (6) sections:

1.1 Establishing Background Conditions

1.2 VOC Monitoring Approach

1.3 Particulate Monitoring Approach

1.4 Meteorological Monitoring Approach

1.5 Available Suppression Techniques

1.6 Reporting

1.1 Establishing Background Conditions

Background air quality monitoring will be conducted during a maximum of two work days prior to the start of the remedial activities. Background air quality monitoring will be conducted for up to 8 hours per day, with the timing generally coinciding with the hours work will typically be occurring at the Site. Background air quality monitoring will be conducted at two sampling stations. Particulate matter (PM-10) will be monitored continuously at each location with a MIE DataRam 4000. The DataRams will be set to take 15-minute running average measurements, and record one average measurement every 15 minutes, including the time and date of the end of the measurement period. The particulate data stored on the DataRams will be periodically transferred to a laptop computer and analyzed as necessary. All particulate will be measured in units of micrograms per cubic meter ($\mu g/m^3$).

1.2 VOC Monitoring Approach

Due to the fact that VOCs are not present in site soils, as evidenced by multiple historical investigations, VOC monitoring will take place only at the active borehole location or limited excavation itself during all RI and remedial activities.

1.3 Particulate Monitoring Approach

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will 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 levels

(as summarized in Table 1). Monitoring equipment will be MIE Data Ram 4000 monitors or equivalent. One (1) upwind and one (1) downwind monitor will be deployed each day equipped with an omni-directional sampling inlet and a PM-10 sample head. The data logging averaging period will be set to 15-minutes with time and date stamp recording. Alarm averaging will be set at 90 µg/m^3 above background per 15-minute period. This setting will allow proactive evaluation of work conditions prior to reaching Action Levels of 100 µg/m^3 above background. The equipment is equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the action level occurs, an Action Limit Report will be completed identifying the monitoring device location, the measured particulate level, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Attachment 1. Daily monitoring equipment locations and meteorological conditions will also be documented on the daily CAMP Monitoring Location Plan. All documentation will be kept on file at the Site.

1.4 Meteorological Monitoring

Meteorological data consisting of wind speed, wind direction, temperatures, barometric pressure, and relative humidity will be collected. The measurements will be continuous and 15-minute average values will be digitally recorded by the instrument. Wind direction readings will be utilized to position the particulate monitoring equipment in appropriate upwind and downwind locations. A Davis Corporation wireless instrument station or equivalent will be used to collect and download all meteorological monitoring data.

1.5 Available Suppression Techniques

If necessary, water misting via controlled fire hose and/or dedicated water truck will be utilized as a Site control measure to mitigate the potential for particulate/dust release in work areas and roadways. Excavation methods, material staging and loading methods, and vapor/dust suppression methods will be performed in accordance with the IRM Work Plan to

be developed following completion of the RI work, and continually evaluated and modified (as necessary) to alleviate the potential for particulate releases.

1.6 Reporting

All recorded data will be downloaded and field logged daily, including Action Limit Reports (if any) and daily CAMP monitoring location figures. All records will be maintained onsite for NYSDEC/NYSDOH review. A description of all CAMP-related activities will be included in an IRM Completion Summary Report submitted to the NYSDEC and NYSDOH. Additionally, all CAMP monitoring records will be included in the overall Final Engineering Report that will be submitted to the NYSDEC and NYSDOH.

Table 1. Action Limit Summary for VOCs and Particulates, Former Avis Headquarters
900 Old Country Road, Garden City, Nassau County, New York

Contaminant	Downwind Action Levels*	Action/Response
Particulates (Monitoring Via Particulate Meter and Observation)	< 100 µg/m^3	1. If dust is observed leaving the work area, then dust control techniques must be implemented or additional controls used.
	100 µg/m3 < level < 150 µg/m^3	1. Employ dust suppression techniques. 2. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate concentration does not exceed 100 µg/m^3 above the upwind level, and provided that no visible dust is migrating from the work area.
	> 150 µg/m^3	1. STOP work. 2. Re-evaluate activities, modify dust suppression techniques. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.
Volatile Organic Compounds (VOCs) (Monitoring Via Photoionization Detector and Odor Observation at the active borehole or excavation site)	< 5 ppm	1. Resume work with continued monitoring.
	5 ppm < level < 25 ppm	1. Work activities must be temporarily halted, source vapors must be identified, suppression techniques employed to abate emissions, and monitoring continued. 2. After these steps, if VOC levels (200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or structure, whichever is less) are below 5 ppm over background, resume work.
	> 25 ppm	1. Identified contributing ground intrusive activities must be halted and vapor suppression techniques must be evaluated and modified until monitoring indicates VOC levels below the action level. 2. After these steps, if VOC levels (200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or structure, whichever is less) are below 5 ppm over background, resume work.

* 15-minute running time-weighted average (twa) above background. Particulate readings are based on the respirable (PM-10) fraction. Background readings are taken at upwind locations relative to Work Areas or Exclusion Zones.

Action Limit Report

ACTION LIMIT REPORT

Project Location: Former Avis Headquarters, 900 Old Country Road, Garden City, Nassau, New York

Date: _____ Time: _____

Name: _____

Contaminant: PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

ACTIVITY DESCRIPTION

CORRECTIVE ACTION TAKEN

APPENDIX E

Health and Safety Briefing/Tailgate Meeting Form

HEALTH & SAFETY BRIEFING / TAILGATE MEETING FORM

Site Name / Location _____

Date: _____ Weather Forecast: _____

Names of Personnel Attending Briefing

_____ _____ _____

_____ _____ _____

_____ _____ _____

Planned Work

_____

_____

_____

Instrument Calibration: Instrument/Time/Cal. Gas/Cal. Concentration/Actual Concentration

_____

_____

_____

Items Discussed

_____

_____

_____

_____

_____

Work Permit Type and Applicable Restrictions

_____

_____

_____

Signatures of Attending Personnel

_____ _____ _____

_____ _____ _____

_____ _____ _____

APPENDIX F

Accident Report and Investigation Form

☐ **Roux Associates, Inc.** ☐ **Remedial Engineering, P.C.**
(Check applicable company name)

ACCIDENT REPORT

Joe Gentile, Corporate Health and Safety Manager
Cell: (610) 844-6911; Office: (856) 423-8800; Office FAX: (856) 423-3220; Home: (484) 373-0953

PART 1: ADMINISTRATIVE INFORMATION

Project #: _____
Project Name: _____
Project Location (street address/city/state)**:**
_____
_____
Client Corporate Name / Contact / Address / Phone #:
_____
_____
_____
_____
_____

Immediate Verbal Notifications Given To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Office Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No
Client Contact	☐Yes	☐No

REPORT STATUS (time due):
☐ Initial (24 hr) ☐ Final (5-10 days)
Date: _____ Date: _____

Accident Report Delivered To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Office Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No

REPORT TYPE: ☐ Loss ☐ Near Loss Estimated Costs: $ _____

OSHA CASE # Assigned by Corporate Health & Safety if Applicable: _____

Corporate Health & Safety Confirmed Final Accident Report
☐Yes ☐No

DATE OF INCIDENT: _____

TIME INCIDENT OCCURRED: _____ ☐AM ☐PM

INCIDENT LOCATION – City, State, and Country (If outside U.S.A)
_____

INCIDENT TYPES: (Select most appropriate if Loss occurred.)
From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level.

☐**INJURY** ☐**ILLNESS**

----------Severity Level----------

☐Fatality ☐First Aid ☐Medical
☐Restricted Work ☐Lost Time Treatment

OTHER INCIDENT TYPES

☐Spill / Release
Material involved:_____
Quantity (U.S. Gallons): _____

☐Misdirected Waste ☐Consent Order ☐NOV
☐Property Damage ☐Exceedance
☐Motor Vehicle ☐Fine / Penalty

ACTIVITY TYPE (Check most appropriate one.)

☐Decommissioning	☐Geoprobe	☐Sampling
☐Demolition	☐Motor Vehicle	☐System Start-up
☐Dewatering	☐Operations/ Maintenance	☐Trenching
☐Drilling		☐AST/UST Removal
☐Excavation	☐Pump/Pilot Test	☐Other_____
☐Gauging	☐Rigging/Lifting	

INJURY TYPE (Check all applicable.)

☐Abrasion	☐Occupational Illness
☐Amputation	☐Puncture
☐Burn	☐Rash
☐Cold/Heat Stress	☐Repetitive Motion
☐Inflammation	☐Sprain/Strain
☐Laceration	☐Other_____

BODY PART AFFECTED (Check all applicable.)

☐Respiratory	☐Shoulder	☐Face
☐Neck	☐Arm	☐Leg
☐Chest	☐Wrist	☐Knee
☐Abdomen	☐Hand/Fingers	☐Ankle
☐Groin	☐Eye	☐Foot/Toes
☐Back	☐Head	☐Other_____

I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Directly/Indirectly Involved in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupa ion; Yrs in Current Occupation; Current Posi ion; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:
1)				
2)				

II. PERSONS INJURED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Injured in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupa ion; Yrs in Current Occupation; Current Position; and Yrs in Current Posi ion:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:	Description of Injury:
1)					
2)					

III. PROPERTY DAMAGED IN INCIDENT (Attach additional information as necessary/applicable.)

Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:
1)				$

2)				$

IV. WITNESSES TO INCIDENT (Attach additional information as necessary/applicable.)

Witness Name:	Address:	Phone #:
1)		
2)		

PART 2: WHAT HAPPENED AND INCIDENT DETAILS

PROVIDE FACTUAL DESCRIPTION OF INCIDENT (e.g., descr be loss/near loss, injury, response / treatment).

I. AUTHORITIES/GOVERNMENTAL AGENCIES NOTIFIED (Attach additional information as necessary/applicable.)

Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of No ification:	Exact Information Reported/Provided:

II. PUBLIC RESPONSES TO INCIDENT (if applicable)

Response/Inquiry By: (check one)	Entity Name:	Name/Phone # of Respondent/ Inquirer:	Address of En ity/Person:	Date & Time of Response/Inquiry:
☐Newspaper ☐Television ☐Community Group ☐Neighbors ☐Other _____				

Describe Response/Inquiry:

Roux/Remedial Response:

(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)
ATTACHED INFORMATION: ☐Photo ☐Sketches ☐Vehicle Acord Form ☐Police Report ☐Other

Name(s) of person(s) who prepared Initial and Final Report:	**Title(s):**	**Phone number(s):**

PART 3: INVESTIGATION TEAM ANALYSIS

CONCLUSION: WHY IT HAPPENED (LIST CAUSAL FACTORS AND CORRESPONDING ROOT CAUSES)

(Root Causes: Lack of knowledge or skill, Doing the task according to procedures or acceptable practices takes more time or effort, Short-cuts or not following acceptable practices is reinforced or tolerated, Not following procedures or acceptable practices did not result in an accident, Lack of or inadequate procedures, Inadequate communications of expectations regarding procedures or acceptable practices, Inadequate tools or equipment, External Factors)

ROOT CAUSE(S) AND SOLUTION(S): HOW TO PREVENT INCIDENT FROM RECURRING

CAUSAL FACTOR	ROOT CAUSE		SOLUTION(S) [Must Match Root Cause(s)]		PERSON RESPONSIBLE	AGREED DUE DATE	ACTUAL COMPLETION DATE
			#	Solution(s)			
			1				
			2				
			3				

INVESTIGATION TEAM:

PRINT NAME	JOB POSITION	DATE	SIGNATURE

No One Gets Hurt!

APPENDIX G

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: BAP1549799-1	
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 ACC DENT?	Y / N

ESTIMATE AMOUNT:	WHERE CAN VEHICLE BE SEEN?:	WHEN CAN VEHICLE BE SEEN?:
OTHER INSURANCE ON VEHICLE - CARRIER:		POLICY NUMBER:

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 H

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 restric ion	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)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condi ion	0	(6) All O her Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

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 Report* 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

APPENDIX I

Weekly Safety Report

APPENDIX I

WEEKLY SAFETY REPORT

Job Name_____ **Job#**_____

Week of: **Days Without Lost Time Injury:**

Describe any recordable incidents or accidents:

What actions were taken to prevent such incidents or accidents from occurring again?

Was training conducted addressing the incident? Y N What date?___

What level of PPE is currently in place?

Has PPE been upgraded or downgraded?

Have Perimeter Air Monitoring action limits been exceeded:

What action was taken to mitigate the exceedance?

Have personal air monitoring limits been exceeded:

What actions were taken?

List any problems with air monitoring equipment:

Write a summary of work completed during the week:

Write a summary of proposed work for the coming week:

Summarize any safety issues that are outstanding:

HSO Name: _____ **HSO Signature:** _____

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**

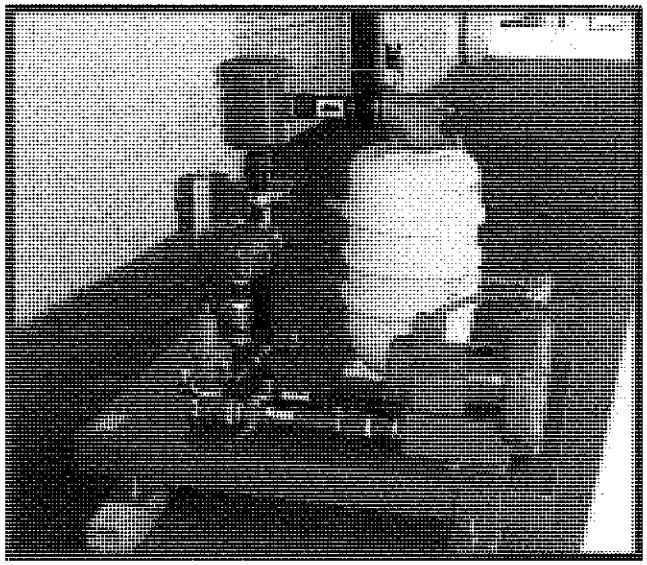
APPENDIX C

EC As-Built Drawings and Component Manual

Gasho
SINCE 1982

The Leader in Blower & Vacuum Solutions

460 West Gay Street
West Chester, PA 19380



Roux Associates Inc.

209 Shafter Street
Islandia, NY 11749-5074
PO # 23366

Operation & Maintenance Manual

Gasho Blower Package Consisting of AMETEK Model #EN505AS58M, MS300PS, and NEMA 4 Manual Motor Starter

JG13D-2711

APRIL 25, 2013

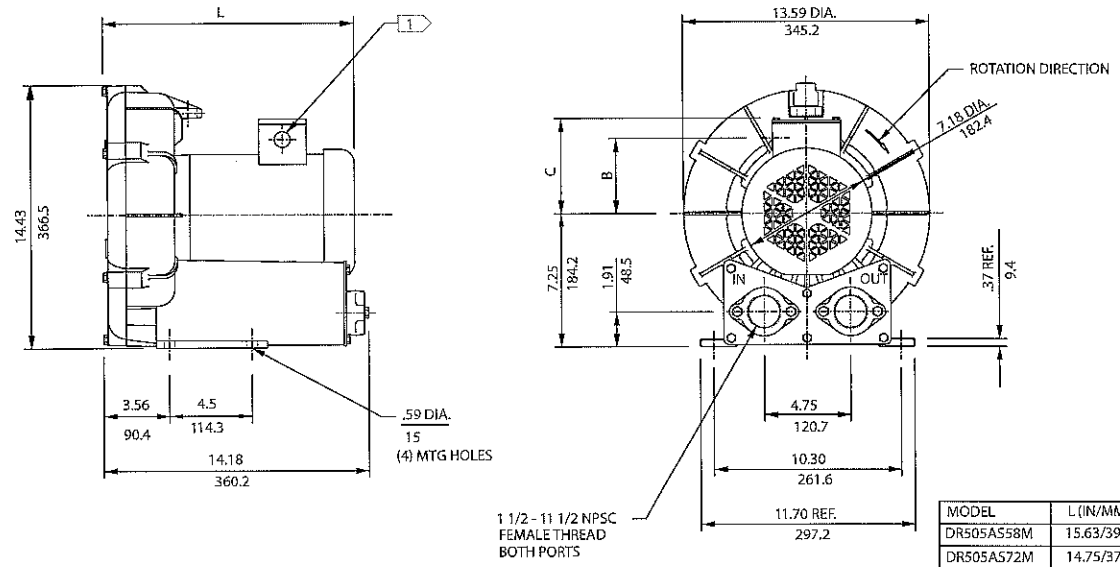
Gasho, Inc.
Blower Package
JG13D-2711

Description	Date	Revision

Item	Qty.	Supplier	Description	Part Number	Misc ID	Weight
1	1	Ametek Rotron	Regenerative Blower	DR505AS58M	# 037542	
2	1	Gasho	Base Weldment	B75		
3	1	Solberg Mfg.	2" Inline Filter	CSL-851-200HC		
4	1	Westwood	1 1/2" Dilution Valve Assembly	EMSP-15		
4.1	1	Apollo	1 1/2" Ball valve			
5	1	Fisher	1" Relief Valve	289H-41	set @ 70" H2O	
6	2	Gasho	Vacuum Gauges	25.0.160.IWC.012.HG		
7	1	Gasho	Pressure Gauge	25.0.160.IWC.006.PSI		
8	3	SMC Specialties	Isolation Valves	VA BRS 025-4F4M-BT		
9	1	Ametek Rotron	Moisture Separator with level swi	38520	MS300PS	
10	1	AID	NEMA 4 - 2 Hp, 230V 1 PH			
10.1	1	ABB	Manual Starter	MS325-12.5		
10.2	1	ABB	Grey Nema 4 Enclosure	IB325-G		
10.3	1	ABB	230 volt undervoltage trip	MS325-UA230		
					Weight	0

ROTRON®

2.0 / 3.0 HP Regenerative Blower



IN
MM

MODEL	L (IN/MM)	B (IN/MM)	C (IN/MM)
DR505AS58M	15.63/397	4.63/117	5.64/143
DR505AS72M	14.75/374	4.25/108	5.25/133
DR505AS86M	14.38/365	4.37/111	5.18/131
DR505K58M	17.0/431	4.63/117	5.64/143
DR505K72M	15.63/397	4.37/111	5.18/131

NOTES
1. TERMINAL BOX CONNECTOR HOLE .88 (22) DIA.
2. DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3. CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

		Part/Model Number						
		DR505AS58M	DR505AS72M	DR505AS86M	DR505K58M	DR505K72M	CP505FE72MLR	CP505CT72MLR
Specification	Units	037542	037543	037544	081882	037551	038239	038237
Motor Enclosure - Shaft Mtl.	-	TEFC - CS	TEFC - CS	TEFC - CS	TEFC - CS	TEFC - CS	Chem TEFC - SS	Chem TEFC - SS
Horsepower	-	2.0	2.0	2.0	3.0	3.0	3.0	2.0
Voltage	AC	115/230	230/460	575	115/230	230/460	230/460	230/460
Phase - Frequency	-	Single - 60 Hz	Three - 60 Hz	Three - 60 Hz	Single - 60 Hz	Three - 60 Hz	Three - 60 Hz	Three - 60 Hz
Insulation Class	-	F	F	F	F	F	F	F
NEMA Rated Motor Amps	Amps (A)	18.2/9.1	5.4/2.7	2.3	25.6/12.8	7.6/3.8	7.6/3.8	5.4/2.7
Service Factor	-	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Max. Blower Amps	Amps (A)	24/11.5	6.8/3.4	3.0	28/14	8.8/4.4	8.8/4.4	6.8/3.4
Locked Rotor Amps	Amps (A)	138/69	38/19	21	194/97	88/44	88/44	38/19
NEMA Starter Size	-	1/0	00/00	00	1.5/0	0/0	0/0	00/00
Shipping Weight	Lbs	97	82	84	91	86	86	82
	Kg	44	37.2	38.1	41.3	39	39	37.2

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.

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
75 North Street, Saugerties, NY 12477
USA: +1 215-256-6601 - Europe: +44 (0) 845 366 9664 - Asia: +86 21 5763 1258
Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

ROTRON®

DR 505 & CP 505

2.0 / 3.0 HP Regenerative Blower

FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- CE compliant - Declaration of Conformity on file
- Maximum flow: 150 SCFM
- Maximum pressure: 65 or 88 IWG
- Maximum vacuum: 73 IWG
- Standard motor: 2.0 or 3.0 HP, TEFC
- Cast aluminum blower housing, impeller & cover; cast iron flanges (threaded)
- UL & CSA approved motor with permanently sealed ball bearings
- Inlet & outlet internal muffling
- 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

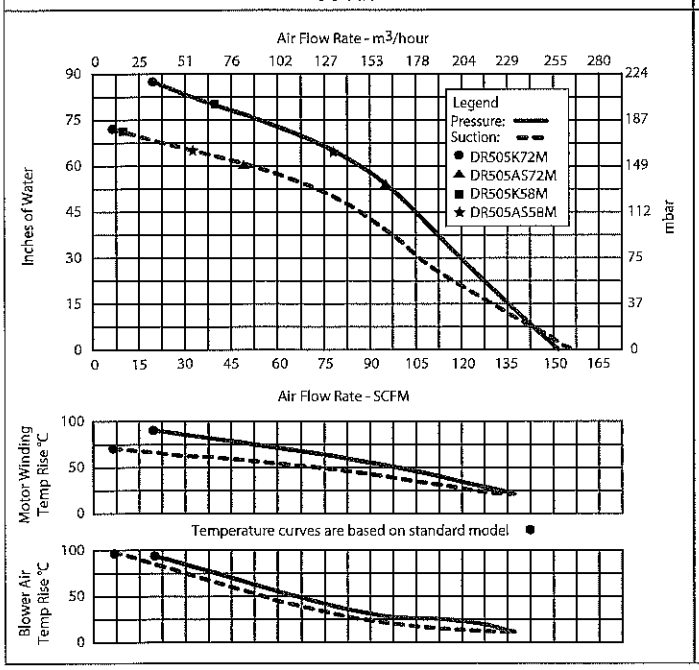
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES

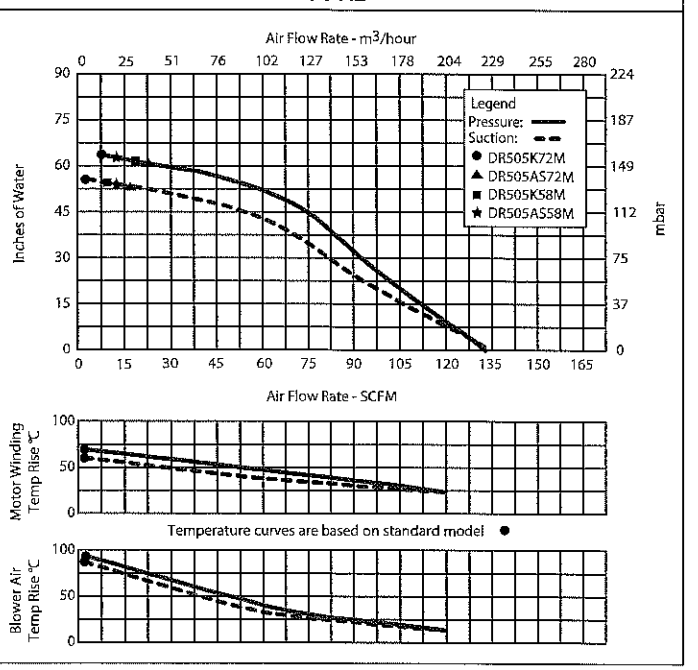
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

Blower Performance at Standard Conditions

60 Hz



50 Hz



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75 North Street, Saugerties, NY 12477
USA: +1 215-256-6601 - Europe: +44 (0) 845 366 9664 - Asia: +86 21 5763 1258
Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL FOR BLOWER MODEL

DR404 – DR656

Technical and 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 200°F. 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

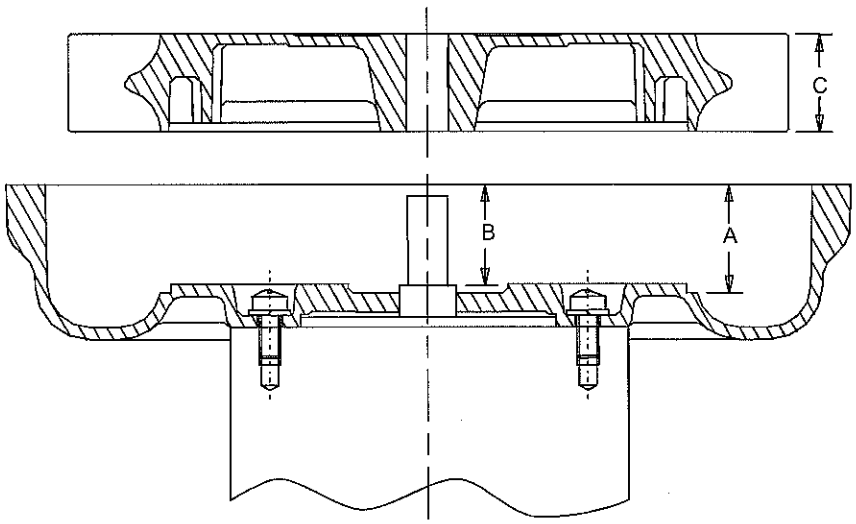
Measure the Following:

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.

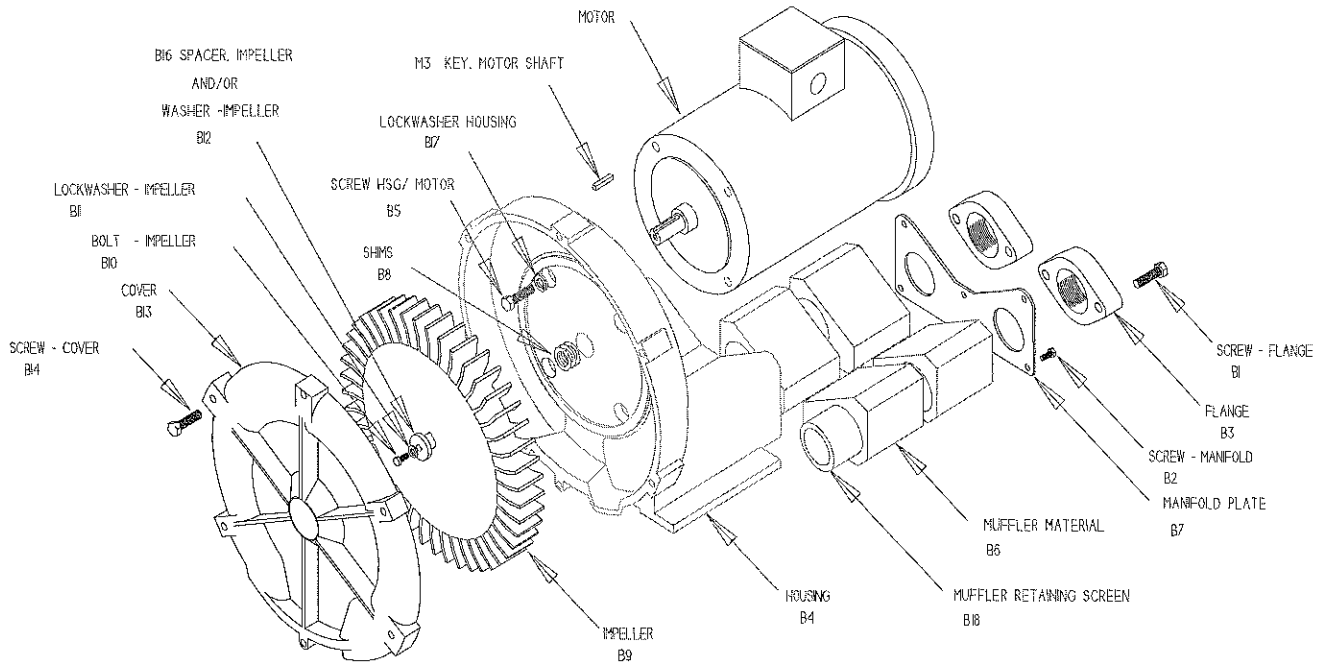
Shim Thickness = B – (A+C)/2

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.



