LONDON FRENCH DRY CLEANING CO. SITE
85-15 ROCKAWAY BEACH BOULEVARD
ROCKAWAY BEACH, QUEENS COUNTY, NEW YORK 11693

SITE MANAGEMENT PLAN

NYSDEC VCP SITE NO: 241035

Prepared for:
Rockaway Commons, LLC
48 E. Old Country Road – Suite 203
Mineola, NY 11501

For Submittal to:

Mr. Robert H. Filkins
Project Manager, Remedial Bureau B
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7016

Prepared by:

PRECISION ENVIRONMENTAL INC.
Precision Environmental Inc.
36-15A 23rd Street
Long Island City, New York 11106

November 2008

TABLE OF CONTENTS

FIGURES:

TABLES:

APPENDICES

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required for fulfillment of Remedial Action at the London French Dry Cleaner Co. facility located in a community shopping center building commonly known as Dayton Shopping Plaza on an approximately 4.6-acre property (hereafter referred to as the "Site") under the New York State Voluntary Cleanup Program (VCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with the Voluntary Cleanup Agreement (VCA) [VCP site number V00620] between the Site's long-term lease holder, Rockaway Commons, LLC, and NYSDEC which was issued on December 20, 2002. Remedial activities on the Site have been completed with NYSDEC and New York State Department of Health (NYSDOH) oversight (Index No W2-0942-02-10, Site No. 241034) and a Record of Decision (ROD) dated July 2007 was issued by NYSDEC.

1.1.1 General

Rockaway Commons, LLC entered into a VCA with the NYSDEC to remediate groundwater contamination caused by London French Dry Cleaning Co. London French Dry Cleaning Co. operation is located in a community shopping center building commonly known as Dayton Shopping Plaza on an approximately 4.6-acre property. The single-story multi-tenant shopping center is located in Rockaway Beach, Queens County, New York City, New York. As part of the VCA, Rockaway Commons, LLC has investigated and remediated contaminated groundwater at the Site. The boundary of the Dayton Plaza Shopping Center Site is more fully described in Figure 1, which includes a description of the Metes and Bounds along with a Site Location Map.

After completion of the remedial work described in the Remedial Action Work Plan, some contamination was left in the subsurface at this Site, which is hereafter referred to as "residual contamination." This Site Management Plan (SMP) was prepared to manage residual contamination at the Site. Remedial Action work on the Site began in October 2000 through June 2002, and was resumed in June 2005 (Remedial Action presently continues). 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 Precision Environmental Inc., (Precision) on behalf of Rockaway Commons, LLC, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002, and the guidelines provided by NYSDEC. This SMP addresses the means for implementation of Institutional Controls (ICs) and Engineering Controls (ECs), which are required by the ROD dated July 2007.

1.1.2 Purpose

The Site contains residual perchloroethylene (PCE) contamination in groundwater left after completion of the Remedial Action performed under the VCP. ECs have been incorporated into the Site remedy to provide proper management of residual contamination in the future to ensure protection of public health and the environment. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP includes all methods necessary ensure compliance with all ECs and ICs required by the Environmental Easement as stated in the ROD for residual contamination at the Site. The SMP has been approved by the NYSDEC, and compliance with this Plan is required by Rockaway Commons, LLC and its successors and assigns. This plan is subject to change by NYSDEC.

Site management is the last phase of the remedial process and is triggered by the issuance of the ROD by NYSDEC. The SMP continues in perpetuity or until extinguished in accordance with 6NYCRR Part 375. It is the responsibility of Rockaway Commons, LLC and its successors and assigns to ensure that all Site Management responsibilities under this plan are performed.

The SMP provides a detailed description of all procedures required to manage residual contamination at the Site following the completion of the Remedial Action. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain all treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP includes four 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 remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC.

Site Management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be on an annual basis.

Important notes regarding this SMP are as follows:

- This SMP defines Site-specific implementation procedures. The penalty for failure to implement the SMP is revocation of the ROD;

- The ROD (ROD Site No. 241035; VCP Site No. V00620) for the Site requires conformance with this SMP, and therefore, serves as a contractual binding authority under which this SMP is to be implemented.

At the time this report was prepared, the SMP and all Site documents related to Remedial Investigation and Remedial Action are maintained at the NYSDEC Region 2 offices in Long Island City.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The Site is located in the Queens County, New York City, New York and is identified as Block 16131 and Lot 10 on the New York City Tax Map. The Site is an approximately 4.6-acre area bounded by Rockaway Beach Boulevard to the north, Holland Avenue to the south, a vacant lot to the east, and Beach 90th Street to the west. Aside from the building, the property contains an asphalt-paved parking lot at its north section (between the building and Rockaway Beach Boulevard). The boundary of the Site is more fully described in Figure 1 – Metes and Bounds.

1.2.2 Site History

The Dayton Shopping Plaza is a single-story multi-tenant community shopping center. The single-story building is approximately 40 years in age. The building has always been used for retail and consumer service operations. The Site (London French Cleaners Co. tenant space) is located in an approximately 1,500 square foot tenant space at the approximate center of the shopping center building. London French Dry Cleaners, Co. has been present at the Site for approximately 22 years and is currently present and operating. There is no other known historical or current activity or process that employed hazardous waste at the Dayton Shopping Plaza property. Prior to installation of a self-contained dry cleaning machine within the Site in 1997, spent PCE and filters were manually transferred and stored in 15-gallon and 55-gallon drums until off-site disposal was arranged. Poor fluid handling practices over time caused releases of PCE to the environment.

1.2.3 Geological Conditions

Rockaway Beach is located on a peninsula in an urban setting. The peninsula is connected at its east end to mainland Long Island. Subsurface sediment beneath the peninsula is composed of a thick sequence of unconsolidated barrier beach deposits (primarily sand and gravel). Historical test borings completed at Dayton Shopping Plaza show that a fine to medium sand extends from surface to 20 feet below ground surface (bgs) and that a fine to medium sand with gravel extends from 20 feet bgs to at least 75 feet bgs. The Atlantic Ocean is located approximately 1,000 feet south of the Site and Beach Channel is located approximately 1,500 feet north of the Site. The topography of the Site area is flat and the Site elevation is approximately eight to ten feet above mean sea level.

Depth to groundwater at the Dayton Shopping Plaza ranges from 4 feet to 8 feet bgs as measured in groundwater monitoring wells prior to and during implementation of the Remedial Action. The measured direction of groundwater flow at the Site is to the southwest. The tidal action of the Atlantic Ocean influences groundwater flow but net direction is to the southwest. For groundwater elevations see Table 1. For groundwater monitoring well locations see Figure 2.

1.3 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The SMP and all Site documents, including the Remedial Investigation and Remedial Action Work Plan, are maintained by the NYSDEC (or successor agency). At the time of publication, these reports could be found at the Region 2 NYSDEC offices in Long Island City, New York.

1.3.1 Summary of Remedial Investigation Findings

The following documents detail soil, groundwater, and indoor air quality at the Site (these documents are archived by NYSDEC):

1) *Proposed Remedial Action Plan for the London French Dry Cleaning Co. site*, dated May 2007, prepared by NYSDEC
2) *Remedial Action Workplan, Dayton Plaza Shopping Plaza*, February 2003, prepared by Langan Engineering and Environmental Services

3) *Remedial Action Workplan Addendum, Dayton Plaza Shopping Plaza*, October 2003, prepared by Langan Engineering and Environmental Services

4) *Supplemental Remedial Investigation Report, Dayton Plaza Shopping Plaza*, April 2004, prepared by Langan Engineering and Environmental Services

5) *Interim Remedial Measure Workplan*, Dayton Plaza Shopping Plaza, June 2006, prepared by Langan Engineering and Environmental Services

6) *Supplemental Remedial Investigation (Phase III) Report (Revision III), Dayton Plaza Shopping Plaza*, November 2006, prepared by Langan Engineering and Environmental Services

7) *Interim Remedial Measure Report*, Dayton Plaza Shopping Plaza, March 2007, prepared by Langan Engineering and Environmental Services

8) *Interim Remedial Measure Progress Report, Effectiveness Monitoring*, Dayton Plaza Shopping Plaza, March 2007, prepared by Langan Engineering and Environmental Services

9) *Interim Remedial Action Progress Report, December 2006, January 2007, and February 2007*, Dayton Plaza Shopping Plaza, March 2007, prepared by Langan Engineering and Environmental Services

Currently, low-level concentrations of PCE exist in groundwater beneath, and within the immediate vicinity of the Site (London French Dry Cleaner Co. tenant space). Prior studies have not identified off-site migration of the groundwater contamination.

The two areas of concern that are addressed within this SMP include:

- residual groundwater contamination that remains beneath and in the immediate vicinity of the Site.

- potential of PCE vapor intrusion into the building interior

Below is a summary of Remedial Investigation findings:

1.3.1.1 Soil

Prior subsurface studies have shown that a localized area of soil contamination exists in the vicinity of an exterior trench drain at the south (rear) side of the Site. Laboratory analysis of subsurface soil samples collected from two soil borings in this area in 1999 showed the greatest PCE concentrations of up to 77 parts per million (ppm), which is above the Recommended Soil Cleanup Objective of 1.3 ppm as defined in the NYSDEC document titled *Technical and Administrative Guidance Memorandum 4046, Recommended Soil Cleanup Levels and Cleanup Objectives and Cleanup Levels* (NYSDEC TAGM). This trench drain was found to be connected to floor drains inside the Site tenant space.

In 2004, four additional soil borings were drilled to a depth of 20 feet bgs adjacent to the trench drain. Soil quality field screening techniques showed no evidence of VOC contamination in samples collected from below the water table (water table measured at five feet bgs in this area). Eight soil samples were collected from above the water table and submitted to a laboratory for VOC analysis. One of these eight samples was found to contain PCE at 15 ppm. All remaining samples contained no VOCs above the NYSDEC TAGM Recommended Soil Cleanup Objectives. See Figure 3 for soil boring locations. Refer to Table 2 for tabulated contaminant concentrations in soil.

An air sparge/soil vapor extraction system (AS/SVE) is currently operating at the Site. Since VOC concentrations within oil in the vicinity of the trench drain have been shown to be decreasing with time, operation of the AS/SVE will serve to further reduce VOC concentrations. Soil quality at the Site is not considered to be an area of concern.

1.3.1.2 On-Site and Off-Site Groundwater

PCE had historically been discharged by London French Dry cleaning Co. at the Site through deficient waste handling practices. Prior investigations, before NYSDEC involvement with the Site, have shown that the pre-remedy extent of the groundwater contamination was limited to the area beneath, and in the immediate vicinity of the Site. The contaminants consisted of PCE and associated breakdown products: trichloroethene, (TCE), dichloroethene (DCE), and vinyl chloride. Groundwater samples collected from nine monitoring wells showed that total VOC concentrations were greatest in a well identified as MW-3 at 8,700 parts per billion (ppb). This 1998 sampling event also showed that PCE contamination was present in six other wells, but at concentrations that did not generally exceed 100 ppb. The applicable regulatory limit for PCE in groundwater is 5 ppb.

The nine monitoring wells were sampled in October 2006 after the Site had been entered into the VCP. Total VOC concentrations in MW-3 were reported at less than 200 ppb, down from the historical maximum of 8,700 ppb. The October 2006 sampling event showed that PCE was reported at 64.9 ppb, the highest single contaminant of the total VOCs detected in MW-3. MW-3 is located within approximately five feet and downgradient of the exterior side of the rear perimeter wall (south side) of the Site. MW-3 is the location of the most severe groundwater contamination at the Dayton Shopping Plaza. The exterior trench drain is located directly adjacent to MW-3.

Comparison of historical and recent groundwater quality data shows that the AS/SVE system has been adequate in reducing contaminant concentrations over time. The AS/SVE system is currently operating and further decreases in the VOC contaminant concentrations are anticipated.

Table 3 lists the most recent contaminant concentrations detected in groundwater (showing exceedences of groundwater quality standards at the Site). In addition, a site plan showing the locations from which the groundwater samples were collected is included in Figure 2.

1.3.1.3 On-Site and Off-Site Soil Vapor

A sub-slab soil vapor study was initiated by the owner of Dayton Shopping Plaza in 1998 and high concentrations of PCE vapors were discovered. This historical study showed that PCE vapor concentrations were as high as 17 million microgram per cubic meter of air (ug/m^3). This condition, coupled with the PCE contamination in groundwater, compelled the owner of Dayton Shopping Plaza to install the AS/SVE system beneath the floor slab. The system operated from October 2000 to June 2002, and was brought back online June 2005 through the present.

Sub-slab soil vapor samples were collected for laboratory analysis in February 2004 after Dayton Shopping Plaza was entered into the VCP, and before reactivation of the AS/SVE. VOC concentrations had decreased from a 1998 high to approximately 110,000 ug/m³ in one sample collected from beneath the Site floor slab. A VOC concentration of approximately 38,000 ug/m³ was detected in a sample collected from beneath the floor slab at the east-adjoining LA Furniture tenant space. Samples of indoor air were also collected collect in 2004 and showed PCE at concentrations of up to 130 ug/m³ in a sample collected from the interior of the Site and up to 33 ug/m³ at other locations within the Dayton Shopping Plaza building.

The VOC concentrations detected in both sub-slab vapor and indoor air were high enough to prompt installation of the existing sub-slab depressurization system in November 2006 (this system is currently operating). The sub-slab depressurization system was installed to augment the effectiveness of the AS/SVE system by widening the influence beneath the Dayton Shopping Plaza building to include areas where elevated VOC vapors had been detected. Indoor air sampling conducted in December 2006 showed that VOC concentrations in air had been reduced to 10 ug/m³. Off-site soil vapor is not a concern since VOC concentrations in groundwater are undetected at its southern (downgradient) border.

A site plan showing soil vapor sample locations is provided in Figure 4. Table 4 includes historical VOC concentrations in indoor air and soil vapor.

1.3.1.4 Summary of the Qualitative Human Health Exposure Assessment

A prior report titled Supplemental Remedial Investigation (Phase II) Report (Revision III), dated November 2006 included the Qualitative Human Health Exposure Assessment (the "Assessment") of the Site. The Assessment verified that the source of the PCE contamination in groundwater was the London French Dry Cleaners, which used PCE in a dry cleaning machine. PCE was released to the environment by product mishandling. In accordance with DER-10 Technical Guidance for Site Investigation and Remediation Appendix 3B, the Assessment consisted of an evaluation of the following five elements:

- Contaminant source
- Contaminant release and transport mechanism
- Point(s) of human exposure
- Route(s) of exposure
- Receptor population

The results of the Assessment disclosed no potential for human exposure by direct contact or ingestion (on-site or off-site) to the PCE contamination in soil or groundwater at the Dayton Plaza Shopping Center. This conclusion was reached because of the continued operation of the AS/SVE system, which has reduced contaminant concentrations in groundwater over time. In addition, this conclusion was reached because the contaminant plume in groundwater beneath the Site does not extend beyond the borders of the Dayton Shopping Plaza property. Further, local groundwater is not used as a source of drinking water.

The Assessment indicated that the only potential route of human exposure to the contaminants of concern was through inhalation of volatile organic vapors inside the Dayton Plaza Shopping Center building. Historical measured VOC concentrations in indoor air samples showed VOC concentrations inside the structure at actionable levels. Accumulation of these vapors was a result of volatilization of the PCE in groundwater beneath the building floor slab. The vapors subsequently migrated to the building interior through cracks, joints and other penetrations in the slab.

The Assessment stated that, although operation of the existing AS/SVE system had been successful in substantially reducing PCE concentrations in groundwater, the extent of influence of the soil vapor extraction portion of the system was insufficient. The Assessment recommended that the SSD system be installed to further reduce VOC concentrations in indoor air by extending the area of influence under the building floor slab (creation of negative air pressure and extraction of sub-slab vapors).

Subsequent to the completion of the Assessment and date of submittal of the Remedial Investigation (Phase II) Report (Revision III), the SSD system was installed and began operation. Subsequent indoor air quality samples were collected for laboratory analysis and showed a substantial decrease in volatile organic vapor concentrations in comparison with earlier data. Based on this reduction, NYSDEC has not required additional indoor air quality testing because all recent data shows volatile organic vapor concentrations below actionable levels.

1.4 DESCRIPTION OF REMEDIAL ACTIONS

The Site was remediated in accordance with the scope of work presented in the following NYSDEC-approved documents:

1) *Remedial Action Workplan*, *Dayton Plaza Shopping Plaza*, February 2003, prepared by Langan Engineering and Environmental Services
2) *Remedial Action Workplan Addendum, Dayton Plaza Shopping Plaza*, October 2003, prepared by Langan Engineering and Environmental Services
3) *Interim Remedial Measure Workplan*, Dayton Plaza Shopping Plaza, June 2006, prepared by Langan Engineering and Environmental Services

Below is a summary of the Remedial Actions required and implemented at the Site:

1. Installation and continued operation of the AS/SVE system to remediate PCE contamination in soil and groundwater at the Site.

2. Installation and continued operation of the sub-slab depressurization system beneath both the Site and adjacent and nearby tenant spaces to prevent human exposure to elevated levels of VOC vapors in indoor air.

3. Implementation of the following Institutional Controls:

    - Language will be emplaced within each tenant lease that restricts occupancy of the building to commercial and industrial use only and directs each occupant to comply with this SMP. Specifically, the tenants shall be instructed to allow full access to each space so that remediation and sub-slab depressurizations systems can be evaluated and maintained. All lease agreements shall also include a restriction on the use of groundwater as a source of potable or process water.

- No residential development of the property will take place and future development is restricted to commercial and/or industrial use.
- Groundwater at the property shall not be used for any purpose, inclusive of irrigation, processing, fabrication or as a source of potable water.

4. A Site Management Plan for long term management of residual contamination, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

5. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, addressed in accordance with all applicable Federal, State and local rules and regulations.

1.4.1 On-Site and Off-Site Treatment Systems

The air sparge/soil vapor extraction system (AS/SVE) is powered by a skid-mounted air compressor located at the rear (south side) of the tenant space occupied by LA Furniture (located east of the London French Cleaners space). The compressor injects air into the shallow aquifer at two points. One injection point is located near the skid, and the second is located in the service road adjacent to the south side of the London French Cleaners tenant space. The air compressor operates continuously. An electrically-powered blower withdraws the air from subsurface soil once it rises through the water table. The blower is located adjacent to the compressor. The blower withdraws the air from two extraction points, each located within five feet of the two injection points. The blower operates continuously. No off-site remediation systems exist.

A sub-slab soil vapor mitigation system has also been installed at the Site and operates continuously. Two 18 inch suction pits were installed in each of five stores. These stores include Medport of Rockaway Beach, Dano’s Pizza, Beauty and More, Sunny Gift and Visiting Services of New York. Four-inch diameter PVC piping extends vertically from the two pits in each store, are joined, and exit at the rear (south side) of the building. In-line fans have been installed at the top of each discharge vent to create negative pressure beneath the floor slab, and remain in continuous operation.

A map showing the locations of the AS/SVE and sub-slab depressurization system components is provided as Figure 5.

1.4.2 Engineering and Institutional Controls

Since residual contamination is present at this Site, Engineering Controls (ECs) and Institutional Controls (ICs) will be implemented to protect public health and the environment in the future. The ECs include the soil vapor extraction system and the sub-slab depressurization system.

A series of Institutional Controls are required to implement, maintain and monitor these Engineering Controls. These Institutional Controls consist of the following:

- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Site must be inspected and certified at a frequency and in a manner defined in this SMP;
- Groundwater monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management for the Site must be reported at the frequency and in a manner defined in this SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitoring wells and soil vapor probes, must be protected and replaced as necessary to ensure continued functioning in the manner specified in this SMP.

The Controlled Property also has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required under the Environmental Easement. Site restrictions that apply to the Dayton Shopping Plaza are:

- Vegetable gardens and farming on the Dayton Shopping Plaza are prohibited.

- Use of groundwater underlying the Dayton Shopping Plaza is prohibited without treatment rendering it safe for the intended use;

- All future activities on the property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the Engineering Controls.

- The property may be used for commercial use only provided the long-term Engineering and Institutional Controls included in the SMP remain in use.

These EC/ICs should:

- Prevent ingestion of groundwater with contamination levels that exceed drinking water standards;

- Prevent contact with or inhalation of volatiles from contaminated groundwater;

- Restore groundwater to pre-disposal/pre-release conditions, to the extent practicable;

- Prevent the discharge of contaminants to surface water;

- Remove the source of ground or surface water contamination;

- Prevent contaminated groundwater from migrating off-Site;

- Prevent inhalation of or exposure to contaminants volatilizing from contaminated soil; and

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

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for Dayton Shopping Plaza dated February 2003. A summary of the remedial strategies and EC/ICs implemented at the Site are as follows:

- Registration of an Environmental Easement, including Institutional Controls, to prevent future exposure to any contamination remaining at the Site.
- Continued operation of the AS/SVE system and sub-slab soil vapor mitigation system.

Since residual contaminated groundwater/soil vapor exists beneath the Site, Engineering Controls and Institutional Controls (EC/ICs) are required 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

The purpose of this Plan is to provide:

- A description of all EC/ICs on the Site;
- The basic operation and intended role of each implemented EC/IC;
- A description of the key components of the ICs created as stated in each lease agreement;
- A description of the features that should be evaluated during each annual inspection and compliance certification period;

- A description of plans and procedures to be followed for implementation of EC/ICs

2.2 ENGINEERING CONTROL COMPONENTS

2.2.1 Engineering Control Systems

- The AS/SVE system is powered by a skid-mounted air compressor located at the rear (south side) of the tenant space occupied by LA Furniture (located east of the London French Cleaners space). The compressor injects air into the shallow aquifer at two points. One injection point is located near the skid, and the second is located in the service road adjacent to the south side of the London French Cleaners tenant space. The air compressor operates continuously. An electrically-powered blower withdraws the air from subsurface soil once it rises through the water table. The blower is located adjacent to the compressor. The blower withdraws the air from two extraction points, each located within five feet of the two injection points. The blower operates continuously. This system is used to accelerate volatilization of the contaminants for extraction by the blower. Manufacturer and support documentation for the AS/SVE system is provided in Appendix A. Operation, Maintenance and Effectiveness Monitoring Plan for the AS/SVE systems is provided in Appendix H.

- The sub-slab depressurization (SSD) system is active and is designed to lower atmospheric pressure beneath the floor slab at critical area of the Dayton Shopping Plaza building. Pressure reduction beneath the slab prevents intrusion of volatile organic vapors into the building interior. The tenant spaces where the system was installed are located at the following positions relative to London French Cleaners: Beauty & More Dano's Pizza, Medport of Rockaway Beach (all located west of London French Cleaners), Sunny Gift, and Visiting Services of New York (located east of London French Cleaners). Manufacturer and support documentation for the sub-slab depressurization system is provided in Appendix B.

2) Preparation and submittal to NYSDEC of a certification of engineering and institutional controls document on an annual basis. This document shall include:

   (a) a discussion and interpretation of groundwater sample analysis results;

   (b) certification that the engineering and institutional controls put in place still remain in place and are either unchanged from the previous certification or are compliant with NYSDEC-approved modifications;

   (c) a statement that indicates that NYSDEC can access to the property; and

   (d) a statement indicating that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the SMP unless otherwise approved by NYSDEC.

Procedures for operating and maintaining the AS/SVE and sub-slab depressurization systems are documented in the Operation and Maintenance Plan (Appendix H). Procedures for monitoring the system are included in the Monitoring Plan. The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the Site, has occurred.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

2.2.2.1 Sub-slab Depressurization (SSD) System

The SSD system was installed within five adjoining and nearby tenant spaces within the Dayton Shopping Plaza building. The NYSDEC ROD also requires continued operation of this sub-slab soil vapor mitigation system. A total of five discharge vents are associated with the sub-slab vapor mitigation system. Two 18 inch suction pits were installed in each of the five stores. Four-inch diameter PVC piping extends vertically from the two pits in each store, are joined, and exit at the rear (south side) of the building. In-line fans have been installed at the top of each discharge vent to create negative pressure beneath the floor slab, The SSD system operation will be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active systems may be submitted by the property owner based on confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

2.2.2.2 Air Sparge/Soil Vapor Extraction System (AS/SVE System)

The AS/SVE system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the system may be submitted by the property owner after residual contamination concentrations in groundwater: (1) are cleaned up to levels below NYSDEC standards, (2) have become asymptotic over an extended period of time as mandated by the NYSDEC and the NYSDOH, or (3) if NYSDEC has determined that the AS/SVE system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the Site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by NYSDEC and NYSDOH. These sampling/monitoring activities will adhere to stipulations outlined in the Monitoring Plan, Section 3.0 of the SMP.

2.3 INSTITUTIONAL CONTROLS COMPONENTS

2.3.1 Institutional Controls

A series of Institutional Controls are required under the RAWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to residual contamination by controlling disturbances of the subsurface contamination; and, (3) restrict the use of the Site to commercial uses only. Adherence to these Institutional Controls on the Dayton Shopping Plaza property is required under the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Environmental Easement by the Grantor and the Grantor's successors and assigns with all elements of this SMP;.

- All Engineering Controls must be operated and maintained as specified in this SMP;
- A soil vapor mitigation system consisting of a sub-slab depressurization system under the Site and nearby tenant spaces must be inspected, certified, operated and maintained as required in this SMP;
- All Engineering Controls on the property must be inspected and certified at a frequency and in a manner defied in the SMP.
- Groundwater monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management for the property must be reported at the frequency and in a manner defined in this SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure the devices function in the manner specified in this SMP.
- Engineering Controls may not be discontinued without a written approval by NYSDEC and NYSDOH. Note: Institutional Controls may be modified, added or deleted from this list as warranted by Site-specific conditions

The Site and the Dayton Shopping Plaza has a series of Institutional Controls in the form of use restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. The restrictions that apply to the property are:

- Vegetable gardens and farming on the property are prohibited;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the SMP.

- The property may only be used for commercial use only provided that the long-term Engineering and Institutional Controls included in this SMP are employed.

- The property may not be used for a higher level of use, such as unrestricted residential use without an amendment or the extinguishment of this SMP.

- Applicant agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the 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 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. This yearly statement must be certified by an expert that the NYSDEC finds acceptable.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all systems installed on-Site will be conducted at the frequency specified in SMP Monitoring Plan schedule. A comprehensive Site-wide Certification will be conducted annually. The inspections will determine and document the following:

- Whether Engineering Controls 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 Site Management Reporting 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 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

The following information should be: 1) modified as conditions change; and, (2) submitted to NYSDEC in the annual Site Certification Report. Should the use restriction language in the lease agreements be modified or terminated, the copy of the revised lease agreement will also be updated in this manner:

2.4.2.1 NYSDEC-acceptable Electronic Database

The following information is presented in Appendix I in an electronic database format:

- A Site summary;
- The name of the current Site owner and/or the remedial party implementing the SMP for the Site;
- The location of the Site;
- The current status of Site remedial activity;
- A copy of the Environmental Easement will be included; and

- A contact name and phone number of a person knowledgeable about the SMP requirements, in order for NYSDEC to obtain additional information, as necessary.

This information should be: 1) modified as conditions change; and, (2) submitted to NYSDEC in the annual Site Certification Report. Should the Environmental Easement be modified or terminated, the copy of the Environmental Easement will also be updated in this manner.

2.4.2.2 Non-routine Notifications

Non-routine notifications are to be submitted by the property owner to the NYSDEC on an as-needed basis for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are consistent with the terms of the ROD.

- 10-day advance notice of any proposed ground-intrusive activities.

- Notice within 48-hours of any damage or defect to the foundations structures that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action taken to mitigate the damage or defect.

- Notice within 48-hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, including a summary of action taken and the 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.

3.0 MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the implemented ECs in reducing or mitigating contamination at the Site. ECs at the Site include the AS/SVE system and the sub-slab depressurization system. This Monitoring Plan is subject to revision by NYSDEC.

3.1.2 Purpose

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of groundwater;
- Evaluating Site information periodically to confirm that the remedy continues to be effective as per the design; and
- Preparing the necessary reports for the various monitoring activities.
- Assessing compliance with NYSDEC groundwater standards;
- Assessing achievement of the remedial performance criteria.

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

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;

- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitor well decommissioning procedures; and
- Annual inspection and certification.

Monitoring of the performance of the remedy and overall reduction in contamination on-Site will be conducted until NYSDEC agrees to either a reduction in monitoring frequency or deactivation of the AS/SVE and sub-slab depressurization systems. Trends in contaminant levels in groundwater in the affected area will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. The following table summarizes the monitoring that will be conducted at the Site:

Monitoring Program	**Frequency***	**Matrix**	**Analysis**
Groundwater	Biannual	Water	EPA Method 8260

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

3.2 ENGINEERING CONTROL SYSTEM MONITORING

3.2.1 AS/SVE System

3.2.1.1 AS/SVE System Monitoring

The AS/SVE is powered by a skid-mounted air compressor located at the rear (south side) of the tenant space occupied by LA Furniture (located east of the London French Cleaners space). The compressor injects air into the shallow aquifer at two points. One injection point is located near the skid, and the second is located in the service road adjacent to the south side of the London French Cleaners tenant space. The air compressor operates continuously. This system is used to accelerate volatilization of the contaminants in groundwater for extraction by the blower. The electrically-powered blower withdraws the air from subsurface soil once it rises through the water table. The blower is located adjacent to the compressor. The blower withdraws the air from two extraction points, each located within five feet of the two injection points. The blower operates continuously.

System design information, boring logs for installation of the vapor extraction wells, and system specifications are provided in Appendix A.

3.2.1.2 AS/SVE Monitoring Schedule

Baseline monitoring of the AS/SVE system has been conducted. Long term monthly monitoring of this system is currently being conducted by on-site building management personnel. Inspection frequency is subject to change by NYSDEC and NYSDOH. Unscheduled inspections and/or sampling may take place when a suspected failure of the AS/SVE system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the AS/SVE system are specified later in this Plan.

3.2.1.3 AS/SVE General Equipment Monitoring

A visual inspection of the complete system will be conducted during the monitoring event. AS/SVE system components to be monitored include, but are not limited to, the compressor, all piping associated with the system, the vacuum blower, and status of all high temperature and high liquid level sensors.

A complete list of components to be checked is provided in the AS/SVE System Inspection Checklist, presented in Appendix C. 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 AS/SVE system restarted.