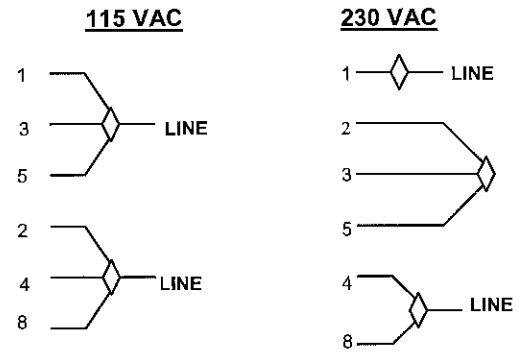
ASSEMBLY DRAWING

DR404 DR454 DR513
DR523 DR505 DR555
DR606 DR656



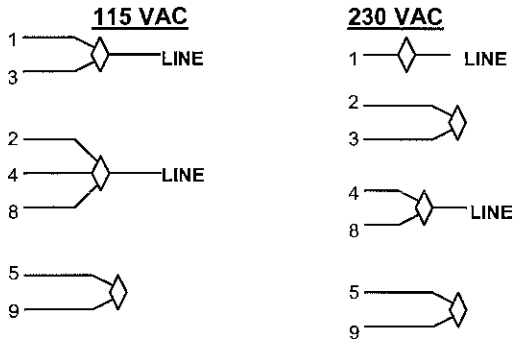
WIRING DIAGRAMS, TEFC and ODP MOTORS

A. 1Ø, 6 WIRE



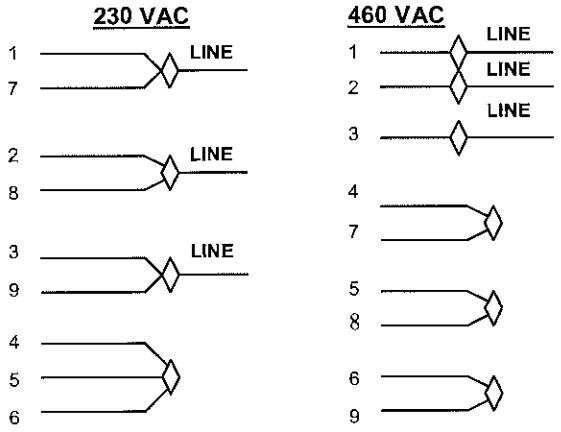
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

B. 1Ø, 7 WIRE



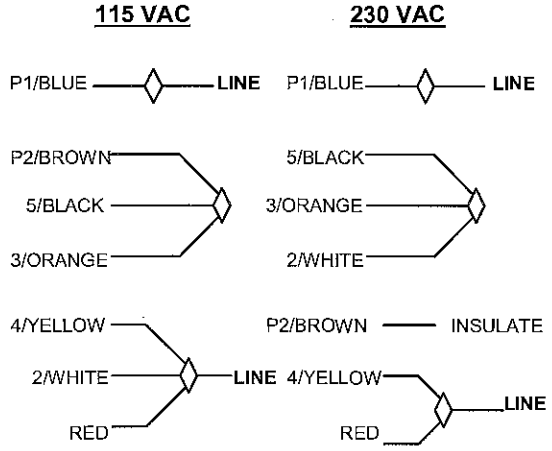
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

C. 3Ø, 9 WIRE



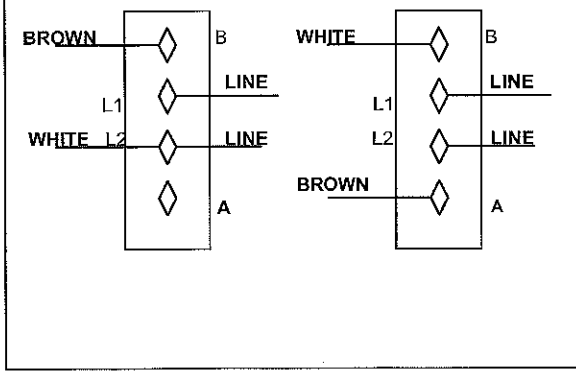
INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

D. 1Ø, EMERSON 1/8 HP MOTOR



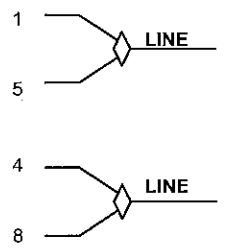
INTERCHANGE RED AND BLACK TO REVERSE ROTATION

E. 1Ø, SPA DUTY WITH TERMINAL STRIPS



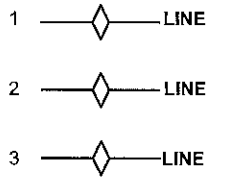
F. 1Ø, 230 VAC

SINGLE VOLTAGE



INTERCHANGE LEAD WIRES 5 & 8 TO REVERSE ROTATION

G. 3Ø, 575 VAC



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

Parts Breakdown

Item No.	Qty. Req'd	Description	DR404	DR454	DR454	DR513	DR523	DR505	DR555	DR555	DR606
Model:			DR404	DR454	DR454	DR513	DR523	DR505	DR555	DR555	DR606
Part No.:			037406	036855	080480	037217	037210	037542	81100	037308	038526
			037408	036856	080481	037209	037211	037543	81102	037306	038527
			037407	036949	080482	037773	037772	037544	81099	037305	038530
				038808				037551	81098	037546	037547
								037545	81101	037309	038529
				OLD	New			037546		037310	080077
											038532
									NEW	OBSOLETE	
M3	1	Key Motor Shaft	510629	510629	510629	510629	155099	510629	510629	510629	510629
B1	4	Screw, Flange	120162	120162	120162	120162	120162	120162	120162	120162	120255
B2	6	Screw, Manifold	155130	155130	155130 (10 pcs)	120214 (10 pcs)	120214	See Next Page		155170	155477
B3	2	Flange	510962	510354	510354	510354	510354	510354	510354	510354	511480
B4	1	Housing	517002	515737	551001	516552	516551	517419	550195	516721	529790
B5	4	Screw, Hsg /Motor	155128	251791	155128	251791	251791	155128	251791	251791	251791
B6	4	Muffler Material	(6 pcs) 517015	515743	515743	516560	516560	(6 pcs) 515743	(8 pcs) 551585	515743	529781
	2	Muffler Material	Not Used	Not Used	551006	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B7	1	Manifold Plate	517008	515744	515744	529868	529868	See Next Page		551953	517458	511284
B8	*	Shim .002"	510356	510356	510356	510356	500664	510356	510356	510356	510356
	*	Shim .005"	510357	510357	510357	510357	500665	510357	510357	510357	510357
	*	Shim .010"	510358	510358	510358	510358	500666	510358	510358	510358	510358
	*	Shim .020"	510359	510359	510359	510359	500667	510359	510359	510359	510359
	*	Shim .030"	Not Used	Not Used	Not Used	Not Used	510292	Not Used	Not Used	Not Used	Not Used
B9	1	Impeller	516987	515675	551067	516557 (2 pcs)	516562	517433	550305	516678	511272
B10	1	Bolt, Impeller	120214	120214	120214	120325	120214	120214	120325	120262	120325
B11	1	Lockwasher, Impeller	120203	120203	120203	120203	120203	120203	120203	120203	120203
B12	1	Washer, Impeller	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	516990	515702	551065	516559	516559	517431	550249	516675	511274
B14	6	Screw, Cover	155129	155236	155129 (8 pcs)	120255 (8 pcs)	155098	155236	(8 PCS) 155236	(7 pcs) 155236	155236
B16	1	Spacer, Impeller Bolt	510355	510355	510355	510355	510355	510355	510355	510355	510355
B17	4	Lockwasher, Housing	251787	251787	251787	251787	Not Used	251787	251787	251787	251787
B18	2	Screen, Muffler Retaining	517016	551087	551087	511718	511718	See Next Page		551423	510362	529782
B19		Bolt, Muffler Hsg/Hsg	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B20		Muffler Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Lip Seal	Not Used	Not Used	Not Used	Not Used	516587	Not Used	Not Used	Not Used	Not Used

*As needed **Viewed looking at inlet/outlet ports

Model	Part #	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)	Bearing, Impeller End (M2)
DR404AL72M	037406	510438	C			
DR404AL86M	037408	510700	G			
DR404AL58M	037407	510439	A			
DR454R72	036855	510317	C			
DR454R58	036856	510319	A			
DR454R86	036949	516034	G			
DR454CD72	038808	510763	C			
DR454R72M	080480	510317	C	Muffler - Liner		
DR454R58M	080481	510319	A	(2 pcs) 551006		
DR454R86M	080482	516034	G			
DR513R72	037217	510317	C			
DR513R58	037209	510319	A			
DR513R86	037773	516034	G			
DR523K72	037210	516571	C	B13A Center		
DR523K58	037211	516572	A	Annulus		
DR523K86	037772	551131	G	(1 pc) 516555		
DR505CD58M	037546	511307	A	B18 517436, B2 155170,B7		
DR505CD72M	037545	511306	C	517460		
DR505K72M	037551	511306	C	R517436		
DR505AS86M	037544	510701	G			
DR505AS72M	037543	510318	C	B2 155130, B7 517458, B18		
DR505AS58M	037542	510320	B	517435		
DR555CK72 - Obsolete	037308	510895	C			
DR555K72 - Obsolete	037306	511306	C			
DR555K58 - Obsolete	037305	511307	A	B2A Washer Manifold	510449	510217
DR555CK86 - Obsolete	037310	511305	G	(6 pcs) 120222		
DR555K86 - Obsolete	037309	516686	G			
DR555CK72	081100	510895	C			
DR555K72	081099	511306	C			
DR555K58	081098	511307	A			
DR555CK86	081102	511305	G			
DR555K86	081101	516686	G			
DR606CK72M - Obsolete	038526	510895	C			
DR606K72M - Obsolete	038527	511306	C			
DR606K58M - Obsolete	038529	511307	A			
DR606CK86M - Obsolete	038530	511305	G			
DR606CK5M - Obsolete	038532	516848	F			
DR606D72M - Obsolete	080077	550689	C			
DR656CK72X	080582	510895	C			
DR656CK5X	080584	516848	F			
DR656CK86X	080583	511305	G			
DR656K72X	080602	511306	C	B7* Muffler Extension 550253		
DR656K58X	080603	511307	A			
DR656D72X	080585	550689	C			
DR656D86X	080604	550694	G			

*As needed **Viewed looking at inlet/outlet ports

Parts Breakdown

Item No.	Qty. Req'd	Description	DR656 080582 080583 080604 080584 080585 080602 080603
M3	1	Key Motor Shaft	510629
B1	4	Screw, Flange	120255
B2	6	Screw, Manifold	155170
B3	2	Flange	511480
B4	1	Housing	550195
B5	4	Screw, Hsg /Motor	251791
B6	4	Muffler Material	(10 pcs) 551585
			Not Used
B7	0	Manifold Plate	Not Used
B8	*	Shim .002"	510356
	*	Shim .005"	510357
	*	Shim .010"	510358
	*	Shim .020"	510359
	*	Shim .030"	Not Used
B9	1	Impeller	550305
B10	1	Bolt, Impeller	120325
B11	1	Lockwasher, Impeller	120203
B12	1	Washer, Impeller	Not Used
B13	1	Cover	550249
B14	6	Screw, Cover	(8 PCS) 155236
B16	1	Spacer, Impeller Bolt	510355
B17	4	Lockwasher, Housing	251787
B18	2	Screen, Muffler Retaining Right (**)	517436
B19		Bolt, Muffler Hsg/Hsg	Not Used
B20		Muffler Housing	Not Used
		Lip Seal	Not Used

*As needed **Viewed looking at inlet/outlet ports

Small Compact Inlet Vacuum Filters

"CSL" Series 3/8" - 3" FPT

APPLICATIONS & EQUIPMENT

- Vacuum Pumps & Systems – P.D., Side Channel, Rotary Vane, Screw, Piston
- Vacuum Packaging Equipment
- Vacuum Lifters
- Blowers - Side Channel & P.D.
- Intake Suction Filters
- Pneumatic Conveying Systems
- Soil Venting/Remediation
- Remote Installations for Piston & Screw Compressors
- Printing Industry
- Factory Automation Equip
- Leak Detection Systems
- Woodworking
- Medical Industry

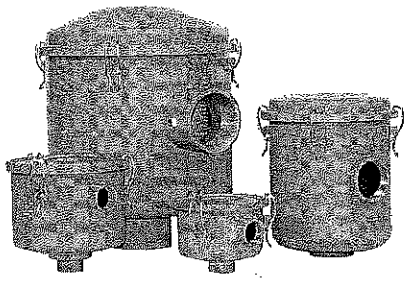
FEATURES & SPECIFICATIONS

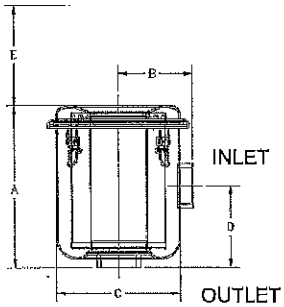
- **Vacuum level**: Typically $1x10^{-3}$ mmHg ($1.3x10^{-3}$ mbar)
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron
- Brazed fittings for **High** vacuum duty
- Stainless steel torsion clips for durability
- Low pressure drop
- Positive engagement O-ring seal system
- Seamless drawn housings
- **Large** dirt holding capacity and **Easy** field cleaning, especially when mounted horizontally or inverted
- Rugged all steel construction w/baked enamel finish
- Various media
- Temp (continuous): min -15°F (-26°C) max 220°F (104°C)
- Filter change out differential: 10" - 15" H_2O over initial delta P
- Pressure drop graphs available upon request

OPTIONS (Inquiries Encouraged)

- Vacuum gauge available
- Dome hood for high holding capacity
- Available in ***Stainless Steel***
- Epoxy coated housings
- Activated carbon prefilter for odor
- Support brackets
- Alternate top-to-canister fastening system for low pressure or pulsating systems

CONFIGURATION DRAWING





Dimension tolerance ± 1/4"

I = Industrial Duty S = Severe Duty

	with Polyester Element	with Paper Element	FPT Inlet & Outlet	DIMENSIONS - inches A	B	C	D	E	Rated Flow SCFM Nominal Rating	Element Rating	Approx. Wt. lbs
I	CSL-825-039HC	CSL-824-039HC	3/8"	3 5/8	2 1/4	3 3/4	1 7/8	3	18	25	0.88
I	CSL-825-050HC	CSL-824-050HC	1/2"	3 5/8	2 1/4	3 3/4	1 7/8	3	18	25	0.88
I	CSL-843-050HC	CSL-842-050HC	1/2"	4 3/8	3	5 7/8	2 1/2	3 1/4	20	55	3
I	CSL-825-075HC	CSL-824-075HC	3/4"	3 3/4	2 1/4	3 3/4	1 7/8	3	24	25	0.88
S	CSL-843-075HC	CSL-842-075HC	3/4"	4 3/8	3	5 7/8	2 1/2	3 1/4	25	55	3
I	CSL-843-100HC	CSL-842-100HC	1"	4 3/8	3 1/4	5 7/8	2 5/8	3 1/4	35	55	3
S	CSL-849-100HC	CSL-848-100HC	1"	6 3/4	4 1/8	7 5/16	4 1/2	5 1/4	40	115	5
I	CSL-843-125HC	CSL-842-125HC	1 1/4"	4 3/8	3 1/4	5 7/8	2 5/8	3 1/4	55	55	3
S	CSL-849-125HC	CSL-848-125HC	1 1/4"	6 3/4	4 1/8	7 5/16	4 1/2	5 1/4	60	115	5
I	CSL-849-150HC	CSL-848-150HC	1 1/2"	6 3/4	4 1/8	7 5/16	4 1/2	5 1/4	80	115	5
S	CSL-851-200HC	CSL-850-200HC	2"	10 1/4	4 9/16	8 3/4	5	9 1/4	175	290	15
I	CSL-851-250HC	CSL-850-250HC	2 1/2"	10 1/2	5 1/8	8 3/4	5 1/2	9 1/4	210	290	15
I	CSL-239-500C*	CSL-238-360C*	3"	15 3/4	8 7/8	13 1/4	8 3/4	11	300	570	33

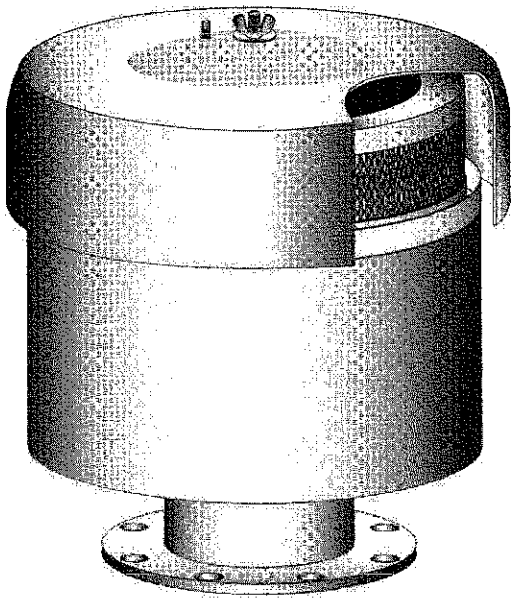
*1/4" taps standard on inlet and outlet

Note: Model offerings and design parameters may change without notice.

1151 Ardmore Ave. • Itasca, IL 60143 USA
Sales/Service: 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

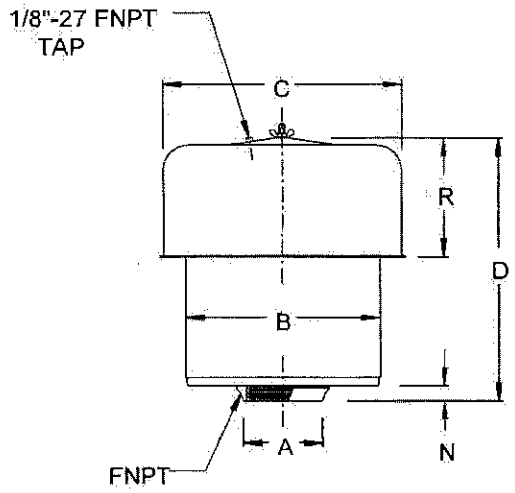
Optional Construction Features and Accessories

- 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

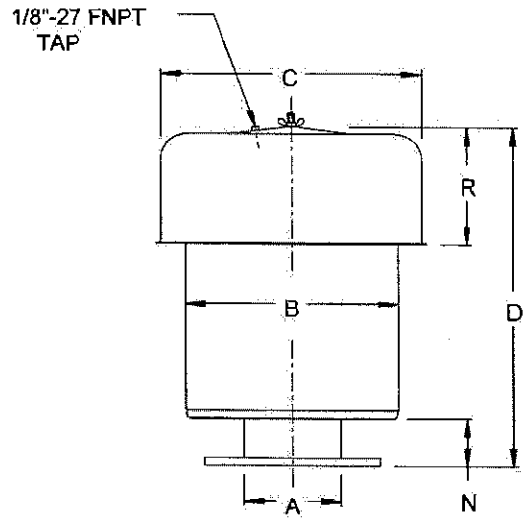
10/98
98BC-2004

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

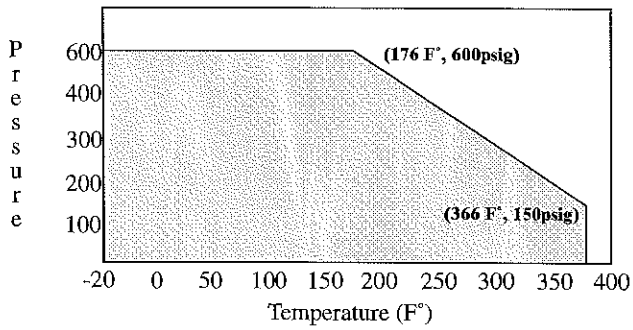
Manufacturer Cross Reference

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

Standards Compliance

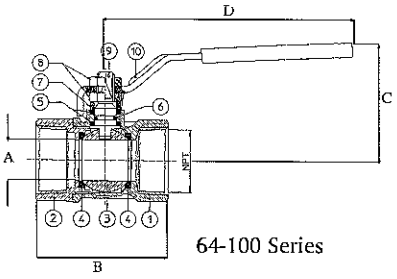
IPG's 64 series brass ball valves comply with the latest editions of these published standards:

- AGA Z21.15.CGA9.1
- AGA No. 3-88
- ANSI B1.20.1
- ANSI B16.18
- CAN/CGA-3.16-M88
- ASME/ANSI B16.33
- ASME/ANSI B16.38
- MSS SP-110
- UL Guide YSDT
- UL Guide YRPV
- UL Guide VQGU
- FM APPROVED



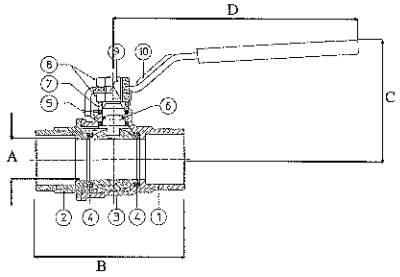
Materials of Construction

Description	Materials
1. Body	Brass UNI 5705-65
2. Retainer	Brass UNI 5705-65
3. Ball	Brass UNI 5705-65
4. Seats	PTFE
5. Stem Seals	PTFE
6. O-Ring	NBR 75 Shore A
7. Packing Gland	Brass UNI 5705-65
8. Nut	Plated Steel
9. Stem	Brass UNI 5705-65 Cr Plated
10. Lever Handle	Plated Steel 1/4" - 2" Models Aluminum 2 1/2" - 4" Models



Optional Kits

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]



NOTE: Specify (-07) suffix for T-Handle i.e. 64-105-07.

64-100 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/4" NPT	64-101-01	0.39	2.02	1.75	3.85	6
3/8" NPT	64-102-01	0.39	2.02	1.75	3.85	7
1/2" NPT	64-103-01	0.59	2.44	1.88	3.85	19
3/4" NPT	64-104-01	0.78	2.71	2.28	4.80	34
1" NPT	64-105-01	0.98	3.07	2.44	4.80	50
1-1/4" NPT	64-106-01	1.25	3.42	3.07	6.02	104
1-1/2" NPT	64-107-01	1.57	3.89	3.34	6.02	268
2" NPT	64-108-01	1.96	4.33	3.79	6.37	309
2-1/2" NPT	64-109-01	2.56	5.59	5.02	8.07	629
3" NPT	64-100-01	3.15	6.45	5.45	8.07	1018
4" NPT	64-10A-01	3.94	7.60	6.34	10.23	1622

64-200 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/2"	64-203-01	0.59	2.53	1.88	3.85	19
3/4"	64-204-01	0.78	2.99	2.28	4.80	34
1"	64-205-01	0.98	3.58	2.44	4.80	50
1-1/4"	64-206-01	1.25	4.09	3.07	6.02	104
1-1/2"	64-207-01	1.57	4.56	3.34	6.02	268
2"	64-208-01	1.96	5.43	3.79	6.37	309
2-1/2"	64-209-01	2.56	6.93	5.02	8.07	629
3"	64-200-01	3.15	8.09	5.45	8.07	1018

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A Division of Conbraco Industires, Inc.

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Matthews, NC 28106

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February 2012

289 Series Spring-Loaded Relief Valves

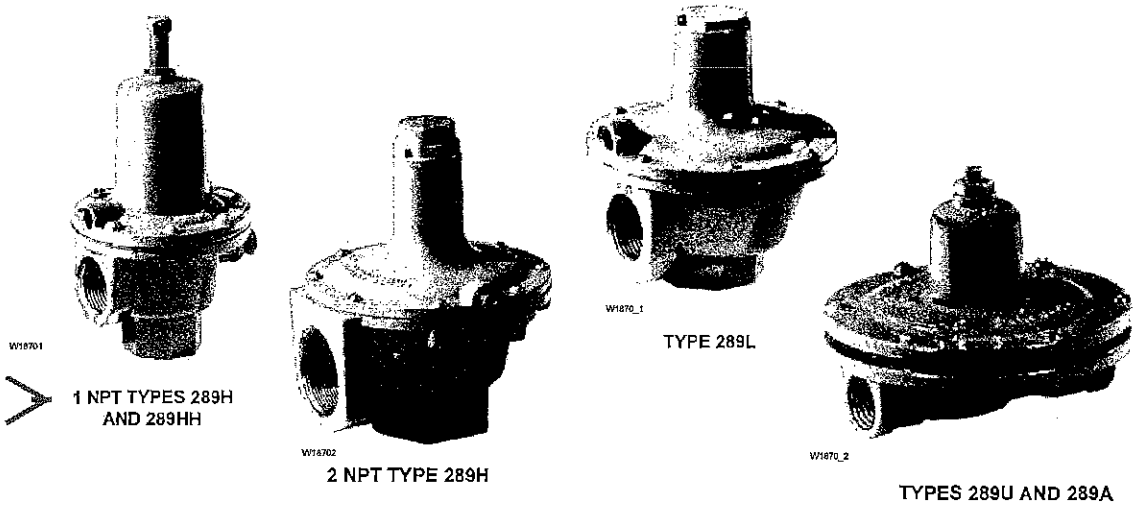


Figure 1. *Types 289H, 289L, and 289U Relief Valves*

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.