3.2.1.4 AS/SVE System Monitoring Devices and Alarms

The AS/SVE system has automated shut down capability in the event of abnormal operating parameters. Shut down occurs when the high level sensor in the moisture separator tank is activated, the high temperature sensor in the air discharge line is activated, and/or if the blower motor internal thermal overload protection is tripped. In the event that shut down occurs, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the AS/SVE system restarted. Operational problems will be noted in the annual Certification Report.

3.2.2 SSD System

3.2.2.1 Sub-Slab Depressurization (SSD) System Monitoring

The SSD system was designed to create negative pressure beneath the floor slab of the shopping plaza structure at specific locations to minimize any potential for intrusion of volatile organic vapors into the building. Historical indoor air sample and sub-slab soil vapor laboratory analysis results have shown that the operation of this system has been effective. Monthly monitoring activities are currently being conducted by on-site management personnel.

Design information for the depressurization pits, and SSD system specifications are provided in Appendix B.

3.2.2.2 SSD System Monitoring Schedule

Baseline monitoring of the SSD system has been conducted. Long term monthly monitoring of this system is currently being conducted by on-site building management personnel. Inspection frequency is subject to change by NYSDEC and NYSDOH. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSD system are specified later in this Plan.

3.2.2.3 SSD System General Equipment Monitoring

A visual inspection of the complete system will be conducted during each monitoring event. SSD system components to be monitored include, but are not limited to, all in-line fans, and all piping associated with the system.

A complete list of components to be checked is provided in the SSD System Inspection Checklist, presented in Appendix D. If 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 SSD system restarted.

3.2.2.4 SSD System Monitoring Devices and Alarms

The SSD system has no automated shut down or malfunction alarm capability. In the event that shut down occurs, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSD system restarted. Operational problems will be noted in the bi-annual Site Management Report.

3.3 GROUNDWATER MONITORING PROGRAM

Groundwater monitoring will be performed on a bi-annual basis to assess the performance of the remedy.

3.3.1 Monitoring System Design

Four existing groundwater monitoring wells are included in the Monitoring System. These wells are identified as MW2, MW3, MW4, and MW8. This network of monitoring wells is designed to monitor both upgradient and downgradient groundwater conditions at the Site. MW2 is located at a hydraulic upgradient position relative to the London French Cleaner tenant space and is situated in the parking lot north of the Dayton Shopping Plaza building. Data gathered from MW2 shall provide background groundwater quality data. All of the remaining wells are located south and downgradient of the building and will provide data on the severity of contamination as groundwater moves from beneath the Site to these downgradient wells. The depth to the water table in these wells ranges from 4.5 feet to 5 feet below ground surface. Each of the wells extends to 12 feet below ground surface and are screened at 2 feet to 12 feet below ground surface. Figure 7 shows the locations of the four monitoring wells. Figure 8 provides groundwater elevation data in each well. Figure 9 shows baseline contaminant concentrations in each well.

3.3.2 Groundwater Well Construction

Each of the monitoring wells were installed using a hollow stem auger drill rig that created 8 inch diameter borings. All wells are constructed of two inch diameter PVC risers with flush-mount caps. See Appendix E for soil boring logs and well construction logs.

3.3.3 Monitoring Schedule

Groundwater samples shall be collected from each of the four wells included in this Monitoring Plan for laboratory analysis twice each calendar year (bi-annually). The duration of the sampling shall be a minimum of five years.

The sampling frequency may be modified by NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the groundwater-monitoring program are specified below.

3.3.4 Sampling Event Protocol

The following procedures shall be followed during each sampling event:

- Depth-to-water measurements shall be obtained from each well prior to sample collection.
- The equivalent of three well volumes of water shall be manually removed from each well prior to sampling.
- Dedicated disposable bailers shall be employed for sample collection.
- Field instrumentation shall be employed to obtain water temperature, pH, conductivity and turbidity at each sampled well.
- All groundwater samples shall be placed in 40 milliliter vials provided by the laboratory. All sample containers shall be appropriately labeled and closed with no trapped air.
- Chain-of-custody documents shall be completed before shipment. The samples need to be placed in ice and secured in a cooler during shipment to the laboratory.

- All groundwater samples will be analyzed at a New York State Department of Health-approved laboratory for analysis under EPA Method 8260.

3.4 WELL REPLACEMENT/REPAIRS AND DECOMMISSIONING

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. Well decommissioning, for the purpose of replacement, will be reported to NYSDEC prior to performance and in the annual report. Well decommissioning without replacement must receive prior approval by NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC and NYSDOH.

3.5 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections should also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix G). 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.

3.6 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

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

- QA/QC Objectives for Data Measurement;
- Sampling Program:
  - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
  - Sample holding times will be in accordance with the NYSDEC ASP requirements.
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
  - 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;
- Data Reduction and Validation:
  - Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:
    - Verification of 100% of all QC sample results (both qualitative and quantitative);
    - Verification of the identification of 100% of all sample results (both positive hits and non-detects);
    - Recalculation of 10% of all investigative sample results; and
    - A Data Usability Summary Report (DUSR) which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.7 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-Site. 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 annual Site Certification Report, as specified in the Reporting Plan of the SMP.

All groundwater sample analysis results will be reported to NYSDEC on a bi-annual basis. A letter will be prepared for submission, subsequent to each sampling event. The letter will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (i.e, groundwater);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled
- A copy of the laboratory certification;
- Any observations, conclusions, or recommendations; and

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

Data will be reported to NYSDEC in hard copy. A summary of the monitoring program deliverables are summarized in Table 1 below.

Table 1: Monitoring/Inspection Deliverables

Task	Frequency*	Bi-annual Reporting Requirement	Annual Reporting Requirement
Groundwater Sampling	Bi-annual	Yes	Yes
Site Certification Report	Annual	No	Yes

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

3.8 CERTIFICATIONS

Site inspections and sampling activities will take place as outlined above. Frequency of inspection is subject to change by NYSDEC. Inspection certification for all ICs and ECs will be submitted to NYSDEC on a calendar year basis and must be submitted by March 1 of the following year. A qualified environmental professional, as determined by NYSDEC, will perform inspection and certification. Further information on the certification requirements are outlined in the Reporting Plan of the SMP.

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

The Operation and Maintenance Plan describes the measures necessary to operate and maintain any mechanical components of the remedy selected for the Site (i.e., active SSD and AS/SVE systems). This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSD and AS/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 SSD and AS/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. The Operation and Management Plan is subject to NYSDEC revision.

4.1.1 Sub-slab Depressurization System

The SSD consists of a total of ten 18 inch suction pits that were excavated below the slab. Refer to Figure 5 for the locations of these suction pits. These suction pits were then filled with gravel. Four-inch diameter PVC piping extends from the gravel-filled pits. Each pit has been covered with concrete and the joints between the pipe penetrations and the concrete have been sealed with caulk. All of the pipe risers extending from the pits are joined by horizontal pipe runs that lead to a single exhaust line that penetrates the roof of the building. A Fantech FR150 in-line fan rated at 230 cubic feet per minute is attached to the exhaust pipe and operates continuously. This system creates negative pressure beneath the floor slab of the building. Historical testing and evaluation has shown that this system has a radius of influence that has been effective in sharply reducing volatile organic vapor concentrations in indoor air. This system began operation in August 2006. Figure 10 shows construction details for the SSD system.

4.1.1.1 Scope

The SSD system must remain in continuous operation to maintain negative pressure beneath the building floor slab. Aside from visual assessment for damage or deactivation, little or no maintenance of the system is required.

4.1.1.2 System Start-Up and Testing

The SSD System is currently in operation. Should the system stop operating, the electrical connection needs to be inspected and the breaker checked. If the electrical line to the in-line fan is viable and is providing power to the fan, a new fan shall be purchased and installed in accordance with manufacturer specifications (see Appendix B).

Once necessary electrical repair/fan replacement has been completed all suction piping and seals need to be visually inspected for damage or evidence of leaks. Visually inspect the air discharge opening located on the roof to verify that no obstructions exist.

Upon re-starting the SSD system after repairs or accidental deactivation, a pressure test shall be conducted at the sampling points that have been installed adjacent to each suction pit. These sampling points consist of narrow diameter PVC tubing that has been inserted through the floor slab and penetrates into subsurface soil. Utilizing a U-tube manometer, open the caps on the sampling points and attach the device. Record pressure readings on a checklist.

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

4.1.1.3 System Operation: Routine Equipment Maintenance

Aside from verifying that the fan is operating, inspecting piping to verify integrity, and to check the exhaust opening on a monthly basis, no other routine maintenance of the SSD system is required.

4.1.1.4 System Operation: Non-Routine Equipment Maintenance

Non-routine equipment maintenance includes replacement of the in-line fan as necessary and repairs/replacement of any damaged piping that is found during monthly inspections. Fan replacement procedures are provided in Appendix B. Piping shall be replaced using 4 inch diameter PVC piping.

4.2.1 Air Sparge/Soil Vapor Extraction System

The AS/SVE is powered by a skid-mounted air compressor located at the rear (south side) of the tenant space occupied by LA Furniture (located east of the London French Cleaners space). The compressor injects air into the shallow aquifer at two points. One injection point is located near the skid, and the second is located in the service road adjacent to the south side of the London French Cleaners tenant space. The air compressor operates continuously. The air filter on the compressor shall be inspected to determine if replacement is necessary. The maintenance shall also include a review for moisture buildup in pertinent system components (moisture separator tank and water collection drum). This task will also be conducted on a monthly basis. An electrically-powered blower withdraws the air from subsurface soil once it rises through the water table. The blower is located adjacent to the compressor. The blower withdraws the air from two extraction points, each located within five feet of the two injection points. The blower operates continuously. The AS/SVE system, as currently configured, began operation in 2003.

4.2.1.1 Scope

The AS/SVE system must remain in continuous operation for continued in-situ groundwater remediation. An Operation, Maintenance and Effectiveness Monitoring

Plan dated February 2003 has been prepared specifically to ensure proper operation of the AS/SVE System. This document is provided as Appendix H.

4.2.1.2 System Start-up and Testing

System start-up and testing procedures are specified in Appendix H.

4.2.1.3 System Operation: Routine and Non-Routine Equipment Maintenance

All routine and non-routine AS/SVE system equipment maintenance procedures are defined in Appendix H.

4.3 GROUNDWATER MONITORING WELL MAINTENANCE

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

4.4 MAINTENANCE REPORTING REQUIREMENTS

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

4.4.1 Routine Maintenance Reports

Checklists (Appendix C and Appendix D) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the information on the following page:

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

4.5 CONTINGENCY PLAN

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

4.5.1 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 Mr. Manouchehr Malekan at (516) 877-1677. These emergency contact lists must be maintained in an easily accessible location at the Site.

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

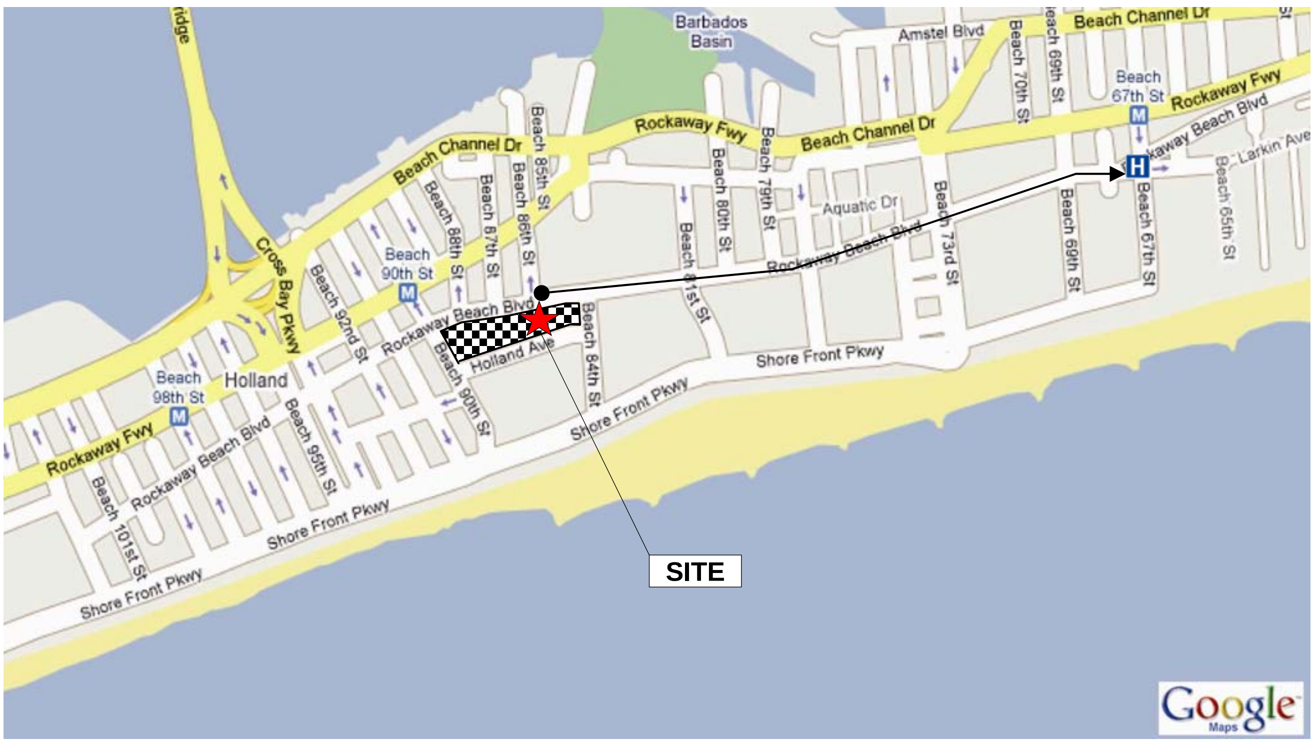
4.5.2 Map and Directions to Nearest Health Facility

Site Location: Dayton Shopping Plaza, 85-15 Rockaway Beach Boulevard, Rockaway Beach, New York

Nearest Hospital Name: New York Hospital of Queens, 67-10 Rockaway Beach Boulevard, Rockaway Beach, New York (718) 474-6636

Directions to the Hospital: Rockaway Beach Boulevard east for 0.8 miles (five minutes travel time)

Map Showing Route from the Site to the Hospital:



4.5.3 Response Procedures

4.5.3.1 Emergency Contacts/Notification System

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. The list is also posted prominently at the Site and made readily available to all personnel at all times.

Potential hazards associated with operation of the AS/SVE and sub-slab depressurization systems are limited to accidental deactivation and fire associated with electrical malfunctions. In the case of system deactivation, Mr. Manouchehr Malekan needs to be contacted at (516) 877-1677. In the event of fire, the local fire department needs to be contacted immediately. No hazardous materials are being employed at the property by the operation of these systems.

5.0 SITE MANAGEMENT REPORTING PLAN

5.1 Certification of Engineering and Institutional Controls

Information of EC/ICs can be found in the Engineering and Institutional Control Plan portion of the SMP. Inspection of the EC/ICs will occur at a frequency described in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan. After the last inspection of the reporting period, a qualified environmental professional will sign and certify the document. The document will certify that:

- On-Site ECs/ICs are unchanged from the previous certification;
- They remain in-place and effective;
- The systems are performing as designed;
- Nothing has occurred that would impair the ability of the controls to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any operation and maintenance plan for such controls;
- Access is available to the Site by NYSDEC and NYSDOH to evaluate continued maintenance of such controls; and
- Site usage is compliant with the SMP and the ROD.

5.3 SITE INSPECTIONS

5.3.1 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;
- When a breakdown of the treatment systems has occurred; and
- Whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.3.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system (Appendix G). This forms is subject to NYSDEC revision.

All applicable inspection forms and other records (including all sampling data of any media at the Site and system maintenance reports) generated for the Site during the calendar year will be included in the annual Site Certification Report.

5.3.3 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,

- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.4 SITE CERTIFICATION REPORT

The Site Certification Report will be submitted annually and will be submitted by March 1 of the calendar year following the reporting period. Other activities such as groundwater and soil vapor monitoring reports will be submitted monthly for the first year, and as determined by NYSDEC thereafter, with those results also incorporated into the annual Site Certification Report. The Site Certification Report will include:

- Summary of the of the remediation measures implemented at the Site (i.e., AS/SVE and SSD systems)

- EC/IC certification;

- All applicable inspection forms and other records generated for the Site during the reporting period;

- Cumulative data summary tables and/or graphical representations of contaminants of concern in groundwater, which include a listing of all compounds analyzed along with the applicable standards, with all exceedences highlighted;

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled during the calendar year (also to be submitted electronically in the NYSDEC-specified format);

- 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;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A summary of the performance and/or effectiveness monitoring;
  - Comments, conclusions, and recommendations based on data evaluation; and
  - Description of the resolution of performance problems.

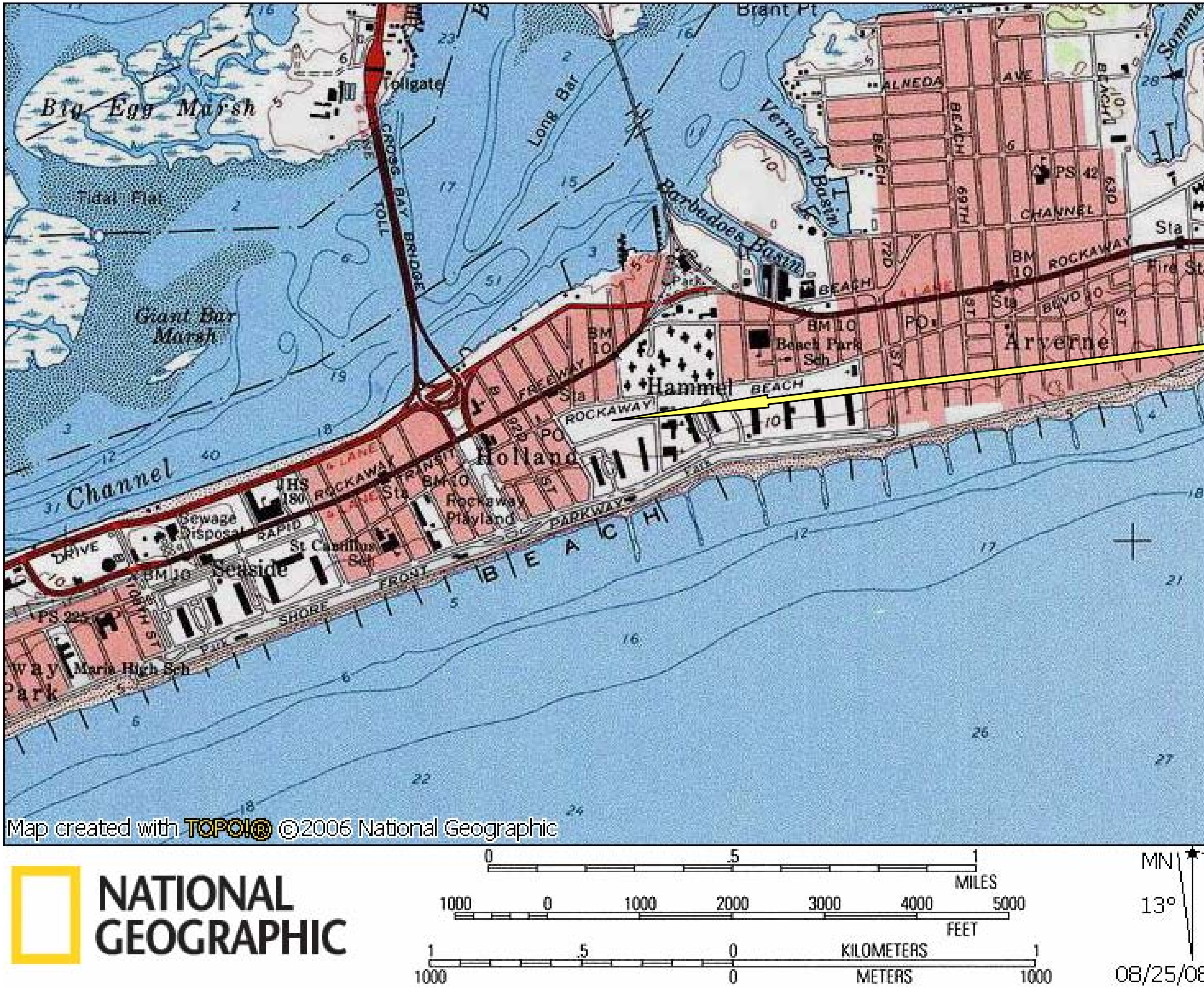
- A Site evaluation, which will address the following:
  - The compliance of the remedy with the requirements of the Site-specific RAWP;
  - The performance and effectiveness of the remedy;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs 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; and
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan.
- A figure showing sampling and well locations, and significant analytical values at sampling locations; and
- Comments, conclusions, and recommendations, based on an evaluation of the information included in the report, regarding EC/ICs at the Site.

The Site Certification Report will be submitted, in hard-copy format, to the NYSDEC Central Office, located at 625 Broadway, Albany, New York, and in electronic format to NYSDEC and NYSDOH.

FIGURES:

Figure 1:

Site Location Map with Metes & Bounds



SITE LOCATION MAP

Contour Interval: 5'

USGS 7.5" Quadrangle Map titled *Far Rockaway, NY,* dated 1992

Site Address:

85-15 Rockaway Beach Blvd.,
Rockaway Beach, NY

PRECISION ENVIRONMENTAL INC.

36-15 23rd Street
Long Island City, NY 11106

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

BEGINNING at the corner formed by the intersection of the new easterly side of Beach 90th Street and the southerly side of Rockaway Beach Boulevard;

RUNNING THENCE east along said southerly side of Rockaway Beach Boulevard the following three courses and distances:

1) north 33 degrees 08 minutes 58 seconds east 60.143 feet to a point on a curve;

2) THENCE on a curve bearing to the south having a radius of 800.0 feet, a distance of 264.820 feet to the point of tangency; and

3) THENCE north 52 degrees 06 minutes 56.7 seconds east, 554.45 feet to a point;

THENCE south 33 degrees, 29 minutes 40 seconds east and parallel with Beach 84th Street, 184.95 feet to the new Northside of Holland Avenue;

THENCE south 42 degrees 46 minutes 31.8 seconds west, along the new Northside of Holland Avenue, 776.03 feet to the new easterly line of Beach 90th Street;

THENCE along the new easterly line of Beach 90th Street, north 58 degrees 10 minutes 25 seconds west, 263.711 feet to the point or place of BEGINNING.

ALL of the streets referred to being as the same are shown and laid out on Alteration Map No. 4240 of the Final topographical Map of the City of New York for the Borough of Queens, adopted January 24, 1963.

Figure 2:

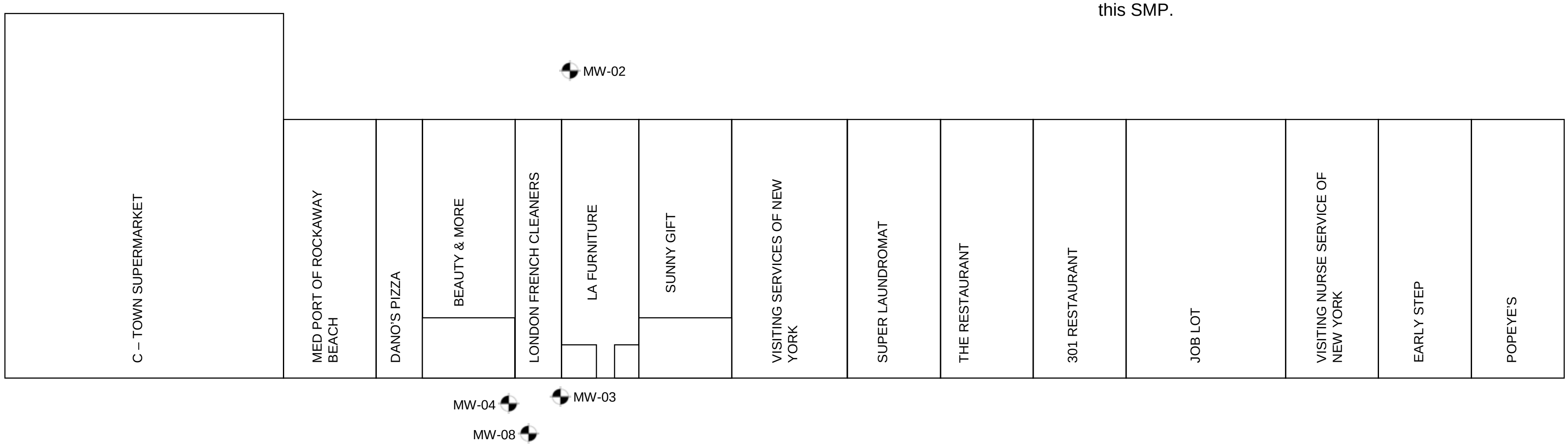
Groundwater Monitoring Well Location Map

LEGEND

MONITORING WELL LOCATION

NOTE

Denoted monitoring wells consist of those to be sampled as part of the SMP. Additional monitoring wells exist at the site but will not be sampled under this SMP.



HOLLAND AVENUE

N

PRECISION ENVIRONMENTAL INC.
36-15A 23rd Street
Long Island City, NY 11106
T: 718-383-2626
F: 718-383-7780
www.precision-enviro.com

Project

DAYTON SHOPPING PLAZA

MONITORING WELL LOCATIONS

QUEENS NEW YORK

Job No.	Date	Scale	Dwg. No.
2063-08-00001	27 MARCH 2008	NOT TO SCALE	1

Figure 3:

Soil Boring Locations

Figure 4:

Soil Vapor and Indoor Air Sampling Locations

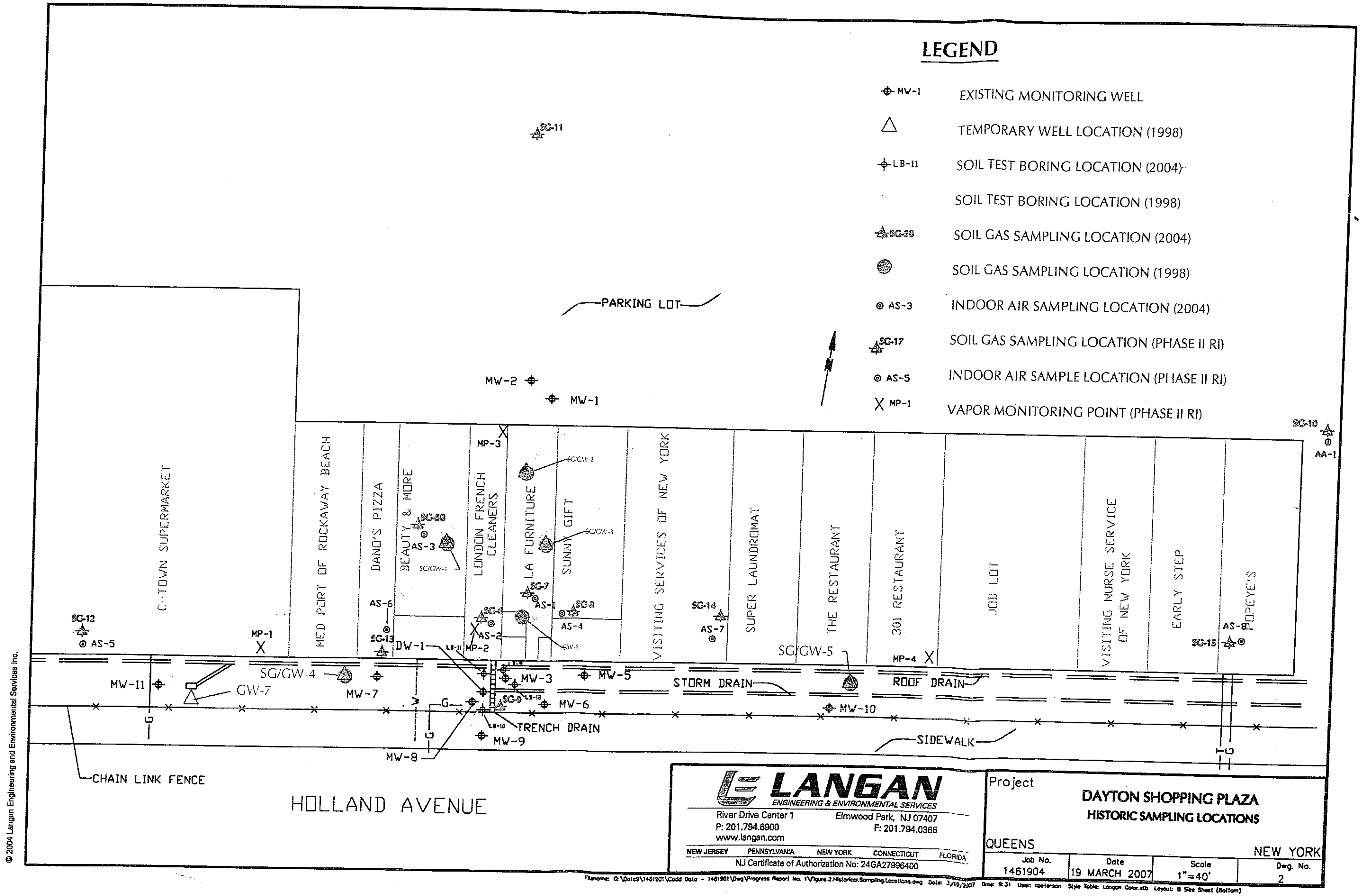
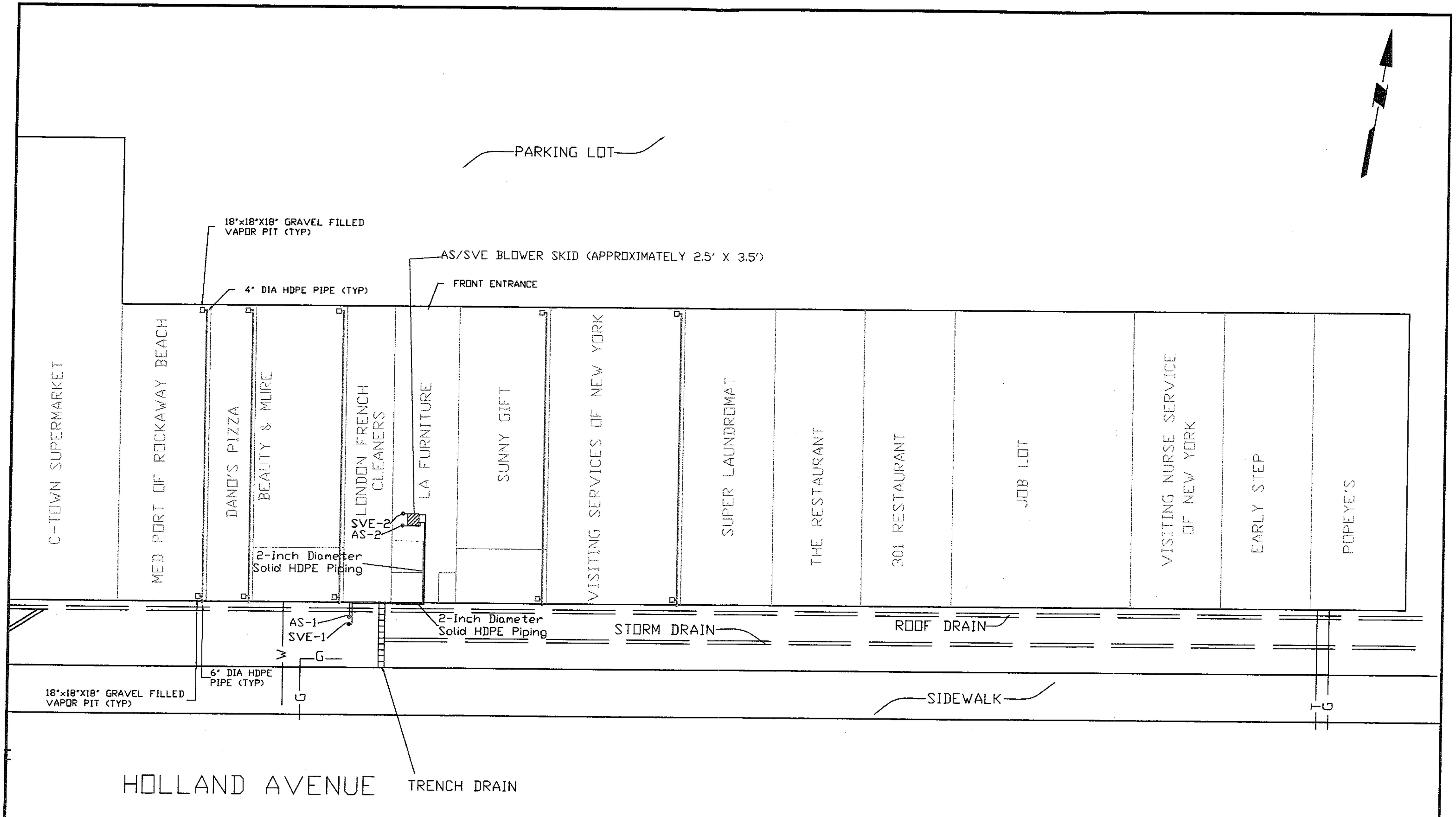

LEGEND
MW-1 EXISTING MONITORING WELL
TEMPORARY WELL LOCATION (1998)
LB-11 SOIL TEST BORING LOCATION (2004)
SOIL TEST BORING LOCATION (1998)
SG-5B SOIL GAS SAMPLING LOCATION (2004)
SOIL GAS SAMPLING LOCATION (1998)
AS-3 INDOOR AIR SAMPLING LOCATION (2004)
SG-17 SOIL GAS SAMPLING LOCATION (PHASE II RI)
AS-5 INDOOR AIR SAMPLE LOCATION (PHASE II RI)
MP-1 VAPOR MONITORING POINT (PHASE II RI)
SG-11
PARKING LOT
MW-2
MW-1
C-TOWN SUPERMARKET
MED PORT OF ROCKAWAY BEACH
DANO'S PIZZA
BEAUTY & MORE
LONDON FRENCH CLEANERS
LA FURNITURE
SUNNY GIFT
VISITING SERVICES OF NEW YORK
SUPER LAUNDROMAT
THE RESTAURANT
301 RESTAURANT
JOB LOT
VISITING NURSE SERVICE OF NEW YORK
EARLY STEP
POPEYE'S
SG-10
AA-1
MP-3
SG-5B
AS-3
SG-7
AS-1
SG-8
AS-4
AS-2
AS-6
SG-13
SG-12
AS-5
MP-1
DW-1
MP-2
SG-14
AS-7
SG/GW-5
MP-4
AS-8
SG-15
MW-11
GW-7
SG/GW-4
MW-7
MW-3
MW-5
STORM DRAIN
ROOF DRAIN
SG-9
MW-6
MW-10
TRENCH DRAIN
MW-9
MW-8
SIDEWALK
CHAIN LINK FENCE
HOLLAND AVENUE
LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
River Drive Center 1
Elmwood Park, NJ 07407
P: 201.794.6900
F: 201.794.0366
www.langan.com
NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA
NJ Certificate of Authorization No: 24GA27996400
Project
DAYTON SHOPPING PLAZA
HISTORIC SAMPLING LOCATIONS
QUEENS
NEW YORK
Job No. 1461904
Date 19 MARCH 2007
Scale 1"=40'
Dwg. No. 2
© 2004 Langan Engineering and Environmental Services Inc.

Figure 5:

Locations of the AS/SVE and SSD Systems



LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

River Drive Center 1 Elmwood Park, NJ 07407
P: 201.794.6900 F: 201.794.0366
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA
NJ Certificate of Authorization No: 24GA27996400

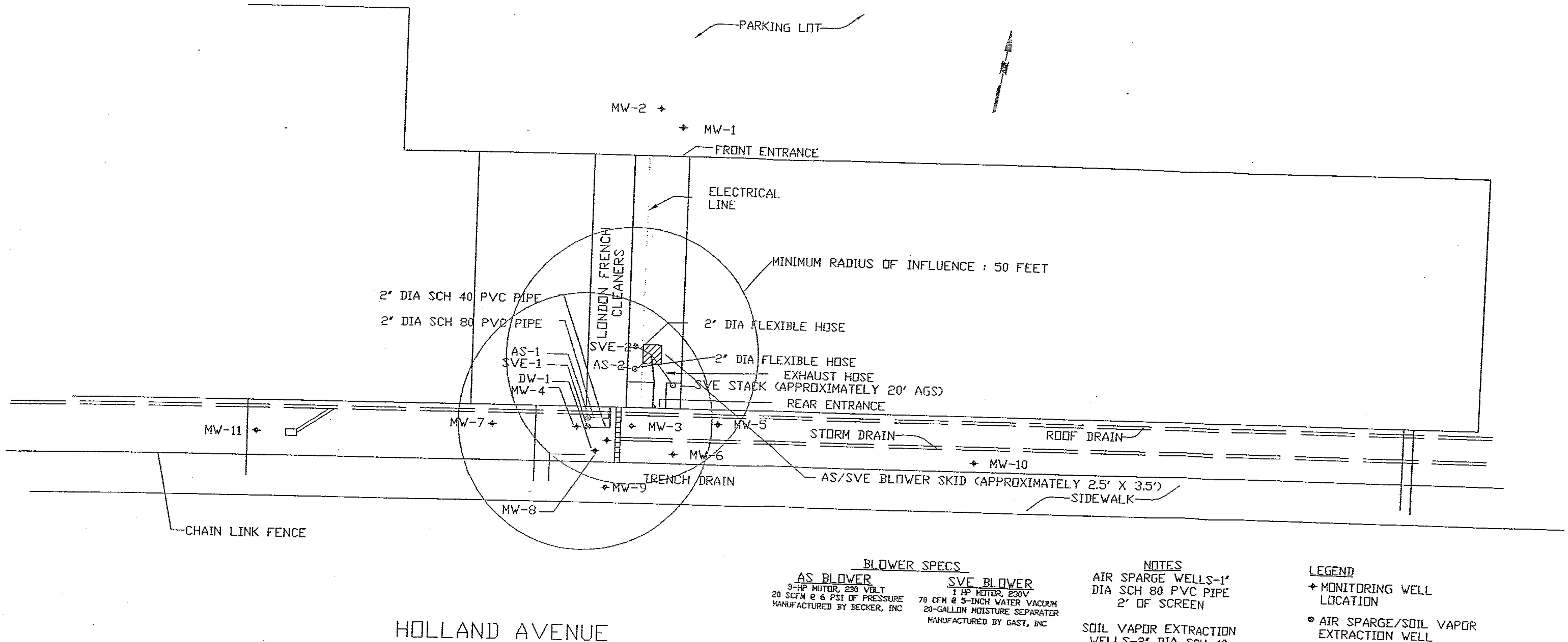
DAYTON SHOPPING PLAZA
INTERIM REMEDIAL MEASURE REPORT
Location of Proposed Vapor Collection Pits.

FAR ROCKAWAY BEACH
QUEENS NEW YORK

Project No.	Date	Scale	Dwg. No.
1461905	9 MARCH 2007	1"=30'	2

Figure 6:

AS/SVE System Layout Plan



BLOWER SPECS

AS BLOWER
3-HP MOTOR, 230 VOLT
20 SCFM @ 6 PSI OF PRESSURE
MANUFACTURED BY BECKER, INC

SVE BLOWER
1 HP MOTOR, 230V
70 CFM @ 5-INCH WATER VACUUM
20-GALLON MOISTURE SEPARATOR
MANUFACTURED BY GAST, INC

NOTES
AIR SPARGE WELLS-1' DIA SCH 80 PVC PIPE
2' OF SCREEN

SOIL VAPOR EXTRACTION WELLS-2' DIA SCH 40 PVC PIPE
2.5' OF SCREEN (SVE-1)
3' OF SCREEN (SVE-2)

LEGEND
✦ MONITORING WELL LOCATION
⊗ AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION

Langan Engineering and Environmental Services

Project
DAYTON SHOPPING PLAZA
AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM LAYOUT
QUEENS

Figure 7:

Site Plan Showing Locations of Monitoring Wells
to be Sampled on a Bi-Annual Basis

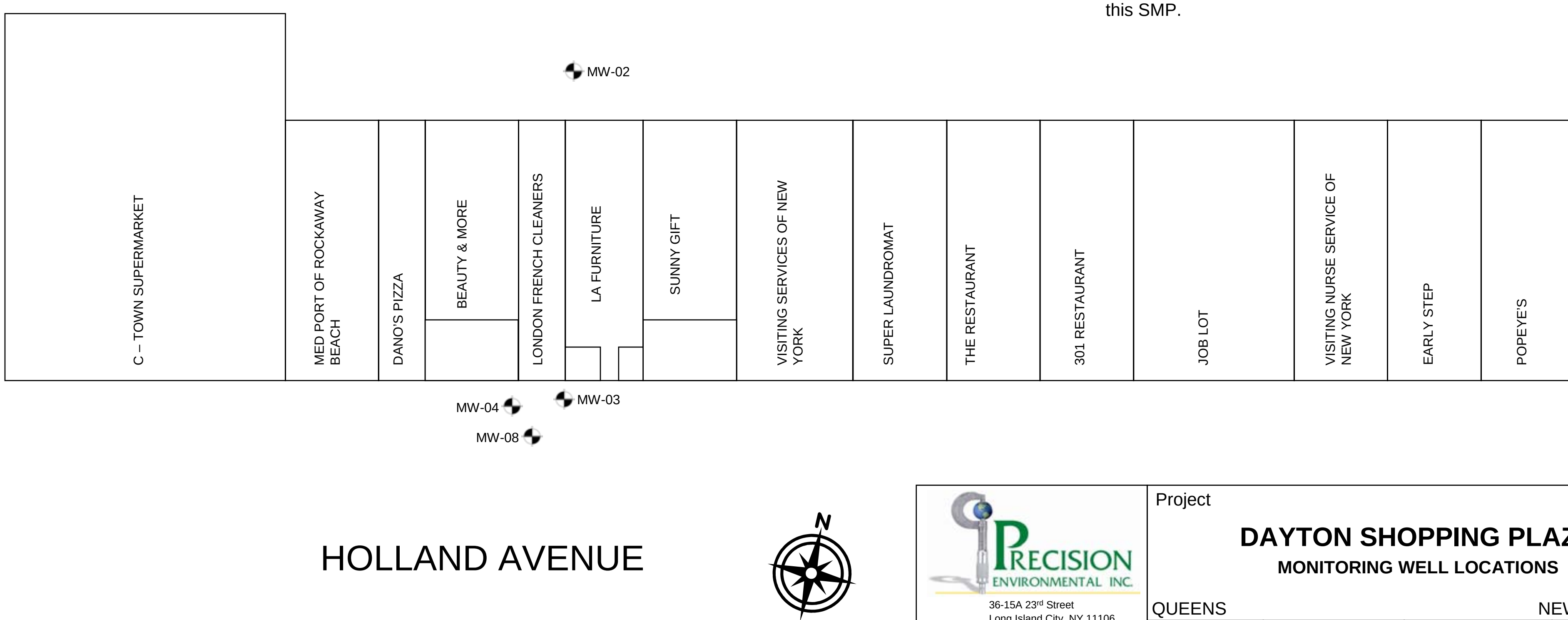
FIGURE 1

LEGEND

MONITORING WELL LOCATION

NOTE

Denoted monitoring wells consist of those to be sampled as part of the SMP. Additional monitoring wells exist at the site but will not be sampled under this SMP.



PRECISION ENVIRONMENTAL INC.
36-15A 23rd Street
Long Island City, NY 11106
T: 718-383-2626
F: 718-383-7780
www.precision-enviro.com

Project

DAYTON SHOPPING PLAZA

MONITORING WELL LOCATIONS

QUEENS NEW YORK

Job No.	Date	Scale	Dwg. No.
2063-08-00001	27 MARCH 2008	NOT TO SCALE	1

Figure 8:

Groundwater Elevation Map

TABLE 3
Ground Water Elevations
Dayton Shopping Center -- Queens, NY
October 2006

Monitoring Well	Top of Casing Elevation (ft.)	Depth to Ground Water (ft)	Ground water Elevation (ft)
MW-1	8.86	Not Measured	Not Measured
MW-2	8.82	5.11	3.71
MW-3	8.55	4.95	3.60
MW-4	8.87	5.08	3.79
MW-5	8.78	5.41	3.37
MW-6	8.62	4.61	4.01
MW-7	9.17	5.81	3.36
MW-8	7.91	5.50	2.41
MW-9	10.1	6.40	3.70
MW-10	8.89	Not Measured	Not Measured
MW-11	9.28	5.60	3.68
DW-1	7.96	5.02	2.94

LEGEND

MONITORING WELL LOCATION

DEEP MONITORING WELL LOCATION

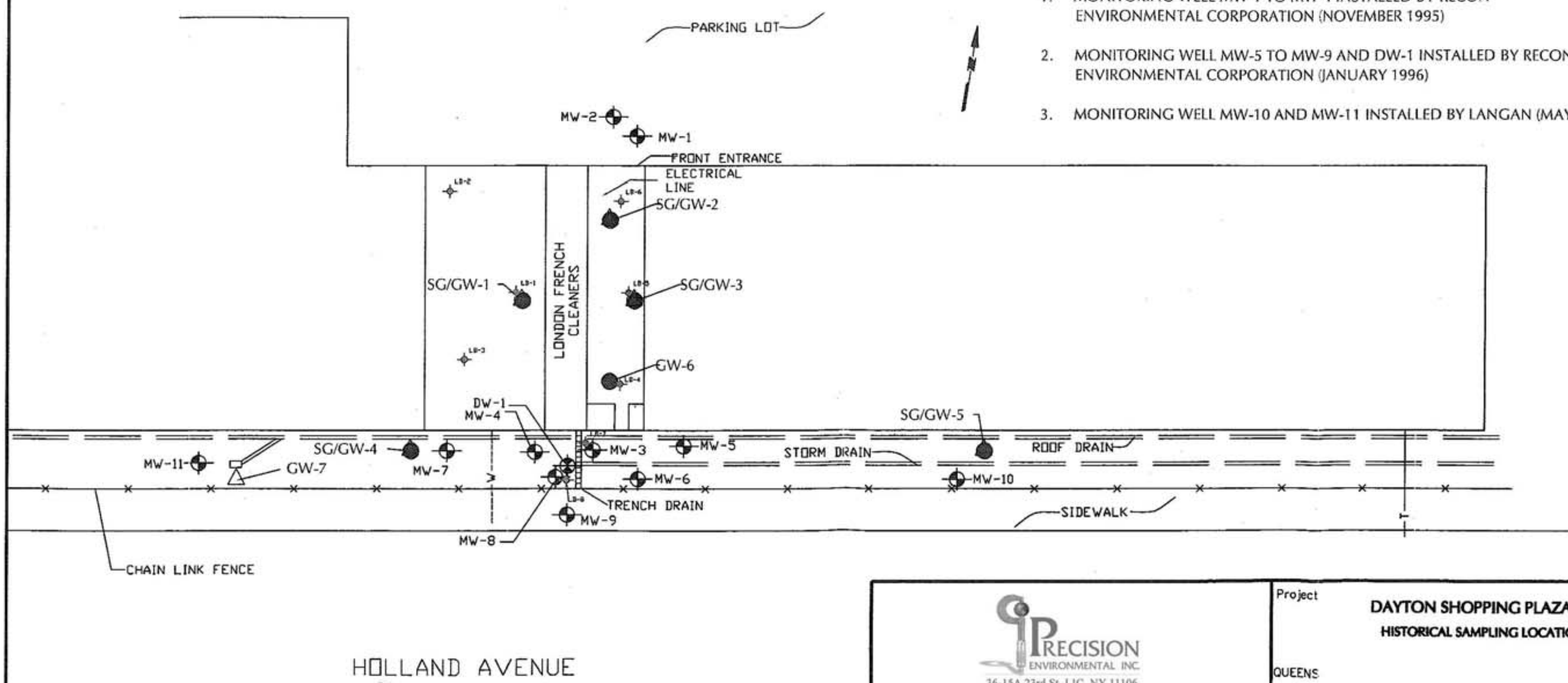
LANGAN BORING (SEPTEMBER 1999)

SUB-SLAB SOIL VAPOR LOCATION (SEPTEMBER 1999)

TEMPORARY WELL POINT (SEPTEMBER 1999)

NOTES

1. MONITORING WELL MW-1 TO MW-4 INSTALLED BY RECON ENVIRONMENTAL CORPORATION (NOVEMBER 1995)
2. MONITORING WELL MW-5 TO MW-9 AND DW-1 INSTALLED BY RECON ENVIRONMENTAL CORPORATION (JANUARY 1996)
3. MONITORING WELL MW-10 AND MW-11 INSTALLED BY LANGAN (MAY 1998)



PRECISION ENVIRONMENTAL INC.
36-15A 23rd St, LIC, NY 11106
Tel: 718.383.2626 Fax: 718.383.7780

Project
DAYTON SHOPPING PLAZA
HISTORICAL SAMPLING LOCATIONS

QUEENS NEW YORK

Figure 9:

Site Plan Showing Baseline Groundwater Contaminant Concentrations

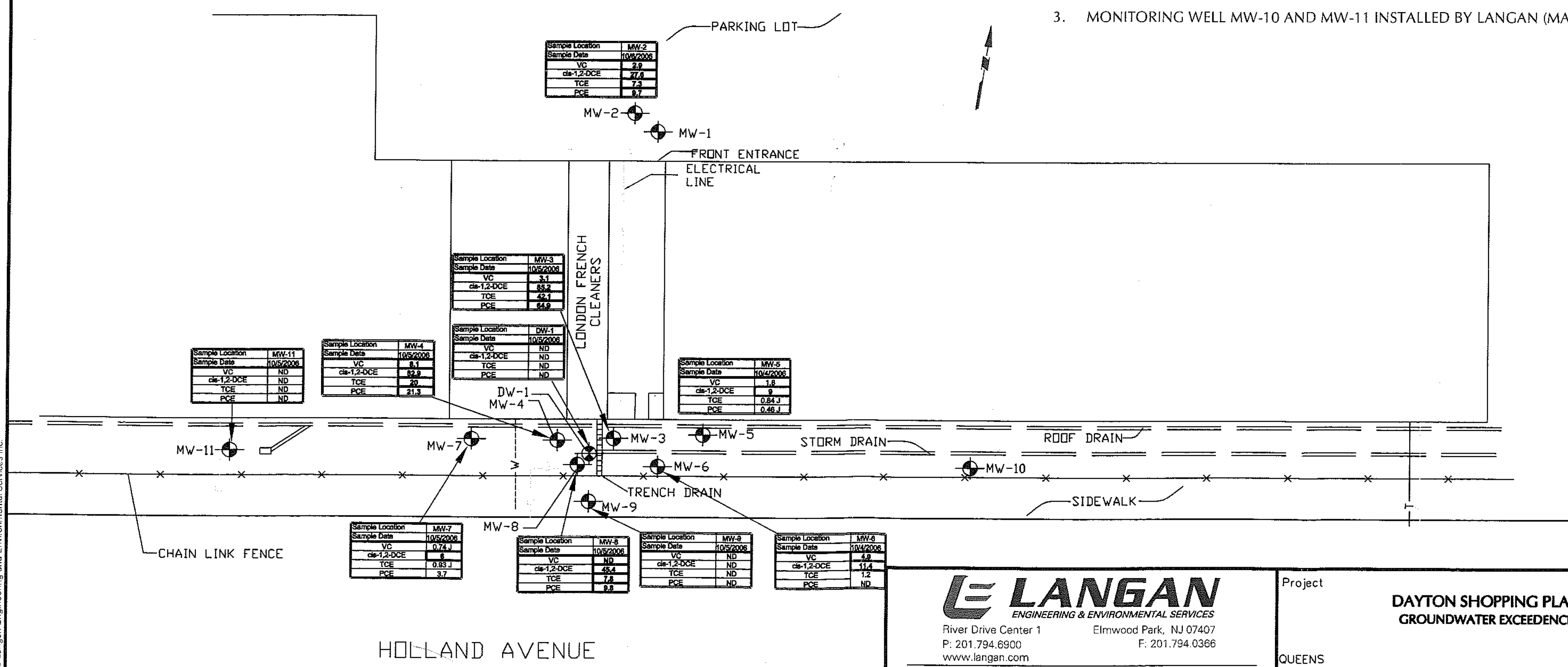
LEGEND

MONITORING WELL LOCATION

DEEP MONITORING WELL LOCATION

NOTES

1. MONITORING WELL MW-1 TO MW-4 INSTALLED BY RECON ENVIRONMENTAL CORPORATION (NOVEMBER 1995)
2. MONITORING WELL MW-5 TO MW-9 AND DW-1 INSTALLED BY RECON ENVIRONMENTAL CORPORATION (JANUARY 1996)
3. MONITORING WELL MW-10 AND MW-11 INSTALLED BY LANGAN (MAY 1998)



Sample Location	MW-2
Sample Date	10/6/2006
VC	2.9
cis-1,2-DCE	27.6
TCE	7.3
PCE	9.7

Sample Location	MW-3
Sample Date	10/5/2006
VC	3.1
cis-1,2-DCE	85.2
TCE	42.1
PCE	64.9

Sample Location	DW-1
Sample Date	10/5/2006
VC	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

Sample Location	MW-11
Sample Date	10/5/2006
VC	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

Sample Location	MW-4
Sample Date	10/5/2006
VC	8.1
cis-1,2-DCE	82.9
TCE	20
PCE	21.3

Sample Location	MW-5
Sample Date	10/4/2006
VC	1.8
cis-1,2-DCE	9
TCE	0.84 J
PCE	0.46 J

Sample Location	MW-7
Sample Date	10/5/2006
VC	0.74 J
cis-1,2-DCE	6
TCE	0.93 J
PCE	3.7

Sample Location	MW-8
Sample Date	10/5/2006
VC	ND
cis-1,2-DCE	45.4
TCE	7.8
PCE	9.8

Sample Location	MW-9
Sample Date	10/5/2006
VC	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

Sample Location	MW-6
Sample Date	10/4/2006
VC	4.9
cis-1,2-DCE	11.4
TCE	1.2
PCE	ND

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
River Drive Center 1 Elmwood Park, NJ 07407
P: 201.794.6900 F: 201.794.0366
www.langan.com
NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA NEVADA
NJ Certificate of Authorization No: 24GA27996400

Project
DAYTON SHOPPING PLAZA
GROUNDWATER EXCEEDENCES

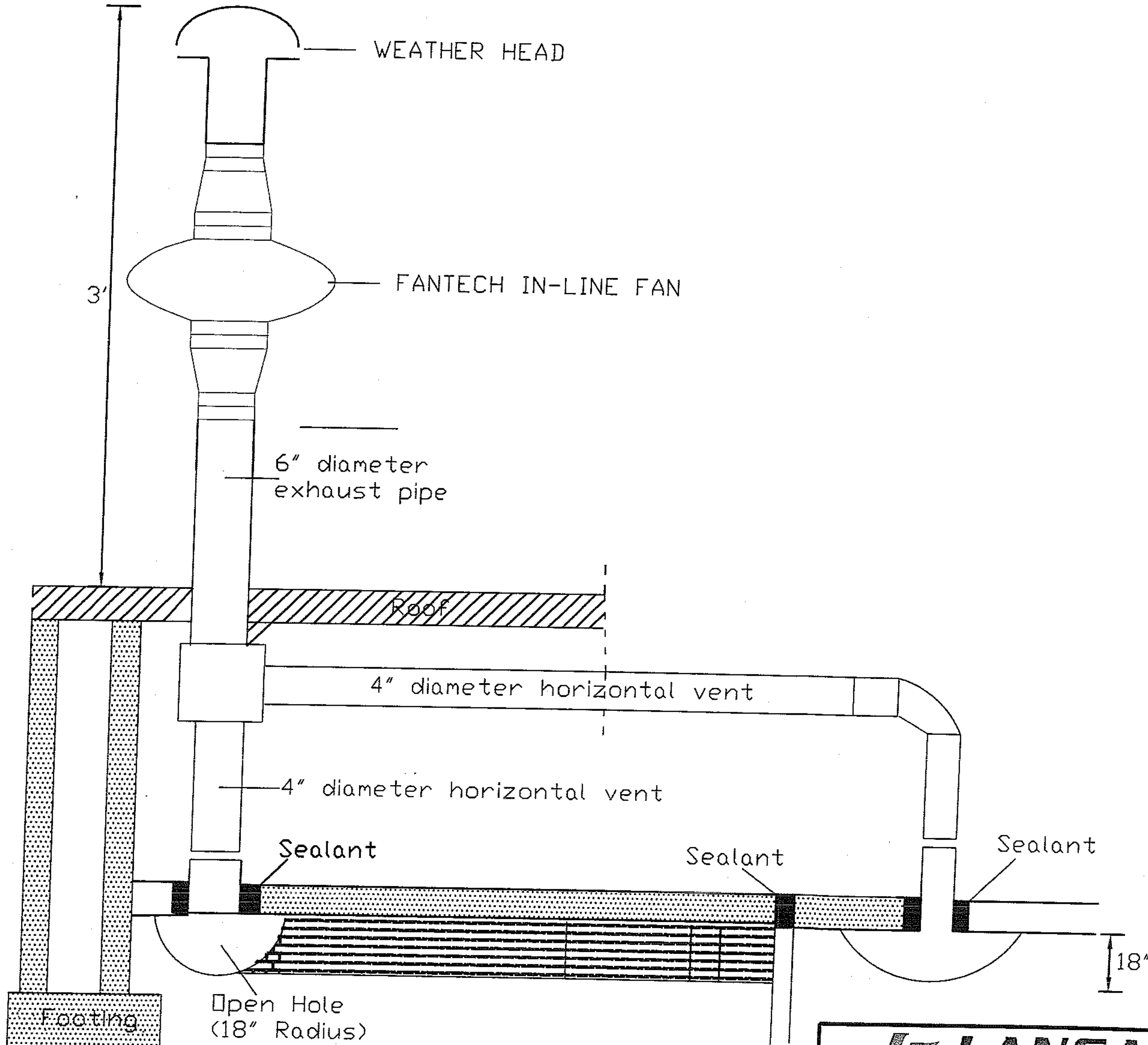
QUEENS NEW YORK

Project No.	Date	Scale	Dwg. No.
1461905	19 MARCH 2007	1"=40'	3

Filename: G:\Data9\1461901\Cadd Data - 1461901\Dwg\Progress Report No. 1\Groundwater Exceedences 2007.01.15.dwg Date: 3/19/2007 Time: 9:33 User: cpeterson Style Table: Langan Color.stb Layout: B Size Sheet (Bottom)

Figure 10:

Sub-Slab Depressurization System Construction Details



LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

River Drive Center 1
Elmwood Park, NJ 07407
P: 201.794.6900
F: 201.794.0366
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA NEVADA

NJ Certificate of Authorization No: 24GA27996400

Project

DAYTON SHOPPING PLAZA
INTERIM REMEDIAL MEASURE REPORT
Sub-Slab Venting System Construction Details

FAR ROCKAWAY BEACH

QUEENS NEW YORK

Project No.	Date	Scale	Dwg. No.
1461905	19 March 2007	NTS	3

TABLES:

Table 1:

Groundwater Elevation Table

TABLE 3 Ground Water Elevations Dayton Shopping Center -- Queens, NY October 2006			
Monitoring Well	Top of Casing Elevation (ft.)	Depth to Ground Water (ft)	Ground water Elevation (ft)
MW-1	8.86	Not Measured	Not Measured
MW-2	8.82	5.11	3.71
MW-3	8.55	4.95	3.60
MW-4	8.87	5.08	3.79
MW-5	8.78	5.41	3.37
MW-6	8.62	4.61	4.01
MW-7	9.17	5.81	3.36
MW-8	7.91	5.50	2.41
MW-9	10.1	6.40	3.70
MW-10	8.89	Not Measured	Not Measured
MW-11	9.28	5.60	3.68
DW-1	7.96	5.02	2.94

Table 2:

Historical Contaminant Concentrations in Soil

TABLE 1
HISTORICAL SOIL ANALYTICAL RESULTS
Dayton Shopping Plaza - Queens, NY

Sample Location	NYSDEC TAGM Criteria(1)	**LB-4**	**LB-5**	**LB-5**	**LB-6**	**LB-6**	**LB-6(2)**	**LB-7**	**LB-7**	**LB-8**	**LB-8**
Consultant		**Langan**	**Langan**	**Langan**	**Langan**	**Langan**	**Langan**	**Langan**	**Langan**	**Langan**	**Langan**
Sample Number		024	025	026	027	028	029	012	013	014	015
Laboratory Sample No.		5-5.5	156181	156182	156183	156184	156185	156168	156169	156170	156171
Sample Depth (ft)		156180	2-2.5	5-5.5	1.5-2	5-5.5	5-5.5	1.5-2	4-4.5	2-2.5	4-4.5
Sample Date		09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999	09/09/1999
Units	(mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VOLATILE ORGANIC COMPOUNDS											
Chloroform	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	---	ND	0.096	ND	ND	ND	ND	1.3	3	11	59
trans-1,2-Dichlorethene	0.3	ND	ND	ND	ND	ND	ND	ND	0.11 J	**0.38 J**	**2.3 J**
Trichloroethene	0.7	0.0015	0.15	ND	ND	ND	0.0012	0.58	**2.6**	**7.6**	**24**
Benzene	0.06	0.0022	ND	ND	ND	ND	ND	**0.14**	ND	ND	ND
Tetrachloroethene	1.4	0.064	**5.4**	0.35	1.2	0.0024	0.0066	**2.9**	**18**	**30**	**77**
Toluene	1.5	0.002 J	ND	ND	ND	0.0007	0.001 J	0.28	ND	ND	ND
Xylene (total)	1.2	ND	ND	ND	ND	ND	0.0007 J	0.087 J	ND	ND	ND
Methylene chloride	0.1	0.0041	ND	ND	ND	0.0042	0.0043	ND	ND	ND	ND
Library Search VOC											
Unknown siloxane	---	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND
Unknown siloxane/unknown	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

(1) - NYSDEC Division of Technical and Administrative Guidance Memorandum:Determination of Soil Cleanup Objectives and Cleanup Levels dated 24 Jan. 1994

(2) - Duplicate sample

Abreviations/Acronyms

ND - Not detected NA = Not analyzed N/A = Not available J - Estimated value identified below the specified quantitation limits.