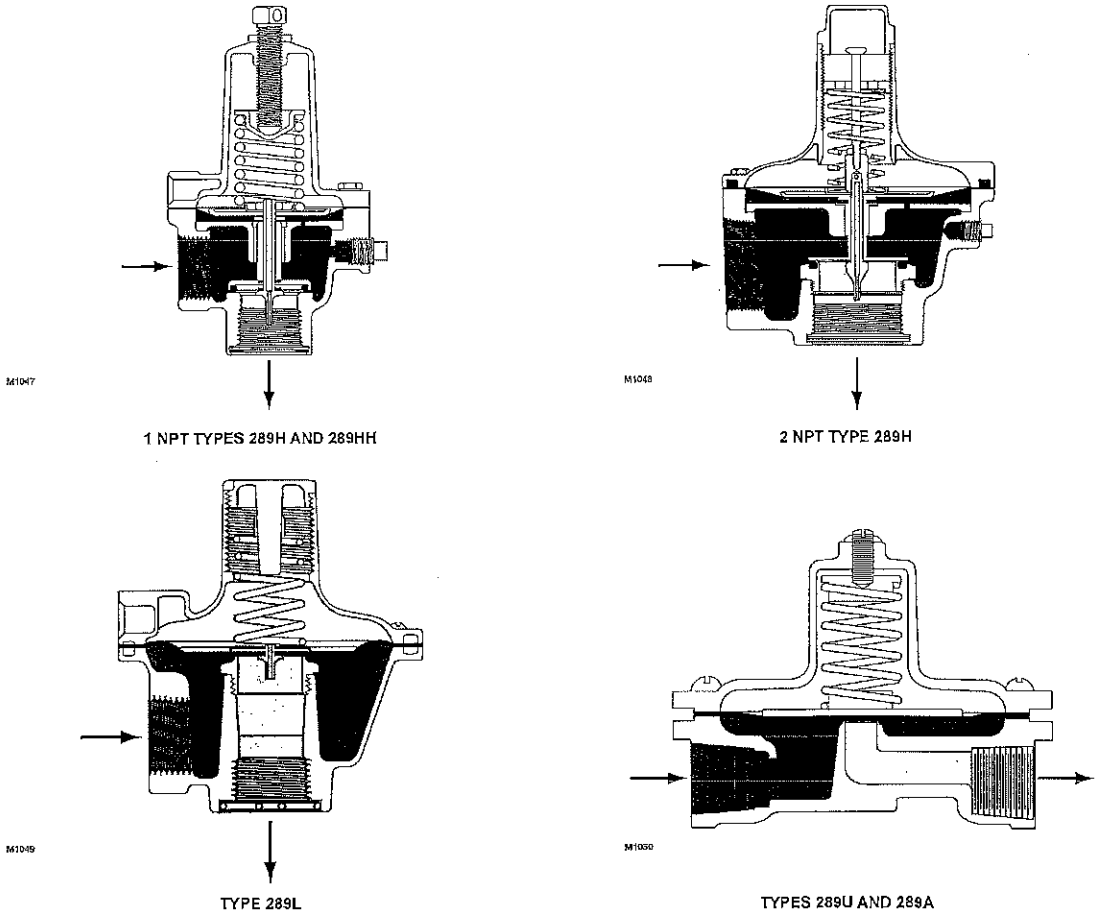
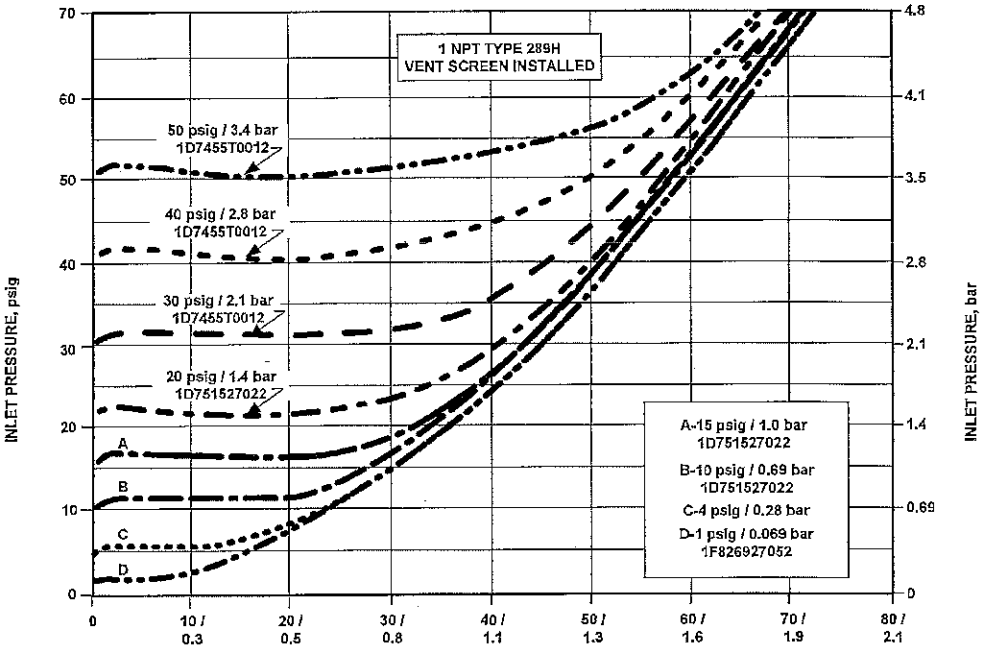


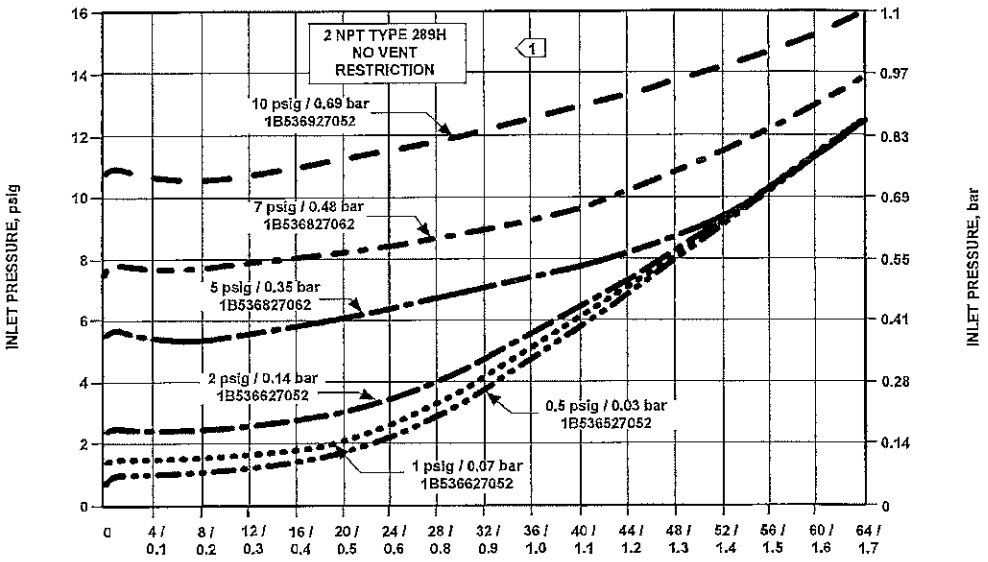
Figure 2. Types 289H, 289L, and 289U Operational Schematics

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

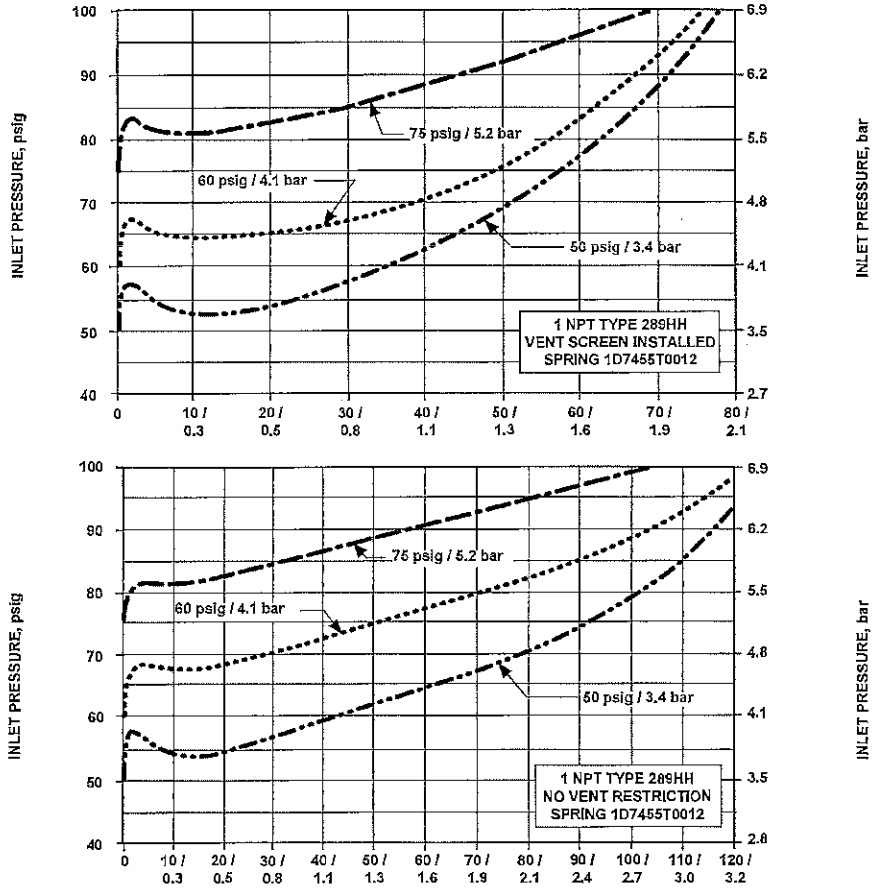
1. This value indicates the relief pressure setting plus pressure build-up.



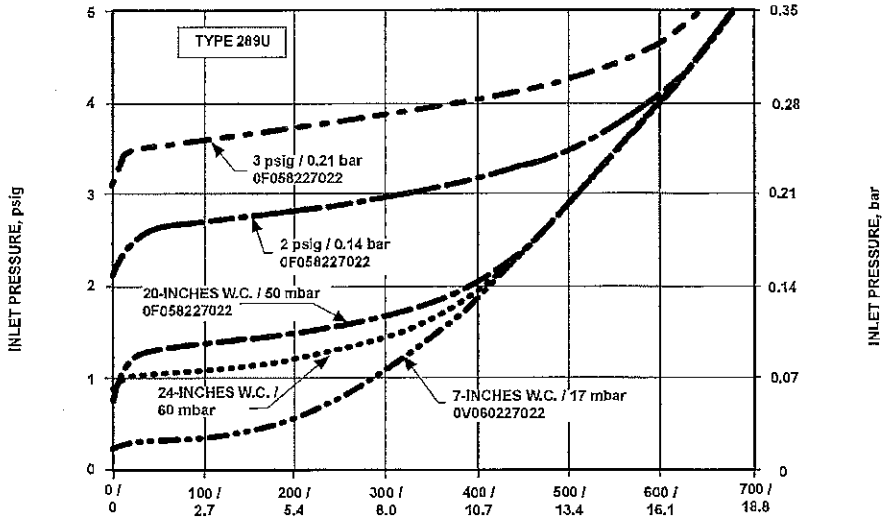


NOTE:
1. LESS THAN A 5% CAPACITY LOSS CAN BE EXPECTED WITH THE VENT SCREEN INSTALLED ON THE 2 NPT TYPE 289H AT MAXIMUM FLOW.
2. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
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*



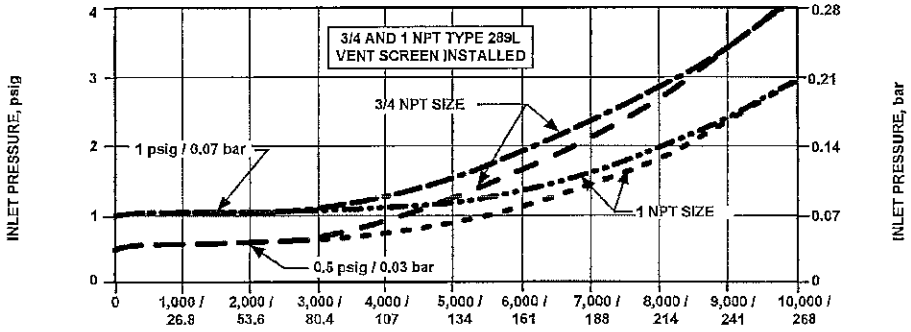
CAPACITIES IN THOUSANDS OF SCFH / Nm³/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS AT 14.7 psia AT 60°F / 1.01325 bar AT 0°C



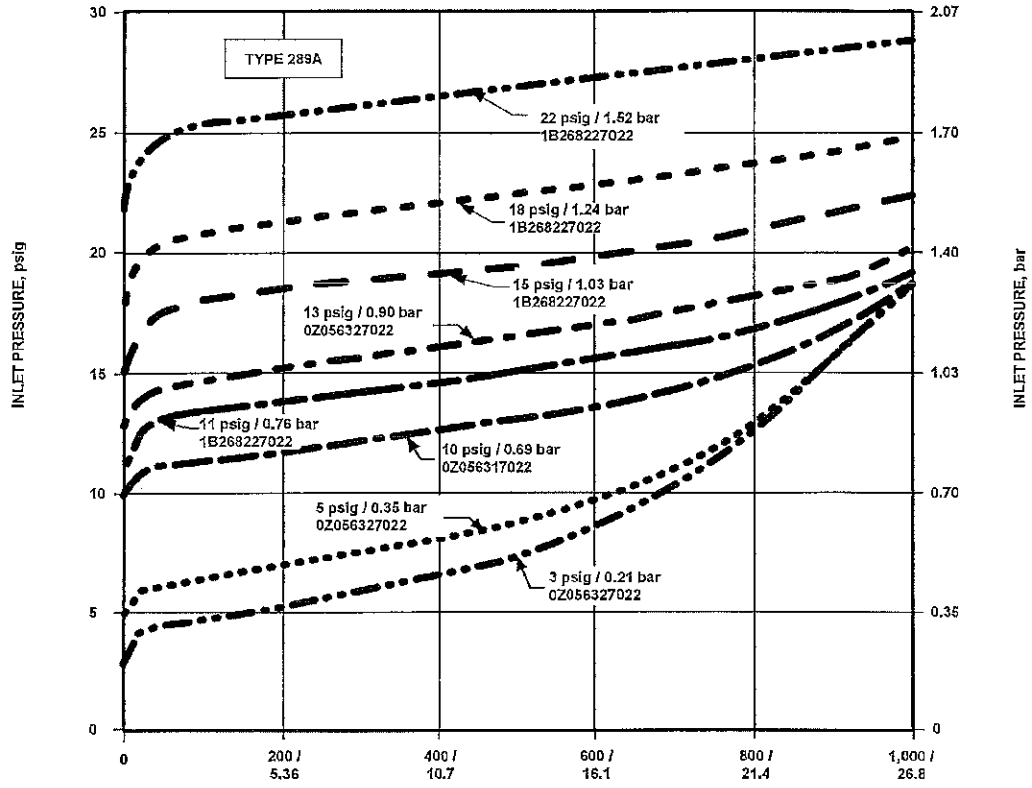
CAPACITIES IN 0.6 SPECIFIC GRAVITY GAS —
CUBIC FEET PER HOUR / Nm³/h—14.7 psia AT 60°F / 1.01325 bar AT 0°C

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)

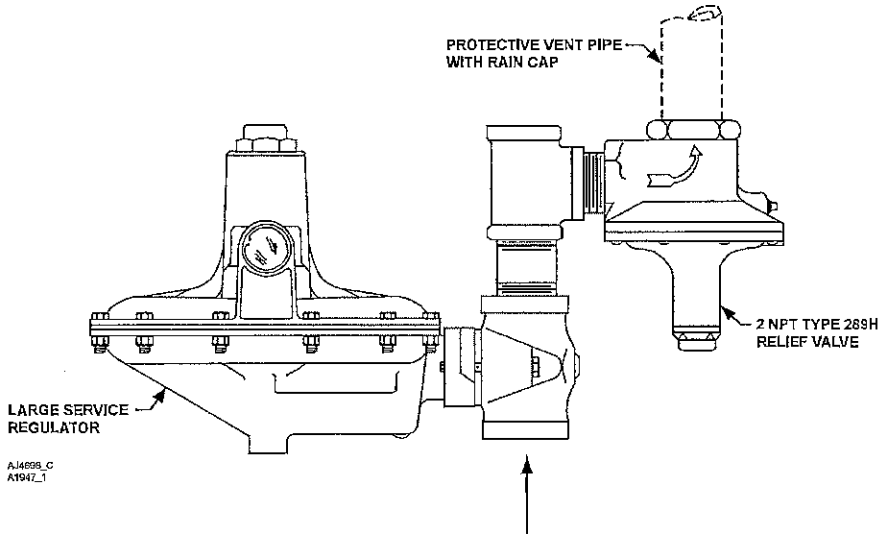


Figure 4. Typical Installation of a 289 Series Relief Valve

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

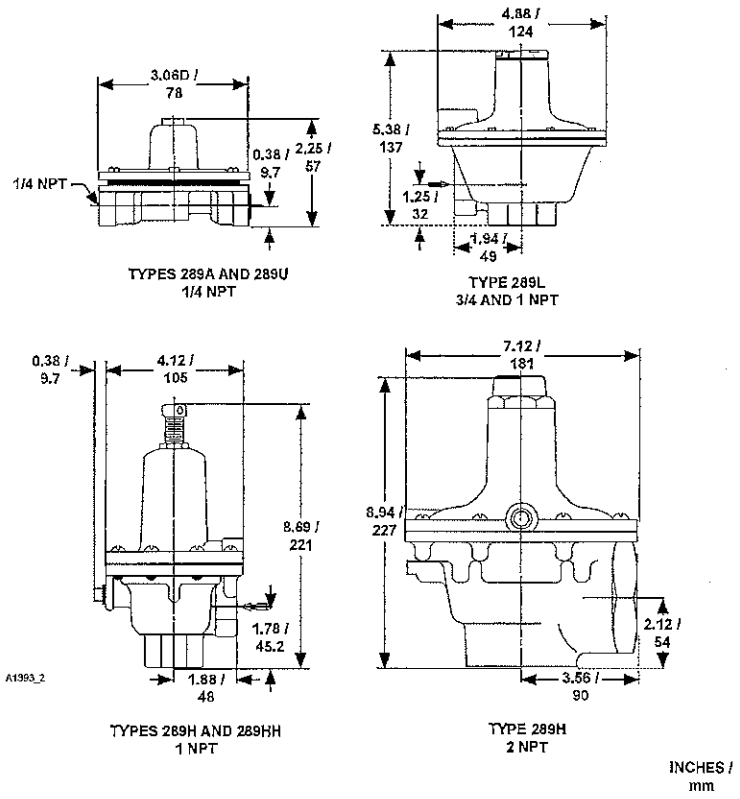


Figure 5. Dimensions

Industrial Regulators

Emerson Process Management
Regulator Technologies, Inc.

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Tel: +39 051 419 0611

Middle East and Africa
Dubai, United Arab Emirates
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For further information visit www.emersonprocess.com/regulators

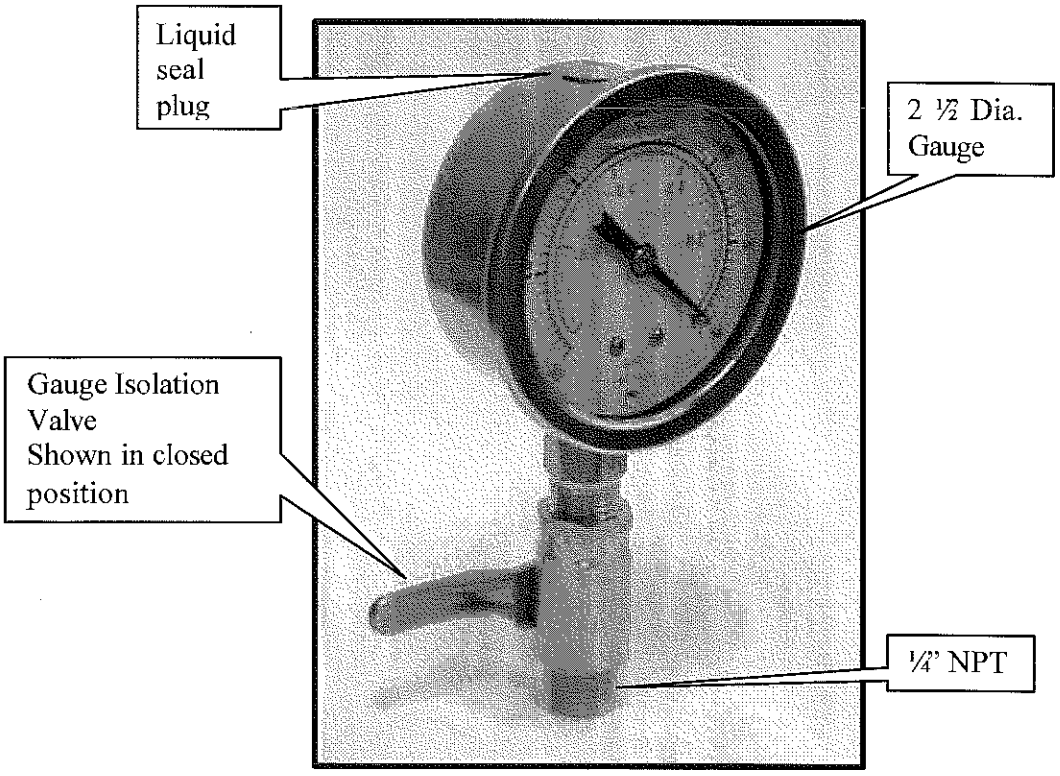
J. E. GASHO & ASSOCIATES, INC.

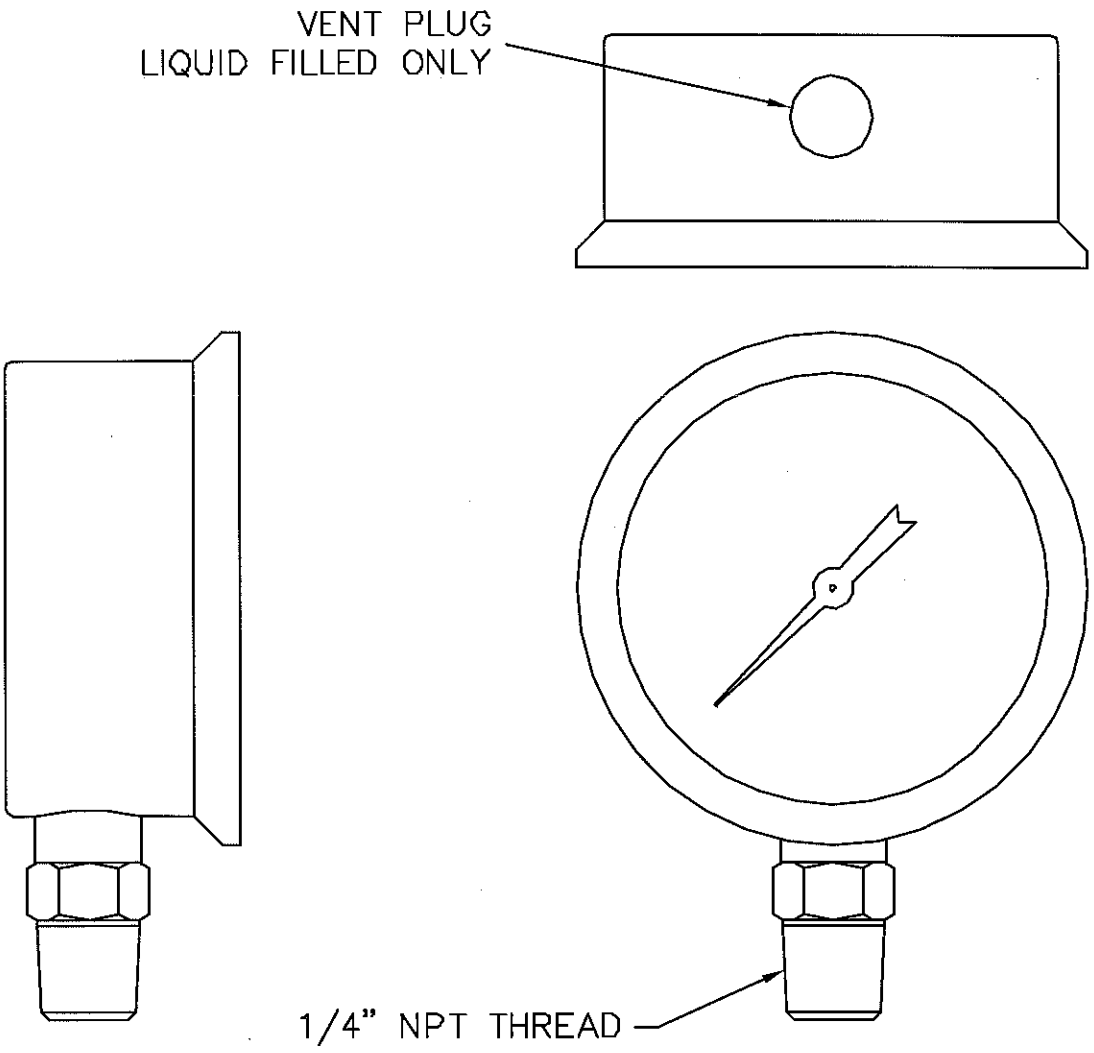
Authorized Manufacturer's Representative
Air / Gas Moving Equipment
460 W. GAY STREET
WEST CHESTER, PA 19380
PHONE: 610-692-5650 FAX: 610-692-5837

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.