Table 3:

Historical Contaminant Concentrations in Groundwater

Table 1
Summary of Groundwater Sampling Analytical Results
Dayton Shopping Plaza
Far Rockaway, New York

Sample ID			MW-2	MW-3	MW-3 (DUP)	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-11	DW-1	FB	TB
Langan Sample Number			073	064	070	065	062	063	066	067	074	068	069	071	072
Lab Sample Number	**CAS No.**	**NYSDEC Groundwater Standards ug/L**	J43205-1	J43218-1	J43218-7	J43218-2	J43042-1	J43042-2	J43218-3	J43218-4	J43205-2	J43205-5	J43218-6	J43218-8	J43218-9
Sampling Date			10/6/2006	10/5/2006	10/5/2006	10/5/2006	10/4/2006	10/4/2006	10/5/2006	10/5/2006	10/6/2006	10/6/2006	10/5/2006	10/5/2006	10/5/2006
Units			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1	1	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS															
Chloroform	67-66-3	7	0.74 J	2	2.1	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	156-59-2	5	**27.6**	**85.2**	**84.4**	**82.9**	**9**	**11.4**	**6**	**45.4**	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	156-60-5	5	0.64 J	0.7 J	0.63 J	1.4	ND	ND	ND	0.46 J	ND	ND	ND	ND	ND
Tetrachloroethene	127-18-4	5	**9.7**	**64.9**	**66.1**	**21.3**	0.46 J	ND	3.7	**9.8**	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	5	**7.3**	**42.1**	**41.6**	**20**	0.84 J	1.2	0.93 J	**7.8**	ND	ND	ND	ND	ND
Vinyl chloride	75-01-4	2	**2.9**	**3.1**	**2.8**	**8.1**	1.8	**4.9**	0.74 J	ND	ND	ND	ND	ND	ND
Total VOCs	-	-	48.88	198	197.63	133.7	13	18	11.37	63.46	0	0	0	0	0

Notes:
NYSDEC- New York State Department of Environmental Commission
TAGM - Technical and Administrative Guidance Memorandum
J -Indicates an estimated value.
E-Indicates value exceeds calibration range
D-Indicates sample was diluted prior to analysis
NA- Not Available
ND- Not Detected
DUP- Duplicate

Table 4:

Historical Contaminant Concentrations in Indoor Air

TABLE 3
SUMMARY OF HISTORICAL SOIL-GAS ANALYTICAL RESULTS
INTERIM REMEDIAL MEASURE WORKPLAN
DAYTON SHOPPING CENTER, QUEENS NY

Sample ID	Environmental		New York State		SG-1	SG-2	SG-3	SG-4	SG-5	SG-5B		SG-6		SG-7		SG-8		SG-9		SG-9 (Dup)	
Langan Sample Number	Protection Agency		Department of							062		063		064		065		066		061	
Lab Sample Number	(EPA)		Health							N58688-2		N58688-3		N58688-4		N58688-5		N58688-6		N58688-1	
Sampling Date	Indoor Air		(NYSDOH)		3/24/1998	3/24/1998	3/24/1998	3/24/1998	3/24/1998	2/2/2004		2/2/2004		2/2/2004		2/2/2004		2/2/2004		2/2/2004	
Sample Depth (feet bgs)	75th Percentile		Indoor Air		Beauty & More	LA Furniture	LA Furniture	Exterior - Southwest	Exterior - Southeast	0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'	
Matrix			75th Percentile		Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Air		Air		Air		Air		Air		Air	
Units	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
Acetone	11	27	NA	46	NA	NA	NA	NA	NA	95.9	228	119	283	69.8	166	139	330	47.3	112	40.9	97.2
1,3-Butadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	6.6	21	1.6	5.7	NA	NA	NA	NA	NA	14.1	45	6.8	22	13.8	44.1	1.5	4.8	0.55	1.8	0.5	1.6
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NA	ND	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzyl Chloride	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	1.0	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1	19	3.6	11	2.2 J	6.9 J	1.4	4.4	ND	ND	ND	ND
Chlorobenzene	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.69	3.4	0.88	0.54	NA	NA	NA	NA	NA	8.2	40	11.1	54.2	4.6	22	2.1	10	ND	ND	ND	ND
Chloromethane	NA	NA	<1.0	2.0	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	0.63	1.3	0.55	1.1
3-Chloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	0.13	0.8	<1.0	0.68	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	0.63
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	25.7	88.5	ND	ND	ND	ND	ND	93.6	15.2	52.3	17.2	59.2
1,1-Dichloroethane	NA	NA	<0.2	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	0	ND	<0.3	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	NA	ND	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0	ND	<0.2	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	3.1	15	ND	ND	4.3	21	1.8	8.9	0.4	2	0.64	3.2
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	5.2	21	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	NA	NA	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	11.6	46	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m-Dichlorobenzene	NA	5.6	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Dichlorobenzene	NA	ND	NA	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Dichlorobenzene	0.93	NA	<0.8	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.3	45.7	43.7	82.2	23.7	44.6	72.8	137	6.4	12	6.8	13
Ethylbenzene	2.2	9.6	1.1	2.8	NA	NA	NA	NA	NA	2.2	9.6	3.5	15	16.3	70.8	0.77 J	3.3 J	0.28 J	1.2 J	0.4	1.7
Ethyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Ethyltoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.31 J	1.5 J	ND	ND	ND	ND	ND	ND	ND	ND	0.12 J	0.59 J
Freon 113	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.099 J	0.76 J
Freon 114	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES
ppbv - parts per billion volume
J -Indicates an estimated value.
NA- Not Available

ND- Not Detected
DUP- Duplicate

TABLE 3
SUMMARY OF HISTORICAL SOIL-GAS ANALYTICAL RESULTS
INTERIM REMEDIAL MEASURE WORKPLAN
DAYTON SHOPPING CENTER, QUEENS NY

Sample ID	Environmental		New York State		SG-1	SG-2	SG-3	SG-4	SG-5	SG-5B		SG-6		SG-7		SG-8		SG-9		SG-9 (Dup)	
Langan Sample Number	Protection Agency		Department of							062		063		064		065		066		061	
Lab Sample Number	(EPA)		Health							N58688-2		N58688-3		N58688-4		N58688-5		N58688-6		N58688-1	
Sampling Date	Indoor Air		(NYSDOH)		3/24/1998	3/24/1998	3/24/1998	3/24/1998	3/24/1998	2/2/2004		2/2/2004		2/2/2004		2/2/2004		2/2/2004		2/2/2004	
Sample Depth (feet bgs)	75th Percentile		Indoor Air		Beauty & More	LA Furniture	LA Furniture	Exterior - Southwest	Exterior - Southeast	0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'	
Matrix			75th Percentile		Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Air		Air		Air		Air		Air		Air	
Units	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
Heptane	1.5	NA	NA	NA	NA	NA	NA	NA	NA	35.8	147	42.9	176	23.4	95.9	29.6	121	12.7	52	20.9	85.7
Hexachlorobutadiene	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexane	1.1	NA	1.0	6.5	NA	NA	NA	NA	NA	2.2	7.8	ND	ND	ND	ND	ND	ND	ND	ND	0.36	1.3
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.95	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropyl Alcohol	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.3	23	ND	ND	9.9	24	21.8	53.5	ND	ND	ND	ND
Methylene chloride	NA	NA	1.6	6.3	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17 J	0.59 J
Methyl ethyl ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.4	33.6	8.3	24	ND	ND	2.6	7.7	1.1	3.2	1	2.9
Methyl Isobutyl Ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.3	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Tert Butyl Ether	NA	NA	NA	6.7	NA	NA	NA	NA	NA	10.3	37.1	29.4	106	6.6	24	1.5	5.4	ND	ND	0.2	0.72
Propylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.4	17.9	ND	ND	ND	ND	ND	ND	1.6	2.7	1.6	2.7
Styrene	0.66	2.8	<2.4	0.68	NA	NA	NA	NA	NA	1.6	6.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.5	30	1.2	1.4	ND	12.9	ND	3.7	ND	0.74	4.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0	ND	<1.3	<0.25						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NA	NA	<1.6	<0.25	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	0.81	4.0	1.4	4.4	NA	NA	NA	NA	NA	0.65	3.2	ND	ND	ND	ND	ND	ND	ND	ND	0.14 J	0.69 J
1,3,5-Trimethylbenzene	1.1	5.4	<2.0	1.7	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2,4-Trimethylpentane	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tertiary Butyl Alcohol	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1.6	11	<1.5	1.2	2,585,000	40,800	1,292,500	278,900	68	32.7	222	16,500	112,000	5,710	38,700	44.6	302	0.78	5.3	0.8	5.4
Tetrahydrofuran	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	NA	NA	6.7	25						20.7	78	29.7	112	20.5	77.3	7	26	2.8	11	3.7	14
Trichloroethylene	0.84	4.5	<1.0	<0.25	570	9.5	570	380	ND	3.8	20	156	838	46.5	250	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NA	NA	0.68	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31	1.7
Vinyl chloride	NA	NA	<0.4	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	NA	18	2.2	4.7	NA	NA	NA	NA	NA	5.2	23	10.0	43	51.4	223	2.8	12	1	4.3	1.3	5.6
o-Xylene	2.1	9.3	1.2	3.1	NA	NA	NA	NA	NA	1.6	6.9	2.2 J	9.6 J	23.5	102	0.61 J	2.6 J	ND	ND	0.24	1
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.8	30	12.1	52.6	74.9	325	3.5	15	1	4.3	1.6	6.9

NOTES

ppbv - parts per billion volume

J -Indicates an estimated value.

NA- Not Available

ND- Not Detected

DUP- Duplicate

TABLE 3
SUMMARY OF HISTORIC SOIL-GAS ANALYTICAL RESULTS
INTERIM REMEDIAL MEASURE WORKPLAN
DAYTON SHOPPING CENTER, QUEENS NY

Sample ID	Environmental		New York State		SG-10		SG-11		SG-12		SG-13		SG-14		SG-15		DUP (SG-15)	
Langan Sample Number	Protection Agency		Department of		067		068		086		084		088		090		091	
Lab Sample Number	(EPA)		Health		N58688-7		N58688-8		N86573-3		N86573-1		N86573-5		N86573-7		N86573-8	
Sampling Date	Indoor Air		(NYSDOH)		2/2/2004		2/2/2004		12/16/2004		12/16/2004		12/16/2004		12/16/2004		12/16/2004	
Sample Depth (feet bgs)	75th Percentile		Indoor Air		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'	
Matrix			75th Percentile		Air		Air		Air		Air		Air		Air		Air	
Units	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3	ppbv	ug/m^3
Acetone	11	27	NA	46	74.8	178	149	354	14.2	33.7	35.2	83.6	19.5	46.3	20.3	48.2	5.4	13
1,3-Butadiene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	6.6	21	1.6	5.7	2.1	6.7	24.4	78	ND	ND	0.85 J	2.7 J	ND	ND	ND	ND	0.15 J	0.48 J
Bromodichloromethane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NA	NA	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoethane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzyl Chloride	NA	NA	<0.2	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	NA	NA	NA	0.7	2.2	1.6	5	1.4 J	4.4 J	1.1 J	3.4 J	ND	ND	2.7	8.4	0.82	2.6
Chlorobenzene	NA	NA	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.35	1.6
Chloroethane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.69	3.4	0.88	0.54	0.86	4.2	4.9	24	ND	ND	2.7	13	2.5	12	0.77 J	3.8 J	0.67	3.3
Chloromethane	NA	NA	<1.0	2	0.62	1.3	2.7	5.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-Chloropropene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	0.13	0.8	<1.0	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	NA	NA	NA	15.7	54	35	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	NA	NA	<0.2	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	0	ND	<0.3	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	NA	ND	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0	ND	<0.2	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NA	NA	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	NA	NA	<0.2	NA	0.38 J	1.9 J	ND	ND	ND	ND	ND	ND	0.97 J	4.8 J	ND	ND	0.4	2
Dibromochloromethane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	NA	NA	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m-Dichlorobenzene	NA	5.6	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Dichlorobenzene	NA	ND	NA	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Dichlorobenzene	0.93	NA	<0.8	NA	ND	ND	ND	ND	9.8	59	ND	ND	2.8	17	ND	ND	0.17 J	1.0 J
trans-1,3-Dichloropropene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethanol	NA	NA	NA	NA	3	5.6	6.4	12	145	273	57.2	108	27	50.8	19.6	36.9	5.5	10
Ethylbenzene	2.2	9.6	1.1	2.8	0.43	1.9	2.1	9.1	ND	ND	ND	ND	ND	ND	ND	ND	0.4	1.7
Ethyl Acetate	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Ethyltoluene	NA	NA	NA	NA	ND	ND	0.73 J	3.6 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	NA	NA	<0.1	NA	ND	ND	ND	ND	0.81 J	6.2 J	3.2	25	1.8	14	0.93 J	7.1 J	0.34	2.6
Freon 114	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES

ppbv - parts per billion volume
J -Indicates an estimated value.
NA- Not Available

ND- Not Detected
DUP- Duplicate

TABLE 3
SUMMARY OF HISTORIC SOIL-GAS ANALYTICAL RESULTS
INTERIM REMEDIAL MEASURE WORKPLAN
DAYTON SHOPPING CENTER, QUEENS NY

Sample ID	Environmental	Environmental	New York State	New York State	SG-10		SG-11		SG-12		SG-13		SG-14		SG-15		DUP (SG-15)	
Langan Sample Number	Protection Agency	Protection Agency	Department of	Department of	067		068		086		084		088		090		091	
Lab Sample Number	(EPA)	(EPA)	Health	Health	N58688-7		N58688-8		N86573-3		N86573-1		N86573-5		N86573-7		N86573-8	
Sampling Date	Indoor Air	Indoor Air	(NYSDOH)	(NYSDOH)	2/2/2004		2/2/2004		12/16/2004		12/16/2004		12/16/2004		12/16/2004		12/16/2004	
Sample Depth (feet bgs)	75th Percentile	75th Percentile	Indoor Air	Indoor Air	0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'		0.5'-1'	
Matrix			75th Percentile	75th Percentile	Air		Air		Air		Air		Air		Air		Air	
Units	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³	ppbv	ug/m³
Heptane	1.5	NA	NA	NA	16.9	69.3	37.9	155	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexane	1.1	NA	1.0	6.5	0.72	2.5	7.5	26	ND	ND	0.91 J	3.2 J	ND	ND	ND	ND	0.18 J	0.63 J
2-Hexanone	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropyl Alcohol	NA	NA	NA	NA	ND	ND	ND	ND	2.7	6.6	2.4	5.9	82.5	202	ND	ND	ND	ND
Methylene chloride	NA	NA	1.6	6.3	0.54	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	NA	NA	NA	NA	3.2	9.4	6.6	19	ND	ND	ND	ND	ND	ND	ND	ND	0.42	1.2
Methyl Isobutyl Ketone	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Tert Butyl Ether	NA	NA	NA	6.7	4.7	17	27.7	99.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Propylene	NA	NA	NA	NA	58.3	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	0.66	2.8	<2.4	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.5	30	1.2	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.11 J	0.60 J
1,1,2,2-Tetrachloroethane	0	ND	<1.3	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NA	NA	<1.6	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	0.81	4	1.4	4.4	ND	ND	2.6	13	ND	ND	ND	ND	ND	ND	ND	ND	0.26	1.3
1,3,5-Trimethylbenzene	1.1	5.4	<2.0	1.7	ND	ND	0.93 J	4.6 J	ND	ND	ND	ND	ND	ND	ND	ND	0.13 J	0.64 J
2,2,4-Trimethylpentane	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tertiary Butyl Alcohol	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	2.5	7.6	4.7	14	0.55	1.7
Tetrachloroethylene	1.6	11	<1.5	1.2	3.7	25	6.7	45	0.94 J	6.4 J	285	1930	16.3	111	4.3	29	3.6	24
Tetrahydrofuran	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	NA	NA	6.7	25	6.4	24	16.6	62.6	ND	ND	1.8	6.8	1.2 J	4.5 J	ND	ND	0.39	1.5
Trichloroethylene	0.84	4.5	<1.0	<0.25	ND	ND	ND	ND	ND	ND	8	43	1.1 J	5.9 J	ND	ND	ND	ND
Trichlorofluoromethane	NA	NA	0.68	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.22	1.2
Vinyl chloride	NA	NA	<0.4	<0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	NA	18	2.2	4.7	1.3	5.6	6	26	ND	ND	ND	ND	ND	ND	ND	ND	1.1	4.8
o-Xylene	2.1	9.3	1.2	3.1	0.3 J	1.3 J	2.1	9.1	ND	ND	ND	ND	ND	ND	ND	ND	0.25	1.1
Xylenes (total)	NA	NA	NA	NA	1.6	6.9	8.2	36	ND	ND	1.0 J	4.3 J	ND	ND	ND	ND	1.3	5.6

NOTES
ppbv - parts per billion volume
J -Indicates an estimated value.
NA- Not Available
ND- Not Detected
DUP- Duplicate

APPENDICES

Appendix A:

Maintenance and Support Documentation for the AS/SVE System

START UP REPORT
SOIL VAPOR EXTRACTION/AIR SPARGING REMEDIAL SYSTEM

DAYTON SHOPPING PLAZA
QUEENS, NEW YORK

Prepared For:

Rockaway Commons, LLC
48 East Old Country Road
Suite 203
Mineola, New York 11501

Prepared By:

Langan Engineering and Environmental Services, Inc.
River Drive Center One, 4th Fl.
Elmwood Park, NJ 07407

Steven A. Ciambruschini, P.G., L.E.P.

Bill Stephanatos, PhD, P.E., D.E.E.

5 February 2001
1461904

Langan
Engineering & Environmental Services

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

1.0 INTRODUCTION

The Remedial Action (RA) technology for the Dayton Shopping Plaza in Queens, New York is an Air Sparging (AS) and a Soil Vapor Extraction (SVE) system to remediate chlorinated volatile organics (VOCs) present in the saturated and unsaturated zones of the site. All major equipment (blowers, particulate filters, etc.) has been installed adjacent to the former dry-cleaner retail space as is shown on Figure 1. Air sparging and soil vapor extraction system diagrams are provided in Attachment A.

2.0 SYSTEM CONSTRUCTION

The remedial system layout, as was designed by Langan, is presented in Figure 1. The remedial system consists of the SVE well points identified SVE-1 and SVE-2 and air sparge well points identified as AS-1 and AS-2.

2.1 Soil Vapor Extraction System

The SVE well points are located adjacent to the existing dry cleaners facility in vacant retail space to the east (SVE-2) and the asphalt paved access road to the south (SVE-1). The SVE wells are interconnected through a piping network manifolded to treatment equipment located inside the vacant space to the east of the dry cleaners. The main header pipe is constructed of 20 feet of 2-inch diameter PolyVinylChloride (PVC) hose. The lateral pipes are also constructed of 2-inch diameter PVC hose. All elbows, tees, unions and other required fittings consist of Schedule 40 PVC.

The two vapor extraction wells were installed by Aquifer Drilling and Testing (ADT) using a Geoprobe Rig. The wells were constructed with 2.5-foot long, 2-inch diameter PVC well screen and 5-foot long PVC riser pipe. The PVC well screen was installed from 2.5 to 3 feet below grade to the bottom of the well(s), located at 5 to 6 feet below grade. That depth corresponds to a depth approximately one foot above the mean high water table. The top of the SVE-2 vapor extraction well was finished as a two-foot stick-up. Vapor extraction well SVE-1 was installed as a flush mount well within a 6-inch diameter road box. Table 1 lists the design parameters of the SVE system well point. The Process and Instrumentation Diagram (P&ID) for the SVE system is included in Attachment A of this start-up report. Construction diagrams are provided as Attachment B.

Each vapor extraction well is controlled by a ball valve to enable adjustment of the air flow and vacuum at each individual well, and a sampling port for drawing air samples and measuring air flow. The individual wells were connected to a 2-inch main header hose via 2-inch PVC piping. The 2-inch PVC header hose is connected to a regenerative vacuum blower designed to extract 50 scfm air flow from the soil vapor wells at 20 inches of water column vacuum. This piping and equipment layout is depicted on Figure 1. Piping materials made out of PVC were selected as the material to be used to convey soil gas vapors due to the expected relatively low concentrations of chlorinated solvent vapors in the soil gas (<10 parts per million by volume (ppmv)).

Vapors from the soil vapor extraction system are extracted with the use of a skid-mounted vacuum blower system. A one horsepower (Hp) regenerative vacuum blower manufactured by GAST (model R4310A-2) and a moisture separator (30-gallon capacity) are used to develop the required vacuum at each well head. Soil gas vapors from the vapor wells are pulled to the moisture tank via the piping network and the vacuum blower. Moisture, if any, associated with the soil gas is collected in the moisture separator and properly stored and disposed off.

Vapors from the vacuum blower will be discharged to the atmosphere in accordance with a Process, Exhaust, and Ventilation System (PE&VS) permit to be obtained from New York State Department of Environmental Conservation (NYSDEC). This permit application will be completed and submitted to the NYSDEC for review. The application will use existing groundwater and soil sampling data to evaluate the potential impacts to the atmosphere utilizing emission estimating and standard impact assessment techniques outlined in NYSDEC Air Permit Regulations. The permit application will establish the need for flow control, dilution or for off-gas treatment, and will size the off-gas control equipment, if needed. Data collected from the pilot operation is being used to complete the application. After the complete application has been reviewed by NYSDEC, Division of Air Quality, a certificate to operate the discharge will be granted for an operating period up to three years. Based upon the current soil analytical data and preliminary air emission calculations, off gas treatment will not be required.

No short circuiting of air from the surface to the vapor wells is expected because the SVE wells are placed below the building floor or asphalt pavement. The floor and the asphalt pavement act as a surface seal to prevent short-circuiting.

2.2 Air Sparging Remedial System

The Air sparge points are located adjacent to the dry cleaners facility in the asphalt paved access road to the south (AS-1) and the vacant building space to the east (AS-2). The air sparging system layout is depicted on Figure 1 and the P&ID for the system included in Attachment A. The AS wells are interconnected through a piping network manifolded to the blower equipment located inside the building. The main header pipe is constructed of approximately 20-feet of 2-inch diameter rubber hose. The lateral hoses are also constructed of 2-inch diameter rubber hose. All elbows, tees, unions and other required fittings are made of Schedule 80 PVC.

The sparge wells were installed by ADT between 21 and 28 of August, 2000 with the use of a Geoprobe to a depth of 17 feet below ground/floor surface. The sparge wells consist of 1 inch diameter PVC with a bottom plug and a two foot length of the screen from 15 to 17 feet below grade. The remainder of the sparge well AS-2 was finished with 1-inch diameter schedule 80 PVC casing to three feet above the concrete floor of the former dry-cleaner retail space. Air sparge well AS-1 was finished flush with the asphalt pavement and placed inside a 6-inch diameter protective road box. Construction details of the sparge wells are shown on Table 2 and in Appendix B.

Air for the sparge points is generated by a 3 Hp, 3-phase, TEFC, oiless rotary vane low pressure air compressor manufactured by Becker, Inc.. The air compressor model number is Becker DTLF 250. Each sparge point is individually valved with a shut-off valve and a pressure regulator valve. The sparge points are connected via 2-inch diameter rubber hose.

The maximum quantity of the air injected by the air sparging system is limited to one-half the volume of soil gas extracted by the soil vapor extraction system. This limitation is designed to maintain overall vacuum in the subsurface soils and prevent the migration of fugitive volatile compounds to surrounding areas and buildings. Each air sparge well is operated from 5 to 6 pounds per square inch gauge (psig) air injection pressure at the location of the well head. This injection pressure variation depends on the ground water table elevation above the well screen. At an injection pressure of 5 psi, each air sparge well is designed to deliver to the subsurface 9 standard cubic feet per minute (scfm). An allowance for 1 psi in air flow piping losses has been incorporated into the design. Thus, at the blower side, the design injection pressure is set at approximately 6 psig.

3.0 REMEDIATION SYSTEM START-UP TESTING

Every remediation system typically requires more frequent monitoring initially after installation in order to establish normal operating ranges and to detect operating problems, if any. The remediation system will require less frequent monitoring following this initial "start-up/shake-down" period.

3.1 Initial System Start-Up

Following equipment installation, an extensive start-up test was conducted on the remediation system on Wednesday, 4 October 2000. The testing consisted of the following tasks described in detail in Sections 3.1.1 through 3.1.5 below.

3.1.1 Verify Equipment Performance

The two blowers were started and inspected in accordance with the manufacturer's recommendations. The equipment was checked to ensure that it is performing within the design specifications. The following steps were taken:

- Determined and recorded the SVE blower's maximum operating flow rate and vacuum. The maximum SVE flow rate was measured using a thermal anemometer and was approximately 74 standard cubic feet per minute (scfm) at 0 vacuum gauge. The maximum vacuum, determined by "deadheading the blower, was measured at 50-inches of w.c. When the blower reaches this vacuum, the vacuum relief valve opens and allows atmospheric air (dilution air) to enter the blower and reduce the maximum vacuum.
- Used the SVE blower to apply vacuums in order to verify integrity of the piping system. The above-ground system piping was thoroughly tested for any leaks, breaks in the vacuum hoses, etc. Any detected leaks were corrected by wrapping up the leak area with sufficient quantity of duct tape.

- Determined and recorded the AS blower's maximum operating flow rate and pressure. The maximum blower flow rate was determined to be 30 cfm at 0 psi injection pressure. The maximum air pressure was about 7 psig. The pressure was determined by closing the effluent ball valve. When the 7 psig pressure was reached, the pressure relief valve was automatically opened to allow excess air to exit the piping.
- Used AS blowers to apply pressure in the piping network in order to verify integrity of the piping system. Several leaks that were found in the system piping were detected and corrected either by tightening the piping connections or applying duct tape.
- Determined and recorded vacuum/pressure losses through the system piping runs. Used portable magnehelic gauges to record vacuum at well heads and compare to vacuum at the manifolds. Compared manifold readings to blower readings. The vacuum losses through the piping network were approximately 2-inches of w.c. The pressure losses through the system were 0.25 psi. The measured losses represent small friction losses due to the nominal length of the piping network and the adequate size of the vacuum hose used.

3.1.2 Verify Performance of System Interlocks

The combined AS/SVE systems utilizes a series of control interlocks to ensure the safe operation of the remediation system. The interlocks serve to protect the remediation equipment from damage caused by abnormal operating conditions. The SVE blower has been designed to automatically shut down under the following conditions:

- If the high-level sensor in the moisture separator tank is activated.
- If the high temperature sensor in the air discharge line is activate.
- If the blower motor's internal thermal overload protection is tripped.

In order to test the performance of these interlocks, the following procedure was executed for the two independent systems. The following tests were performed with the SVE equipment in operation. The systems were adjusted for this phase to not extract air from the extraction by using the dilution and purge valves.

- Turned down the adjustment set screw for the SVE temperature high temperature switch until system shut down. Monitored the discharge temperature gauge to record the temperature at which the blower shuts down. That temperature was 140 °F.
- Turned the entire system off. Blocked the high-liquid level sensor in the moisture separator in the full position. Verified that the system does not start and that the red alarm button is on.

3.1.3 Verify Performance of SVE and Air Sparging Wells

Each system point was tested to verify that the appropriate radius of influence can be achieved.

- Operated one SVE well at a time at approximately the operating design parameters, (i.e. 40-inches of vacuum). Recorded resulting vacuum at the existing monitoring wells MW-3, MW-4, and MW-6 in the vicinity of the operating SVE wells. Additionally, field screening instruments were used to determine the volatile organic concentration in the extracted air and the resulting air velocity in the system piping resulting from the use of each extraction well. The PID measured approximately 40 ppmv from the operation of SVE-1 and 40 ppmv from the operation of SVE-2. Using the thermal anemometer, the air flow rate was determined to be about 30 cfm from the operation of each well. Measured the vacuum at the nearby groundwater monitoring wells (MW-3, MW-4 and MW-6). The vacuum measured at these wells was 2, 2, and 0.5 inches w.c., respectively.
- Operated one air sparging well at a time (with its corresponding SVE well) at approximately its design operating parameter, (8 cfm at 5 psi injection pressure). Confirmed that the air flow rate and pressure requirement are approximately those projected in the system design. Measured and recorded the change in groundwater dissolved oxygen concentration, air pressure, and air volatile organic concentrations at the surrounding monitoring wells (MW-3, MW-4 and MW-6). The D.O readings in monitoring wells MW-3, MW-4 and MW-6 increased by 4, 3 and 3 ppm, respectively. Furthermore, the PID readings increased by about 2 ppmv over the readings before the initiation of the AS system. As with the SVE system, checked and recorded the resulting VOC

concentrations and air velocities in the SVE system during this phase. The VOC concentrations increased by about 6 ppmv in the SVE exhaust piping. The SVE air velocities increased and the SVE blower vacuum decreased (from 25 inches w.c. before the startup of the AS blower to 18 inches after the startup of the AS blower).

- Operated the entire system, checked subsurface vacuum and pressure response, dissolved system concentrations and VOC levels at monitor wells within the target area. All monitoring data indicated that the SVE and AS wells do exert influence over MW-3, MW-4 and MW-6.

3.1.4 Determine Removal Rates for Remediation System

Following verification that the system equipment can operate at the design specifications, the system was checked to determine the potential volatile organic removal rate. The data collected during the well performance checks was used to determine the maximum removal rate for the remediation system. Using a 50-cfm exhaust air flow rate, a 40 ppmv PID reading and a 2-inch exhaust hose diameter, the initial mass removal rate was estimated to be 1.1 pounds of chlorinated VOCs per day. At the end of the start-up day, the PID readings were reduced to 10 ppmv. As a result, the VOC mass removal rate was reduced to about 0.28 pounds per day. On 4 October 2000, two tedlar bag air samples were collected from the SVE effluent to determine the VOC speciation in the off-gas. One sample was collected with the AS blower off and a second sample was collected with the AS blower on. The samples were shipped to Air Toxics Ltd., an environmental analytical laboratory, located in Folsom, California. The laboratory performed analysis via U.S. Environmental Protection Agency (USEPA) Method TO-14 using GC/MS in the full scan mode. The air sampling results are included in Attachment C and are shown in Table 3 below.

It should be noted that Acetone, 2-Butanone (Methyl Ethyl Ketone), and Tetrahydrofuran are main components of the PVC primer and PVC cement used to glue the piping components. These compounds typically dissipate after one week of system operation.

The laboratory analytical results for this sample, along with field-screened data, was used to determine if the system has the potential to exceed the air discharge limitations. Based on the tedlar bag samples, it was determined that the chlorinated VOC (Total cVOC was 8.5 ppmv, excluding the PVC primer and cement compounds) mass removal was about 0.23 pounds per day. The mass removal rate will continue to decline with time following an asymptotic reduction curve. At these emission levels, no off-gas treatment should be needed to meet either the annual or the short-term NYSDEC Air-Guide 1 Air Guideline Concentrations (AGC and SGC).

3.1.5 Establish Target Operating Parameters for System

The data collected during the SVE start-up testing was used to determine ranges for normal system operation. The AS blower was set to operate at 5 psi air injection pressure and at 18 cfm air injection rate. The SVE blower was set to operate at 20-inches w.c. vacuum and at 50 cfm flow rate. These ranges were be chosen to maximize the remediation system's removal efficiency while maintaining compliance with air emissions limitations. The system's operating parameters will be adjusted periodically based on current data. These adjustments will be made to maintain efficient mass removal as soil and groundwater volatile organic concentrations decline.

3.2 Routine System Monitoring

Following start-up testing, and the establishment of target operating ranges, the system was put into continuous operation. The system will be monitored continuously with remote monitoring and routine site inspections. The system will be monitored once per week for the first four weeks of operation. The measured operating parameters will be compared to the established acceptable ranges and adjustments will be made as necessary. Following the first four weeks of operation, and assuming that the system appears to operate consistently, the monitoring schedule will be changed to once every two weeks for the second month of operation.

TABLE 1
Soil Vapor Extraction Well Design Parameters
Dayton Plaza Shopping Center
Queens, New York

DESIGN PARAMETERS	SOIL VAPOR EXTRACTION SYSTEM
Well Screen Length	2.5 feet
Bottom Depth of Screen (BLS)	5 feet BLS
Screen Size	40 slot (0.040 inches)
Well Diameter	2 inches
Vacuum at Well Head	25 inches of water column
Flow Rate per Well (max.)	30 scfm
Total SVE System Flow Rate	60 scfm
Pipe Schedule	Schedule 40 PVC
Number of Wells	2
Vacuum at Blower Inlet	35 inches of water column
Well Seal Material	Bentonite
Sand Packing	#1 Morrie Sand
Seal Thickness (min.)	12 inches
Seal Height Above Screen (min.)	6 inches
Borehole Filling Material	Grout/cement to concrete floor elevation

NOTES:
BLS = Below Land Surface
Scfm = standard cubic feet per minute
PVC = Poly Vinyl Chloride

TABLE 2
Air Sparging Well Design Parameters
Dayton Plaza Shopping Center
Queens, New York

DESIGN PARAMETERS	AIR SPARGING SYSTEM
Well Screen Length	2 feet
Bottom Depth of Screen (BLS)	17 feet BLS
Screen Size	20 slot (0.020 inches)
Well Diameter	1 inch
Pressure at Well Head	5.0 psi
Flow Rate per Well (max.)	10 scfm
Total AS System Flow Rate	20 scfm
Pipe Schedule	Schedule 80 PVC
Number of Wells	2
Pressure at Blower Effluent	6.0 psi
Well Seal Material	Bentonite
Sand Packing	#1 Morrie Sand
Seal Thickness (min.)	24 inches
Seal Height Above Screen (min.)	24 inches
Borehole Filling Material	Grout/cement to concrete floor or pavement elevation

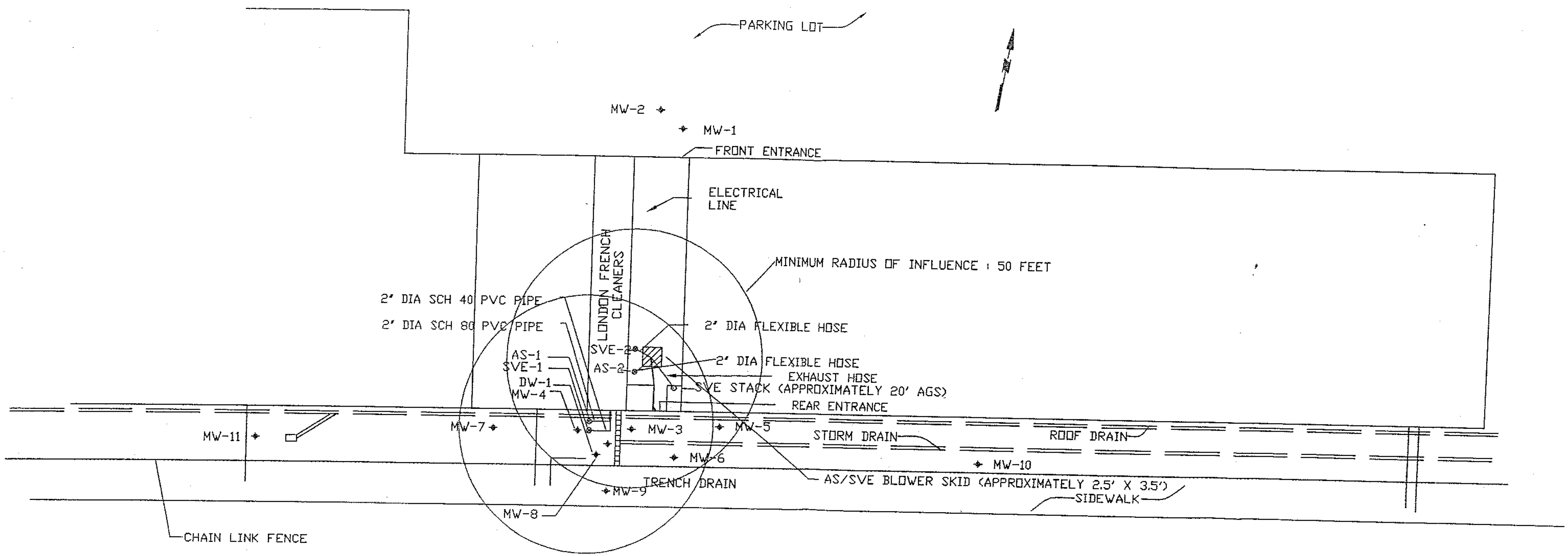
NOTES:
BLS = Below Land Surface
Scfm = standard cubic feet per minute
PVC = Poly Vinyl Chloride

TABLE 3
Air Sampling Results
Dayton Shopping Plaza
Queens, New York

Compound	Molecular Weight	Concentration (AS off) (ppbv)	Concentration (AS on) (ppbv)	Emission Rate (lb/yr)
cis-1,2-Dichloroethene	97	1,700	1,700	14.31
Trichloroethene	131.4	700	770	8.78
Tetrachloroethene	165.8	4,700	5,900	84.94
Trans-1,2-Dichloroethene	97	120	110	0.926
Acetone	58.1	1,800	410	2.07
2-Butanone	72.1	1,500	470	2.94
Tetrahydrofuran	72.1	2,200	690	4.31
TOTAL VOCs		**12,720**	**10,050**	

Notes:

1. Emission rate calculated using the formula: Removal (lb/yr) = C_{gas} * MW*Q_{CFM}*3.66 x 10^{-4} *365
2. Flow rate assumed to be 65 cfm.



HOLLAND AVENUE

BLOWER SPECS

AS BLOWER
3-HP MOTOR, 230 VOLT
20 SCFM @ 6 PSI OF PRESSURE
MANUFACTURED BY BECKER, INC

SVE BLOWER
1 HP MOTOR, 230V
70 CFM @ 5-INCH WATER VACUUM
20-GALLON MOISTURE SEPARATOR
MANUFACTURED BY GAST, INC

NOTES
AIR SPARGE WELLS-1" DIA SCH 80 PVC PIPE 2' OF SCREEN

SOIL VAPOR EXTRACTION WELLS-2" DIA SCH 40 PVC PIPE
2.5' OF SCREEN (SVE-1)
3' OF SCREEN (SVE-2)

LEGEND
✦ MONITORING WELL LOCATION
⊗ AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION

Langan Engineering and Environmental Services
(201) 794-6900
Elmwood Park,NJ Doylestown,PA Miami,Fl

Project
DAYTON SHOPPING PLAZA
AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM LAYOUT
QUEENS NEW YORK

Job No.	Date	Scale	Dwg. No.

WELL CONSTRUCTION SUMMARY

Well No. AS-1

PROJECT	PROJECT NO.	
Dayton Shopping Center	1461902.04	
LOCATION	**ELEVATION AND DATUM**	
Queens, New York		
DRILLING AGENCY	**DATE STARTED**	**DATE FINISHED**
ADT	08/05/2000	08/05/2000
DRILLING EQUIPMENT	**DRILLER**	
Geoprobe 54 LT	Marques Larabie	
SIZE AND TYPE OF BIT	**INSPECTOR**	
2" OD Steel Pipe	Craig Peterson	

METHOD OF INSTALLATION

Boring was advanced by Geoprobe to 17 feet below ground surface (bgs) using 2" OD Steel Pipe. A 1" diameter schedule 80 PVC screen, from 15 to 17' bgs and riser from 0.5 to 15' bgs were inserted through the opening left from the steel pipe. The annular space was filled with a Morie sand pack and a cement & bentonite seal. The well was completed with a flush mount.

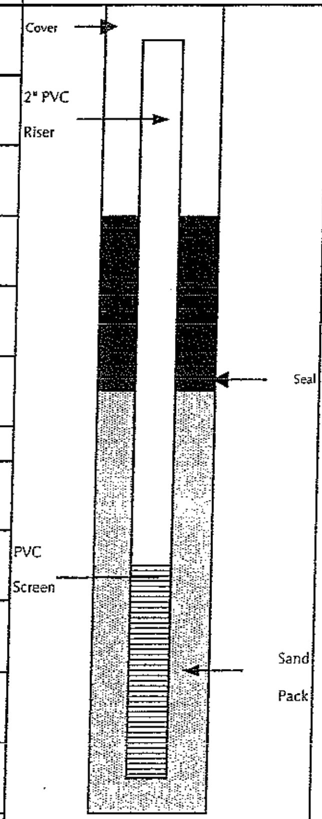
METHOD OF WELL DEVELOPMENT

The air sparge well was not developed.

TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL
SCH 80 PVC	1" OD	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF SEAL MATERIAL**
SCH 80 PVC	1" OD	BENTONITE
BOREHOLE DIAMETER		**TYPE OF FILTER MATERIAL**
	2"	No 1 Morrie Sand

	ELEVATION	DEPTH (ft)
TOP OF CASING		0.5
TOP OF SEAL		11
TOP OF FILTER		13
TOP OF SCREEN		15
BOTTOM OF WELL		17
SCREEN LENGTH		2'
SLOT SIZE		0.02"

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Blk-Dk br f-m SAND, tr silt, tr f gravel, tr wood, tr glass, tr brick (fill)	11.0
	13.0
	15.0
	17.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	08/05/2000	5'

LANGAN Engineering and Environmental Services, Inc.
River Drive Center 1, Elmwood Park, NJ 07407

WELL CONSTRUCTION SUMMARY

Well No. SVE-1

PROJECT Dayton Shopping Center	PROJECT NO. 1461902.04
LOCATION Queens, New York	ELEVATION AND DATUM
DRILLING AGENCY ADT	DATE STARTED 08/05/2000 — DATE FINISHED 08/05/2000
DRILLING EQUIPMENT Geoprobe 54 LT	DRILLER Marques Larabie
SIZE AND TYPE OF BIT 2" OD Steel Pipe	INSPECTOR Craig Peterson

METHOD OF INSTALLATION

Boring was advanced by Geoprobe to 6 feet below ground surface (bgs) using 2" OD Steel Pipe. A 2" diameter schedule 40 PVC screen, from 2.5 to 5 feet bgs and riser from 0.5 to 2.5' bgs were inserted through the opening left from the steel pipe. The annular space was filled with a Morie sand pack and a cement & bentonite seal. The well was completed with a flush mount.

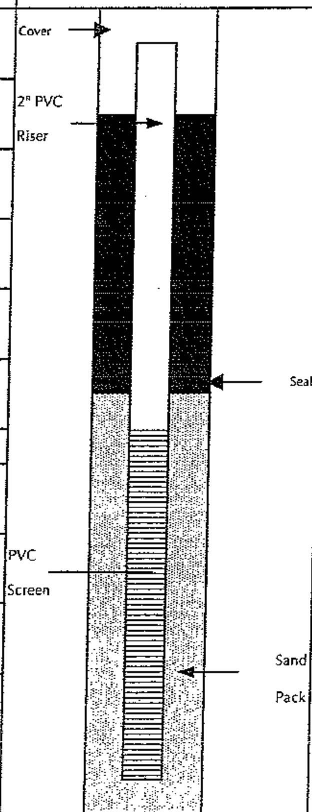
METHOD OF WELL DEVELOPMENT

The SVE was not developed.

TYPE OF CASING SCH 40 PVC	DIAMETER 2" OD	TYPE OF BACKFILL MATERIAL
TYPE OF SCREEN SCH 40 PVC	DIAMETER 2" OD	TYPE OF SEAL MATERIAL BENTONITE
BOREHOLE DIAMETER	2"	TYPE OF FILTER MATERIAL No 1 Morrie Sand

	ELEVATION	DEPTH (ft)
TOP OF CASING		0.5
TOP OF SEAL		1
TOP OF FILTER		2
TOP OF SCREEN		2.5
BOTTOM OF WELL		5
SCREEN LENGTH		2.5'
SLOT SIZE		0.02"

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
	1.0
Blk-Dk br f-m SAND, tr silt, tr f gravel, tr wood, tr glass, tr brick (fill)	
	2.0
	2.5
	5.0
	6.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	08/05/2000	5'

LANGAN Engineering and Environmental Services, Inc.

River Drive Center 1, Elmwood Park, NJ 07407

WELL CONSTRUCTION SUMMARY

Well No. AS-2

PROJECT Dayton Shopping Center	PROJECT NO. 1461902.04
LOCATION Queens, New York	ELEVATION AND DATUM
DRILLING AGENCY ADT	DATE STARTED 08/30/2000 — DATE FINISHED 08/30/2000
DRILLING EQUIPMENT Geoprobe 54 LT	DRILLER Marques Larabie
SIZE AND TYPE OF BIT 2" OD Steel Pipe	INSPECTOR Craig Peterson

METHOD OF INSTALLATION

Boring was advanced by Geoprobe to 17 feet below ground surface (bgs) using 2" OD Steel Pipe. A 2" diameter schedule 80 PVC screen, from 15 to 17' bgs and riser from 3' above the ground surface (ags) to 15' bgs were inserted through the opening left from the steel pipe. The annular space was filled with a Morie sand pack and a cement & BENTONITE seal. The well was completed with a stick up.

METHOD OF WELL DEVELOPMENT

The air sparge well was not developed.

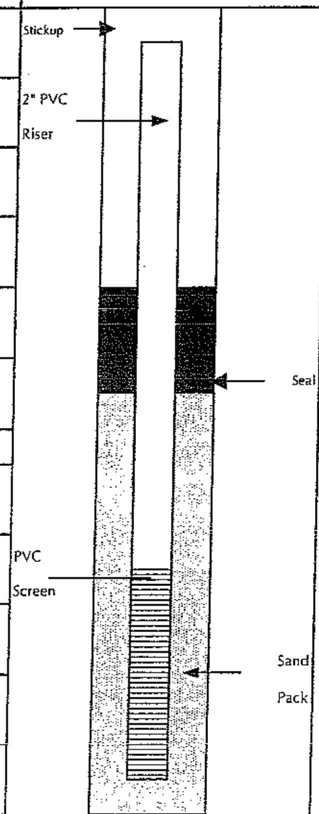
TYPE OF CASING SCH 80 PVC	DIAMETER 1" OD	TYPE OF BACKFILL MATERIAL
TYPE OF SCREEN SCH 80 PVC	DIAMETER 1" OD	TYPE OF SEAL MATERIAL BENTONITE
BOREHOLE DIAMETER	2"	TYPE OF FILTER MATERIAL No 1 Morrie Sand

	ELEVATION	DEPTH (ft)
TOP OF CASING		2.5' ags
TOP OF SEAL		11' bgs
TOP OF FILTER		13
TOP OF SCREEN		15
BOTTOM OF WELL		17
SCREEN LENGTH		2'
SLOT SIZE		0.02"

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	08/30/2000	7'

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
	+3'
Blk-Dk br f-m SAND, tr silt, tr f gravel, tr wood, tr glass, tr brick (fill)	
	11.0
	13.0
	15.0
	17.0

LANGAN Engineering and Environmental Services, Inc.
River Drive Center 1, Elmwood Park, NJ 07407

g:/data91461901/Engineering Data/Environmental/Logs/Well Construction Summary AS-2

WELL CONSTRUCTION SUMMARY

Well No. SVE-2

PROJECT Dayton Shopping Center	PROJECT NO. 1461902.04
LOCATION Queens, New York	ELEVATION AND DATUM
DRILLING AGENCY ADT	DATE STARTED 08/30/2000 — DATE FINISHED 08/30/2000
DRILLING EQUIPMENT Geoprobe 54 LT	DRILLER Marques Larabie
SIZE AND TYPE OF BIT 2" OD Steel Pipe	INSPECTOR Craig Peterson

METHOD OF INSTALLATION

Boring was advanced by Geoprobe to 6 feet below ground surface (bgs) using 2" OD Steel Pipe. A 2" diameter schedule 40 PVC screen, from 3 to 6 feet bgs and riser from 3' above the ground surface (ags) to 3' bgs were inserted through the opening left from the steel pipe. The annular space was filled with a Morie sand pack and a cement & bentonite seal. The well was completed with a stick up.

METHOD OF WELL DEVELOPMENT

The SVE was not developed.

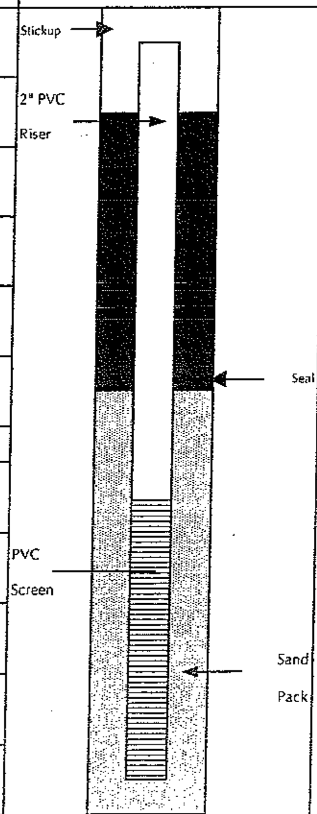
TYPE OF CASING SCH 40 PVC	DIAMETER 2" OD	TYPE OF BACKFILL MATERIAL
TYPE OF SCREEN SCH 40 PVC	DIAMETER 2" OD	TYPE OF SEAL MATERIAL BENTONITE
BOREHOLE DIAMETER	2"	TYPE OF FILTER MATERIAL No 1 Morrie Sand

	ELEVATION	DEPTH (ft)
TOP OF CASING		2.5' ags
TOP OF SEAL		1' bgs
TOP OF FILTER		2
TOP OF SCREEN		3
BOTTOM OF WELL		6
SCREEN LENGTH		3
SLOT SIZE		0.02"

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
	08/30/2000	7'

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
	+3'
Blk-Dk br f-m SAND, tr silt, tr f gravel, tr wood, tr glass, tr brick (fill)	1.0
	2.0
	3.0
	6.0

LANGAN Engineering and Environmental Services, Inc.
River Drive Center 1, Elmwood Park, NJ 07407

NATIONAL ENVIRONMENTAL SYSTEMS INC
36 Maple Avenue • Seekonk, Massachusetts 02771
508 761-6611 FAX 508 761-6898

System

NES PROJECT NUMBER: 00-Q –249-A REV 1
PROJECT NAME: LANGAN ENVIRONMENTAL-QUEENS, NY

Prepared for:
LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES
RIVER DRIVE CENTER ONE
ELMWOOD PARK, NJ 07407-1338

Prepared by:

National Environmental Systems
36 Maple Avenue Seekonk, MA 02771
Phone (508) 761-6611 Fax (508) 761-6898
National Environmental Systems, Inc. is a Woman-Owned Small Business

NATIONAL
ENVIRONMENTAL INC
SYSTEMS

36 Maple Avenue • Seekonk, Massachusetts 02771
508 761-6611 FAX 508 761-6898

INSTALLATION GUIDELINES

1. Inspect exterior and interior of control panel for damage that may have occurred during shipment. Check all interior components within panel for tightness. Vibration during transport may loosen screw terminals, din rail mounted components, hardware, etc. Check motor starter overloads and reset if tripped.

2. Panel and associated wiring should be installed by a qualified, licensed, electrician familiar with remediation/water treatment equipment. All information required for proper installation is contained on the drawings or other documents within this manual. Drawings containing information on panel interior and exterior layout, line diagrams, and process and instrumentation are also included in this section for reference only.

Many remediation systems are installed in "hazardous locations" and therefore the installer must follow the National Electric Code requirement for these areas. The control panel and associated equipment should only be installed in the area for which it was designed.

Many systems utilize a combination of intrinsically safe and non-intrinsically safe circuits. Proper separation and demarkation is required. Please refer to the National Electric Code Article 504 "Intrinsically Safe Systems" and any local codes.

3. Before applying power to any equipment, the component manufacturers operation and start-up manual (compressor, blower, pump, etc.) should be reviewed. Some equipment cannot be operated in the wrong rotation even momentarily without damage. Verifying proper rotation should only be done after review of the associated equipment manual.

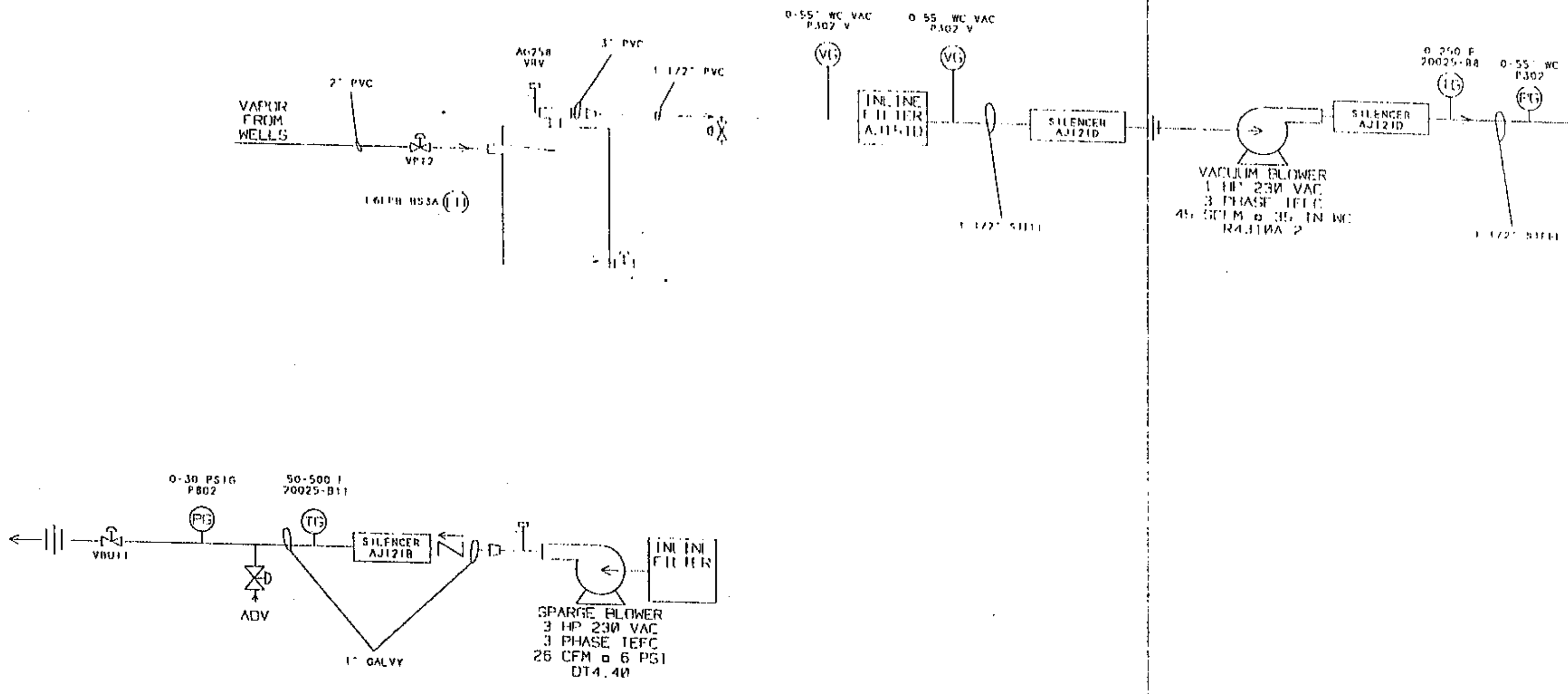
4. As a general rule, all fluid levels, drive components, plumbing attachments, etc. should be inspected. The equipment should be initially started in a no-load condition with non-contaminated process fluid (i.e. SVE vacuum blower started with all recovery wells shut off, and the ambient air dilution valve open fully). **Do not store equipment for more than one month without running it.** Idle blowers, pumps or other items may rust or sieze if not run once a month.

5. Once proper operation of all equipment has been verified the system can be started. Turn the selector switches to "auto" or "on", and press reset if necessary. The system should run automatically.

6. If it is possible, any alarm conditions (i.e. SVE moisture separator high level) should be manually actuated to ensure proper system response.

7. The system can now be adjusted to design flow rates, pressures, etc. All adjustments should be made gradually.

P&ID



LEGEND

- CHECK VALVE
- BALL VALVE
- SAMPLE PORT
- RELIEF VALVE
- SOLENOID VALVE

- EH EMERGENCY HIGH SWITCH
- H HIGH LEVEL FOR PUMP TURN ON
- L LOW LEVEL FOR PUMP TURN OFF
- PS PRESSURE SWITCH
- PG PRESSURE GAUGE
- VS VACUUM SWITCH
- TG TEMPERATURE GAUGE
- VG VACUUM GAUGE
- FM FLOW METER

NATIONAL ENVIRONMENTAL SYSTEMS
508 761 6611
36 MAPLE AVENUE, SEEKONK, MA 02771

PROCESS AND INSTRUMENTATION DIAGRAM

JOB NAME: LANGAN QUEENS

NES PROJECT. 00A249		SHEET	REV.
DATE: 0-25-00	DRAWN: CJJ		
SCALE: N. T. S.	DESIGN: CJJ	P&ID	

CONTROL PANEL DESCRIPTION

CONTROLLER – Relay based

CAPABLE OF CONTROLLING

(1) SVE Blower	1 HP, 230V, three phase, TEFC
(1) Sparge Blower	3 HP, 230V, three phase, TEFC

ALARMS - Manual reset.

- High moisture separator level

NORMAL OPERATION

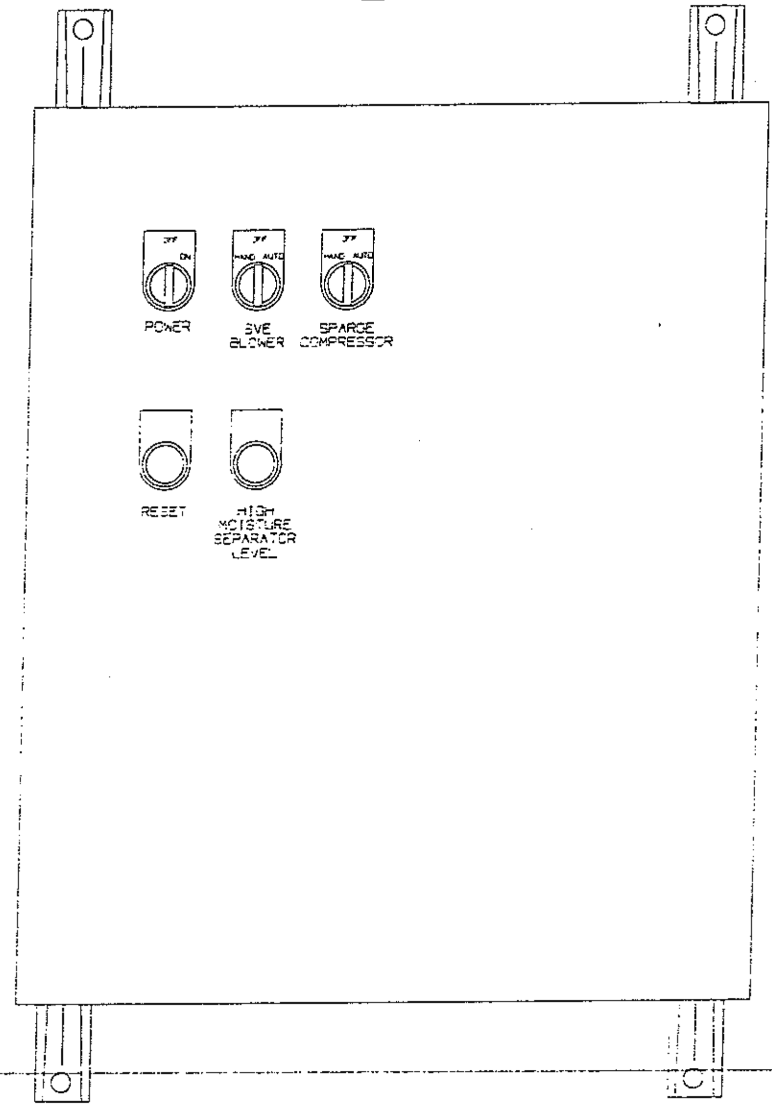
Equipment will operate if the panel switch is in the AUTO position and no alarm is present. Equipment will operate if the panel switch is in the HAND position with or without an alarm condition. The Sparge blower can not be operated unless the SVE blower motor starter is energized.