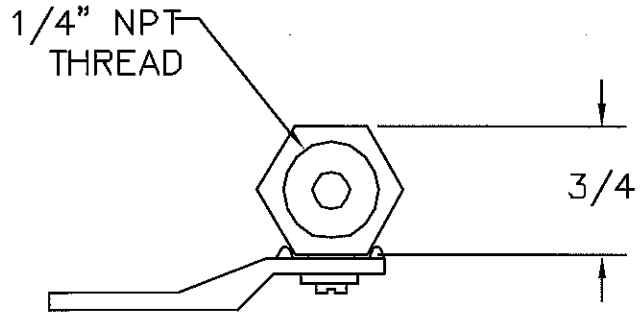
REV.	DATE	DESCRIPTION

DRAWN BY: M. WITTE | DATE: 8-18-00
APPROVED BY: | DATE:
DIMENSIONS IN INCHES
SCALE:
TOLERANCE: | ANGULAR TOLERANCE:
MATERIAL: | WEIGHT:
SHEET 1 OF 1

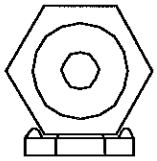
J. E. GASHO & Assoc., Inc.
460 W. GAY ST.
WEST CHESTER, PENNSYLVANIA 19380

PRESSURE GAUGE NUMBERING SYSTEM

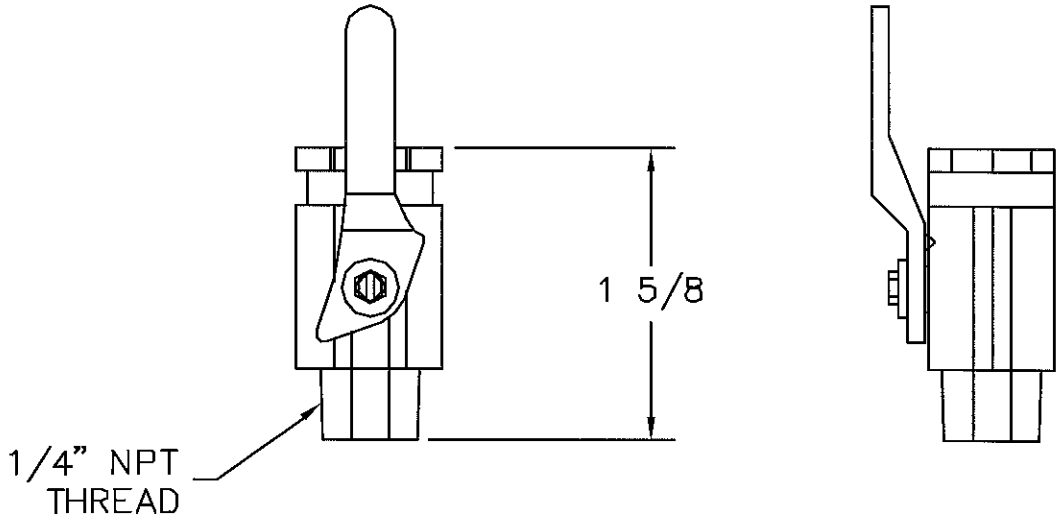
—



PLAN VIEW – CLOSED



PLAN VIEW – OPEN

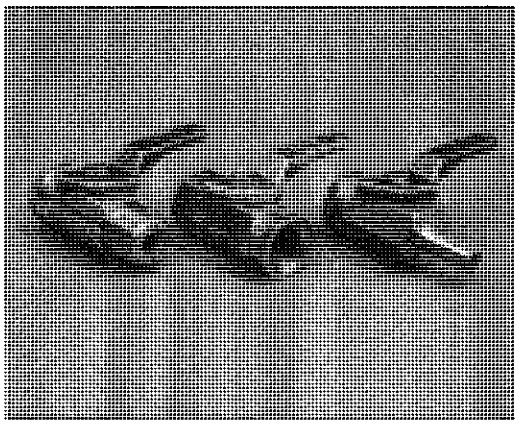


			DRAWN BY: M. WITTE	DATE: 8–17–00
			APPROVED BY:	DATE
			DIMENSIONS IN INCHES	
			SCALE	
			TOLERANCE	ANGULAR TOLERANCE
			MATERIAL	WEIGHT
REV.	DATE	DESCRIPTION	SHEET 1 OF 1	

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

GAUGE ISOLATION VALVE
SMC
VA BRS 025–4F4M–BT

—



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

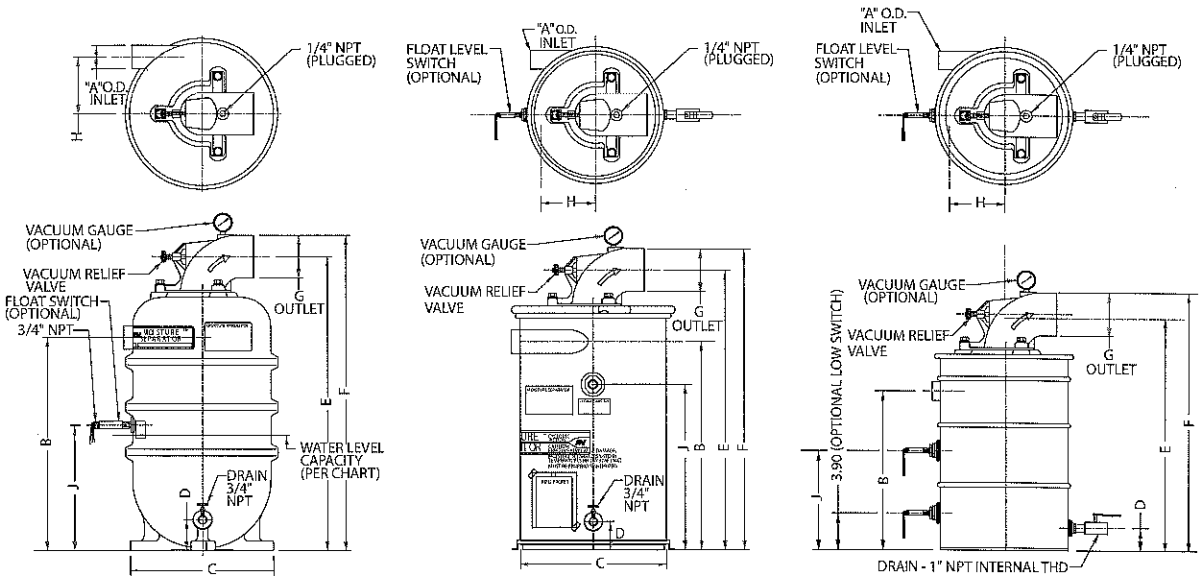
SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.
Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - info@specialtymfg.com

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 Efficiency 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 float switch available. Metal MS200/300DS models are not the standard stocked, but are available.

		Part/Model Number							
Specification	Units	MS200PS 038519	MS300PS 038520	MS200DS 080086	MS300DS 080087	MS350BS 038357	MS500BS 080660	MS600BS 080659	MS1000BS 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

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

ROTRON®

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

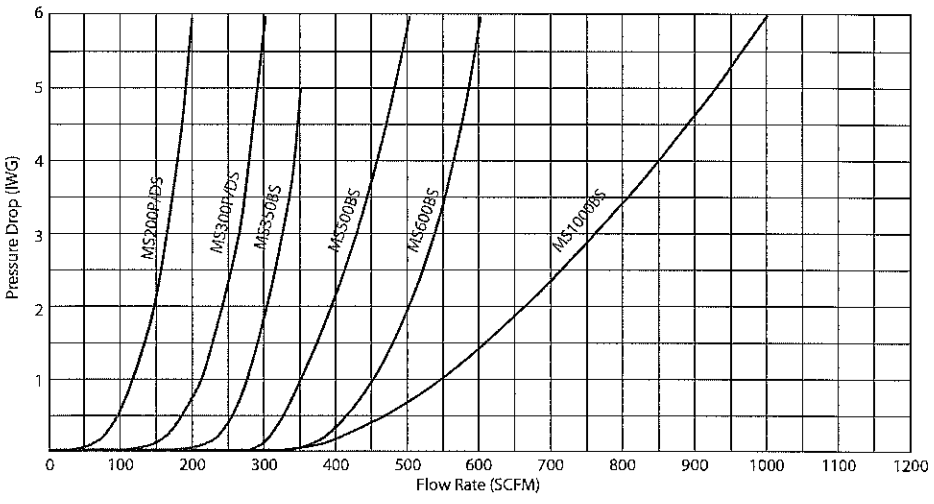
The body of the moisture separator shall be constructed of heavy wall plastic or heavy gauge cold rolled steel. The steel interior and exterior shall be epoxy (powder) coated to resist abrasion, corrosion, and chipping that might expose the surface. The inlet shall be tangentially located and welded 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)
404 454 505 513 523 555 633 833	MS200PS	7	2.38	4.5 OD	12
	MS200DS	10	2.0		22
656 6 757	MS300PS	7	2.88		12
	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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AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

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
internet: www.ametektip.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.

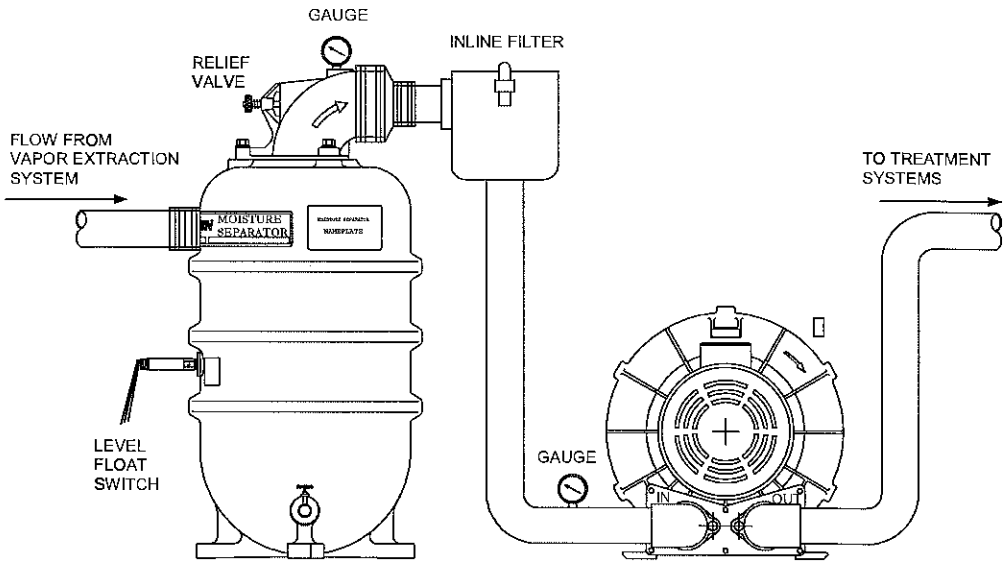
5. **Install/Adjust Relief Valve** - For MS500/600, first install the relief valve with teflon tape on threads. Use a wrench, but tighten only enough to prevent leakage. Next step for all MS units, back off the relief valve adjuster relaxing spring pressure. Then block the moisture separator inlet while 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 maxim um. 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.

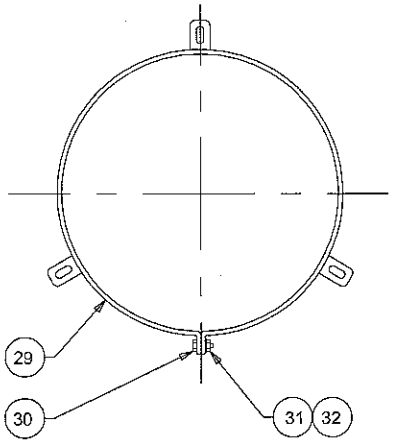
Automatic draining options are at the discretion of the customer.

Maintenance

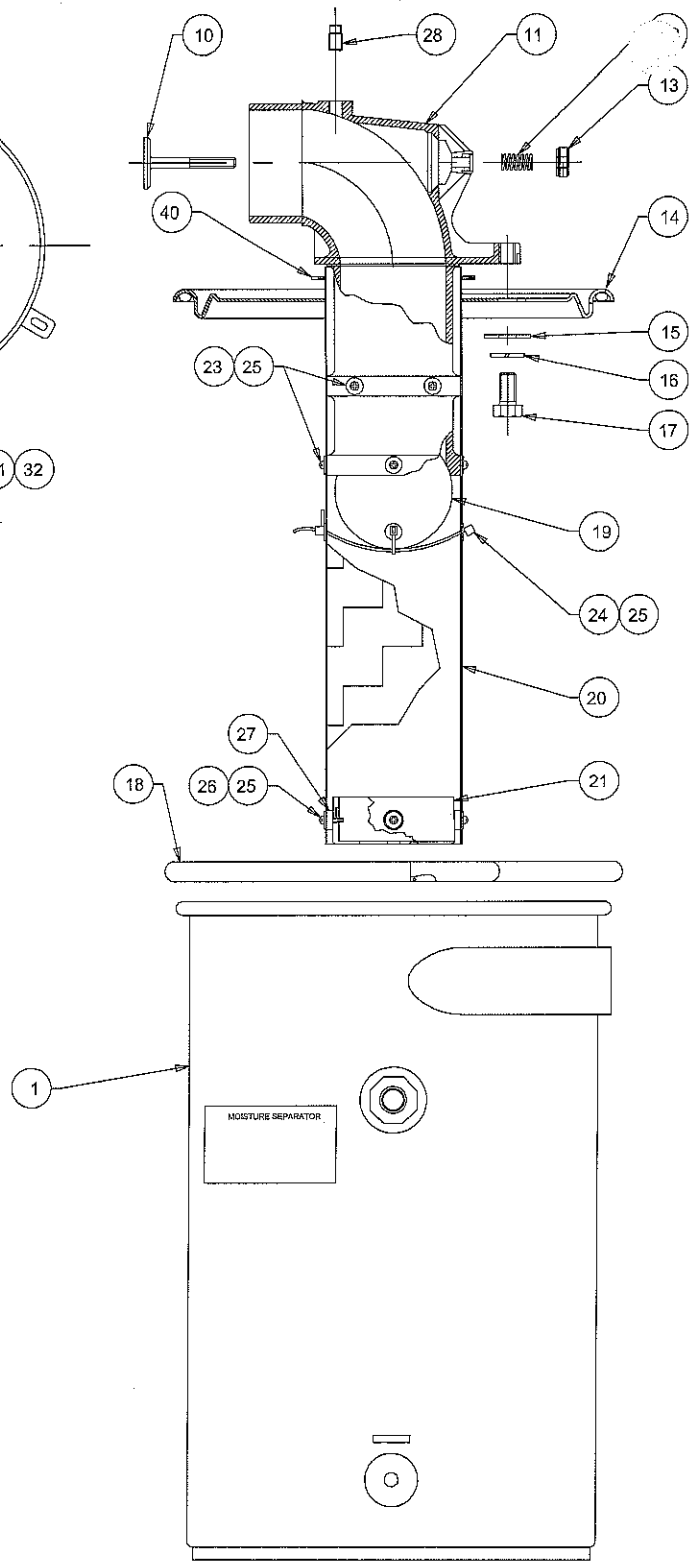
This MS series moisture separator has been designed to require minimal maintenance. During normal operation a layer of sludge may build up on the bottom of the separator. As necessary, the top assembly of the moisture separator should be removed and the inside cleaned out with water. Keeping the inside 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.

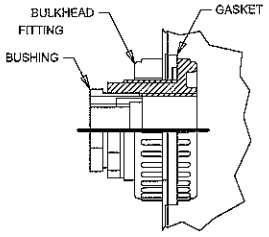
If you have any questions regarding this product, contact your local sales representative or our Application Engineering Department at the factory.

AMETEK ROTRON
MOISTURE SEPERATOR

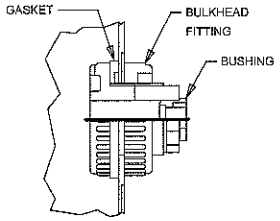


FOOT CLAMP DETAIL

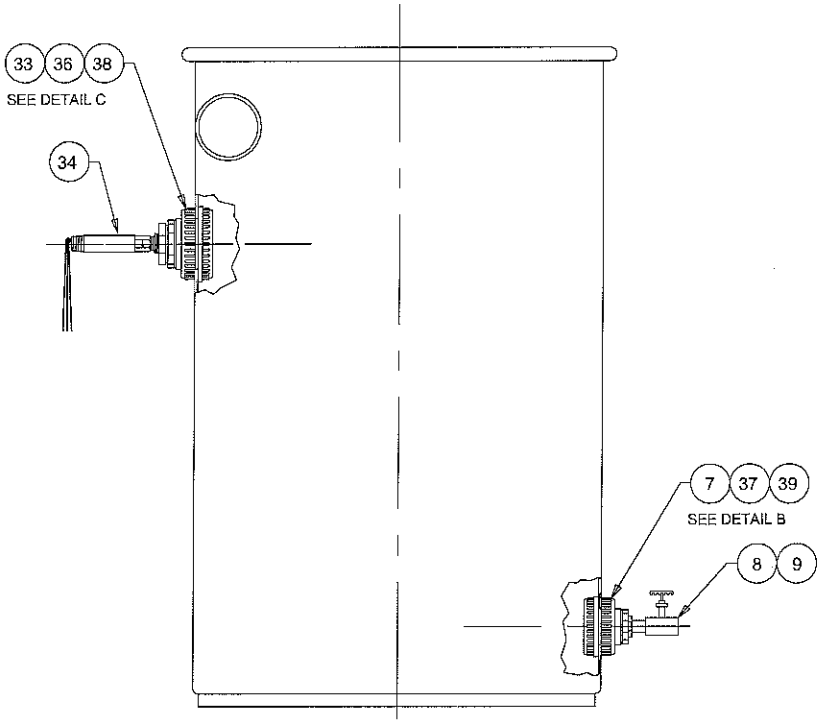




DETAIL C
BULKHEAD FITTING ASSY



DETAIL B
BULKHEAD FITTING ASSY



Parts Breakdown

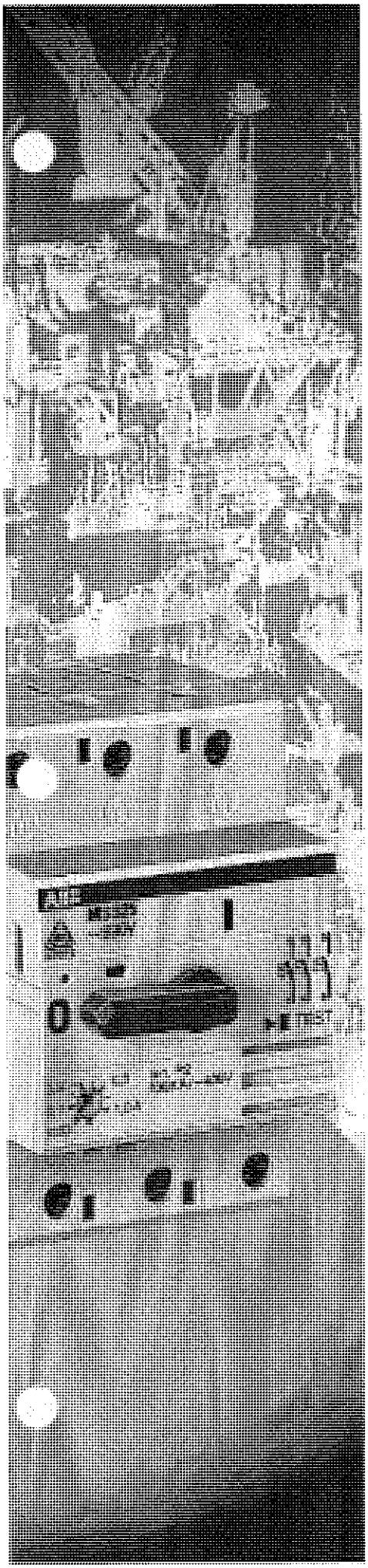
Item No.	Qty. Req'd	Description	MS200/300D_	MS350B_	MS200/300P_	MS500/600B	MS1000
		Model:				*038353*	038914
		Part No.:	038355	038277	038517	*038354*	038916
			038356	038357	038518	*038003*	080019
			038275		038519	*038075*	
			038276		038520	080657	
			080086			080658	
			080087			080659	
						080660	
						080661	
						080662	
						OBSOLETE	
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, Bulkhead 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

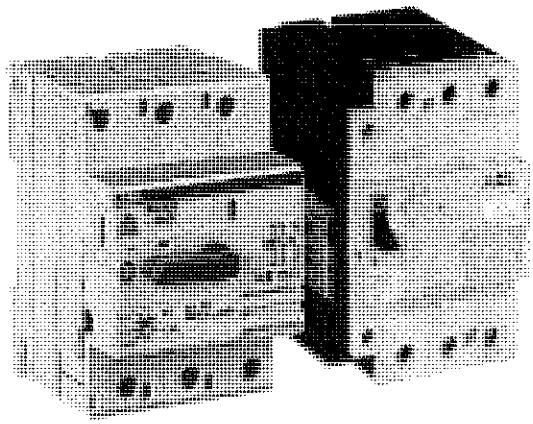
Model	Model Part No.	Item No.	Item Part #
MS200DS	038355	1	529463
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS300DS	038356	1	529464
		14	529006
		18	529004
		29*	529367
		33	529841
		34	529461
		36	552634
		38	529842
MS200D	038275	1	523362
		14	529006
		18	529004
		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



Manual motor starters
Type MS325
Type M63TM



Description

Type MS325

- Suitable for use with 3-phase motors up to 25 FLA
- UL Listed & CSA certified for 1200A group motor installation with fuses
- 14 setting ranges from 0.1 to 25 amps
- Up to 30kA or 85kA with no back up fuse required

Type M63TM

- Suitable for use with 3-phase motors up to 65 FLA
- UL Listed & CSA certified for 1200A group motor installation with fuses
- 7 setting ranges from 6 to 65 amps

Type MS325 and Type M63TM

- 35mm DIN rail snap-on mounting
- Terminals supplied in the open position
- High vibration resistance
- Compact size
- Wide range of accessories
- Easy field wiring for single phase applications
- Internal magnetic trips
- Screwdriver guide holes
- Touch safe design: All connection terminals are protected against accidental touch
- Adjustable ambient compensated Class 10 overload relay (-20°C to +55°C open, -20°C to +45°C enclosed)
- Enclosures with the following accessories
  - Padlock attachment
  - Pilot light
- Meets UL, CSA, VDE & IEC international standards
- Modular design
- Accessories include:
  - Additional auxiliary contact block (1 N.O. & 1 N.C.)
  - Undervoltage trip
  - Three phase connecting bus bars
  - Through the door operator
  - Shunt trip

Group Motor Applications

The need for individual short circuit protective devices such as fuses is eliminated with group motor applications, saving installation expense and panel space. ABB Line manual motor starters are UL Listed and can be used in group installations of motors.

Single Motor Applications

ABB Line manual motor starters provide overload protection as required by Article 430 of the National Electrical Code. Control is provided by manual operation of the contacts; overload protection is provided by an adjustable bi-metallic trip mechanism.

Index

Manual motor starters

Selection

Group installation is an approach to building multi-motor control systems in accordance with Section 430-53 of the National Electrical Code. The selection of components used in group installations is a simple process which consists of several steps.

- First, is the selection of the appropriate fuse as Branch Circuit Protective Device (BCPD).
- Second, is the selection of the appropriate motor starter and protector.
- Third, the selected MS325 must be checked for UL listing with the selected BCPD and the available short circuit current at the application location.

1. Fused Disconnect

Calculate maximum fuse size according to NEC 430-53 (c). I_{max} (fuse size) = 175% x FLC (full load current for largest motor) + the sum of FLC (full load current for largest motor) + the sum of FLC values for other motors on that branch using NEC Table 430-150 on the right. Select fuse from NEC Table 240-6 below. Where I_{max} falls between two fuse ampere ratings NEC 430-53 (c) permits going to the next high ampere rating.

2. Motor Starter & Protector Selection

Select the proper MS325 catalog number for each motor load from the next page based on the actual motor full load current (FLA) using the "Thermal setting range" column for reference.

3. MS325 Interruption ratings

Using the Interruption ratings table on the next page, identify the system application voltage and interrupting capacity for the type of fuse selected in step 1 above.

NEC 240-6 Standard fuse amperes
15, 20, 25, 30, 40, 45, 50, 60, 70, 80, 90, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600

5

Examples: Select components for protecting the following 3-phase, 460VAC, squirrel cage induction motors. The nameplate data are: 1/2 HP, 1.0 FLA; 3 HP, 4.8 FLA; 5 HP, 7.6 FLA; 7.5 HP, 11 FLA; 10 HP, 14 FLA.

MS325 data

Motor rating at 460V		MS325	Contactor
Horsepower	FLA, AC3		
1/2	1.0	MS325-1.0	B9C
3	4.8	MS325-6.3	B9C
5	7.6	MS325-9.0	B9C
7.5	11	MS325-12.5	B12C
10	14	MS325-16	B16C

NEC Table 430-150 full load current, 3ph AC motor

Horsepower	Induction type squirrel cage & wound rotor ①		
	230V amps	460V amps	575V amps
1/2	2	1	.8
3/4	2.8	1.4	1.1
1	3.6	1.8	1.4
1.5	5.2	2.6	2.1
2	6.8	3.4	2.7
3	9.6	4.8	3.9
5	15.2	7.6	6.1
7.5	22	11	9
10	28	14	11
15	42	21	17
20	54	27	22
25	68	34	27

Example: Using Fused Disconnect

- I_{max} = 175% x 14 + (11 + 7.6 + 4.8 + 1) = 48.9A
- Fuse rating using Table NEC 240-6 = 50A
- Minimum disconnect size = 115% x Total FLA
- NEC 430-150 table = 115% x (14+ 11 + 7.6 + 4.8 + 1) = 44.16

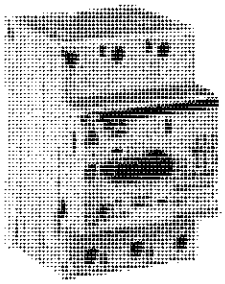
Disconnect for 50A fuses is ok.
Note: Refer to NEC 310-1 and NEC 430-53(d) for cable sizing.

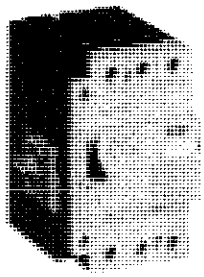
For full load currents of 208 and 200 volt motors, increase the corresponding 230 volt motor full-load current by 10% and 15%, respectively.

① These values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for especially low speeds or high torques may require more running current, and multispaed motors will have full-load current varying with speed, in which case the nameplate current rating shall be used.