ALARM OPERATION

Alarm –Moisture separator high level
Panel response – Both SVE blower and Sparge blower are shut down.

PANEL EXTERIOR

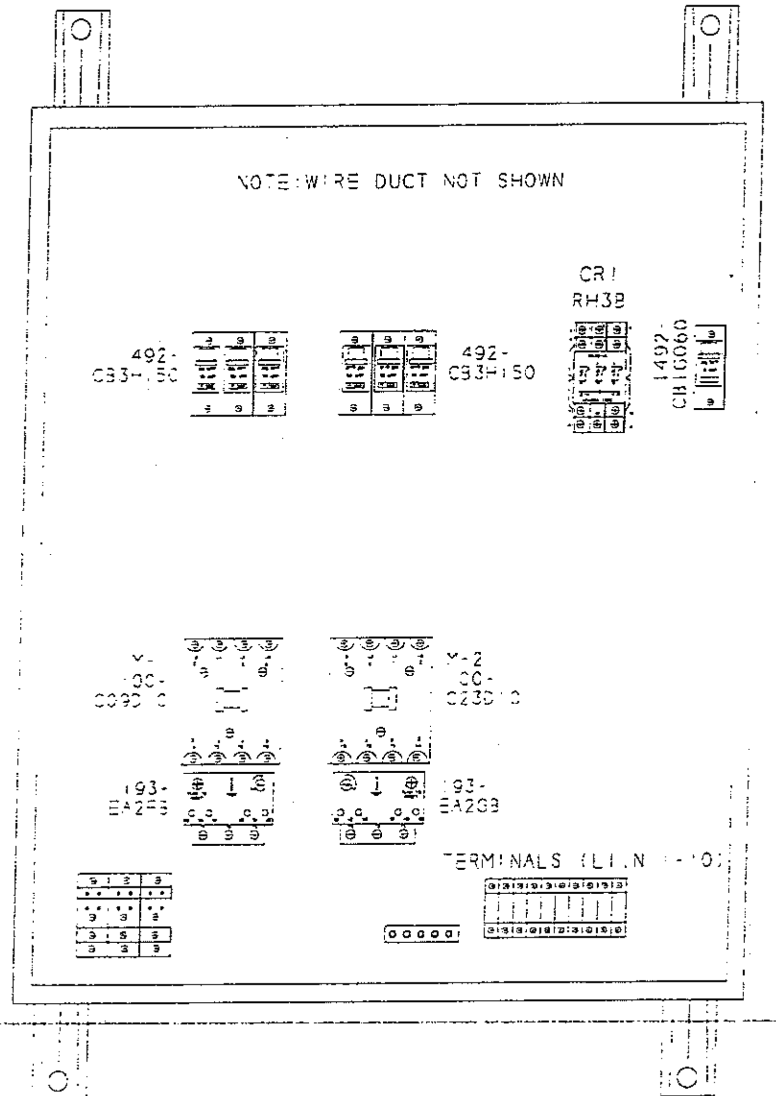
16 X 14 X 8
NEMA 4



NATIONAL ENVIRONMENTAL SYSTEMS 528-761-6611 36 MAPLE AVENUE, SEEKONK, MA Z2771	
PANEL EXTERIOR	
JOB NAME : LANGAN - QUEENS NY	
NES PROJECT: ZZA248	SHEET
DATE: 8-25-ZZ DRAWN: CJJ	REV:
SCALE: DESIGN: RJC	PNLEXT

PANEL INTERIOR

16 X 14 X 8
NEMA 4



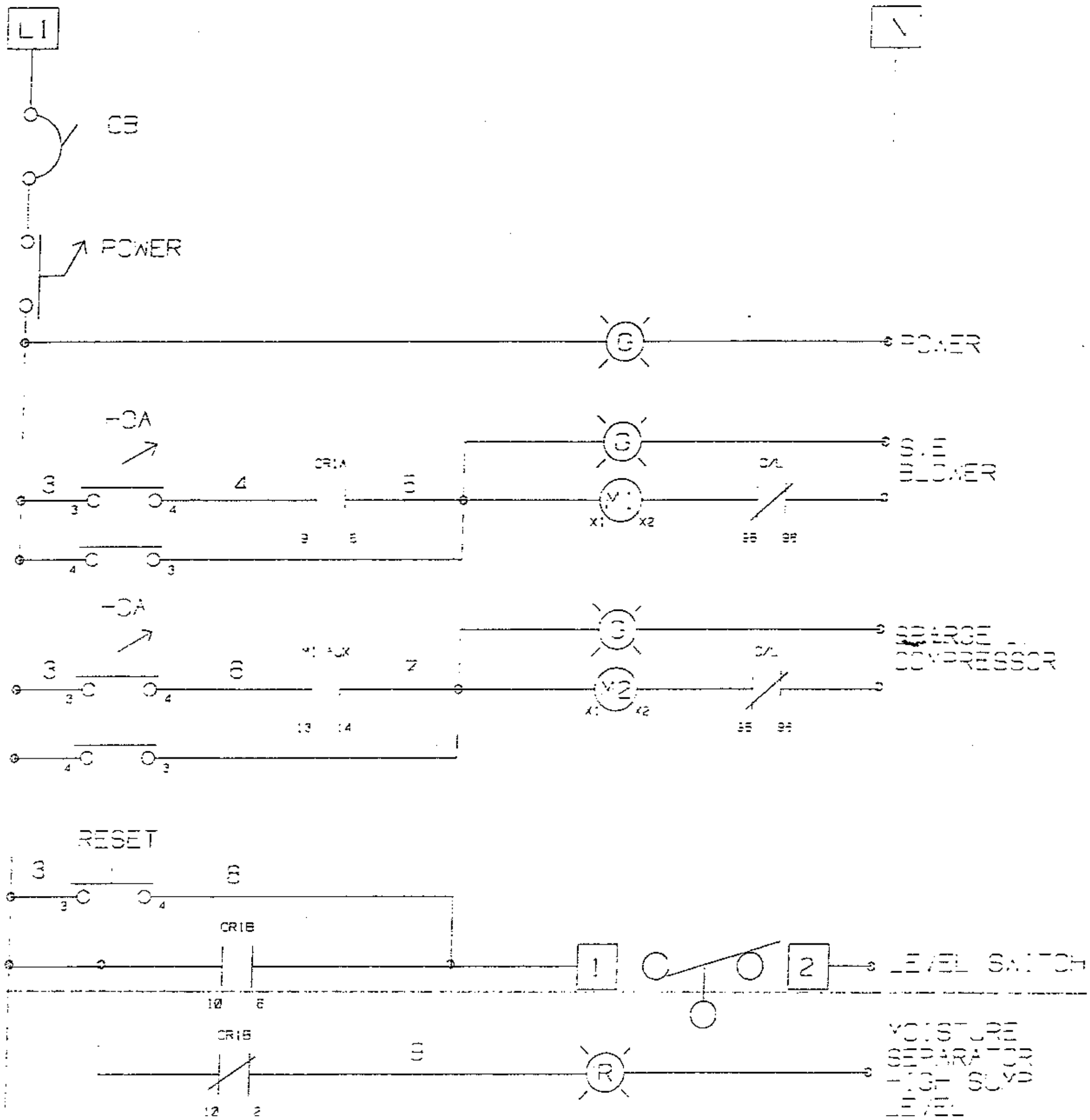
NATIONAL ENVIRONMENTAL SYSTEMS
508-761-6611
38 MAPLE AVENUE, SEEKONK, MA 02771

PANEL INTERIOR

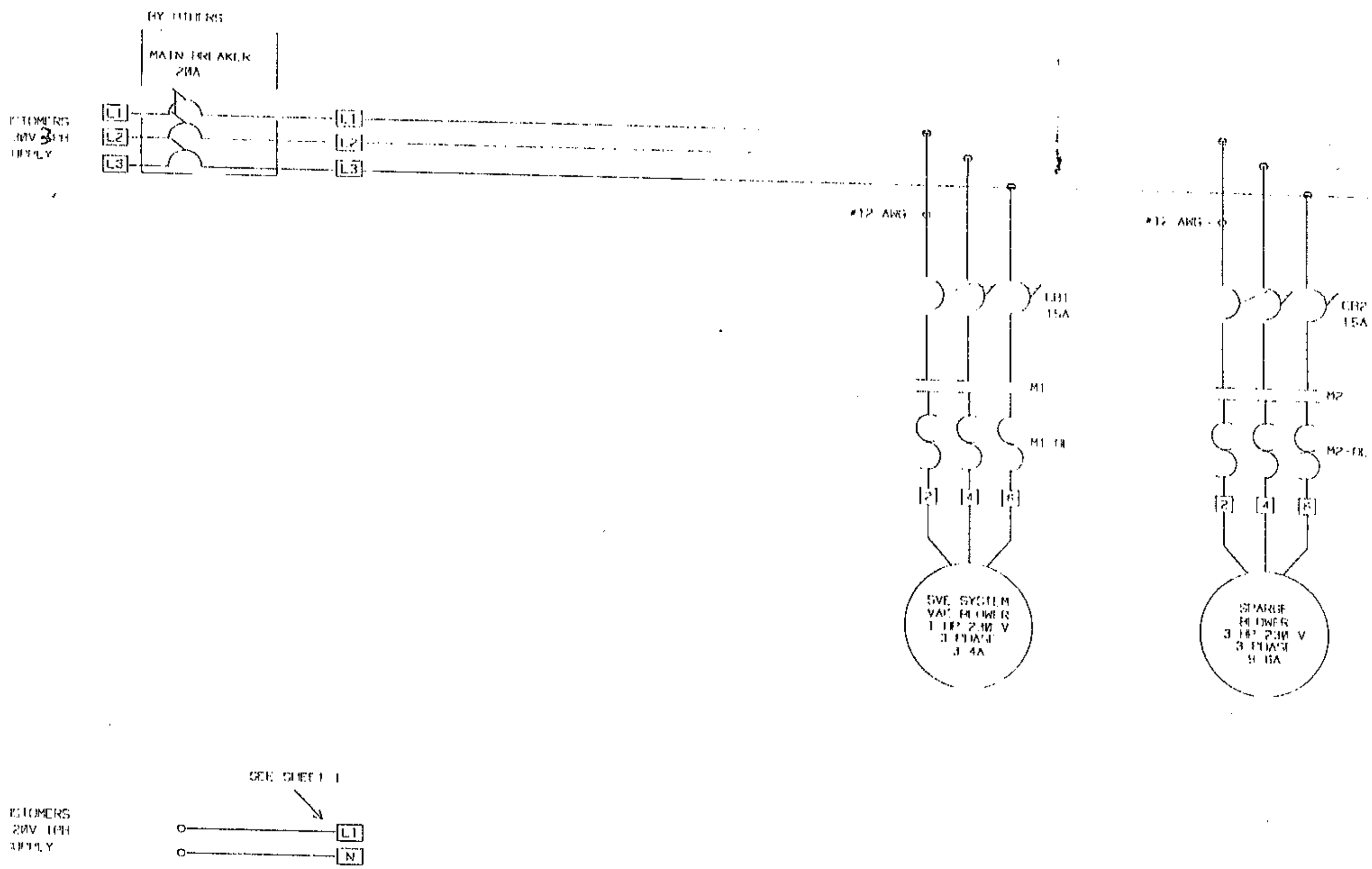
JOB NAME : LANGAN - QUEENS NY

NES PROJECT: 20A249		SHEET	
DATE: 6-25-22	DRAWN: CJJ		REV:
SCALE:	DESIGN: RJD	PNLINT	

RELAY LOGIC



NATIONAL ENVIRONMENTAL SYSTEMS 508-761-6611 36 MAPLE AVENUE, SEEKONK MA 02771	
PANEL INTERIOR	
JOB NAME: LANGAN - QUEENS NY	
NES PROJECT: 00A249	SHEET
DATE: 8-28-00	DRAWN: REV:
SCALE:	DESIGN: PNLINT



NATIONAL ENVIRONMENTAL SYSTEMS 508-761-6611 36 MAPLE AVENUE, SEEKONK, MA 02771			
LINE DIAGRAM			
JOB NAME · LANGAN /QUEENS			
NES PROJECT: 00A249		SHEET 2 OF 2	
DATE: 9/3/00	DRAWN: RJD		REV:
SCALE: N. T. S	DESIGN: RJD	LINEDAIG	

NATIONAL
ENVIRONMENTAL INC.
SYSTEMS

36 Maple Avenue . Seekonk, Massachusetts 02771
Phone: 508 761-6611 Fax: 508 761-6898

SOIL VAPOR EXTRACTION UNIT

INSTALLATION, OPERATION, & MAINTENANCE MANUAL

Job Name: Langan – Queens NY Job #: 00-A-249 Date: 09/25/2000

SYSTEM DATA

Flow	45 scfm	Vacuum	35 in H2O
Motor Voltage	230 VAC	Phase	3
Horsepower	1		

INSTALLATION

- Remove the packaging from the soil gas unit and inspect. Verify that gauges and other components are not damaged.
- Secure the soil gas unit on a level, structurally sound surface.
- Connect vapor extraction well piping to inlet of soil gas unit. All wells should be closed and the fresh air dilution valve fully open. If a dilution valve was not supplied by NES, it should be sized to allow the blower to operate without opening any wells.
- Connect discharge piping to threaded metal piping on outlet side of blower or silencer.
- Have a licensed electrician, familiar with the installation of remediation equipment, install the control panel and make any necessary connections from the panel to the equipment (if not factory installed by NES). All electrical specifications/power requirements can be found above or within the electrical schematic section of this manual.
- Before operating the equipment, review all manufactures literature within this manual. Check all fluid levels, belt tension, motor couplings, piping, etc. Do not check rotation of electrical equipment until the manufactures literature is reviewed. Some equipment can not operate in a reverse direction without damage to the internals.

OPERATION

Turn on power and press start button. Allow motor to run for a few seconds with fresh dilution air only. Check rotation.

If the relief valve is adjustable, it should be adjusted prior to opening the wells. Tighten the relief valve adjuster until it cannot be pushed in. Adjust the blower vacuum pressure by closing the fresh air dilution valve until the design operating vacuum is achieved. Pick a point on the blower curve,(located within this manual) with a higher vacuum pressure than the design point. Close the fresh air dilution valve until that vacuum is achieved. Adjust the relief valve until it starts to open and allow air in. Slowly close the fresh air dilution valve. The blower should completely open the relief valve and never exceed the maximum vacuum pressure on the blower curve.

Temperature Switch Option

The temperature switch should be set before allowing the system to operate unattended. Setpoints are typically based on the efficiency of carbon vs. temperature, maximum discharge temperature of blower, or the maximum temperature rating of down stream equipment. High discharge temperatures can usually be lowered by increasing the airflow through the blower, lowering the vacuum pressure, or discharge pressure. All adjustments should be made after the unit has reached operating temperature.

Vacuum Switch Option

A vacuum switch is usually installed when the Soil Gas Unit is working in conjunction with a Air Sparge Unit (ASU). A low vacuum alarm will signal to shut down the ASU. Using the blower curve, find the flow rate equivalent to the ASU flow rate. The vacuum pressure associated with that flow rate should be the minimum set point for the vacuum switch.

Once all adjustments have been completed contaminated air can be introduced into the system. **Slowly** open the desired well(s) and close the fresh air dilution valve until the system design flowrate and vacuum pressure are achieved.

MAINTENANCE

The following should be checked periodically. Frequency is site specific. See manufactures literature for specific recommendations.

Fluid levels	Piping	Temperature switch
Filter	Belts/Couplings	Vacuum switch
Motor amperage	Level switches	

NOTES ABOUT THE CONTROLS

The motor that drives your soil gas unit is controlled by a motor starter equipped with an undervoltage trip coil. The starter can be tripped for a number of conditions, i.e. low voltage, motor overload, or short circuit. In most cases if the control station is explosion proof the motor can be reset by pushing the start button, if the control station is non XP the motor starter reset is located within the panel on the starter itself.

The blower warranty becomes void if the high motor temperature switch (tstat) is not connected to the control circuit. Do not disconnect this device.

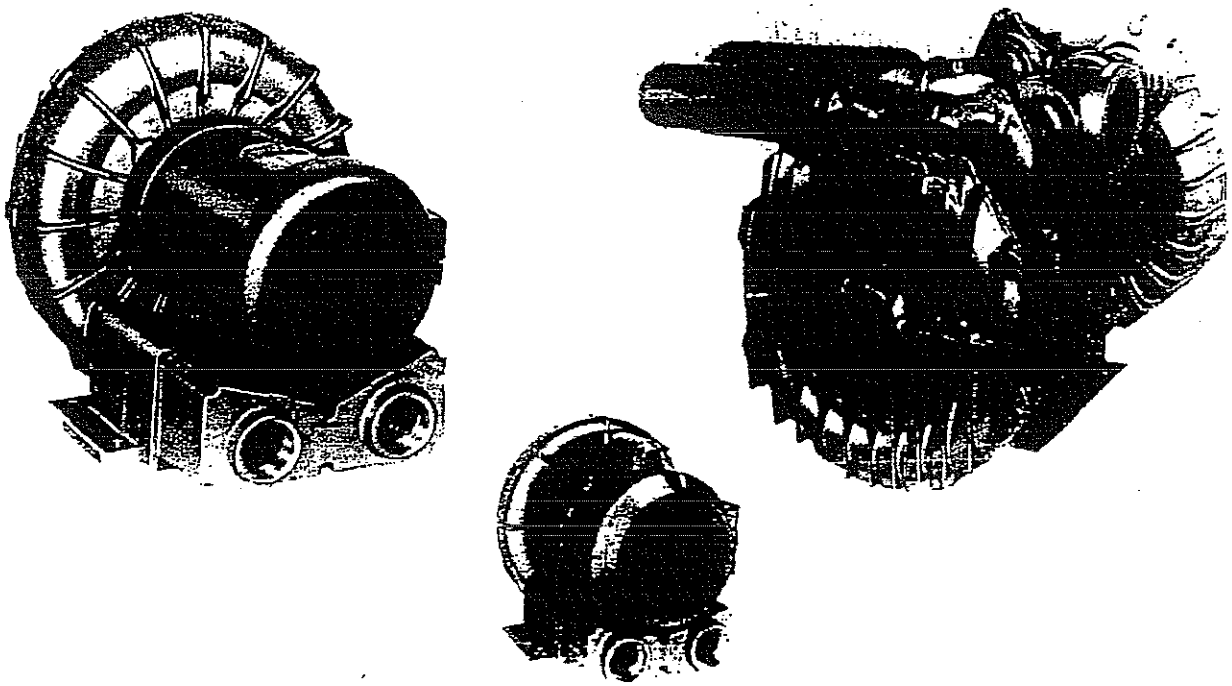
Included is a guide for troubleshooting motor related problems.

MOTOR TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
1. Motor does not start.	a) No Power	Check circuit breaker Check wiring Check motor starter reset
	b) Alarm condition present	Correct alarm, Reset panel
	c) Short circuit	Check wiring.
	d) Bad motor	Check resistance of motor windings. Contact NES.
2. Motor starts but runs only for a while.	a) Motor overloaded	Check current draw with ammeter without load on motor, (dilution valve open)
	b) Optional alarm switch .	Check switch operation Check blower operating point to blower curve Check switch set point
	c) Motor temperature	Reduce ambient air temperature Check blower operating point to blower curve
	d) Low voltage	Compare supply voltage to motor nameplate voltage

GAST®
A Unit of IDEX Corporation

STANDARD REGENAIR BLOWER OPERATION & MAINTENANCE MANUAL



CONTENTS:

ISO 9001 CERTIFIED

Visit us at our website
www.gastmfg.com

KEEP THIS DOCUMENT FOR FUTURE REFERENCE

'his is the hazard alert symbol: ⚠. When you see this nbol, be aware that personal injury or property a is possible. The hazard is explained in the text ollowing the symbol. Read the information carefully fore proceeding.

The following is an explanation of the three ifferent types of hazards:

⚠ DANGER Severe personal injury or death will occur if hazard is ignored.

⚠ WARNING Severe personal injury or death can occur if hazard is ignored.

⚠ CAUTION Minor injury or property damage can occur if hazard is ignored.

NERAL INFORMATION

'hese instructions do not apply to:

Blowers without motors, SDR Series

M & H Series, model number with M or H as third character

3) Blowers powered with Explosion Proof Motors

DANGER Pumping flammable or explosive gases or operating this unit in an atmosphere containing them can result in fire or explosion damage to unit and surrounding environment.

wer is only to be used for pumping air and under o circumstances be used with any other gases. Blower st not be used for pumping fluids, particles, solids, or y substance likely to cause fire or explosion.

⚠ WARNING Keep hands or other body parts away from blower suction which can cause severe lacerations and limb loss.

⚠ CAUTION Operating blower above recommended 40° C (105° F) temperature can result in overheating or fire damage. For higher ambient operation, consult the factory.

CAUTION Blowers may generate heat. To prevent burns to skin, do not touch blower during operation or until unit has cooled.

wer performance is reduced by lower atmospheric ressure found at high altitudes, consult the factory or a st distributor for details.

NSTALLATION

PORTANT

move any plastic caps before starting blower. Any or material (burrs, chips, welding drops, slag, pipe , excess sealant, sand, lime, etc.) must be noved, or filtered out. Any such material, no matter ow small, entering blower can damage it. Clean out w plumbing before attaching to blower inlet.

Mounting

The single impeller blower may be installed in any orientation as long as flow of cool, ambient air over blower is not blocked. The dual impeller models must be mounted with shaft horizontal.

⚠ CAUTION Attach blower to solid surface before starting, to prevent injury or damage from unit movement.

⚠ CAUTION Blower must be installed with a proper sized inlet filter, gauge, and relief valve; if not, blower can be permanently destroyed due to foreign material entry and thermal expansion causing catastrophic failure.

The flow of cooling air over the blower and motor must not be blocked. It is very important to install blower in well-ventilated area where temperature does not exceed 40°C. Check this temperature after blower has been running for an hour.

Strong forced ventilation is often needed for larger blowers. In vacuum service, hot discharge air of larger blowers, must be plumbed away to avoid overheating room or enclosure where blower is located. Discharge excess air into atmosphere, through a relief valve.

Wiring

⚠ WARNING Electrical shock or fire hazard can result fro incorrect wiring.

Wiring must conform to all required safety codes and be installed by a qualified person. Grounding is required.

Fuses protect wiring against short circuits. On motors without Automatic restart, thermal protection or magnetic over-current cutouts are absolutely necessary to prevent motor overloading. This is due to the following, one phase in a three-phase electric system, high starting frequency, or jammed blower. Required power will rise as differential pressure increases. For motor wiring diagram, see inside of conduit box or motor nameplate. Large motors may have two nameplates, one for 50Hz, the other for 60Hz. Be sure that all dual-voltage motors are wired for power source.

Rotation

Blower should only rotate clockwise as viewed from motor side. This is marked with an arrow on most castings. Proper rotation can be confirmed by checking air flow at IN and OUT ports. On blowers powered by a 3-phase motor, changing any two power lines can reverse rotation.

Plumbing

Connect motor and check rotation direction before connecting plumbing. Threaded-pipe ports are designed as connection ports only and will not support plumbing. Be sure to use same or larger size pipe and fittings to prevent air flow restriction and overheating blower.

When installing plumbing, be sure to use a small amount of pipe-thread lubricant. This protects the aluminum blower u . When installing two blowers in parallel, use plumbing t ole pipe sizes larger in diameter than that of blower.

Accessories

Keep in mind filters progressively increase losses, due to logging. Install a vacuum gauge to monitor filter restriction. Install a relief valve to avoid overloading of large blowers, caused by changes in pressure or vacuum.

using blower in a vacuum application in a dirty environment, an intake filter must be used with relief valve to prevent entry of foreign material into blower. A moisture separator is necessary applications where there is high humidity or liquids being used in process. See Recommended Accessories on page 4-7 nd consult distributor for details.

Do not install check valves that close with a strong spring due to their large pressure loss. Check valves listed in ccessory section (page 4) are recommended. They have minimal pressure drop, positive sealing, and are resistant to high discharge temperatures of large blowers.

OPERATION

⚠ CAUTION Avoid running R4 size blowers or larger with no air flow through them; this will damage blower. Protect with Gast recommended pressure or vacuum relief valve.

⚠ WARNING Solid or liquid material exiting blower or piping can cause eye or skin damage. Keep away from air stream.

⚠ WARNING Some of these models may exceed 85 dB(A). When in close proximity to these models hearing protection is required. See Technical Data Sheet (if provided), for specific model(s).

Do not exceed maximum pressure or vacuum capabilities marked on data label of unit.

Fit correct-sized pipes and choose accessories that reduce to a minimum air friction load loss. Do not throttle discharge or suction pipe to reduce capacity. Throttling increases differential pressure, which consequently increases power absorption and working temperature. When blower is ran at duties above 125mbar (50" H20) metal pipe may be required for hot exhaust air.

⚠ CAUTION Air temperature increases when passing through blower. Outlet piping can cause burns. Access to these hot temperature areas should be guarded, limited, or marked "HOT".

Once blower is in operation, check the following:

- Working pressure and vacuum values.
- Adjust relief valve pressure or vacuum setting, if needed.
- Measure motor current and compare with motor nameplate data.
- Rated electrical overload cutout.
- Check ambient and discharge air temperatures to ensure they do not exceed allowed values one hour after starting. Exhaust air should not exceed 230° F for all blowers except R6PS and R7S models.

MAINTENANCE

⚠ WARNING Power must be de-energized and disconnected before servicing. Be sure all rotating parts have stopped. Electric shock or severe cuts can result if hazard is ignored.

Noise-absorbing foam used in mufflers needs to be periodically replaced. The electric motor and blower also need periodic cleaning to remove accumulated dust and dirt. If they are not cleaned, this can result in excessive vibration, an increase in temperature, or can reduce service life of the blower. Initial inspection is suggested at 8000 hours, then user should determine frequency.

An increase in differential pressure across an inlet filter indicates its getting clogged. Clean inlet air filter as often as needed, blowing down against current to clean it. Change cartridge when cleaning no longer gets cartridge clean.

A dirty cartridge causes a high intake resistance resulting in an increase of differential pressure, absorbed power, and working temperature.

The motor bearings of small motors (Less than 51/2 HP, refer to motor nameplate), are greased for long life. Large motors (51/2 HP or larger, refer to 60 Hz motor nameplate) are equipped with alemite grease fittings. To relubricate these bearings clean tip of grease gun and apply grease to fitting. Use one or two strokes of Shell Dolium R grease.

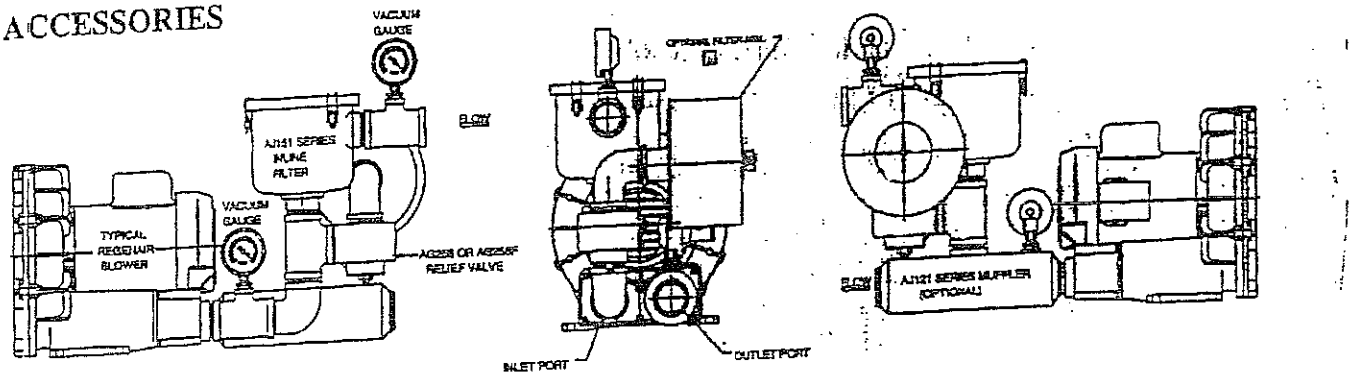
Hours of Service per year	Suggested Relubrication Interval
5,000	3 years
Continual Normal Application	1 year
Seasonal Service (motor idle for 6 monthes or more)	1 year beginning of season
Continucus-high ambients, dirty or moist applications	6 months

Gast will not guarantee a field-rebuilt blower. If repairs are needed contact or send blower to a Gast authorized service facility.