The voltage listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

Manual motor starters
Type MS325, M63TM


MS325-1.0


M63TM

Manual motor starters

Thermal setting range (Amps)	Single-phase horsepower ratings ①		3-phase horsepower ratings			Branch CPD Maximum fuse size ②	Catalog number	List price
	120V	240V	240V	480V	600V			
MS325								
0.10 - 0.16	–	–	–	–	–	1600A	MS325-0.16	
0.16 - 0.25	–	–	–	–	–	1600A	MS325-0.25	**$ 96**
0.25 - 0.40	–	–	–	–	–	1600A	MS325-0.40	
0.40 - 0.63	–	–	–	–	–	1600A	MS325-0.63	
0.63 - 1.0	–	–	–	1/2	1/2	1600A	MS325-1.0	
1.0 - 1.6	–	1/10	–	3/4	3/4	1600A	MS325-1.6	
1.6 - 2.5	–	1/6	1/2	1	1.5	1600A	MS325-2.5	**110**
2.5 - 4.0	1/8	1/3	1	2	3	1600A	MS325-4.0	
4.0 - 6.3	1/4	1/2	1.5	3	5	1600A	MS325-6.3	
6.3 - 9.0	1/3	1	2.5	5	7.5	1600A	MS325-9.0	
9.0 - 12.5	1/2	2	3	7.5	10	1600A	MS325-12.5	**128**
12.5 - 16	1	2.5	5	10	10	1600A	MS325-16	
16 - 20	1.5	3	5	10	15	1600A	MS325-20	**141**
20 - 25	2	3	7.5	15	20	1600A	MS325-25	**149**
M63TM						Max. fuse size or circuit breaker		
6 - 10	1/2	1 1/2	3	5	5	1200A	M63TM-10	**245**
10 - 16	1	2	5	10	15	1200A	M63TM-16	**265**
16 - 25	1 1/2	3	5	10	15	1200A	M63TM-25	**265**
22 - 32	1 1/2	3	7 1/2	15	20	1200A	M63TM-32	**305**
28 - 40	3	7 1/2	15	30	40	1200A	M63TM-40	**305**
36 - 52	3	10	20	40	50	1200A	M63TM-52	**305**
45 - 65	5	15	25	50	60	1200A	M63TM-63	**305**

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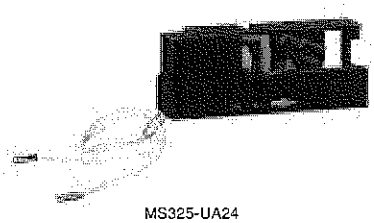
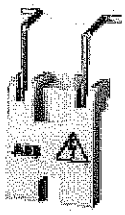
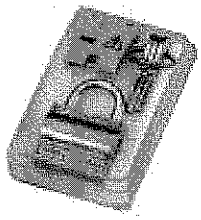
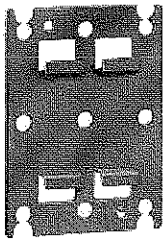
① Single phase motor ratings are based upon wiring all three poles in series.
≠ In group motor applications, use the lowest maximum fuse size.

Accessories for manual motor starters
Type MS325

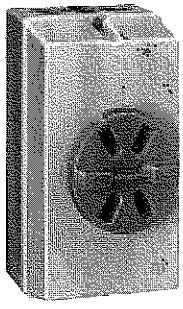

MS325-UA24

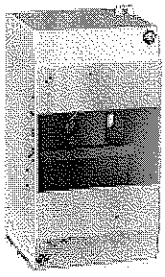

MS325-SA1


MS325-SA3


MS325-MP


MS325-L


MS325-EP2


MS325-EP4

Undervoltage trip for Type MS325

Item description	Catalog number	List price
24V	MS325-UA24	
48V	MS325-UA48	
60V	MS325-UA60	
110V	MS325-UA110	$ 55
230V	MS325-UA230	
400V	MS325-UA400	
415V	MS325-UA415	
480V	MS325-UA480	

Shunt trips for Type MS325

Item description	Catalog number	List price
110 – 127V, 60 Hz	MS325-ST110	
208V, 60 Hz	MS325-ST230	$ 55
440 – 480V, 60 Hz	MS325-ST3	

Auxiliary contact blocks for Type MS325

Item description	Catalog number	List price
1 NO & 1 NC	MS325-HK11	
2NO	MS325-HK20	$ 22
2NC	MS325-HK02	

Supporting terminal for Type MS325

Item description	Catalog number	List price
for UA or as N/LS clamp	MS325-AS	$ 10

Padlocking devices for Type MS325

Item description	Catalog number	List price
Adapter for padlock type SA1	MS325-SA1	$ 10
Complete padlock device SA3	MS325-SA3	25

Mounting plate for Type MS325

Item description	Catalog number	List price
for MS 325 screw connection	MS325-MP	$ 5

Identification labels for Type MS325

Item description	Catalog number	List price
Transparent cover	MS325-TC	$ .50
Description labels, sheet of 160	MS325-L	5.00

Molded plastic enclosures for Type MS325

Item description	Protection level	Catalog number	List price
Enclosure and cover, gray color	IP65	MS325-EP2	$ 50
Emergency OFF cover, yellow clamp red handle	IP65	MS325-EP3	50
Width 54mm (for 1 MS325 & no accessories)	IP40	MS325-EP4	15
Width 72mm (for 1 MS325 & accessories)	IP40	MS325-EP5	15
Grounding terminal	IP40	MS325-GND	6

Technical data for manual motor starters
Type MS325

General data

Rated voltage	600 V
Rated current	25 A (14 setting ranges, 0.1 to 25A)
Rated frequency	50 - 60 Hz
Electrical and mechanical life endurance	100,000 operations
Mounting position	Optional
Ambient temperature	-25°C to +50°C
Temperature compensation	-25°C to + 50°C
Wire range	14 - 6 AWG

Standards
- IEC 157-1, 292-1, 337-1
- VDE 0660 part 101, 104, 106, 200
- SEV 1090-1, 1092-1, 1093-1

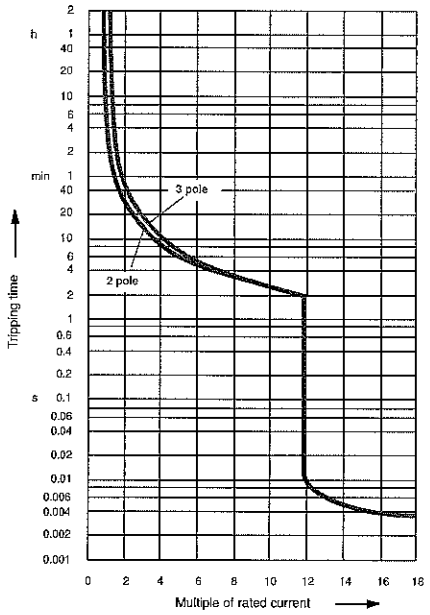
Approvals
- UL: E137861 (MS 325); E90353 (Auxiliary contact blocks)
- CSA: LR 15332
- NEMKO, DEMKO, FI, SEV, KEMA, KEUR

Tripping values

Thermal tripping setting ranges (A)	Magnetic tripping operating current (A)
0.1 - 0.16	1.6
0.16 - 0.25	2.5
0.25 - 0.40	4.0
0.4 - 0.63	6.3
0.63 - 1	12
1 - 1.6	19
1.6 - 2.5	30
2.5 - 4	48
4 - 6.3	75
6.3 - 9	108
9 - 12.5	150
12.5 - 16	192
16 - 20	240
20 - 25	300

Low voltage trip

Rated voltage	400V
Rated frequency	50 - 60 Hz
Rated power	0.9 W
Operating voltage	
• Drop out (% of nominal control voltage)	10% - 75%
• Pull in	80% - 110%



Auxiliary and pilot contacts

Rated voltage	400V
Rated current	
• I_{th}	6 A
• AC 11	2 A, 200 V
Connection cross sections	2 x 14 AWG

Interruption ratings

Thermal setting range (Amps)	High fault short circuit rating 480V kA	Maximum group fuse A	Maximum BCP fuse 600V A
0.10 - 0.16	85	1600	1
0.16 - 0.25	85	1600	1
0.25 - 0.40	85	1600	1
0.40 - 0.63	85	1600	10
0.63 - 1.00	85	1600	10
1.00 - 1.60	85	1600	10
1.60 - 2.50	85	1600	10
2.50 - 4.00	85	1600	15
4.00 - 6.30	30	1600	25
6.30 - 9.00	30	1600	35
9.00 - 12.5	30	1600	50
12.5 - 16.0	30	1600	60
16.0 - 20.0	30	1600	80
20.0 - 25.0	30	1600	100

Maximum switching capacity for DC loads
using 3 main current paths in series

DC Load	Voltage	Amps
DC 1	60V	25
	110V	25
	220V	25
	440V	25
DC 2/3	60V	25
	110V	25
	220V	25
	440V	25
DC 4/5	60V	25
	110V	25
	220V	25
	440V	25

Auxiliary leads

Type load		Voltage	Amps
Carrying capacity of aux. contacts Thermal permanent current I_{th}			6
Rated operating for current I_e	**AC11** up to	220VAC	2
		380VAC	1.5
		500VAC	1.2
	DC11 up to	60VDC	1.5
		110VDC	1
		220VDC	0.3
		440VDC	0.1

5

AC 1000 – 2/97

Technical data for manual motor starters
M63TM

UL/CSA technical data

Domestic applications

Maximum rated continuous current	Amps	65
Rated operating voltage	AC-volts	600
Ambient temperature compensation at full rated current		
	°C	-20 to +55
	°F	-4 to +131

Power losses of switch (cold condition)
Rated current [1 Amp]/power loss Watts (undervoltage release and shunts have to be considered separately)

Amp	Watt
2.4	8
6	7
25	14
63	23

DC operation

1 pole		
	90VDC	—
	120VDC	—
	240VDC	—
2 poles in series		
	90VDC	—
	120VDC	—
	240VDC	—
Max.	120VDC, 25A, per pole	
	240VDE, 25A, two poles in series	

Rated mechanical endurance	up to 25 Amps	100,000 make/break
	above 25 Amps	30,000 make/break
Maximum switching frequency	operators/hours	25

Conductor size

Power conductor	(solid or stranded) AWG	(1) or (2) 16-4 (1) 3 & (1) 16-6 or (1) 3
Control conductor	(solid or stranded) AWG	(2) 20-12

Terminal torque

Power terminals	Lb. In.	22-26.5
Control terminals	Lb. In.	9-11

Accessories
Auxiliary contact block (1 N.O., 1 N.C.) and
Short circuit indicator (1 N.O., 1 N.C.)

Contact ratings	AC	B600
	DC	Q300
Conductor size	(Solid or stranded) AWG	(2) 20-12
Terminal torque	Lb. In.	9-11

Undervoltage release

Dropout voltage range	(x rated Voltage) V	0.73 to 0.37
Reset voltage	(x rated Voltage) V	0.8 to 1.1
Power consumption, pickup	VA9W	10/6
Power consumption, sealed	VA/W	4.7-2
Clearing time	ms	20

Shunt trips

Power consumption, pickup	VA/W	10/6
Operating voltage	(x rated voltage)	0.73 to 1.1
Max. permissible command duration	s	continuous
Max. opening time	ms	20

Remote-control actuator

Rated operational control voltage	AC V	—
Power consumption, pickup	W	—
Power consumption, sealed	W	—

IEC technical data

Number of poles		3
Max. rated current I_n		63
Rated operational voltage U_e	AcV	690
Rated frequency	Hz	50/60
Rated insulation voltage U_i	V	750
Rated surge withstand capability U_{imp}	kV	6

Utilization category

acc. to IEC 947-1 (circuit breakers)	A
acc. to IEC 947-4-1 (motor starters)	AC-3

Phase failure sensitivity	yes
Temperature compensation	yes
Characteristics of main circuit breakers	yes
Characteristics of EMERGENCY-STOP circuit breakers with appropriate accessories	yes

Short-circuit interrupting capability I_{cn} at DC
time constant r = 15ms

	1 pole	2 poles in series	3 poles in series		
up to	DC 110V	DC 220V	DC 330V	kA	upon request
up to	DC 150V	DC 300V	DC 450V	kA	upon request

Switching capability at max. rated current

		Equipment protection	Motor protection
220/230V	kW	18	11
240V	kW	20	15
380/400V	kW	31	22
415V	kW	34	22
500V	kW	41	30
660V	kW	55	37
690V	kW	57	45

Degree of protection

With open terminals	IP00
With conductors connected	IP20
Shock-hazard protection acc. to DIN VDE0106 Part 100	yes

Conductor cross-section for main conductions

Type of connection		SIGUT
Solid or stranded	mm^2	1 x 1.5 to 2 x 16
	mm^2	or 1 x 25 + 1 x 10
Finely stranded with end sleeve	mm^2	1 x 1.5 to 2 x 10
	mm^2	or 1 x 16 + 1 x 10
Tightening torque of control terminal screws	Nm	1 to 1.3

Accessories

Auxiliary contacts

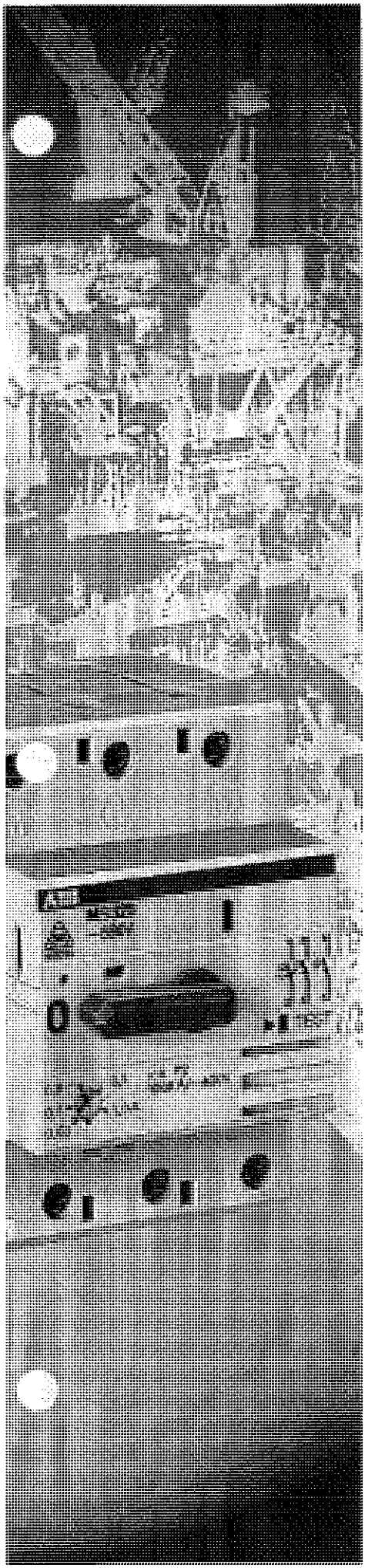
Rated operation voltage Ue	ACV	230 400 500
Rated operational current Ie	A	3 1.5 1.2
Utilization category	AC-15	

Conductor cross-section

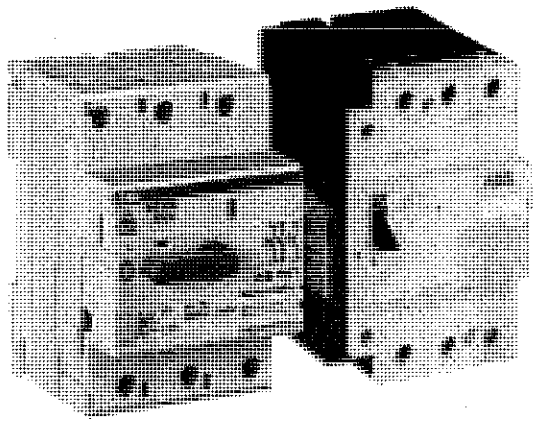
Type of connection		SIGUT
Solid or stranded	mm^2	1 x 0.5 to 2 x 2.5
Finely stranded with end sleeve	mm^2	1 x 0.5 tp 2 x 1.5
Tightening torque	Nm	1 to 1.3

Short-circuit protection for control circuits

Back-up fuse (gL/gG)	A	10
Miniature circuit breaker	A	6



Manual motor starters
Type MS325
Type M63TM



Description

Type MS325
- Suitable for use with 3-phase motors up to 25 FLA
- UL Listed & CSA certified for 1200A group motor installation with fuses
- 14 setting ranges from 0.1 to 25 amps
- Up to 30kA or 85kA with no back up fuse required

Type M63TM
- Suitable for use with 3-phase motors up to 65 FLA
- UL Listed & CSA certified for 1200A group motor installation with fuses
- 7 setting ranges from 6 to 65 amps

Type MS325 and Type M63TM
- 35mm DIN rail snap-on mounting
- Terminals supplied in the open position
- High vibration resistance
- Compact size
- Wide range of accessories
- Easy field wiring for single phase applications
- Internal magnetic trips
- Screwdriver guide holes
- Touch safe design: All connection terminals are protected against accidental touch
- Adjustable ambient compensated Class 10 overload relay (-20°C to +55°C open, -20°C to +45°C enclosed)
- Enclosures with the following accessories
  – Padlock attachment
  – Pilot light
- Meets UL, CSA, VDE & IEC international standards
- Modular design
- Accessories include:
  – Additional auxiliary contact block (1 N.O. & 1 N.C.)
  – Undervoltage trip
  – Three phase connecting bus bars
  – Through the door operator
  – Shunt trip

Group Motor Applications

The need for individual short circuit protective devices such as fuses is eliminated with group motor applications, saving installation expense and panel space. ABB Line manual motor starters are UL Listed and can be used in group installations of motors.

Single Motor Applications

ABB Line manual motor starters provide overload protection as required by Article 430 of the National Electrical Code. Control is provided by manual operation of the contacts; overload protection is provided by an adjustable bi-metallic trip mechanism.

Index

Manual motor starters

Manual motor starters
Selection information

Selection
Group installation is an approach to building multi-motor control systems in accordance with Section 430-53 of the National Electrical Code. The selection of components used in group installations is a simple process which consists of several steps.

- First, is the selection of the appropriate fuse as Branch Circuit Protective Device (BCPD).
- Second, is the selection of the appropriate motor starter and protector.
- Third, the selected MS325 must be checked for UL listing with the selected BCPD and the available short circuit current at the application location.

1. Fused Disconnect
Calculate maximum fuse size according to NEC 430-53 (c). I_{max} (fuse size) = 175% x FLC (full load current for largest motor) + the sum of FLC (full load current for largest motor) + the sum of FLC values for other motors on that branch using NEC Table 430-150 on the right. Select fuse from NEC Table 240-6 below. Where I_{max} falls between two fuse ampere ratings NEC 430-53 (c) permits going to the next high ampere rating.

2. Motor Starter & Protector Selection
Select the proper MS325 catalog number for each motor load from the next page based on the actual motor full load current (FLA) using the "Thermal setting range" column for reference.

3. MS325 Interruption ratings
Using the Interruption ratings table on the next page, identify the system application voltage and interrupting capacity for the type of fuse selected in step 1 above.

NEC 240-6 Standard fuse amperes
15, 20, 25, 30, 40, 45, 50, 60, 70, 80, 90, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600

5

Examples: Select components for protecting the following 3-phase, 460VAC, squirrel cage induction motors. The nameplate data are: 1/2 HP, 1.0 FLA; 3 HP, 4.8 FLA; 5 HP, 7.6 FLA; 7.5 HP, 11 FLA; 10 HP, 14 FLA.

MS325 data

Motor rating at 460V		MS325	Contactor
Horsepower	FLA, AC3		
1/2	1.0	MS325-1.0	B9C
3	4.8	MS325-6.3	B9C
5	7.6	MS325-9.0	B9C
7.5	11	MS325-12.5	B12C
10	14	MS325-16	B16C

NEC Table 430-150 full load current, 3ph AC motor

Horsepower	Induction type squirrel cage & wound rotor ①		
	230V amps	460V amps	575V amps
1/2	2	1	.8
3/4	2.8	1.4	1.1
1	3.6	1.8	1.4
1.5	5.2	2.6	2.1
2	6.8	3.4	2.7
3	9.6	4.8	3.9
5	15.2	7.6	6.1
7.5	22	11	9
10	28	14	11
15	42	21	17
20	54	27	22
25	68	34	27

Example: Using Fused Disconnect
- I_{max} = 175% x 14 + (11 + 7.6 + 4.8 + 1) = 48.9A
- Fuse rating using Table NEC 240-6 = 50A
- Minimum disconnect size = 115% x Total FLA
- NEC 430-150 table = 115% x (14+ 11 + 7.6 + 4.8 + 1) = 44.16

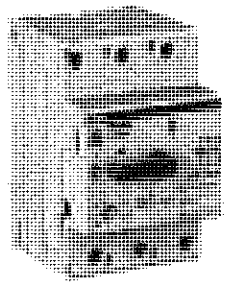
Disconnect for 50A fuses is ok.
Note: Refer to NEC 310-1 and NEC 430-53(d) for cable sizing.

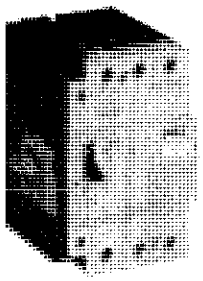
For full load currents of 208 and 200 volt motors, increase the corresponding 230 volt motor full-load current by 10% and 15%, respectively.

① These values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for especially low speeds or high torques may require more running current, and multispeed motors will have full-load current varying with speed, in which case the nameplate current rating shall be used.

The voltage listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

Manual motor starters
Type MS325, M63TM


MS325-1.0


M63TM

Manual motor starters

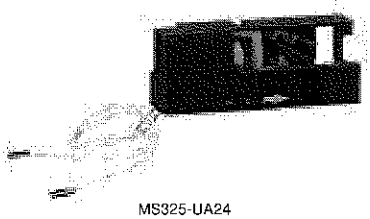
Thermal setting range (Amps)	Single-phase horsepower ratings ①		3-phase horsepower ratings			Branch CPD Maximum fuse size ②	Catalog number	List price
	120V	240V	240V	480V	600V			
MS325								
0.10 - 0.16	–	–	–	–	–	1600A	MS325-0.16	
0.16 - 0.25	–	–	–	–	–	1600A	MS325-0.25	**$ 96**
0.25 - 0.40	–	–	–	–	–	1600A	MS325-0.40	
0.40 - 0.63	–	–	–	–	–	1600A	MS325-0.63	
0.63 - 1.0	–	–	–	1/2	1/2	1600A	MS325-1.0	
1.0 - 1.6	–	1/10	–	3/4	3/4	1600A	MS325-1.6	
1.6 - 2.5	–	1/6	1/2	1	1.5	1600A	MS325-2.5	**110**
2.5 - 4.0	1/8	1/3	1	2	3	1600A	MS325-4.0	
4.0 - 6.3	1/4	1/2	1.5	3	5	1600A	MS325-6.3	
6.3 - 9.0	1/3	1	2.5	5	7.5	1600A	MS325-9.0	
9.0 - 12.5	1/2	2	3	7.5	10	1600A	MS325-12.5	**128**
12.5 - 16	1	2.5	5	10	10	1600A	MS325-16	
16 - 20	1.5	3	5	10	15	1600A	MS325-20	**141**
20 - 25	2	3	7.5	15	20	1600A	MS325-25	**149**
M63TM						Max. fuse size or circuit breaker		
6 - 10	1/2	1 1/2	3	5	5	1200A	M63TM-10	**245**
10 - 16	1	2	5	10	15	1200A	M63TM-16	**265**
16 - 25	1 1/2	3	5	10	15	1200A	M63TM-25	**265**
22 - 32	1 1/2	3	7 1/2	15	20	1200A	M63TM-32	**305**
28 - 40	3	7 1/2	15	30	40	1200A	M63TM-40	**305**
36 - 52	3	10	20	40	50	1200A	M63TM-52	**305**
45 - 65	5	15	25	50	60	1200A	M63TM-63	**305**

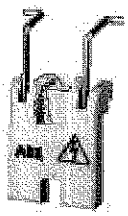
5

① Single phase motor ratings are based upon wiring all three poles in series.
≠ In group motor applications, use the lowest maximum fuse size.

MANUAL MOTOR STARTERS: Selection: 5.3 Accessories: 5.4 - 5.6 Technical data: 5.7 - 5.8 Approximate dimensions: 5.9 - 5.12

Accessories for manual motor starters
Type MS325


MS325-UA24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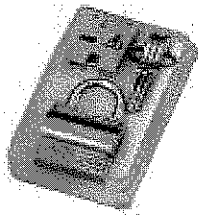
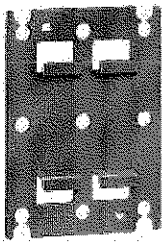
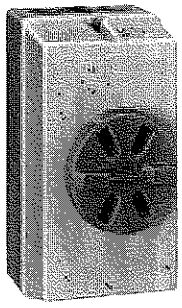
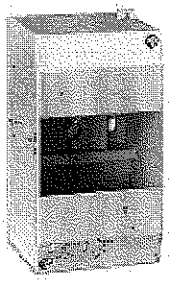

MS325-SA3


MS325-MP


MS325-L


MS325-EP2


MS325-EP4

Undervoltage trip for Type MS325

Item description	Catalog number	List price
24V	MS325-UA24	
48V	MS325-UA48	
60V	MS325-UA60	
110V	MS325-UA110	$ 55
230V	MS325-UA230	
400V	MS325-UA400	
415V	MS325-UA415	
480V	MS325-UA480	

Shunt trips for Type MS325

Item description	Catalog number	List price
110 – 127V, 60 Hz	MS325-ST110	
208V, 60 Hz	MS325-ST230	$ 55
440 – 480V, 60 Hz	MS325-ST3	

Auxiliary contact blocks for Type MS325

Item description	Catalog number	List price
1 NO & 1 NC	MS325-HK11	
2NO	MS325-HK20	$ 22
2NC	MS325-HK02	

Supporting terminal for Type MS325

Item description	Catalog number	List price
for UA or as N/LS clamp	MS325-AS	$ 10

Padlocking devices for Type MS325

Item description	Catalog number	List price
Adapter for padlock type SA1	MS325-SA1	$ 10
Complete padlock device SA3	MS325-SA3	25

Mounting plate for Type MS325

Item description	Catalog number	List price
for MS 325 screw connection	MS325-MP	$ 5

Identification labels for Type MS325

Item description	Catalog number	List price
Transparent cover	MS325-TC	$ .50
Description labels, sheet of 160	MS325-L	5.00

Molded plastic enclosures for Type MS325

Item description	Protection level	Catalog number	List price
Enclosure and cover, gray color	IP65	MS325-EP2	$ 50
Emergency OFF cover, yellow clamp red handle	IP65	MS325-EP3	50
Width 54mm (for 1 MS325 & no accessories)	IP40	MS325-EP4	15
Width 72mm (for 1 MS325 & accessories)	IP40	MS325-EP5	15
Grounding terminal	IP40	MS325-GND	6

Technical data for manual motor starters
Type MS325

General data

Rated voltage	600 V
Rated current	25 A (14 setting ranges, 0.1 to 25A)
Rated frequency	50 - 60 Hz
Electrical and mechanical life endurance	100,000 operations
Mounting position	Optional
Ambient temperature	-25°C to +50°C
Temperature compensation	-25°C to + 50°C
Wire range	14 - 8 AWG

Standards
- IEC 157-1, 292-1, 337-1
- VDE 0660 part 101, 104, 106, 200
- SEV 1090-1, 1092-1, 1093-1

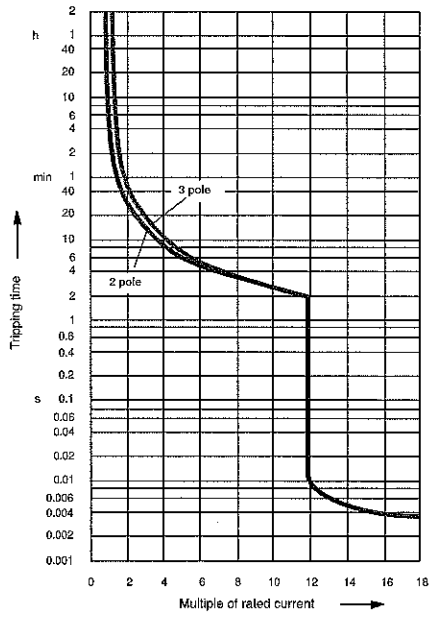
Approvals
- UL: E137861 (MS 325); E90353 (Auxiliary contact blocks)
- CSA: LR 15332
- NEMKO, DEMKO, FI, SEV, KEMA, KEUR

Tripping values

Thermal tripping setting ranges (A)	Magnetic tripping operating current (A)
0.1 - 0.16	1.6
0.16 - 0.25	2.5
0.25 - 0.40	4.0
0.4 - 0.63	6.3
0.63 - 1	12
1 - 1.6	19
1.6 - 2.5	30
2.5 - 4	48
4 - 6.3	75
6.3 - 9	108
9 - 12.5	150
12.5 - 16	192
16 - 20	240
20 - 25	300

Low voltage trip

Rated voltage	400V
Rated frequency	50 - 60 Hz
Rated power	0.9 W
Operating voltage	
• Drop out (% of nominal control voltage)	10% - 75%
• Pull in	80% - 110%



Auxiliary and pilot contacts

Rated voltage	400V
Rated current	
• I_{th}	6 A
• AC 11	2 A, 200 V
Connection cross sections	2 x 14 AWG

Interruption ratings

Thermal setting range (Amps)	High fault short circuit rating 480V kA	Maximum group fuse A	Maximum BCP fuse 600V A
0.10 - 0.16	85	1600	1
0.16 - 0.25	85	1600	1
0.25 - 0.40	85	1600	1
0.40 - 0.63	85	1600	10
0.63 - 1.00	85	1600	10
1.00 - 1.60	85	1600	10
1.60 - 2.50	85	1600	10
2.50 - 4.00	85	1600	15
4.00 - 6.30	30	1600	25
6.30 - 9.00	30	1600	35
9.00 - 12.5	30	1600	50
12.5 - 16.0	30	1600	60
16.0 - 20.0	30	1600	80
20.0 - 25.0	30	1600	100

Maximum switching capacity for DC loads
using 3 main current paths in series

DC Load	Voltage	Amps
DC 1	60V	25
	110V	25
	220V	25
	440V	25
DC 2/3	60V	25
	110V	25
	220V	25
	440V	25
DC 4/5	60V	25
	110V	25
	220V	25
	440V	25

Auxiliary leads

Type load		Voltage	Amps
Carrying capacity of aux. contacts Thermal permanent current I_{th}			6
Rated operating for current I_e	**AC11** up to	220VAC	2
		380VAC	1.5
		500VAC	1.2
	DC11 up to	60VDC	1.5
		110VDC	1
		220VDC	0.3
		440VDC	0.1

5

Technical data for manual motor starters
M63TM

UL/CSA technical data

Domestic applications

Maximum rated continuous current	Amps	65
Rated operating voltage	AC-volts	600
Ambient temperature compensation at full rated current		
	°C	-20 to +55
	°F	-4 to +131

Power losses of switch (cold condition)

Rated current [1 Amp]/power loss Watts (undervoltage release and shunts hava to be considered separately)

Amp	Watt
2.4	8
6	7
25	14
63	23

DC operation

1 pole		
	90VDC	—
	120VDC	—
	240VDC	—
2 poles in series		
	90VDC	—
	120VDC	—
	240VDC	—
Max.	120VDC, 25A, per pole	
	240VDE, 25A, two poles in series	

Rated mechanical endurance	up to 25 Amps	100,000 make/break
	above 25 Amps	30,000 make/break
Maximum switching frequency	operators/hours	25

Conductor size		
Power conductor	(solid or stranded) AWG	(1) or (2) 16-4 (1) 3 & (1) 16-6 or (1) 3
Control conductor	(solid or stranded) AWG	(2) 20-12
Terminal torque		
Power terminals	Lb. In.	22-26.5
Control terminals	Lb. In.	9-11

Accessories

Auxiliary contact block (1 N.O., 1 N.C.) and Short circuit indicator (1 N.O., 1 N.C.)

Contact ratings	AC	B600
	DC	Q300
Conductor size	(Solid or stranded) AWG	(2) 20-12
Terminal torque	Lb. In.	9-11

Undervoltage release		
Dropout voltage range	(x rated Voltage) V	0.73 to 0.37
Reset voltage	(x rated Voltage) V	0.8 to 1.1
Power consumption, pickup	VA9W	10/6
Power consumption, sealed	VA/W	4.7-2
Clearing time	ms	20
Shunt trips		
Power consumption, pickup	VA/W	10/6
Operating voltage	(x rated voltage)	0.73 to 1.1
Max. permissible command duration	s	continuous
Max. opening time	ms	20
Remote-control actuator		
Rated operational control voltage	AC V	—
Power consumption, pickup	W	—
Power consumption, sealed	W	—

IEC technical data

Number of poles		3
Max. rated current I_n		63
Rated operational voltage U_e	AcV	690
Rated frequency	Hz	50/60
Rated insulation voltage U_i	V	750
Rated surge withstand capability U_{imp}	kV	6

Utilization category

acc. to IEC 947-1 (circuit breakers)	A
acc. to IEC 947-4-1 (motor starters)	AC-3
Phase failure sensitivity	yes
Temperature compensation	yes
Characteristics of main circuit breakers	yes
Characteristics of EMERGENCY-STOP circuit breakers with appropriate accessories	yes

Short-circuit interrupting capability I_{cn} at DC

time constant r = 15ms

	1 pole	2 poles in series	3 poles in series		
up to	DC 110V	DC 220V	DC 330V	kA	upon request
up to	DC 150V	DC 300V	DC 450V	kA	upon request

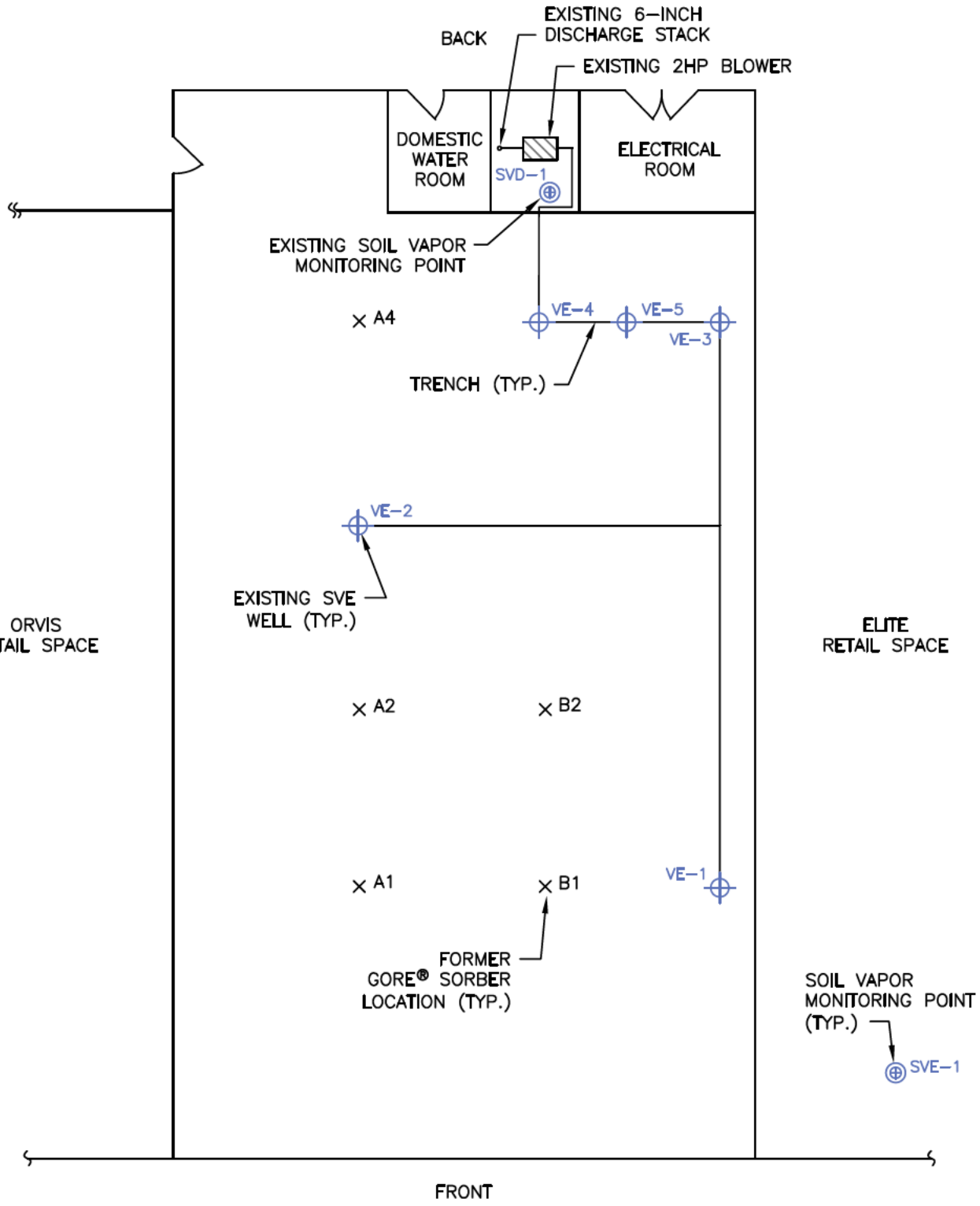
Switching capability at max. rated current

		Equipment protection	Motor protection
220/230V	kW	18	11
240V	kW	20	15
380/400V	kW	31	22
415V	kW	34	22
500V	kW	41	30
660V	kW	55	37
690V	kW	57	45

Degree of protection		
With open terminals		IP00
With conductors connected		IP20
Shock-hazard protection acc. to DIN VDE0106 Part 100		yes
Conductor cross-section for main conductions		
Type of connection		SIGUT
Solid or stranded	mm^2	1 x 1.5 to 2 x 16
	mm^2	or 1 x 25 + 1 x 10
Finely stranded with end sleeve	mm^2	1 x 1.5 to 2 x 10
	mm^2	or 1 x 16 + 1 x 10
Tightening torque of control terminal screws	Nm	1 to 1.3

Accessories

Auxiliary contacts		
Rated operation voltage Ue	ACV	230 400 500
Rated operational current Ie	A	3 1.5 1.2
Utilization category	AC-15	
Conductor cross-section		
Type of connection		SIGUT
Solid or stranded	mm^2	1 x 0.5 to 2 x 2.5
Finely stranded with end sleeve	mm^2	1 x 0.5 tp 2 x 1.5
Tightening torque	Nm	1 to 1.3
Short-circuit protection for control circuits		
Back-up fuse (gL/gG)	A	10
Miniature circuit breaker	A	6



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20' 0 20'

Title:

SVE SYSTEM (RETAIL D)

FORMER AVIS HEADQUARTERS PROPERTY
900 OLD COUNTRY ROAD
GARDEN CITY, NEW YORK 11530

Prepared For:

EQUITY ONE, INC.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: G.N.	Date: 03APR14	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	1A
Project Mgr: C.W.	Project: 1924.0001Y000	
File: 1924.0001Y208.05.DWG		

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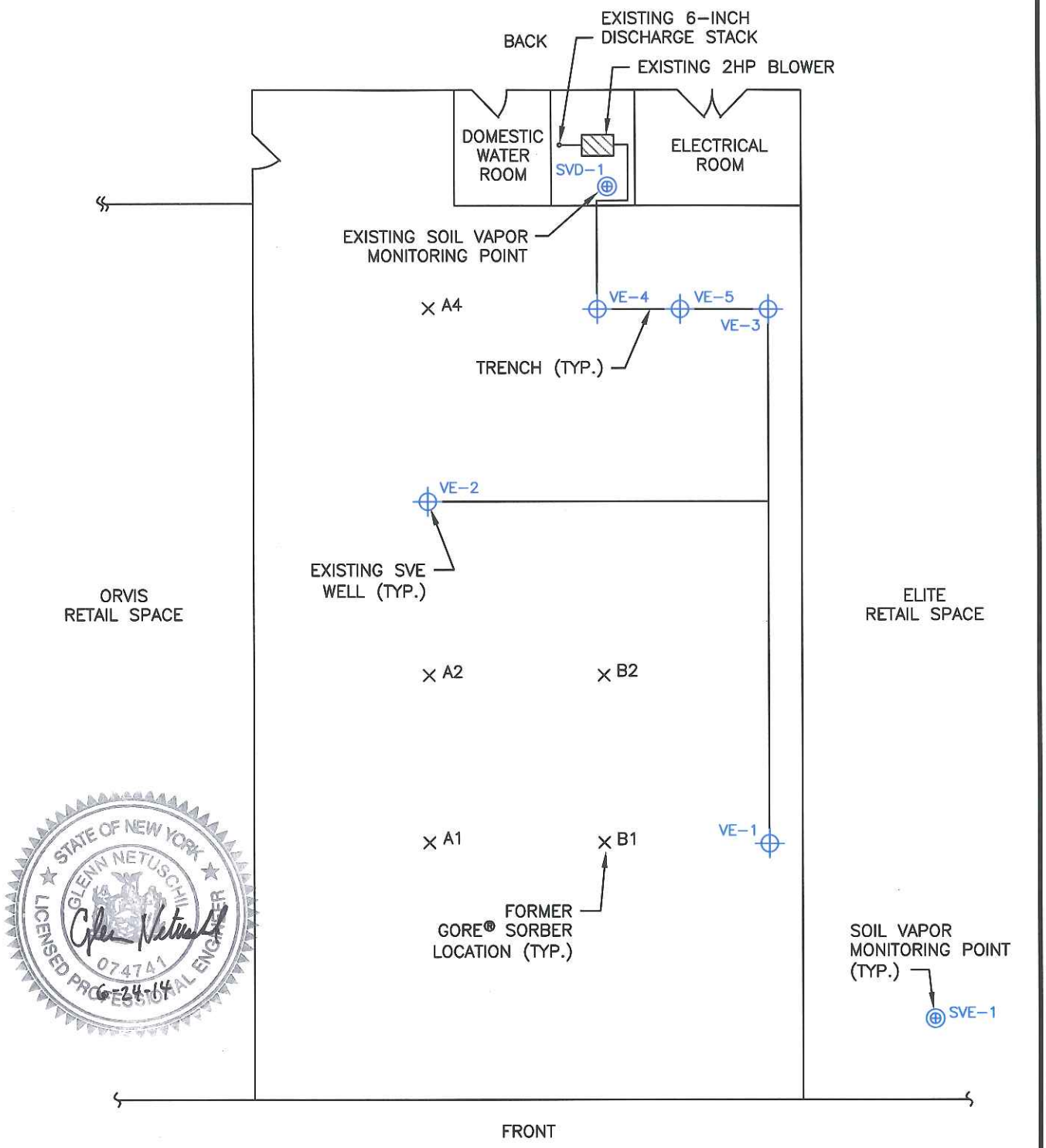

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Project Mgr: C.W.	Project: 1924.0001Y000	
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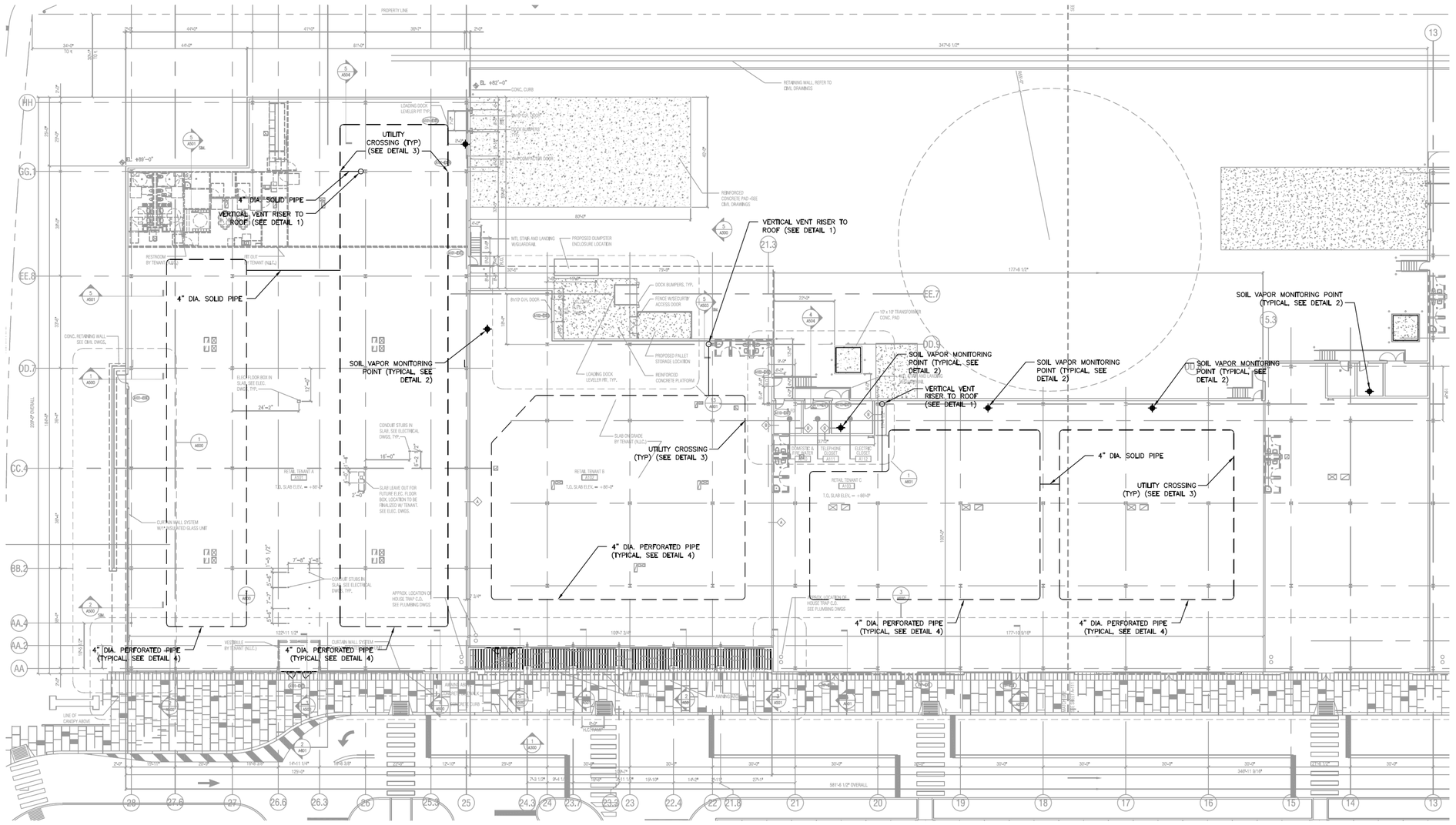
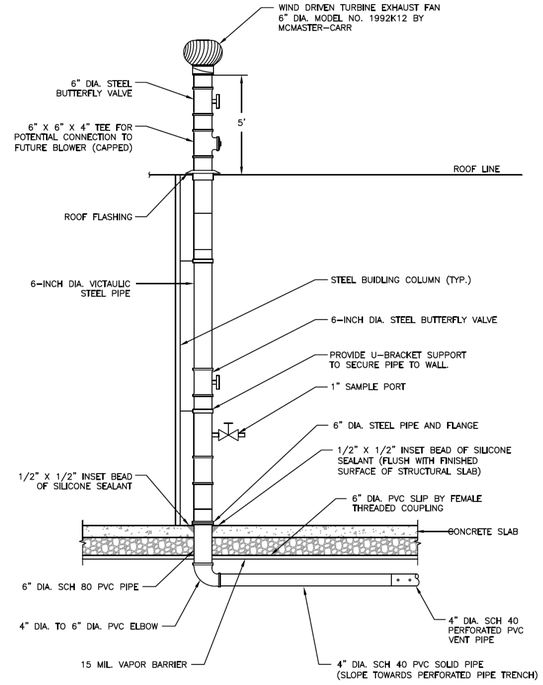


SUB-SLAB DEPRESSURIZATION SYSTEM PLAN

SCALE: 1" = 20'

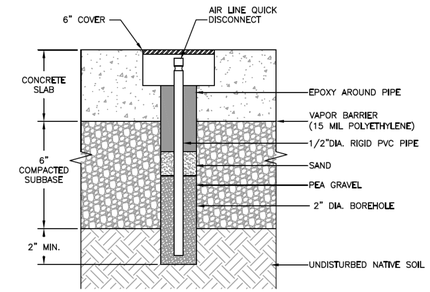
NOTES

1. SUB-SLUB DEPRESSURIZATION SYSTEM PIPING WAS INSTALLED IN 2-FOOT WIDE BY 1-FOOT DEEP WASHED GRAVEL TRENCH SURROUNDED BY FILTER FABRIC ENVELOPE.
2. A 15 MIL THICK POLYETHYLENE VAPOR BARRIER WITH TAPED SEAMS AND 6-INCH OVERLAP WAS INSTALLED ABOVE SUB-SLAB DEPRESSURIZATION SYSTEM PIPING AND BELOW CONCRETE FLOOR SLAB. THE VAPOR BARRIER INSTALLED WAS STEGO WRAP™ MANUFACTURED BY STEGO INDUSTRIES, INC.
3. BUILDING PLAN FROM GREENBERG FARROW, PLC. SHEET NO. A-111.00



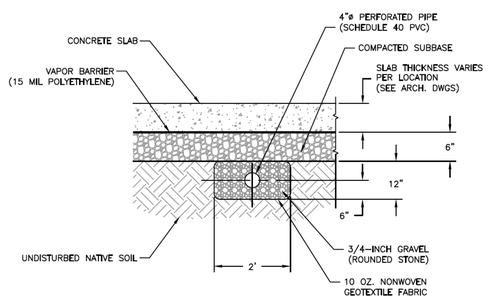
1 RISER DETAIL

SCALE: NOT TO SCALE



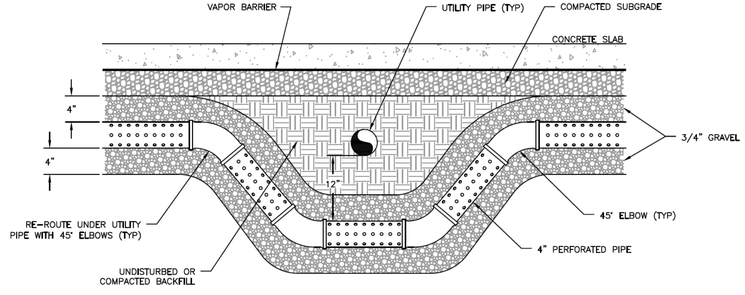
2 SOIL VAPOR MONITORING POINT DETAIL

SCALE: 1" = 4'



4 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL

SCALE: NOT TO SCALE



3 TYPICAL UTILITY PIPE CROSSING

SCALE: NOT TO SCALE

AS-BUILT DRAWINGS

Title:

SUB-SLAB DEPRESSURIZATION SYSTEM PIPING FOR RETAIL A, B AND C-BLDG A

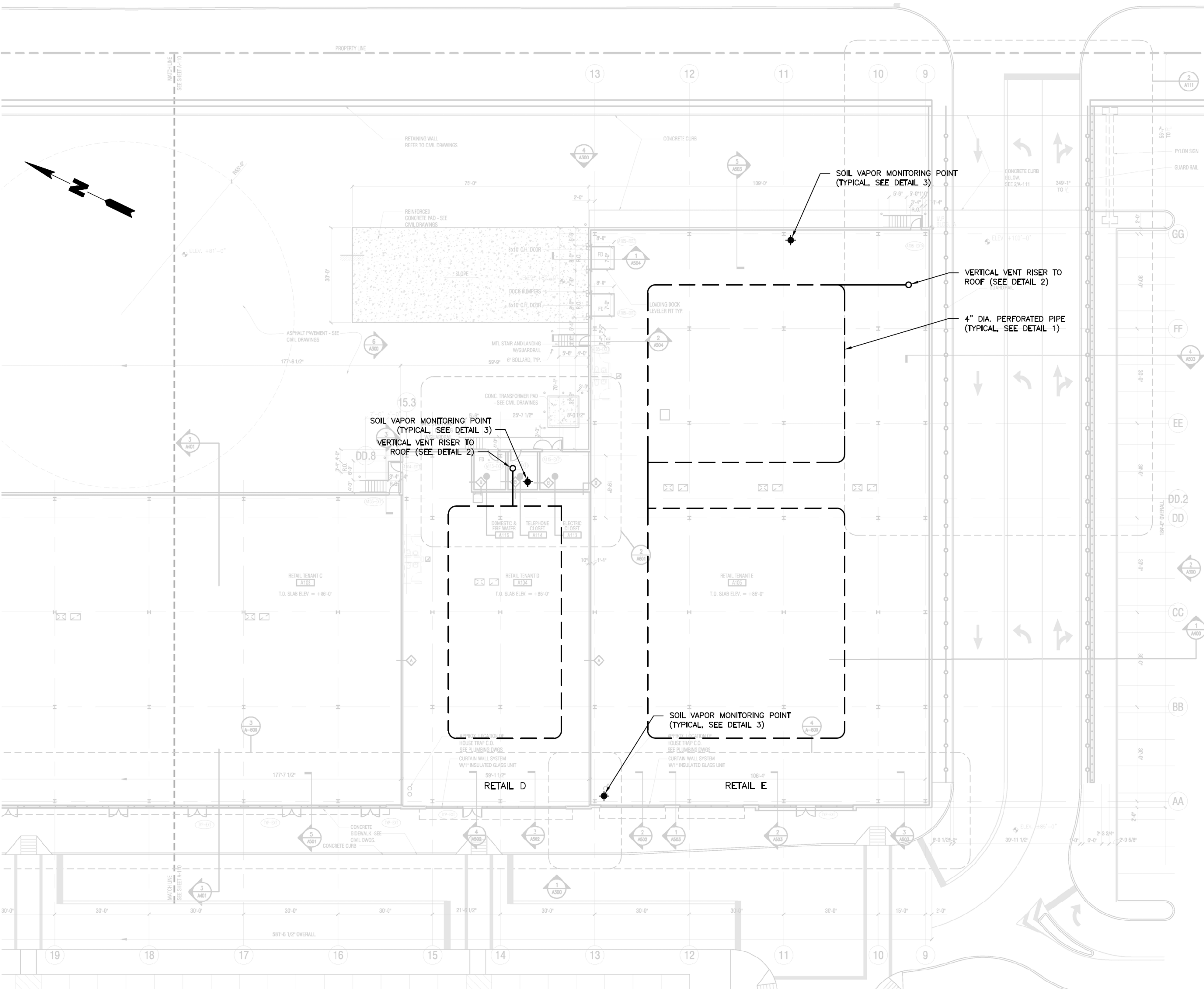
900 OLD COUNTRY ROAD
GARDEN CITY, NEW YORK, 11530

Prepared For:

EQUITY ONE, INC.