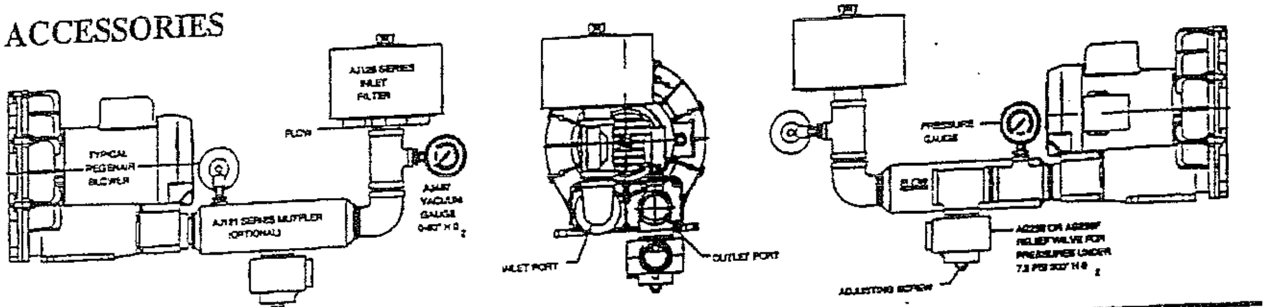
RECOMMENDED ACCESSORIES CONFIGURATION ASSEMBLY

These are only suggested configurations for these accessories. These configurations may vary depending on the system this unit is being used in.

VACUUM ACCESSORIES



PRESSURE ACCESSORIES



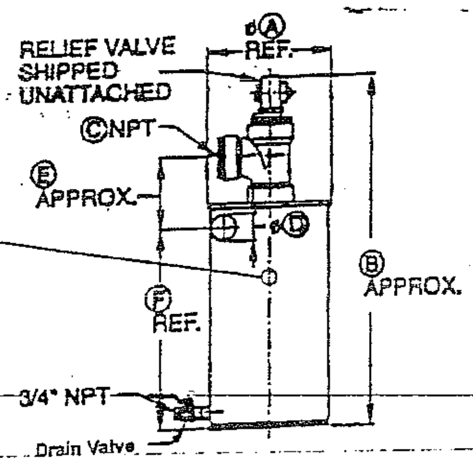
MOISTURE SEPARATOR (FOR VACUUM)

The purpose of the moisture separator is to remove liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and a build up of mineral deposits.

Explosion-proof high level float switch AJ213 is optional.

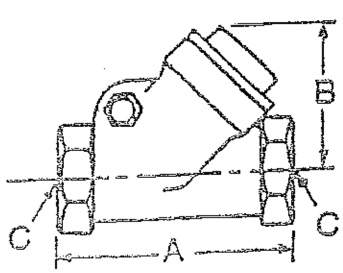
Model Number	R4, R4P, R5, R2M, R3M	R4, R4P, R5, R6, R6M	R5, R6, R6P, R6PS	R6P, R6PP, R7, R7S
Part Number	RMS160	RMS200	RMS300	RMS400
CFM Capacity	160	200	300	400
Liquid cap (gallon)	10	19	19	40
A (diameter)	14.8"	19.7"	19.7"	24"
Dimension B	41.5"	39"	39"	48"
C (NPT) outlet	2"	2"	2.5"	3"
D (diameter) inlet	2"	2"	2.5"	3"
Dimension E	7.5"	7.5"	7.5"	9.7"
Dimension F	26.6"	26.6"	26.6"	29"

Maximum vacuum allowed 22 inches Hg



HORIZONTAL SWING TYPE CHECK VALVE

Designed to prevent backwash of fluids that would enter the blower. Also prevents air back-streaming if needed. They can be mounted with their discharge either vertical or horizontal. Valve will open with 3" of water pressure.

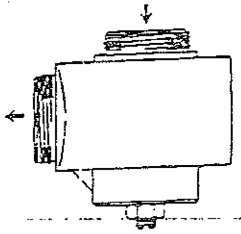


Model Number	R1 & R2	R3	R4, R5, SDR4, SDR4, R4P	R6, R6P, SDR6P, SDR6, R6PS	R7, R7S
Part Number	AH326B	AH326C	AH326D	AH326F	AH326G
Dimension A	3.57"	4.19"	4.50"	5.25"	8.00"
Dimension B	2.32"	2.69"	2.94"	3.82"	5.07"
Dimension C	1" NPT	1¼" NPT	1½" NPT	2" NPT	2½" NPT

Pressure/Vacuum Gauges

Pressure Gauge	Part # AJ496	$2^5/_8$" Dia.	$^1/_4$" NPT	0-60in. H_2O and 0-150 mbar
	Part # AE133	$2^5/_8$" Dia.	$^1/_4$" NPT	0-160in. H_2O and 0-400 mbar
	Part # AE133A	$2^5/_8$ Dia.,	$^1/_4$" NPT	0-200in. H_2O
Vacuum Gauge	Part # AJ497	$2^5/_8$" Dia.	$^1/_4$" NPT	0-60in. H_2O and 0-150mbar
	Part # AE134	$2^5/_8$" Dia.	$^1/_4$" NPT	0-160in. H_2O and 0-400

Pressure/Vacuum Relief Valve

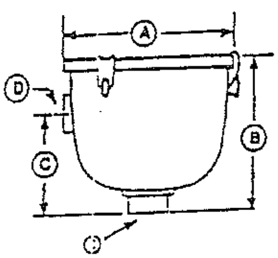


Part # AG258 — $1^1/_2$" NPT — Adjustable 30-200 in. H_2O 200 cfm max
Silencer for AG258 Relief Valve — Part # AJ121D

Part # AG258F — $2^1/_2$" NPT — Adjustable 25-200 in. H_2O 560 cfm max
Silencer for AG258F Relief Valve — Part # AJ121G

INLINE FILTERS (FOR VACUUM)

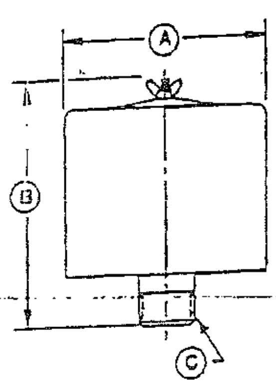
The impeller of a blower passes very close to the housing.
It is recommended to have an inlet or in-line filter to ensure trouble-free life.



Model Number	R1	R2	R3	R4	SDR4, R4P, R5, R4H	SDR5, SDR6, R6, R7H, R6P, R4M, R7M	SDR6P, R6PP, R6PS, R7, R7S	R8M, R9
Part Number	AJ151A	AJ151B	AJ151C	AJ151D	AJ151E	AJ151G	AJ151H	AJ151L
Dimension A	5.93"	7.38"	7.38"	7.38"	8.75"	8.00"	14.00"	14.00"
Dimension B	4.50"	6.81"	6.81"	6.81"	10.25"	10.25"	26.50"	27.13"
Dimension C	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	18.13"	18.5"
Dimension D	1" FPT	1" FPT	$1^1/_4$" FPT	1 1/2" FPT	2" FPT	$2^1/_2$" FPT	3" MPT	4" MPT
Dimension E	1" FPT	1" FPT	$1^1/_4$" FPT	$1^1/_2$" FPT	2" FPT	$2^1/_2$" FPT	3" MPT	4" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135C
Micron	10	10	10	10	10	10	10	10

MPT = Male Pipe Thread FPT = Female Pipe Thread

INLET FILTERS (FOR PRESSURE)

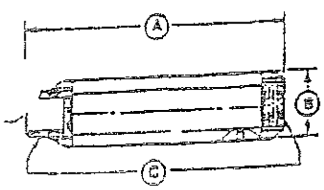


Model Number	R1, R2	R3	R4, R5, SDR4, R4P	SDR5, R6, R4M, R7H, SDR6, R6P, R6PP, R6PS	SDR6P, R7, R7P, R7S	R9, R9P
Part Number	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G	AJ126L
Dimension A	6.00"	6.00"	7.70"	10.63"	10.00"	10.00"
Dimension B	4.62"	7.12"	7.25"	4.81"	13.12"	14.62"
Dimension C	1" MPT	$1^1/_4$" MPT	$1^1/_2$" MPT	2" FPT	$2^1/_2$" MPT	4" MPT
Replacement Element	*AJ134B*	*AJ134C*	*AJ134E*	*AG340*	*AJ135A*	*AJ135H*
Micron	10	10	10	10	10	10

MPT = Male Pipe Threads FPT = Female Pipe Threads All are heavy duty for high amount of particulates, Inlet filters for REGENAIR blowers are drip-proof when mounted as shown.

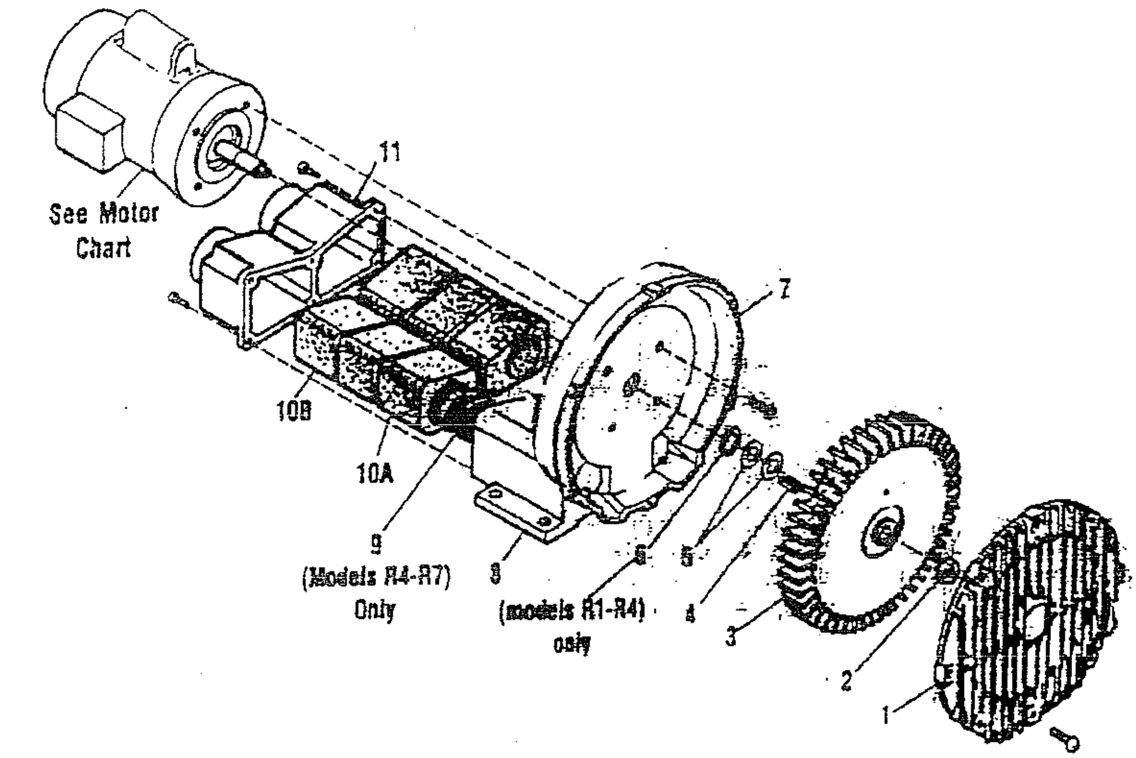
MUFFLERS

Designed to reduce noise by up to 5 dbA and remove high frequency sound associated with all blowers.



Model Number	R1 & R2	R3	R4, R5, SDR4, R4P	R4H, R4M, R6, R6P, SDR6P, SDR6, R6PP, R6PS	R7, R7S	R9	R7P	R9P
Part Number	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121H	AJ121M	AJ121[illegible]
Dimension A	7.46"	7.94"	12.75"	17.05"	17.44"	20.3"	33.6"	39"
Dimension B	2.38"	2.62"	3.25"	3.63"	4.25"	4.75"	6.0"	7.0"
Dimension C	1" NPT	$1^1/_4$" NPT	$1^1/_2$" NPT	2" NPT	$2^1/_2$" NPT	3" NPT	4" NPT	5" NPT

EXPLODED VIEW AND PARTS ORDERING INFORMATION



PARTS ORDERING INFORMATION

Ref. No.	Description	Part Qty	R1102	R2103 R2303A	R3105-1 R3305A-1	R3105-12	R4110-2 R4310A-2	R4P115 R4P315A	R6PP3110M R6PS3110M
	Cover	1	AJ101A	AJ101B	AJ101C	AJ101C	AJ101D	AJ101L	AJ101KA
	Stop nut	1	BC187	BC187	BC181	BC181	BC181	BC181	BB718
3	Impeller	1	AJ102A	AJ102BQ	AJ102C	AJ102CA	AJ102D	AJ102L	AJ102KA
4	Square Key	1	AH212C	AH212	AB136A	AB136A	AB136D	AB136	AB136
5	Shim Spacer	As Req.	AE686-5	AE686-3	AJ109	AJ109	AJ109	AJ109	AJ169
6	Retaining Ring	1	AJ145	AJ145	AJ149	AJ149	AJ149	-	-
7	Housing	1	AJ103A	AJ103BQ	AJ103C	AJ103C	AJ103DR	AJ103L	AJ103KD
8	Muffler Box	1	-	-	-	-	-		-
9	Spring	2	-	-	-	-	AJ113DR	AJ113DQ	-
10A	Foam	As Req.	(4)AJ112A	(4)AJ112B	(4)AJ112C	(4)AJ112C	(4)AJ112DS	AJ113ER	-
10B	Foam	2	-	AJ112BQ	AJ112CQ	AJ112CQ	AJ112DR	-	-
11	Muffler Extension	1	AJ106A	AJ106BQ	AJ106CQ	AJ106CQ	AJ106DQ	AJ106FR	-

PARTS ORDERING INFORMATION

Ref. No.	Description	Part Qty	R5325A-2 R5125-2	R6350A-2 R6335A-2 R6150J-2	R6P350A R6P335A	R6P355A	R7100A-3	R7P3180M R7S3180M	R5P3300M	R93150A
1	Cover	1	AJ101EQ	AJ101FB	AJ101K	AJ101KA	AJ101G	AJ101G	AJ101M	AJ101M
2	Bolt	1	BB617B	BB617B	BB617B	BB718	BB718	BB718	BB707	BB707
3	Impeller	1	AJ102E	AJ102FR	AJ102K	AJ102KA	AJ102GZ	AJ102GZ	AJ102M	AJ102M
4	Square Key	1	AB136	AB136	AB136	AB136	AC528	AC528	AC528M	AC528M
5	Shim Spacer	As Req.	AJ109	AJ109	AJ109	AJ169	AJ110	AJ110	BJ110	BJ110
7	Housing	1	AJ103EQ	AJ103FQ	AJ103K	AJ103KA	AJ103GA	AJ103GA	AJ103M	AJ103M
8	Muffler Box	1	-	-	AJ104K	AJ104K	AJ104GA	-	-	AJ104M
	Spring	2	AJ113DQ	AJ113FQ	AJ113FQ	AJ113FQ	AJ113G	-	-	AJ113M
	Foam	As Req.	(6)AJ112ER	(6)AJ112FC	(8)AJ112K	(8)AJ112K	(8)AJ112GA	-	-	(10)AJ112M
11	Muffler Extension	1	AJ106EQ	AJ106FR	-	-	-	-	-	

* Parts listed are for stock models. For specific CEM models consult the factory. When corresponding or ordering parts, please give complete model and serial numbers.

R1102, R2103, R2105, R3105-1,
R3105-12, R4110-2, R4P115, R5125-2, R6125-2

Low Voltage - Single Phase

Blue	P1	Line
Brown	P2	Tie Together
Black	5	Insulate
Orange	3	
White	2	Tie Together
Yellow	4	Line

High Voltage - Single Phase

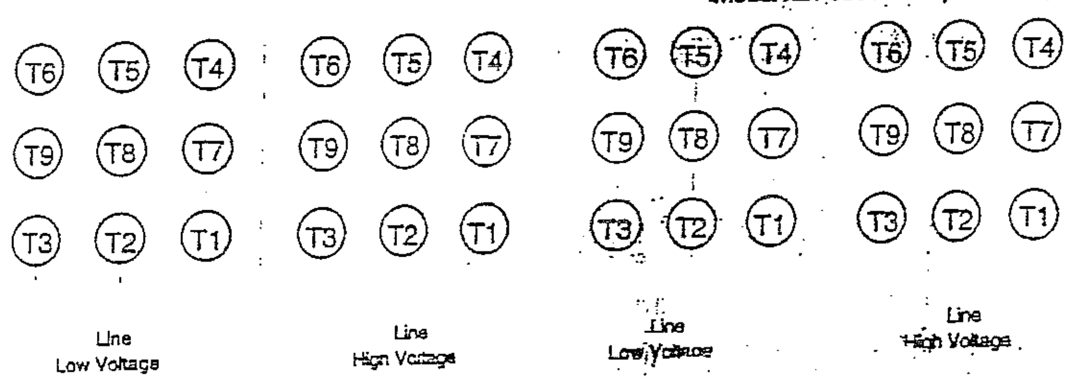
Blue	P1	Line
Brown	P2	Insulate
Black	5	
Orange	3	Tie Together Insulate
White	2	
Yellow	4	Line

Models
R2303A, R3305A-1, R3305A-13, R4310A-2,
R4P315A, R6350A-2, R6P350A, R6PP3110M,
R6PS3110M, R7100A-3, R7P3180M, R7S3180M, R93150A

NOTE: Models R6P355A, R4H3060A and R4H3090 have two additional leads labeled "J" for an external thermal motor protection circuit.

Connections for 3 Phase, 9 Leads

Model R9P3300M Only

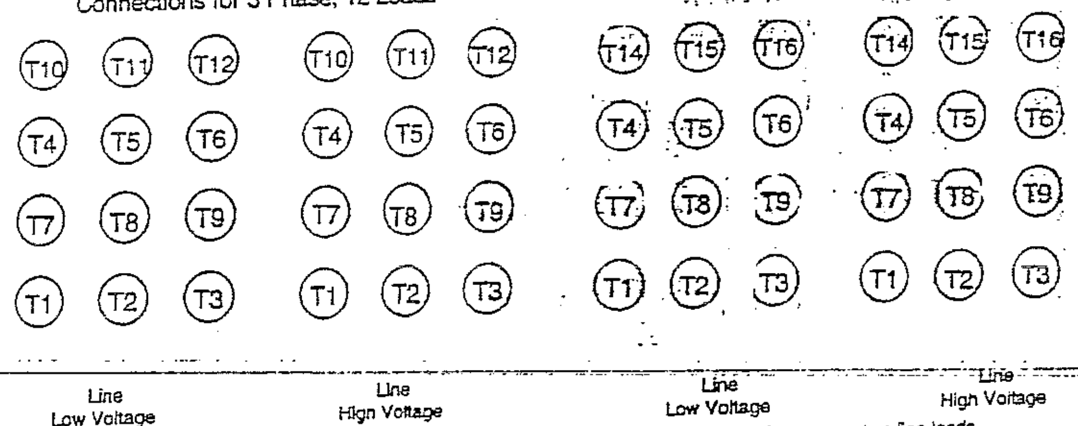


Models R6335A-2, R6P335A

Connections for 3 Phase, 12 Leads

Models R5325A-2, R6325A-2

Connections for 3 Phase, 12 Leads

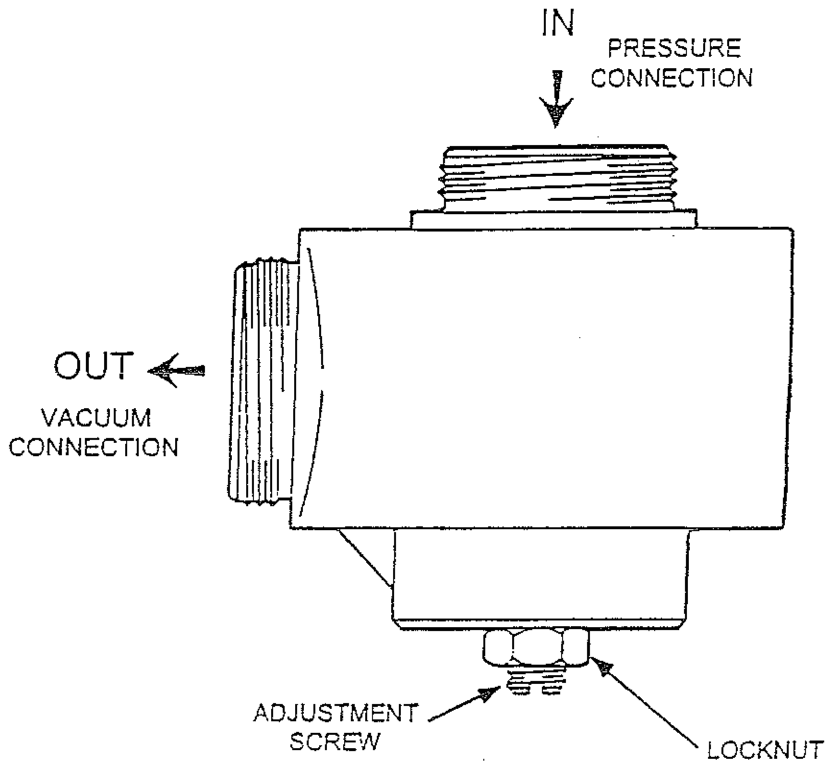


To reverse rotation on any three phase motor, interchange any two external motor line connections to any two line leads.

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE DIAGNOSIS	POSSIBLE REMEDY
Abnormal sound	Impeller damaged or contaminated by foreign material	Replace or clean impeller Install adequate filtration
Increase in sound	Foreign material or heat can destroy muffler foam	Replace foam muffler elements Filter foreign material
Blown Fuse	Electrical wiring problem	Have qualified person check that impeller turns Check fuse, wiring diagram, or wiring capacity
Unit very hot	Running at too high a pressure or vacuum	Install a relief valve and pressure or vacuum gauge

BLOWER PRESSURE/VACUUM RELIEF VALVE (AG258 or AG258F) OPERATING INSTRUCTIONS



AUTHORIZED SERVICE FACILITIES

Gast Manufacturing Corp
2300 Highway M-139
Benton Harbor, MI 49023
TEL: 616-926-6171
FAX: 616-927-0808

Gast Manufacturing Corp
505 Washington Ave
Carlstadt, NJ 07072
TEL: 201-933-8484
FAX: 201-933-5545

Brenner Fiedler & Assoc.
13824 Bentley Place
Cerritos, CA 90701
TEL: 800-843-5558
TEL: 310-404-2721
FAX: 310-404-7975

Gast Manufacturing Co., Ltd
Beech House, Knaves Beech
Business Centre, Loudwater
High Wycombe, Bucks HP 10 9SD
England
TEL: 011 44 628 532600
FAX: 011 44 628 532470

Wainbee Limited
215 Brunswick Blvd.
Pointe Claire, Quebec
Canada H9R 4R7
TEL: 514-697-8810
FAX: 514-697-3070

Wainbee Limited
5789 Coopers Avenue
Mississauga, Ontario
Canada L4Z 3S6
TEL: 416-213-7202
FAX: 416-213-7207

Japan Machinery Co. Ltd.
Central PO Box 1451
Tokyo, 100-91 Japan
TEL: 81-3-3573-5421
FAX: 81-3-3571-7865
or: 81-3-3571-7896

NOTE: General Correspondence should be sent to--
Gast Manufacturing Corp.
P O Box 97
Benton Harbor, MI 49022-0097

KEEP THIS DOCUMENT FOR FUTURE REFERENCE

This is the hazard alert symbol: ⚠ When you see this symbol, be aware that personal injury or property damage is possible. The hazard is explained in the text following the symbol. Read the information carefully before proceeding.

The following is an explanation of the three different types of hazards:

⚠ DANGER Severe personal injury or death will occur if hazard is ignored.

⚠ WARNING Severe personal injury or death can occur if hazard is ignored.

⚠ CAUTION Minor injury or property damage can occur if hazard is ignored.

GENERAL INFORMATION

By setting a relief valve at a given pressure or vacuum duty you can be assured that no harm will come to the blower or products in your application from excessive duties. The AG258 & AG258F blower relief valves can be adjusted to limit the pressure and/or vacuum level and maintain adequate air flow through the blower to prevent damage from excessive heat.

⚠ WARNING Operating Regenair Regenerative blowers with more than 1 HP motors, and insufficient air flow can result in damage to the blower by excessive heating of the air passing through the blower.

INSTALLATION

⚠ WARNING When installing the pressure or vacuum relief valve, all power sources to the electric motor and any accessory devices should be disconnected and all rotating parts should be at a standstill or bodily injury could result.

⚠ CAUTION For units with air flows exceeding 200 CFM the AG258F relief valve should be used to provide proper air flow through the blower.

⚠ CAUTION Relief valve is heavy, dropping valve could cause bodily injury.

The valve is position sensitive. The recommended installation position is with the adjusting screw positioned vertically down. Fine adjustments to the limiting vacuum can be made by rotating the valve body up to 20 degrees from the vertical position.

OPERATION/ADJUSTMENT

The vacuum relief valve will have to be adjusted to limit the vacuum to the blower. The course adjustment of the relief valve is accomplished by loosening the lock nut on the adjusting screw and turning the adjusting screw with the blade of a screwdriver. Turning the adjusting screw clockwise will increase the relief valve setting, and counter clockwise will decrease the setting. Hold the screwdriver in place when retightening the lock nut.

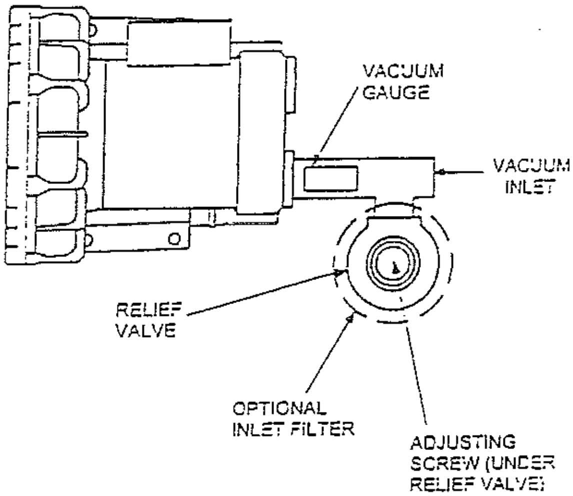
The use of the Gast pressure gauge (part# AE133, or AE133A) or vacuum gauge (part#AE134) will provide and accurate setting.

MAINTENANCE

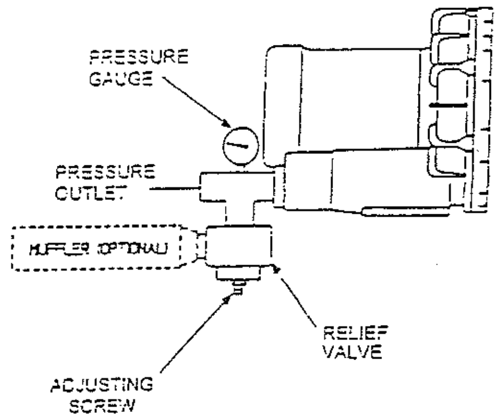
⚠ WARNING All power to the motor must be de-energized and disconnected before servicing. Failure to do so could result in severe personal injury.

All components of the valve are made of corrosion resistant metal. In normal operation the only maintenance required is cleaning the valve with Gast Flushing Solvent (AH255A). Often the valve need not be disassembled to clean. Particular attention should be given to cleaning the small hole through the center of the piston. If this becomes clogged the valve will not function properly. A pin or small diameter wire may be used to clean the blocked hole.

TOP VIEW - VACUUM SETUP



SIDE VIEW - PRESSURE SETUP

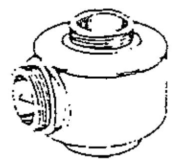


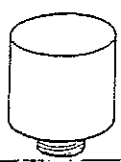
Accessories for GAST REGENAIR Blowers

Relief Valve

By setting a relief valve at a given pressure/vacuum you can be assured that no harm will come to the blower or products in your application from excessive duties.

AG258





PV
Series

- Pressure/Vacuum Relief Valve, 1 1/2" NPT, Adjustable 30-170 in. H_2O, 200 cfm max. **Part #AG258**
- Silencer for AG258 Relief Valve **Part #AJ121D**
- Pressure/Vacuum Relief Valve, 2 1/2"NPT, Adjustable for higher flows. **Part #AG258F**
- Silencer for AG258F Relief Valve, **Part #AJ121G**
- Pressure Relief Valve, 1 1/4" NPT, preset for 6.5 psi for 50 Hz, **Part #PV065**
- Pressure Relief Valve, 1 1/4" NPT, preset for 7.2 psi, for 60 Hz, **Part #PV072**
- Pressure Relief Valve, 1 1/4" NPT, preset for 8.4 psi, for 50 Hz, **Part #PV084**
- Pressure Relief Valve, 1 1/4" NPT, preset for 9.1 psi, for 60 Hz, **Part #PV091**
- Pressure Relief Valve, 1 1/4" NPT, preset for 9.8 psi, for 50 Hz, **Part #PV098**
- Pressure Relief Valve, 1 1/4" NPT, preset for 10.2 psi, for 60 Hz, **Part #PV102**

Pressure-Vacuum Gauge

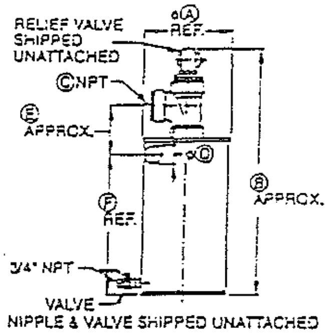
To monitor the system performance so as not to exceed maximum duties. Using two (one on each side of the filter) is a great way to know when the filter needs servicing.

- Pressure Gauge, Part# AJ496, 2 5/8" Dia., 1/4" NPT, 0-60in. H_2O and 0-150 mbar
- Pressure Gauge, Part# AE133, 2 5/8" Dia., 1/4" NPT, 0-160in. H_2O and 0-400 mbar
- Pressure Gauge, Part# AE133A, 2 5/8" Dia., 1/4" NPT, 0-200in. H_2O

- Vacuum Gauge, Part# AJ497, 2 5/8" Dia., 1/4" NPT, 0-60in. H_2O and 0-150 mbar
- Vacuum Gauge, Part# AE134, 2 5/8" Dia., 1/4" NPT, 0-160 in. H_2O and 0-400 mbar

Moisture Separators (for vacuum)

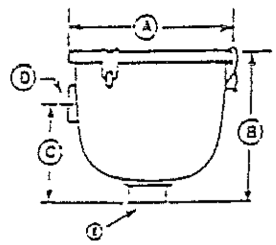
The purpose of the moisture separator is to remove liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and a build up of mineral deposits.