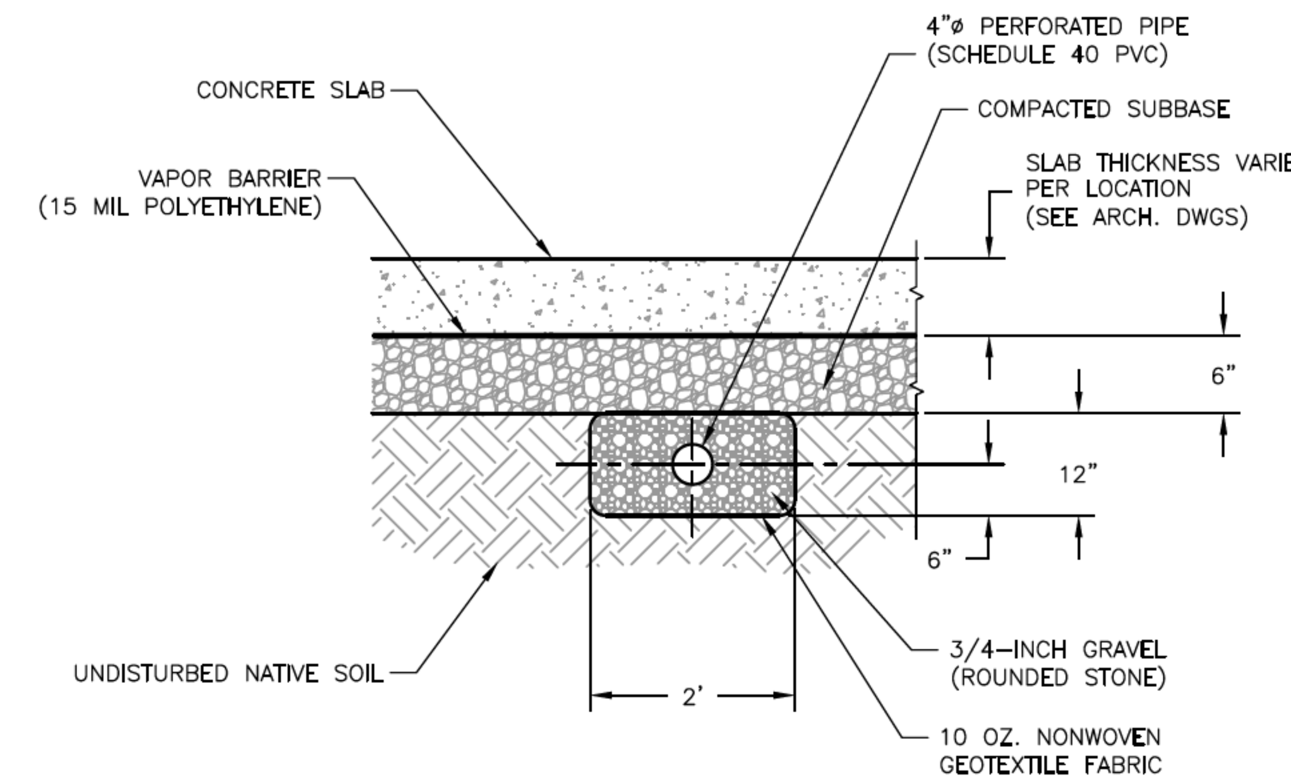
Remedial	Compiled by: J.L.	Date: 15JUNE12	PLATE
REMEDIAL ENGINEERING, P.C.	Prepared by: J.A.D.	Scale: AS SHOWN	3
ENVIRONMENTAL ENGINEERS	Project Mgr: J.L.	Project: 1924.0001Y000	
	File: 1924.0001Y159R.03		

V:\CAD\PROJECTS\1924\0001Y\159R\1924.0001Y159R.03.DWG



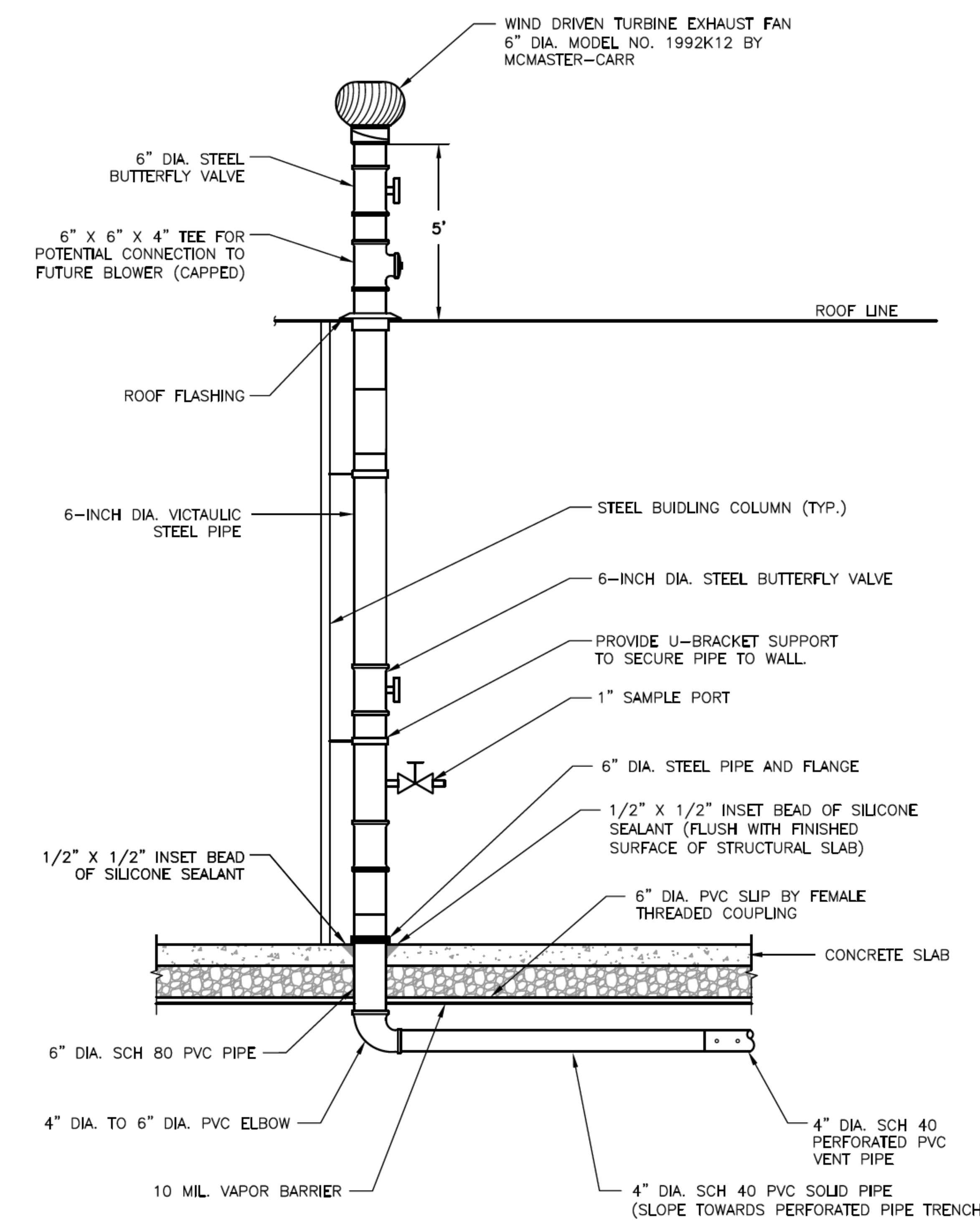
SUB-SLAB DEPRESSURIZATION SYSTEM PLAN

SCALE: 1" = 20'



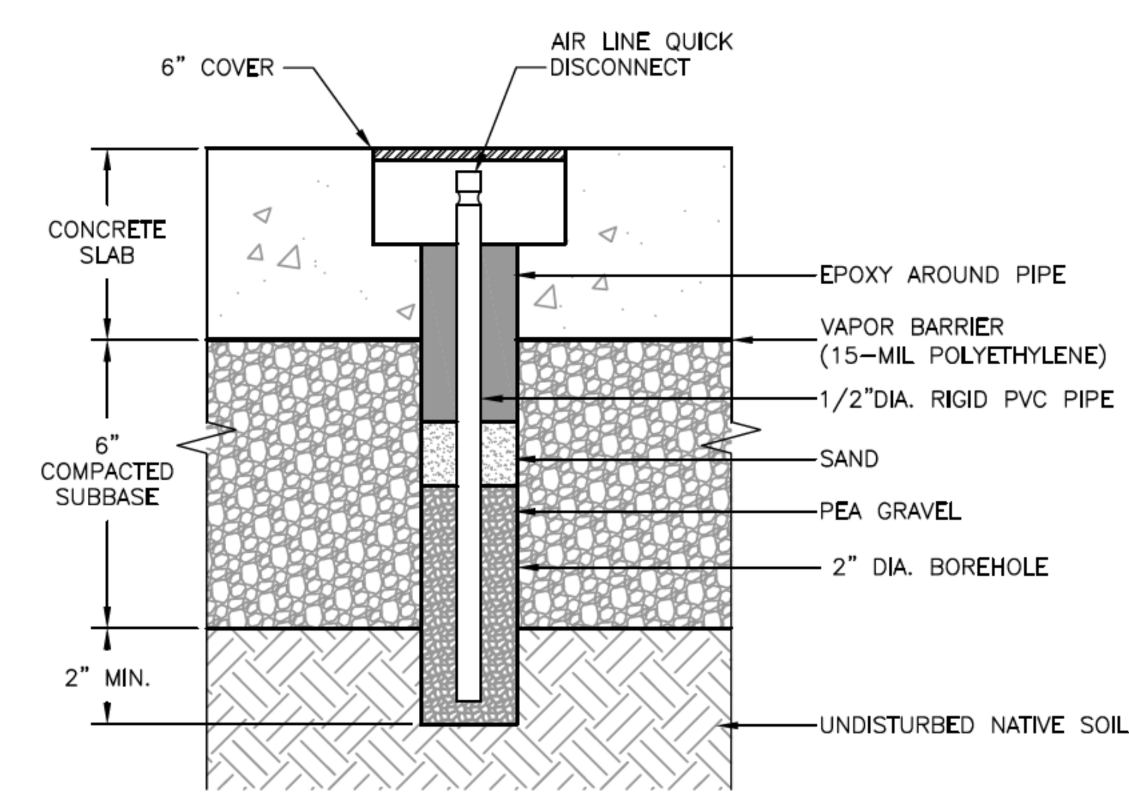
1 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL

SCALE: NOT TO SCALE



2 VERTICAL RISER DETAIL

SCALE: NOT TO SCALE



3 SOIL VAPOR MONITORING POINT DETAIL

SCALE: 1" = 4'

NOTES

1. SUB-SLUB DEPRESSURIZATION SYSTEM PIPING WAS INSTALLED IN 2-FOOT WIDE BY 1-FOOT DEEP WASHED GRAVEL TRENCH SURROUNDED BY FILTER FABRIC ENVELOPE.
2. A 15 MIL THICK POLYETHYLENE VAPOR BARRIER WITH TAPED SEAMS AND 6-INCH OVERLAP WAS INSTALLED ABOVE SUB-SLAB DEPRESSURIZATION SYSTEM PIPING AND BELOW CONCRETE FLOOR SLAB. THE VAPOR BARRIER INSTALLED WAS STEGO WRAP MANUFACTURED BY STEGO INDUSTRIES, INC.
3. BUILDING PLAN FROM GREENBERG FARROW, PLC. SHEET NO. A-111.00

AS-BUILT DRAWINGS

Title:

SUB-SLAB DEPRESSURIZATION SYSTEM PIPING FOR RETAIL D AND E - BLDG A

900 OLD COUNTRY ROAD
GARDEN CITY, NEW YORK, 11530

Prepared For:

EQUITY ONE, INC.

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.L.	Date: 15JUNE12	PLATE
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 1924.0001Y000	4
File: 1924.0001Y159R.04.DWG		

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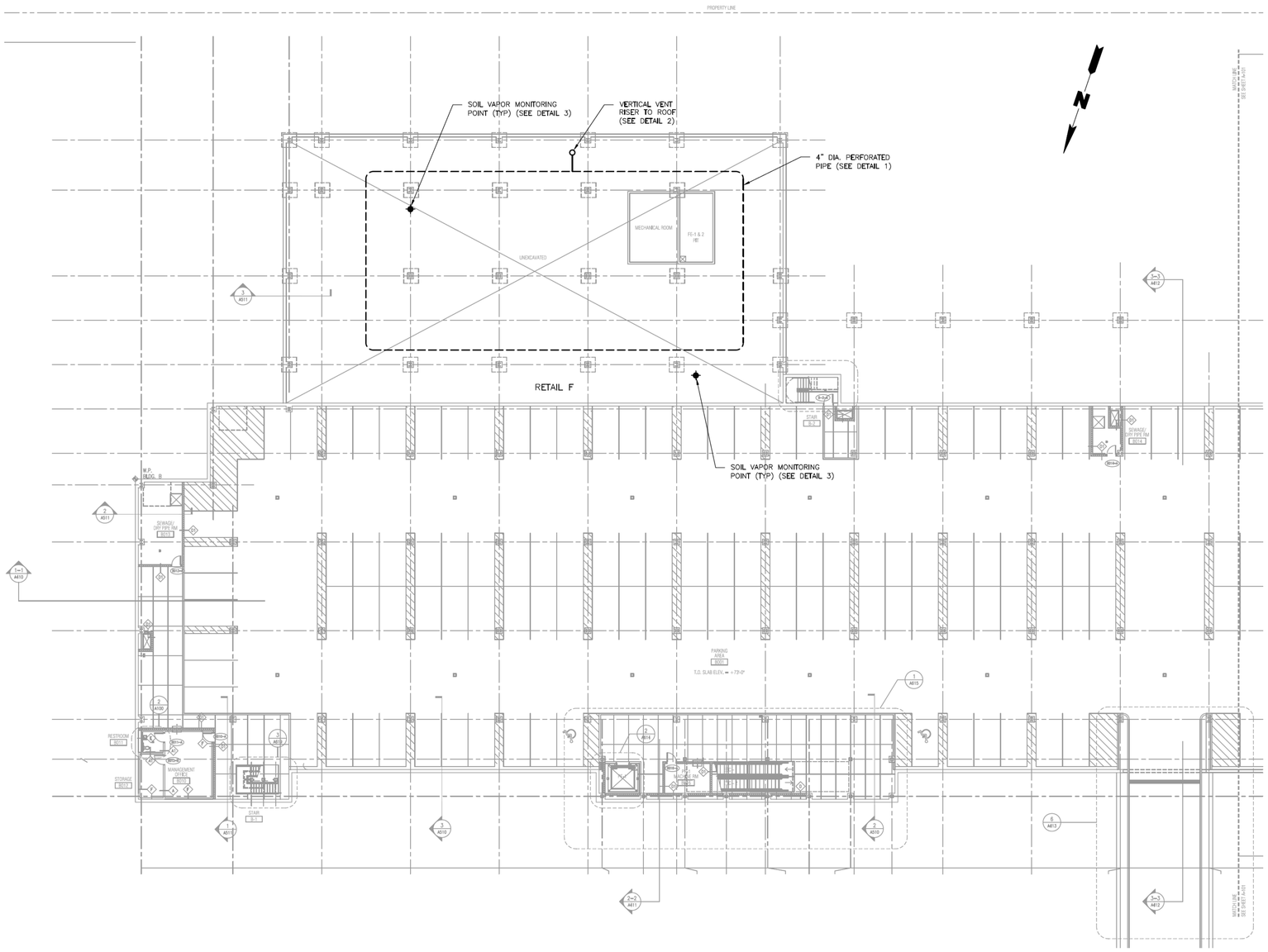
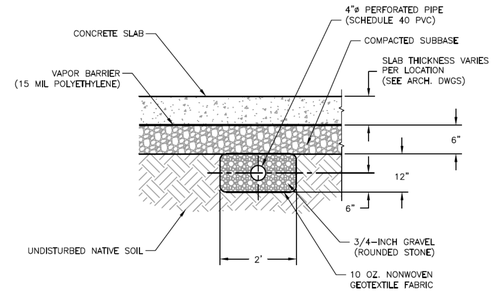


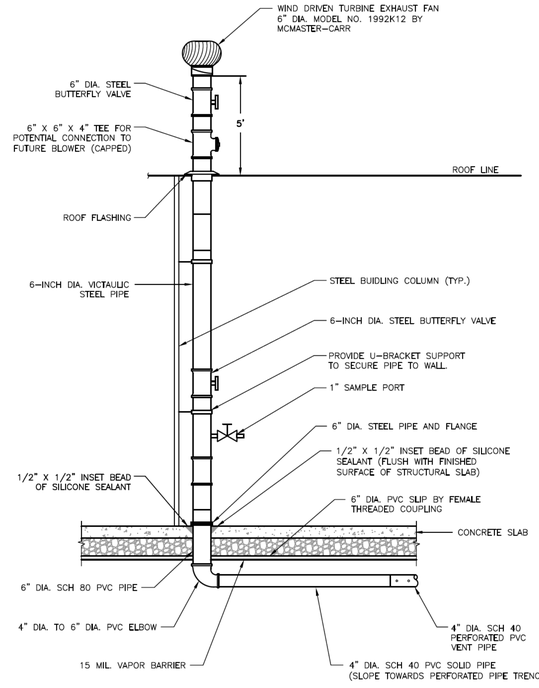
SUB-SLAB DEPRESSURIZATION SYSTEM PLAN

SCALE: 1" = 20'



1 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL

SCALE: NOT TO SCALE

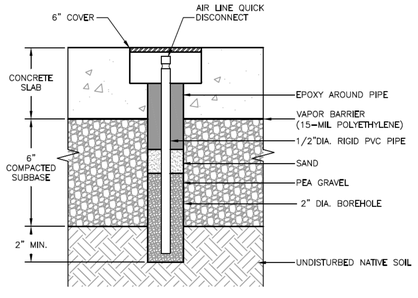


2 VERTICAL RISER DETAIL

SCALE: NOT TO SCALE

NOTES

1. SUB-SLAB DEPRESSURIZATION SYSTEM PIPING WAS INSTALLED IN 2-FOOT WIDE BY 1-FOOT DEEP WASHED GRAVEL TRENCH SURROUNDED BY FILTER FABRIC ENVELOPE.
2. A 15 MIL THICK POLYETHYLENE VAPOR BARRIER WITH TAPED SEAMS AND 6-INCH OVERLAP WAS INSTALLED ABOVE SUB-SLAB DEPRESSURIZATION SYSTEM PIPING AND BELOW CONCRETE FLOOR SLAB. THE VAPOR BARRIER INSTALLED WAS STEGO WRAP™ MANUFACTURED BY STEGO INDUSTRIES, INC.
3. BUILDING PLAN FROM GREENBERG FARROW, PLC. SHEET NO. A-100.00.



3 SOIL VAPOR MONITORING POINT DETAIL

SCALE: 1" = 4'

AS-BUILT DRAWINGS

Title:

SUB-SLAB DEPRESSURIZATION SYSTEM PIPING FOR RETAIL F - BLDG - B

900 OLD COUNTRY ROAD
GARDEN CITY, NEW YORK, 11530

Prepared For:

EQUITY ONE, INC.

Remedial ENGINEERING, P.C. ENVIRONMENTAL ENGINEERS	Compiled by: J.L.	Date: 18JUNE12	PLATE
	Prepared by: J.A.D.	Scale: AS SHOWN	5
	Project Mgr: J.L.	Project: 1924.0001Y000	
	File: 1924.0001Y159R.04.DWG		

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Table 1. Equity One Air Emission Calculations, Former Avis Headquarters Brownfield Site (Site No. C130206), Garden City, NY

Calculations based on SVE effluent air sample collected on 2/14/14

	µg/m3	PPMv
Tetrachloroethene (PCE) concentration:	36	0.0052
Trichloroethene (TCE) concentration:	26	0.0048

Air flow rate (cubic feet per minute [cfm]): 120

Calculate Emission Rate in Pounds/Hour (lb/hr):
Flow Rate = 120 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) = 120 cfm * 0.0052 PPMv * 165.8 * 1.581E-07 = **0.0000 lb/hr or 0.14 lb/yr**
Emission Rate for TCE (lb/hr) = 120 cfm * 0.0048 PPMv * 131.4 * 1.581E-07 = **0.00001 lb/hr or 0.10 lb/yr**

Standard Point Source Method (Appendix B – Division of Air Resources):
Hs (Height of Stack) = 32' Hb (Height of Building) = 27'
Hs/Hb = 1.185 < 1.5 No Plume Rise
Therefore effective stack height H_E = Hs, H_E=32'

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 ($\mu g/m^3$) = 0.0004
Ca for TCE ($\mu g/m^3$) = 0.00026

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 ($\mu g/m^3$) = 0.000
Cp for TCE ($\mu g/m^3$) = 0.00026

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

AGC for PCE = 1.0 $\mu g/m^3$	Ca for PCE = 0.0004 < 1.0 -- OK!

AGC for TCE = 0.5 $\mu g/m^3$	Ca for TCE = 0.00026 < 0.5 -- OK!

Calculate Maximum Short Term Impact (Cst)
Cst ($\mu g/m^3$) = Cp * 65

Cst for PCE ($\mu g/m^3$) = 0.023
Cst for TCE ($\mu g/m^3$) = 0.02

SGC for PCE = 1,000 $\mu g/m^3$	Cst for PCE = 0.84 < 1,000 -- OK!
SGC for TCE = 14,000 $\mu g/m^3$	Cst for TCE = 0.05 < 14,000 -- OK!

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

APPENDIX D

Soil Vapor Sampling Log Form

Soil Vapor Sampling Form
Equity One, Westbury, New York
Soil Vapor Sampling

Date: _____ **Time:** _____
Weather : _____
Temperature: _____ Humidity: _____
Wind Magnitude: _____ Wind Direction: _____
Barometric Pressure: _____ Precipitation: _____

Sampling Team: _____
Sampling Location: _____
Site Condition (i.e. any adjacent questionable facilities, vent pipes, tanks, etc. and what type of basements are present)
Redevelopment of Property-Building enclosed

Prior to commencing the sampling activity, remove the brass cap from the end of the sample tubing and fit a new brass hose barb fitting onto the sample tubing.

Calibrate the Helium detection meter

Utility Clearance Completed: Yes

Sampling Depth: 4ft feet below land surface (If ambient air sample, elevate can to approx 3 ft - 5 ft above land surface)
Sealed with bentonite: Yes
Apparent Moisture Content: _____
Purge Rate: _____ Must be less than 0.2 L/min
Purge Time: _____
Helium Rate at enclosure: _____
Helium Rate from sample tubing: _____ Is this rate <10% of the rate at the enclosure **Yes / No**

If the Helium readings have a greater ratio than 10% the seals should be rechecked and the tracer gas should be reapplied.

Once the tracer gas screening procedures are completed and no short-circuiting is determined to be present at the location the soil vapor sample can be collected in a lab certified clean summa canister at a rate less than 0.2 L/min.

Finishing pressure should be within 0.5 - 4 " of Hg

Is the Summa Canister Certified Clean and within the proper holding time ?

Starting Pressure: _____ in. of Hg
Starting Time: _____
Ending Time: _____
Ending Pressure: _____ in. of Hg

Summa Canister Identification #: _____
Flow Regulator ID # _____
Sample ID # _____
Time _____
Analysis TO-15
Laboratory _____

Comments:

APPENDIX E

EC System Inspection Checklist and General Site-wide Inspection Form

SVE System and SDSS Inspection Checklist, Equity One, 900 Old Country Road, Garden City, New York

Date: _____

Completed By: _____

Description	Status			Actions Taken / Comments
	Ok	Action Req.	N/A	
SVE System (Retail Space D)				
A. Aboveground Piping				
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.				
C. 60-Gallon 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.				
SSDS System (Retail Space F)				
A. Aboveground Piping				
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.				
C. 60-Gallon 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.				

Site-Wide Inspection Checklist, Equity One, 900 Old Country Road, Garden City, New York

Date: _____

Completed By: _____

Description	Status			Actions Taken / Comments
	Ok	Action Req.	N/A	
SVE System (Retail Space D)				
A. Aboveground Piping				
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.				
C. 7-Gallon 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.				
SSDS System (Retail Space F)				
A. Aboveground Piping				
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.				
C. 50-Gallon 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.				

APPENDIX F

Quality Assurance Project Plan

April 14, 2010

QUALITY ASSURANCE PROJECT PLAN

900 Old Country Road
Garden City, New York

Prepared for

EQUITY ONE, INC.
250 Fifth Avenue, 24th Floor
New York, New York 10019

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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TABLES

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 performance of the Remedial Investigation (RI) at 900 Old Country Road, Garden City, New York (Site) are of quality sufficient to meet project-specific data quality objectives (DQOs). The QAPP was prepared in accordance with the guidance provided in New York State Department of Environmental Conservation (NYSDEC) draft 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).

2.0 BACKGROUND, OBJECTIVES, AND SCOPE

In order to achieve project objectives, Roux Associates has developed a scope of work that includes sampling of soil, groundwater, and soil vapor. A brief overview of each element of the RI scope of work is provided below. RI sampling locations are shown in Figure 4 of the RI Work Plan.

2.1 Soil

Samples of soil will be collected and analyzed at a minimum of 37 locations for the following analytes:

- Target Compound List plus 30/Target Analyte List (TCL + 30/TAL), which includes: TCL volatile organic compounds (VOCs) +10, TCL semivolatile organic compounds (SVOCs) +20, TCL pesticides, TCL polychlorinated biphenyls (PCBs), TAL metals, and total cyanide.
- Total Petroleum Hydrocarbons (TPH).

2.2 Groundwater

Groundwater samples will be collected from twenty-one (21) existing monitoring wells installed around the perimeter of the Site and three new monitoring wells installed by Roux Associates during the investigation. After gauging for potential separate-phase petroleum product, each well will be sampled for TCL VOCs (with tentatively identified compounds [TICs]) and TAL metals. Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured. In addition, groundwater samples will be collected from groundwater profile borings (grab samples) as needed based on field observations during soil sampling. Two samples will be collected from each boring: one shallow sample and one deep sample. These grab samples will be analyzed for the same analytes as the groundwater samples collected from the monitoring wells.

2.3 Soil Vapor and Sub Slab Samples

Soil vapor samples will be collected from locations around the subject buildings and locations in the interior of the subject buildings based on the results of the planned Gore Module screening. Sampling depths and analytical methods will be selected in consultation with the NYSDEC and NYSDOH protocols. In addition, two indoor and one outdoor ambient air samples will be collected.

3.0 PROJECT ORGANIZATION

The overall management structure and a general summary of the responsibilities of project team members are presented below.

Project Manager

Craig Werle of Roux Associates/Remedial Engineering will serve as Project Manager. The Project Manager is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the investigation. 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. Activities of the Project Manager are supported by the Project Quality Assurance Coordinator.

Field Team Leader

Wendy Monterosso of Roux Associates/Remedial Engineering will serve as the Field Team Leader. The Field Team Leader bears the responsibility for the successful execution of the field program, as scoped in the RI Work Plan and the Field Sampling Plan (FSP). The Field Team Leader will direct the activities of all technical staff in the field as well all subcontractors. He 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 analyzing the field samples has not been selected at this point but will be 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.

Quality Assurance Officer

Wai Kwan, PhD. of Roux Associates will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews, inspections, and audits to ensure that

the data collection is conducted in accordance with the FSP and QAPP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

4.0 SAMPLING PROCEDURES

Detailed discussions of sampling, decontamination, and sample handling procedures are provided in the FSP (Appendix D of the RI Work Plan).

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The primary intended use for the RI data is to characterize Site conditions and determine if remediation needs to be undertaken at the Site. The primary DQO of the soil, groundwater, and soil vapor sampling programs, therefore, 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 1 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.

All RI "assessment" analyses (i.e., TCL VOCs, SVOCs, pesticides/PCBs; TAL metals; and cyanide) will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods. The laboratory selected to analyze the field samples collected during the RI shall maintain a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the "assessment" analyses listed in Section 2.0.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables. A Data Usability Report will be prepared for all data packages generated for the RI.

Table 1. Field and Laboratory QC Summary

QC Check Type	Minimum Frequency	Use
Field QC		
Duplicate	1 per matrix per SDG*	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	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate**	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:

* SDG - Sample Delivery Group - Assumes a single extraction or preparation

** Provided to lab by field sampling personnel

APPENDIX G

EC Operating Log and Non-routine Maintenance Form

SVE and SDSS Operating Log, Equity One, Garden City, New York

Source of Reading	Units	Values	Comments
RETAIL D SVE SYSTEM SVE Wells (at manifold)			
VE-1	Inches of Water		
VE-2	Inches of Water		
VE-3	Inches of Water		
VE-4	Inches of Water		
VE-5	Inches of Water		
Knock-Out Tank Vacuum	Inches of Water		
Blower Inlet Vacuum	Inches of Water		
Blower Discharge Pressure	Inches of Water		
Blower Effluent PID Reading	PPMV		
RETAIL F SSDS Vacuum at suction piping (existing 6-inch discharge piping)	Inches of Water		
Knock-Out Tank Vacuum	Inches of Water		
Blower Inlet Vacuum	Inches of Water		
Blower Discharge Pressure	Inches of Water		
Blower Effluent PID Reading	PPMV		

Are the systems operating within the acceptable conditions? _____

If no, was the condition corrected and how? _____

Form Completed By: _____ Signature: _____ Date & Time: _____

SVE and SDSS System Non-Routine Maintenance Form, Equity One, Garden City, New York

DATE	DESCRIPTION OF WORK DONE	CAUSE (Use as many lines as required to define the problem)	Completed By

APPENDIX H

Field Sampling Plan

April 14, 2010

FIELD SAMPLING PLAN

900 Old Country Road
Garden City, New York

Prepared for

EQUITY ONE, INC.
250 Fifth Avenue, 24th Floor
New York, New York

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

ROUX

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1.0 INTRODUCTION

Roux Associates has developed this Field Sampling Plan (FSP) to describe in detail the field sampling methods to be used during performance of the Remedial Investigation (RI) for the site located at 900 Old Country Road, Garden City, New York (Site). The objective of the RI is to determine the nature and extent of contamination at the Site with regards to previously identified areas of concern (AOCs), to identify and investigate any additional previously unidentified AOCs, characterize environmental media at the Site, qualitatively assess the potential exposure of receptors to Site contaminants, and develop any other additional data necessary to support the development of a Remedial Action Work Plan. The current plan for the Site is development includes 330,000 square feet of retail commercial space and a possible hotel.

The FSP was prepared in accordance with directives provided in the United State Environmental Protection Agency (USEPA) guidance document titled "Draft DER-10 Technical Guidance for Site Investigation and Remediation" (November 2009) issued by the New York State Department of Environmental Conservation (NYSDEC), as well as relevant NYSDEC Technical and Administrative Guidance Memoranda (TAGMs), and provides guidelines and procedures to be followed by field personnel during performance of the RI. Information contained in this FSP relates to sampling objectives, sampling locations, sampling frequencies, sample designations, sampling equipment, sample handling, sample analysis, and decontamination.

2.0 SAMPLING OBJECTIVES

Prior Site characterization work was conducted on the Site over the course of several years by various entities.

The objective of the proposed sampling is to determine the nature and extent of the known contamination on Site, to evaluate any additional AOCs and potential associated contamination and to obtain a current representation of the environmental conditions at the Site. Due to the dilapidated state of the Cendant building, a full investigation has not been performed in this area of the site. GORE-SORBER® screening modules (Gore modules) will be utilized in the Cendant building, Manufacturing building and several locations outside these buildings and their associated leaching structures to evaluate the potential for unknown areas of concern and to assist in finalizing locations for soil and soil vapor sampling.

The sampling procedures associated with characterization of soil, the groundwater, and soil vapors are discussed in detail in Section 4 of this FSP. A discussion of the data quality objectives (DQOs) is provided in the Quality Assurance Project Plan (QAPP) Attached to the RI Work Plan as Appendix E.

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled during the RI include soil, groundwater, and soil vapor. Sampling locations, analytical suites, and frequency vary by medium. A discussion of the sampling schedule for each medium is provided below, while the assumed number of field samples to be collected for each medium, including quality control (QC) samples, is shown in Table D-1, results of the Gore modules may indicate the need to modify the number of samples for any given media. Specifics regarding the collection of samples at each location and for each task are provided in Section 4 of this FSP.

3.1 Soil Sampling

Soil samples underlying the Site will be collected at 37 locations as shown in Figure 4 of the RI Work Plan). At each former leach pool structure, two soil samples will be collected: one from the base of the former structures and one from five feet below the base of the former structures. In the 11 leach pools that exhibited exceedances when previously sampled by others (LP-4, LP-14, LP-15, and LP-21 through LP-28) only one soil sample will be collected from the interval approximately five feet below the depth of the previously collected sample. From each of the eight previously sampled dry wells on the northern and northeastern section of the property (DW-1, DW-2, DW-14, DW-16, DW-19 through DW-22), one soil sample will be collected from the interval with the highest PID reading and from the interval five feet below this. During the installation of monitoring wells MW-17A, MW-20 and MW-21, one to two soil samples will be collected based on field observations; one soil sample will be collected at the two-foot interval immediately above the water table and an additional sample will be collected from any interval that exhibits visual or olfactory evidence of impacts. Soil samples will be collected from beneath the floor slabs of the Cendant building and the Manufacturing Building (locations will be finalized based on results obtained from the Gore modules). Additional soil boring locations in the outdoor areas surrounding the buildings may be added to the sampling plan based on the results of the Gore module screening. All samples will be analyzed for Target Compound List (TCL) plus 30/ Target Analyte List (TCL + 30/TAL) (which includes TCL Volatile Organic Compounds [VOCs], TCL Base neutral acids [BNA], [SVOCs] + 20, TCL Pesticides, TCL polychlorinated biphenyls [PCBs], TAL Metals, and Total Cyanide), and Total Petroleum Hydrocarbons (TPH).

3.2 Groundwater Sampling

Groundwater samples will be collected from all existing monitoring wells (21) located at the Site and the three additional monitoring wells that will be installed during the investigation. After gauging for potential separate-phase petroleum product, each well will be sampled for TCL VOCs + tentatively identified compounds that can be identified (ID TICs), and TAL metals (both total and dissolved). Field parameters including pH and conductivity will also be measured prior to gauging. In addition, groundwater samples will be collected from any boring that exhibits evidence of contamination (elevated PID readings or visual evidence) during drilling (grab samples). These grab samples will be analyzed for the same analytes as the groundwater samples from monitoring wells.

3.3 Soil Vapor

Gore modules will be installed and analyzed across the site to identify additional areas of concern where further investigation is necessary. Gore modules are passive diffusion samplers that consist of sealed durable microporous tubes of polytetrafluoroethylene or GORE-TEX® Membrane. The sample tubes contain hydrophobic pores that are small enough to reject soil and water to a depth of over 30 feet. Inside each module is an adsorbent structure engineered by Gore to be hydrophobic and collect a wide variety of volatile inorganic and organic compounds ranging from C2 (ethane) to C20 (phytane). The engineered adsorbents inside the modules are designed to physically fit inside a thermal desorption apparatus for analysis by GC/MS. Since these modules can be deployed over a broad area, they are ideal screening tools for evaluating the Cendant building, Manufacturing building, and previously uninvestigated outdoor areas of the site to determine the need for further investigation. Any Gore samples that show evidence of elevated soil vapor concentrations will be targeted for GeoProbe™ soil borings to identify potential areas of concern. Soil vapor samples collected Summa canisters will be used to quantitatively verify the extent of soil vapor impacts indicated by Gore module sample results.

Due to the dilapidated state of the Cendant and Manufacturing buildings, thorough investigation has not yet been completed. The proposed Gore module locations are shown on Figure 4 of the RI Work Plan. Actual interior locations may vary based on field conditions with regard to the floor plan layout of the buildings, concrete slab thickness, access issues, and health and safety concerns. A total of 40 Gore modules are proposed, 15 in a grid using 125-foot centers throughout

the Cendant building, four within the Manufacturing building, and 21 from areas around the outside of the buildings in the vicinity of former soil vapor sampling locations performed by others and down gradient of areas of concern.

A total of nine soil vapor sampling locations are proposed, three from areas around the outside of the southeast corner of the Cendant building and southwest corner of the Manufacturing building, 4 from below the Cendant building floor slab and two from below the Manufacturing building floor slab. Sample locations for sub-slab soil vapor samples have been selected based on areas of known or suspected industrial activities and where previous sampling has indicated contamination. Based on the results of the Gore module screening, the final locations may be altered in the field and/or additional locations added to the sampling program. In addition, two indoor and one outdoor ambient air samples will be collected. All samples will be analyzed for VOCs using USEPA method TO-15.

4.0 FIELD SAMPLING PROCEDURES

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the RI (i.e., soil, groundwater, and soil vapor).

4.1 Soil Sampling

Borings will be advanced using Geoprobe™ truck or track-mounted direct-push drill rig. Samples of the soil profile will be collected in continuous four or five-foot increments using a 2-inch-diameter macrocore sampler to a depth of approximately 20 feet below grade, which is the anticipated depth to the water table.

The soil from each four or five-foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into a large Zip-loc™ bags for recording headspace. After a minimum of 15 minutes for equilibration with the headspace in the Zip-loc™ bag, each sample will be screened for organic vapors using a photo-ionization detector (PID). Samples for possible VOC analysis will be placed in a laboratory-supplied jar prior to screening, due to the potential for loss of VOCs through volatilization. Soil samples will be collected from the approximate depth of the bottom of the former leach pool structures and from 10 feet below the bottom of the former structures. Soil samples will be collected from the two-foot interval immediately above the water table in monitoring well borings (MW-17A, MW-20 and MW-21 and any interval that exhibits visual evidence of contamination or an elevated PID reading. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates standard operating procedures. Upon completion each boring will be sealed with bentonite/cement grout.

Additional details regarding soil-sampling protocols are described in Roux Associates' Standard Operating Procedure for the Collection of Soil Samples for Laboratory Analysis, which is provided in Attachment D-1.

4.2 Groundwater Sampling

Details for the collection of groundwater samples from both monitoring wells and groundwater profile borings are provided below.

4.2.1 Groundwater Samples from Monitoring Wells

Each well will be developed to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with aquifer. The well will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has a turbidity below 50 nephelometric turbidity units (NTUs), if possible.

Groundwater samples will be collected no sooner than one week following development of the wells. Prior to sampling, depth to water will be measured at each well using an electronic water level indicator with an accuracy of +/-0.01 feet. All wells will then be purged and sampled using a peristaltic pump, or an alternative method, depending on the observed depth to groundwater and logistical issues. Samples will be analyzed for VOCs and metals. Additional details for the collection of groundwater samples are included in the Roux Associates SOPs (Attachment D-1).

These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates' SOPs.

4.2.2 Groundwater Samples from Profile Borings

Groundwater samples will be collected, if warranted, from soil borings that exhibit PID or visual evidence of contamination at or near the water table. These samples will be collected using a Geoprobe™ 2-foot expandable stainless steel screen. The screen is not exposed until the target depth is achieved in order to obtain a representative sample from the desired depth interval. A manually activated check valve or Teflon bailer will be used to obtain water from the screen. Samples will be collected from two feet below the top of the water table and analyzed for the same parameters as groundwater samples collected from the monitoring wells. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates' SOPs.

4.3 Soil and Sub slab Vapor Sampling

Soil vapor samples will be collected from areas around the outside of the buildings near potential impact areas, and from below the floor slab of the Cendant and Manufacturing buildings in areas of known or suspected industrial activity. Gore modules will be used to determine the most appropriate locations for soil vapor and sub-slab soil vapor samples. In addition, ambient air

samples will be collected to provide data on the background air quality both inside and outside of the building.

Prior to the collection of soil and sub-slab vapor samples, a pre-sampling inspection will be performed to identify and minimize conditions that may interfere with the proposed testing and Gore module screening will be conducted. Gore modules will be analyzed for VOCs and SVOCs using a modified 8260/8270 methodology. All soil vapor samples, sub slab vapor samples, and ambient samples will be analyzed using USEPA Method TO-15 for VOCs.

4.3.1 Pre-Sampling Inspection

This inspection will seek to evaluate the type of structure, floor layout, air flows, physical conditions, and any other pertinent information.

Task 1 – Pre-Sampling Inspection, Location Stakeout and Utility Clearance Activities

A pre-sampling inspection will be performed prior to the proposed sampling event to identify and minimize conditions that may interfere with the proposed testing. The inspection will seek to evaluate the type of structure, floor layout, air flows, and physical conditions of the building(s) being studied. At present, it is known that several areas of the Cendant building are in severe disrepair, and there is no active utility service to the building. Lack of lighting and floor plans, and obvious concerns regarding the structural integrity of the building have limited prior investigations of this building and will likely pose significant difficulties with placement of sampling locations. This information, along with information on sources of potential indoor air contamination, will be summarized in a description of the building inspection/inventory.

Items to be included in the building inventory include the following:

a. construction characteristics, including foundation cracks and utility penetrations, ceiling construction and firewall separations, or other openings that may serve as preferential pathways for vapor intrusion; and

b. use or storage of petroleum products (e.g., fuel containers, gasoline operated equipment and unvented kerosene heaters) by transient building occupants.

Since the buildings are abandoned and have not been in use since 2001, potential interference from current products or activities releasing volatile chemicals is not considered to be an issue, however;

occupancy by vagrants and vandals does not rule out the storage or use of kerosene-type heaters or use of spray paint in and around the building. Once any interfering conditions are corrected (if applicable), ventilation may be needed prior to sampling to eliminate residual contamination in the indoor air. If ventilation is appropriate, it will be completed 24 hours or more prior to the scheduled sampling time. Opening windows and doors, and operating exhaust fans may be needed since the building has no operational HVAC system.

Unnecessary building ventilation will be avoided within 24 hours prior to and during sampling.

To avoid potential interferences and dilution effects, every effort will be made to avoid the following for 24 hours prior to sampling:

a. smoking in the building;

b. painting;

c. using a wood stove, fireplace, or other auxiliary heating equipment (e.g., kerosene heater);

d. operating or storing field equipment or generators in the building;

e. allowing containers of gasoline or oil to remain within the building, except for fuel oil tanks; and

f. engaging in any activities that use materials containing volatile chemicals.

The primary objective of the product inventory is to identify potential air sampling interference by characterizing the occurrence and use of chemicals and products throughout the building, keeping in mind the goal of the investigation and site-specific contaminants of concern.

Any products found in the buildings will be inventoried prior to testing to provide an accurate assessment of the potential contribution of volatile chemicals. If available, chemical ingredients of interest (e.g., analyte list) will be recorded for each product. If the ingredients are not listed on the label, record the product's exact and full name, and the manufacturer's name, address and telephone number will be recorded, if available.

All proposed sample locations will be field located prior to the commencement of the vapor investigation in order to avoid potential subsurface structures and/or utilities. Attempts will be

made to obtain information regarding the location of former utilities in the locations that are to be sampled. The proposed locations are shown on Figure 4 of the RI Work Plan.

4.3.2 Geophysical Survey

A geophysical survey will be performed at the Site to attempt to locate any additional previously unidentified areas of concern, as well as potential utility interference with the planned scope of work. Previous geophysical surveying was performed in limited areas of the Site including the northwestern corner surrounding the Thomasville Home Furnishings building, the northeastern corner of the Site in the area of the former fuel oil and diesel USTs, and in limited areas surrounding the six leaching pool networks and two septic tanks. Roux Associates will target geophysical survey activities on areas that are previously uninvestigated including the areas east south and southwest of the Cendant building and the area surrounding the Manufacturing building.

Interior portions of the Cendant, Manufacturing and Storage buildings may be selected to undergo geophysical survey as warranted based on the findings of the building inspection.

4.3.3 Gore Module Installation

The Gore modules are proposed to be installed in a grid pattern as shown on Figure 4 of the RI Work Plan. Each Gore module will be installed in a one-inch diameter hole drilled through the building slab or asphalt surface completion and extending to approximately six inches below the slab or asphalt. One dedicated Gore module will be installed within each borehole, capped with a sealing device, and left in place for 10-14 days. Following the required exposure period, the Gore modules will be retrieved, returned to their respective sample jars, and submitted to Gore Technologies for analysis under standard chain of custody procedures. Gore modules will analyzed for VOCs and SVOCs using a modified 8260/8270 methodology.

4.3.4 Soil Vapor Samples from Soil Borings

Soil vapor samples will be collected from areas outside of the building from borings installed using a Geoprobe rig, Geoprobe hand tools, or manually driven method, to the target depth of 5 feet. Once the target depth is achieved the rods will be pulled up 2 feet, exposing a void space. New Teflon lined tubing equipped with a threaded stainless steel fitting will be attached to the expendable soil vapor sampling point inside the rods, to prevent infiltration of ambient air.

The sample tubing will be connected to a 'T' connector, with one end leading to a vacuum pump and the other end leading to a pre-evacuated SUMMA canister with a laboratory calibrated regulator set to collect a sample over a one-hour interval (100 milliliters per minute). Prior to sample collection, the Teflon™-lined tubing will be purged of approximately two volumes of the tubing using a vacuum pump set at a rate of 0.2 liters per minute. A tracer gas (i.e., laboratory grade helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the borehole seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the valve leading to the pump will be closed, and the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. In addition to the soil vapor samples, one ambient air sample will also be collected in the vicinity of the soil vapor locations to provide background results. Soil vapor samples and ambient air samples will be submitted for laboratory analysis under chain of custody procedures for analysis using USEPA Method TO-15 for VOCs. The boreholes will be allowed to collapse after the rods are removed and areas of asphalt/concrete will be properly patched.

4.3.5 Sub-Slab Soil Vapor Samples

Sample locations for sub-slab soil vapor samples will be selected based on areas of known or suspected industrial activities and the results of the Gore module screening. Sub-slab vapor samples will be collected directly below the slab, by penetrating the floor slab using a hammer drill to create a 1-inch diameter hole in the concrete down to 6–inches below the slab. The sample tubing will be placed through this hole and will be held in place and sealed with a clay seal.

The sample tubing will be connected to a 'T' connector, with one end leading to a vacuum pump and the other end leading to a pre-evacuated SUMMA canister with a laboratory calibrated regulator set to collect a sample over a one-hour interval (100 milliliters per minute). Prior to sample collection, the Teflon™-lined tubing will be purged of approximately two volumes of the tubing using a vacuum pump set at a rate of 0.2 liters per minute. A tracer gas (i.e., helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the borehole seal and verify that ambient air is not being drawn into the sample. Following purging and verification with the tracer gas, the valve leading to the pump will be closed, and the soil vapor sample will be directed to the laboratory supplied six-liter SUMMA canister. In addition to the soil vapor samples, two ambient air samples will also be collected in the vicinity

of some soil vapor locations to provide background results. Soil vapor samples and indoor ambient air samples will be submitted to for laboratory analysis under chain of custody procedures for analysis using USEPA Method TO-15 for VOCs. Sample results will be reported in $\mu g/m^3$ and the method detection limits shall be less than or equal to 1 $\mu g/m^3$.

When sub-slab vapor samples are collected, the following actions/conditions will be documented to aid in the interpretation of the sampling results:

a. floor plan sketches that include the floor layout with sample locations, former chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, compass orientation (north), and any other pertinent information should be noted;

b. if possible, photographs will accompany floor plan sketches;

c. weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., windows/doors closed) will be reported; and

d. any pertinent observations, such as spills, floor stains, and odors will be recorded.

4.3.6 Indoor and Outdoor Ambient Air Samples

Indoor and outdoor air samples will be collected concurrently with the soil vapor and sub-slab sampling. Indoor air samples will be collected in order to characterize exposures to air within the buildings, while outdoor air samples will serve to better define the background atmospheric conditions within the area. These samples will be collected in Summa canisters over a one-hour interval and analyzed for VOCs using USEPA method TO-15. These canisters will be placed in locations chosen to provide representative background results based on Site conditions at the time of sampling.

5.0 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 and shipping procedures.

5.1 Field Sample Handling

A detailed discussion of the number and types of samples to be collected during each task, as well as the analyses to be performed can be found in Section 3.0 of this FSP. The types of containers, volumes needed, and preservation techniques for the aforementioned testing parameters are presented in Table D-2.

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to confirm 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. Specific procedures regarding sample tracking from the field to the laboratory are described in Roux Associates' SOP for Sample Handling (Attachment D-1).

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 fieldwork and to decide if additional samples are required.

All samples being shipped off-site for analysis must be accompanied by a properly completed chain of custody form (Attachment D-2). 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/or laboratory pick up 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.

5.3 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. Additional information regarding sample handling is provided in Roux Associates' SOP for Sample Handling (Attachment D-1).

All samples will be shipped within 12 hours of collection (when possible) 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 or analyte.
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 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 with packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in double 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 Federal Express or other carrier, as appropriate.

11. Separate chain of custody forms. Seal proper copies within a large Zip-Lock™ bag and tape to 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 Federal Express or other courier service as appropriate. Retain airbill receipt for project records. (Note: All samples will be shipped for "NEXT A.M." delivery).

16. Telephone laboratory contact and provide him/her with the following shipment information:

    - sampler's name;
    - project name;
    - number of samples sent according to matrix and concentration; and
    - airbill number.

6.0 SITE CONTROL PROCEDURES

Site control procedures, including decontamination and waste handling and disposal, are discussed below.

6.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and 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 D-1. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

6.2 Waste Handling and Disposal

All waste materials (drill cuttings, decontamination water, etc.) generated during the RI will be consolidated and stored in appropriate bulk containers (drums, etc.), and temporarily staged at an investigation-derived-waste storage area onsite. Roux Associates will then coordinate waste characterization and disposal by appropriate means.

Table D-1. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[3]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	TCL VOCs	28	3	10	10	3	3	57
	TCL SVOCs +20	28	3		10	3	3	47
	TCL Pesticides	28	3		10	3	3	47
	TCL PCBs	28	3		10	3	3	47
	TAL Metals	28	3		10	3	3	47
	Total Cyanide	28	3		10	3	3	47
	TPH	28	3		10	3	3	47
Groundwater	TCL VOCs	24	2	5	2	2	2	37
	TAL Metals (total)	24	2		2	2	2	32
	TAL Metals (dissolved)	24	2		2	2	2	32
Gore Sorber Modules	Modified VOC/SVOC	40	0	0	0	0	0	40
Soil Vapor	TO-15 VOCs	12	0	0	0	0	0	12

[1] Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)

[2] Based on 1 cooler per day

[3] Based on 1 per day

TCL - USEPA Contract Laboratory Program Target Compound List

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

PCBs - Polychlorinated Biphenyls

TAL - USEPA Contract Laboratory Program Target Analyte List

TCLP - Toxicity Characteristics Leaching Procedure

TBD - To Be Determined

Table D-2. Preservation, Holding Times and Sample Containers

Analysis	Bottle Type	Preservation(a)	Holding Time(b)
Total Petroleum Hydrocarbons (TPH) 8015 Gas Range Organics	2 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
Total Petroleum Hydrocarbons (TPH) 8015 Diesel Range Organics	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
Target Analyte List (TAL) Metals (total) SW-846 6010/7471	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	180 days, Hg 28 days
Target Analyte List (TAL) Metals (dissolved) SW-846 6010/7471	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	180 days, Hg 28 days
Total Cyanide SW-846 9012B	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
Target Compound List (TCL)			
TCL Volatile Organic Compounds (VOCs) SW-846 8260B	2 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs) SW-846 8270C	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
TCL Pesticides SW-846 8081A	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
TCL Polychlorinated biphenyls (PCBs) SW-846 8082	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis

(a) All samples to be preserved in ice during collection and transport

(b) Days from date of sample collection.

Attachment D-1

Roux Associates' Standard Operating Procedure for Tasks Described in this Field Sampling Plan

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.

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 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

Attachment D-2

Chain of Custody Form

ROUX CHAIN OF CUSTODY

№ 11332 Y

ROUX ASSOCIATES, INC.
Environmental Consulting & Management
209 SHAFTER STREET
ISLANDIA, NEW YORK 11749-5074
(631) 232-2600 FAX: (631) 232-9898

ANALYSES

PAGE OF

PROJECT NAME	PROJECT NUMBER
PROJECT LOCATION	
PROJECT MANAGER	SAMPLER(S)

SAMPLE DESIGNATION / LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX							TOTAL BOTTLES	NOTES

RELINQUISHED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N
RELINQUISHED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N

DELIVERY METHOD	COMMENTS
ANALYTICAL LABORATORY	

CHAINOF CDR 12AUG98