Model No.	R4, R4P, R5 R2M, R3M	R4, R4P, R5, R6, R6M	R5, R6, R6P, R6PS	R6P, R6PP, R7, R7S
Part No.	RMS160	RMS200	RMS300	RMS400
Liquid Cap (gal.)	10	19	19	40
A (dia.)	14.3"	19.7"	19.7"	24"
Dim. B	41.5"	39"	39"	48"
C (NPT)	2"	2"	2.5"	3"
D (dia.)	2"	2"	2.5"	3"
Dim. E	7.5"	7.5"	7.5"	9.7"
Dim. F	26.5"	26.5"	26.6"	29"

Inline Filters (for vacuum)

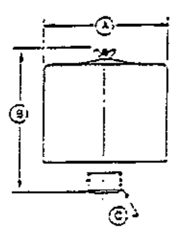
The impeller of a blower passes very close to the housing. It is recommended to have an inlet or inline filter to ensure troublefree life.



Model No.	R1	R2	R3, R1H	R4, R2H, R2M, R3M, R3H	SDR4, R4P, R5, R7H, R8H, R4H	SDR5, SDR6, R6, R6P, R9H, R5M, R6M, R7M	SDR6P, R6PP, R6PS, R7, R7S	R8M	R9M
Part No.	AJ151A	AJ151B	AJ151C	AJ151C	AJ151E	AJ151G	AJ151H	AJ151L	AJ151M
Dim. A	5.93"	7.38"	7.38"	7.38"	8.75"	8.00"	14.00"	14.00"	19.50"
Dim. B	4.50"	6.31"	6.31"	6.31"	10.25"	10.25"	25.50"	27.13"	28.13"
Dim. C	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	15.13"	18.5"	19.50"
Dim. D	1" FPT	1" FPT	1 1/4" FPT	1 1/2" FPT	2" FPT	2 1/2" FPT	3" MPT	4" MPT	5" MPT
Dim. E	1" FPT	1" FPT	1 1/4" FPT	1 1/2" FPT	2" FPT	2 1/2" FPT	3" MPT	4" MPT	5" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135C	AJ135H
Micron	10	10	10	10	10	10	10	10	10

MPT = Male Pipe Thread FPT = Female Pipe Thread

Inlet Filters (for pressure)

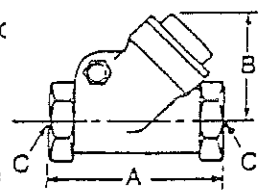


Model No.	R1 & R2	R3	R4, R5, SDR4 & R4P	SDR5, R5, SDR6, R6P, R6PP, R6PS	SDR6P, R7, R7P, R7S
Part No.	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G
Dim. A	6.00"	6.00"	7.73"	10.63"	10.00"
Dim. B	4.62"	[illegible]	7.25"	4.81"	13.12"
Dim. C	1" MPT	1 1/4" MPT	1 1/2" MPT	2" FPT	2 1/2" MPT
Replacement Element	AJ134B	AJ134C	AJ134E	AG340	AJ135A
Micron	10	10	10	10	10

MPT = Male Pipe Thread FPT = Female Pipe Thread
All are heavy-duty for high amount of particulates.
Inlet filters for REGENAIR blowers are drip-proof when mounted as shown.

Horizontal Swing Type Check Valve

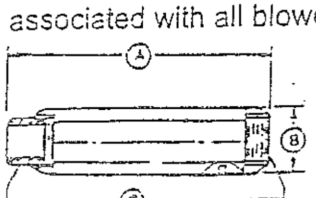
Designed to prevent backwash of fluids that would enter the blower. Also prevents air back-streaming if needed. They can be mounted with their discharge either vertical or horizontal. Valve will open with 3" of water pressure.



Model No.	R1 & R2	R3	R4, R5, SDR4, SDR5, R4P	R6, R6P, R6PS, SDR6, SDR6P	R7, R7S
Part No.	AH326B	AH326C	AH326D	AH326F	AH326G
Dim. A	3.57"	4.19"	4.50"	5.25"	8"
Dim. B	2.32"	2.69"	2.94"	3.82"	5.07"
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT

Mufflers

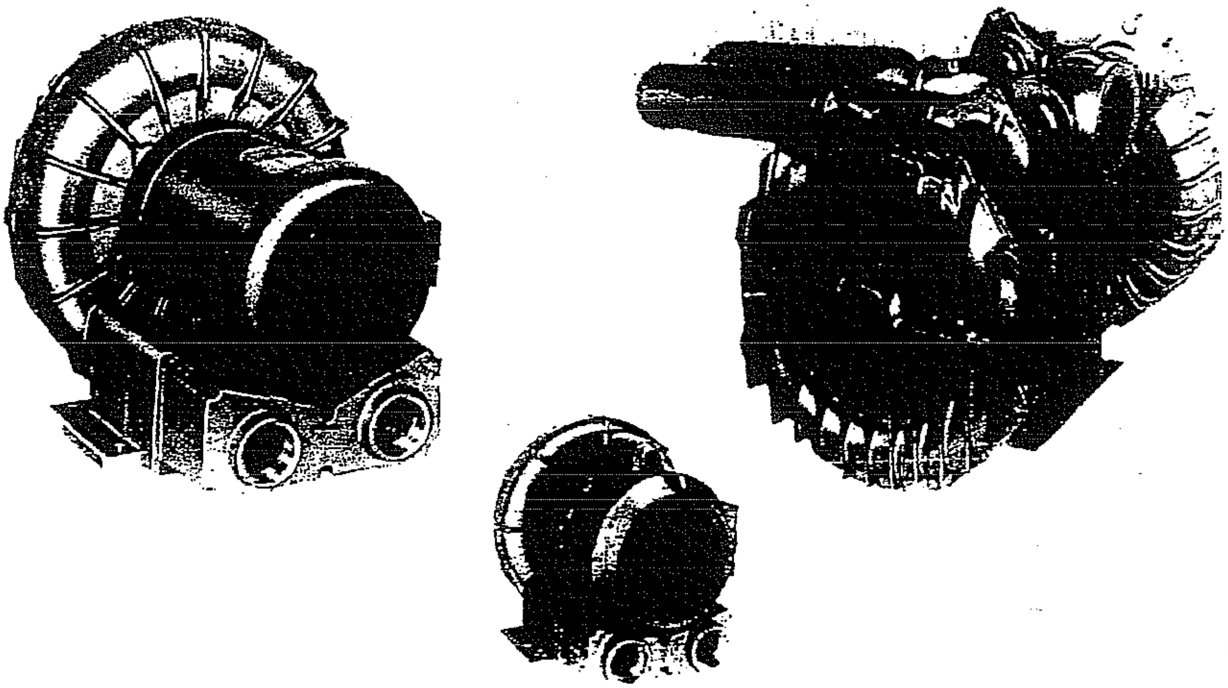
Designed to reduce noise by up to 5 dbA and remove high frequency sound associated with all blowers.



Model No.	R1 & R2	R3	R4, R5, SDR4, R4P	R6, SDR6P, SDR6, R6P, R6PP, R6PS	R7, R7P	R7S
Part No.	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121GE
Dim. A	7.46"	7.94"	12.75"	17.05"	17.44"	17.44"
Dim. B	2.38"	2.62"	3.25"	3.63"	4.25"	4.25"
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT	2 1/2" NPT

GAST®
A Unit of IDEX Corporation

STANDARD REGENAIR BLOWER OPERATION & MAINTENANCE MANU



CONTENTS:

ISO 9001 CERTIFIED

Visit us at our websi
www.gastmfg.com

KEEP THIS DOCUMENT FOR FUTURE REFERENCE

his is the hazard alert symbol: ⚠. When you see this mbol, be aware that personal injury or property a is possible. The hazard is explained in the text ollowing the symbol. Read the information carefully fore proceeding.

The following is an explanation of the three lifferent types of hazards:

⚠ **DANGER** Severe personal injury or death will occur if hazard is ignored.

⚠ **WARNING** Severe personal injury or death can occur if hazard is ignored.

⚠ **CAUTION** Minor injury or property damage can occur if hazard is ignored.

NERAL INFORMATION

hese instructions do not apply to:

Blowers without motors, SDR Series

M & H Series, model number with M or H as third character

3) Blowers powered with Explosion Proof Motors

DANGER Pumping flammable or explosive gases or operating this unit in an atmosphere containing them can result in fire or explosion damage to unit and surrounding environment.

wer is only to be used for pumping air and under o circumstances be used with any other gases. Blower st not be used for pumping fluids, particles, solids, or substance likely to cause fire or explosion.

⚠ **WARNING** Keep hands or other body parts away from blower suction which can cause severe lacerations and limb loss.

⚠ **CAUTION** Operating blower above recommended 40° C (105° F) temperature can result in overheating or fire damage. For higher ambient operation, consult the factory.

CAUTION Blowers may generate heat. To prevent burns to skin, do not touch blower during operation or until unit has cooled.

wer performance is reduced by lower atmospheric ressure found at high altitudes, consult the factory or a Gast distributor for details.

NSTALLATION

PORTANT

move any plastic caps before starting blower. Any or naterial (burrs, chips, welding drops, slag, pipe , excess sealant, sand, lime, etc.) must be noved, or filtered out. Any such material, no matter ow small, entering blower can damage it. Clean out plumbing before attaching to blower inlet.

Mounting

The single impeller blower may be installed in any orientation as long as flow of cool, ambient air over blower is not blocked. The dual impeller models must be mounted with shaft horizontal.

⚠ **CAUTION** Attach blower to solid surface before starting, to prevent injury or damage from unit movement.

⚠ **CAUTION** Blower must be installed with a proper sized inlet filter, gauge, and relief valve; if not, blower can be permanently destroyed due to foreign material entry and thermal expansion causing catastrophic failure.

The flow of cooling air over the blower and motor must not be blocked. It is very important to install blower in well-ventilated area where temperature does not exceed 40°C. Check this temperature after blower has been running for an hour.

Strong forced ventilation is often needed for larger blowers. In vacuum service, hot discharge air of larger blowers, must be plumbed away to avoid overheating room or enclosure where blower is located. Discharge excess air into atmosphere, through a relief valve.

Wiring

⚠ **WARNING** Electrical shock or fire hazard can result fro incorrect wiring.

Wiring must conform to all required safety codes and be installed by a qualified person. Grounding is required.

Fuses protect wiring against short circuits. On motors without Automatic restart, thermal protection or magnetic over-current cutouts are absolutely necessary to prevent motor overloading. This is due to the following, one phase in a three-phase electric system, high starting frequency, or jammed blower. Required power will rise as differential pressure increases. For motor wiring diagram, see inside of conduit box or motor nameplate. Large motors may have two nameplates, one for 50Hz, the other for 60Hz. Be sure that all dual-voltage motors are wired for power source.

Rotation

Blower should only rotate clockwise as viewed from motor side. This is marked with an arrow on most castings. Proper rotation can be confirmed by checking air flow at IN and OUT ports. On blowers powered by a 3-phase motor, changing any two power lines can reverse rotation.

Plumbing

Connect motor and check rotation direction before connecting plumbing. Threaded-pipe ports are designed as connection ports only and will not support plumbing. Be sure to use same or larger size pipe and fittings to prevent air flow restriction and overheating blower.

When installing plumbing, be sure to use a small amount of p[illegible]e-thread lubricant. This protects the aluminum blower t[illegible]s. When installing two blowers in parallel, use plumbing t[illegible] [illegible]ole pipe sizes larger in diameter than that of blower.

[illegible]ccessories

Keep in mind filters progressively increase losses, due to c[illegible]ogging. Install a vacuum gauge to monitor filter restriction. I[illegible]stall a relief valve to avoid overloading of large blowers, caused by changes in pressure or vacuum.

I[illegible] using blower in a vacuum application in a dirty environment, an intake filter must be used with relief valve to prevent entry of foreign material into blower. A moisture separator is necessary [illegible] applications where there is high humidity or liquids being used in process. See Recommended Accessories on page 4-7 and consult distributor for details.

[illegible]o not install check valves that close with a strong spring due to their large pressure loss. Check valves listed in [illegible]ccessory section (page 4) are recommended. They have [illegible]inimal pressure drop, positive sealing, and are resistant to high discharge temperatures of large blowers.

OPERATION

⚠ **CAUTION** Avoid running R4 size blowers or larger with no air flow through them; this will damage blower. Protect with Gast recommended pressure or vacuum relief valve.

⚠ **WARNING** Solid or liquid material exiting blower or piping can cause eye or skin damage. Keep away from air stream.

⚠ **WARNING** Some of these models may exceed 85 dB(A). When in close proximity to these models hearing protection is required. See Technical Data Sheet (if provided), for specific model(s).

Do not exceed maximum pressure or vacuum capabilities marked on data label of unit.

[illegible]it correct-sized pipes and choose accessories that reduce to a minimum air friction load loss. Do not throttle discharge or [illegible]uction pipe to reduce capacity. Throttling increases differential pressure, which consequently increases power absorption and working temperature. When blower is ran at [illegible]uties above 125mbar (50" H20) metal pipe may be required for hot exhaust air.

⚠ **CAUTION** Air temperature increases when passing through blower. Outlet piping can cause burns. Access to these hot temperature areas should be guarded, limited, or marked "HOT".

Once blower is in operation, check the following:

- Working pressure and vacuum values.
- Adjust relief valve pressure or vacuum setting, if needed.
- Measure motor current and compare with motor nameplate data.
- Rated electrical overload cutout.
- Check ambient and discharge air temperatures to ensure they do not exceed allowed values one hour after starting. Exhaust air should not exceed 230° F for all blowers except R6PS and R7S models.

MAINTENANCE

⚠ **WARNING** Power must be de-energized and disconnected before servicing. Be sure all rotating parts have stopped. Electric shock or severe cuts can result if hazard is ignored.

Noise-absorbing foam used in mufflers needs to be periodically replaced. The electric motor and blower also need periodic cleaning to remove accumulated dust and dirt. If they are not cleaned, this can result in excessive vibration, an increase in temperature, or can reduce service life of the blower. Initial inspection is suggested at 8000 hours, then user should determine frequency.

An increase in differential pressure across an inlet filter indicates its getting clogged. Clean inlet air filter as often as needed, blowing down against current to clean it. Change cartridge when cleaning no longer gets cartridge clean.

A dirty cartridge causes a high intake resistance resulting in an increase of differential pressure, absorbed power, and working temperature.

The motor bearings of small motors (Less than 51/2 HP, refer to motor nameplate), are greased for long life. Large motors (51/2 HP or larger, refer to 60 Hz motor nameplate), are equipped with alemite grease fittings. To relubricate these bearings clean tip of grease gun and apply grease to fitting. Use one or two strokes of Shell Dolium R grease.

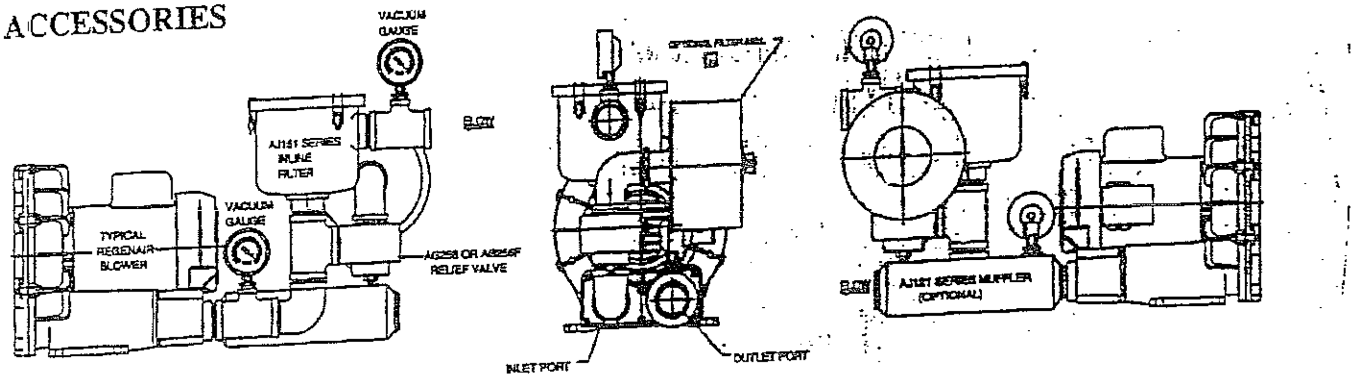
Hours of Service per year	Suggested Relubrication Interval
5,000	3 years
Continual Normal Application	1 year
Seasonal Service (motor idle for 6 monthes or more)	1 year beginning of season
Continuous-high ambients, dirty or moist applications	6 months

Gast will not guarantee a field-rebuilt blower. If repairs are needed contact or send blower to a Gast authorized service facility.

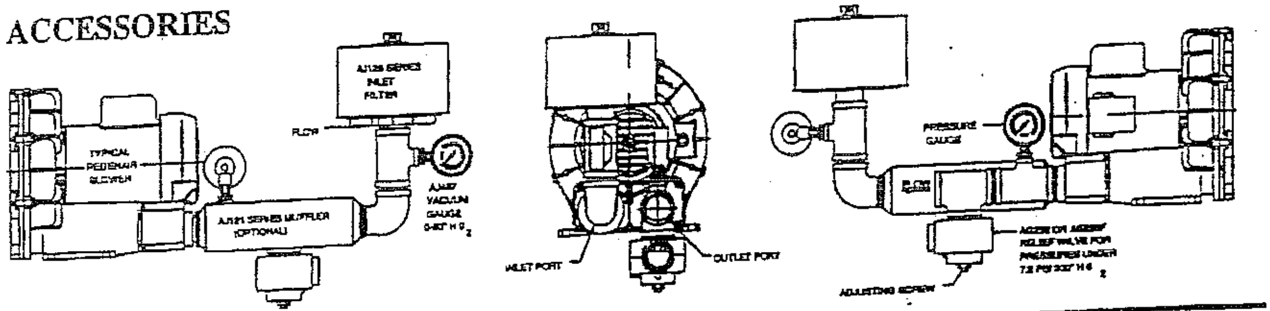
ECOMMENDED ACCESSORIES CONFIGURATION ASSEMBLY

se . only suggested configurations for these accessories. These configurations may vary depending on the li n this unit is being used in.

CUUM ACCESSORIES



SSURE ACCESSORIES



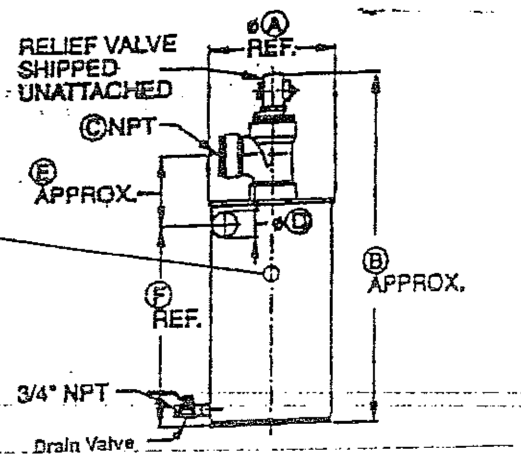
MOISTURE SEPARATOR (FOR VACUUM)

The purpose of the moisture separator is to remove liquids from the gas stream in a vacuum process. This helps protect the blower from corrosion and a build up of mineral deposits.

Explosion-proof high level float switch AJ213 is optional.

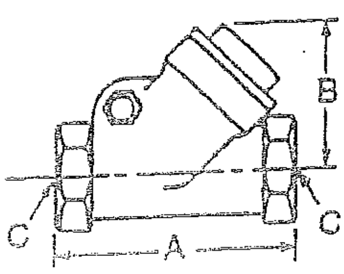
Model Number	R4, R4P, R5, R2M, R3M	R4, R4P, R5, R6, R6M	R5, R6, R6P, R6PS	R6P, R6PP, R7, R7S
Part Number	RMS160	RMS200	RMS300	RMS400
CFM Capacity	160	200	300	400
Liquid cap (gallon)	10	19	19	40
A (diameter)	14.8"	19.7"	19.7"	24"
Dimension B	41.5"	39"	39"	48"
C (NPT) outlet	2"	2"	2.5"	3"
D (diameter) inlet	2"	2"	2.5"	3"
Dimension E	7.5"	7.5"	7.5"	9.7"
Dimension F	26.6"	26.6"	26.6"	29"

Maximum vacuum allowed 22 inches Hg



HORIZONTAL SWING TYPE CHECK VALVE

Designed to prevent backwash of fluids that would enter the blower. Also prevents air back-streaming if needed. They can be mounted with their discharge either vertical or horizontal. Valve will open with 3" of water pressure.

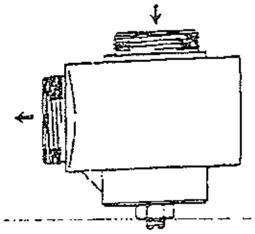


Model Number	R1 & R2	R3	R4, R5, SDR4, SDR4, R4P	R6, R6P, SDR6P, SDR6, R6PS	R7, R7S
Part Number	AH326B	AH326C	AH326D	AH326F	AH326G
Dimension A	3.57"	4.19"	4.50"	5.25"	8.00"
Dimension B	2.32"	2.69"	2.94"	3.82"	5.07"
Dimension C	1" NPT	1¼" NPT	1¼" NPT	2" NPT	2½" NPT

Pressure/Vacuum Gauges

Pressure Gauge	Part # AJ496	$2^5/_8$" Dia.	$^1/_4$" NPT	0-60in. H_20 and 0-150 mbar
	Part # AE133	$2^5/_8$" Dia.	$^1/_4$" NPT	0-160in. H_20 and 0-400 mbar
	Part # AE133A	$2^5/_8$ Dia.,	$^1/_4$" NPT	0-200in. H_20
Vacuum Gauge	Part # AJ497	$2^5/_8$" Dia.	$^1/_4$" NPT	0-60in. H_20 and 0-150mbar
	Part # AE134	$2^5/_8$" Dia.	$^1/_4$" NPT	0-160in. H_20 and 0-400

Pressure/Vacuum Relief Valve

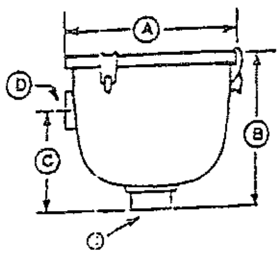


Part # AG258 $1^1/_2$" NPT Adjustable 30-200 in. H_20 200 cfm max
Silencer for AG258 Relief Valve Part # AJ121D

Part # AG258F $2^1/_2$" NPT Adjustable 25-200 in. H_20 560 cfm max
Silencer for AG258F Relief Valve Part # AJ121G

INLINE FILTERS (FOR VACUUM)

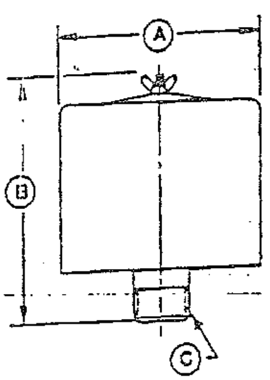
The impeller of a blower passes very close to the housing.
It is recommended to have an inlet or in-line filter to ensure trouble-free life.



Model Number	R1	R2	R3	R4	SDR4, R4P, R5, R4H	SDR5, SDR6, R6, R7H, R6P, R4M, R7M	SDR6P, R6PP, R6PS, R7, R7S	R8M, R9
Part Number	AJ151A	AJ151B	AJ151C	AJ151D	AJ151E	AJ151G	AJ151H	AJ151L
Dimension A	5.93"	7.38"	7.38"	7.38"	8.75"	8.00"	14.00"	14.00"
Dimension B	4.50"	6.81"	6.81"	6.81"	10.25"	10.25"	26.50"	27.13"
Dimension C	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	18.13"	18.5"
Dimension D	1" FPT	1" FPT	$1^1/_4$" FPT	1 1/2" FPT	2" FPT	$2^1/_2$" FPT	3"MPT	4" MPT
Dimension E	1" FPT	1" FPT	$1^1/_4$" FPT	$1^1/_2$" FPT	2" FPT	$2^1/_2$" FPT	3" MPT	4" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135G
Micron	10	10	10	10	10	10	10	10

MPT = Male Pipe Thread FPT = Female Pipe Thread

INLET FILTERS (FOR PRESSURE)

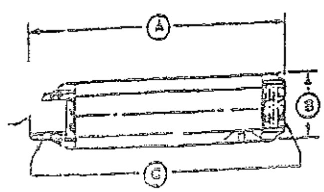


Model Number	R1, R2	R3	R4, R5, SDR4, R4P	SDR5, R6, R4M, R7H, SDR6, R6P, R6PP, R6PS	SDR6P, R7, R7P, R7S	R9, R9P
Part Number	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G	AJ126L
Dimension A	6.00"	6.00"	7.70"	10.63"	10.00"	10.00"
Dimension B	4.62"	7.12"	7.25"	4.81"	13.12"	14.62"
Dimension C	1" MPT	$1^1/_4$" MPT	$1^1/_2$" MPT	2" FPT	$2^1/_2$" MPT	4" MPT
Replacement Element	*AJ134B*	*AJ134C*	*AJ134E*	*AG340*	*AJ135A*	*AJ135H*
Micron	10	10	10	10	10	10

MPT = Male Pipe Threads FPT = Female Pipe Threads All are heavy duty for high amount of particulates, Inlet filters for REGENAIR blowers are drip-proof when mounted as shown.

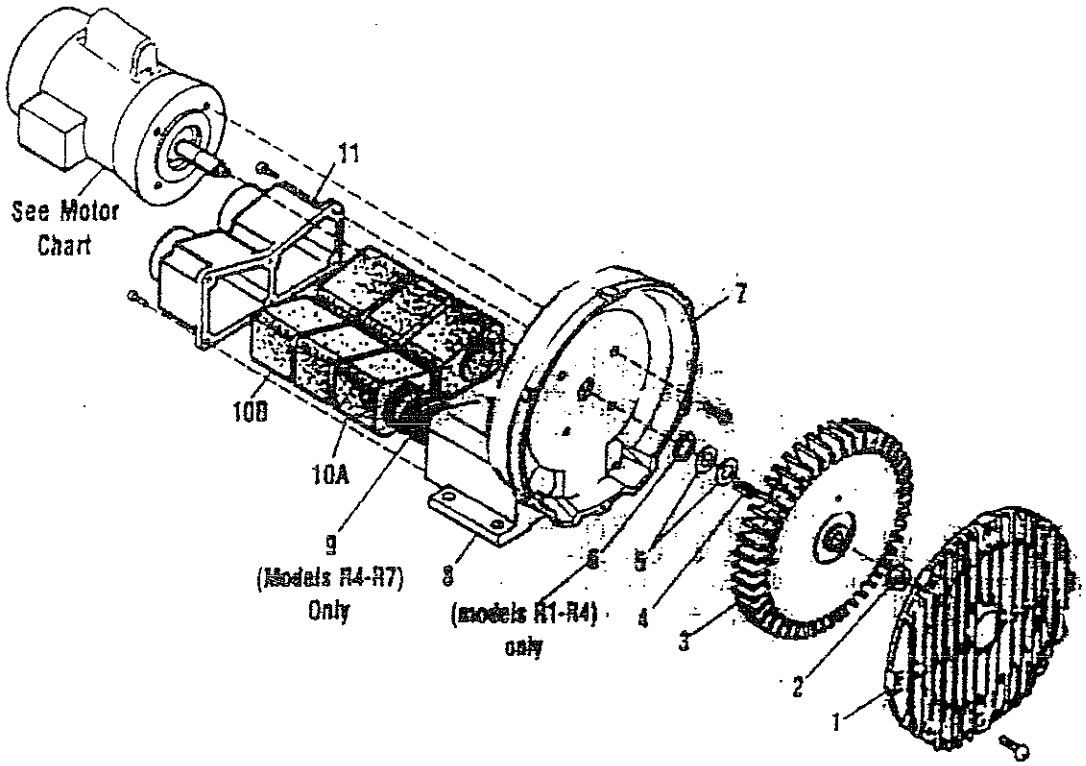
MUFFLERS

Designed to reduce noise by up to 5 dbA and remove high frequency sound associated with all blowers.



Model Number	R1 & R2	R3	R4, R5, SDR4, R4P	R4H, R4M, R6, R6P, SDR6P, SDR6, R6PP, R6PS	R7, R7S	R9	R7P	R9P
Part Number	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121H	AJ121M	AJ12[illegible]
Dimension A	7.46"	7.94"	12.75"	17.05"	17.44"	20.3"	33.6"	39"
Dimension B	2.38"	2.62"	3.25"	3.63"	4.25"	4.75"	6.0"	7.0"
Dimension C	1" NPT	$1^1/_4$" NPT	$1^1/_2$" NPT	2" NPT	$2^1/_2$" NPT	3" NPT	4" NPT	5" NPT

EXPLODED VIEW AND PARTS ORDERING INFORMATION



PARTS ORDERING INFORMATION

Ref. No.	Description	Part Qty	R1102	R2103 R2303A	R3105-1 R3305A-1	R3105-12	R4110-2 R4310A-2	R4P115 R4P315A	R6PP3110M R6PS3110M
	Cover	1	AJ101A	AJ101B	AJ101C	AJ101C	AJ101D	AJ101L	AJ101KA
	Stopnut	1	BC187	BC187	BC181	BC181	BC181	BC181	BB718
3	Impeller	1	AJ102A	AJ102BQ	AJ102C	AJ102CA	AJ102D	AJ102L	AJ102KA
4	Square Key	1	AH212C	AH212	AB136A	AB136A	AB136D	AB136	AB136
5	Shim Spacer	As Req.	AE686-5	AE686-3	AJ109	AJ109	AJ109	AJ109	AJ169
6	Retaining Ring	1	AJ145	AJ145	AJ149	AJ149	AJ149	-	-
7	Housing	1	AJ103A	AJ103BQ	AJ103C	AJ103C	AJ103DR	AJ103L	AJ103KD
8	Muffler Box	1	-	-	-	-	-	-	-
9	Spring	2	-	-	-	-	AJ113DR	AJ113DQ	-
10A	Foam	As Req.	(4)AJ112A	(4)AJ112B	(4)AJ112C	(4)AJ112C	(4)AJ112DS	AJ113ER	-
10B	Foam	2	-	AJ112BQ	AJ112CQ	AJ112CQ	AJ112DR	-	-
11	Muffler Extension	1	AJ106A	AJ106BQ	AJ106CQ	AJ106CQ	AJ106DQ	AJ106FR	-

PARTS ORDERING INFORMATION

Ref. No.	Description	Part Qty	R5325A-2 R5125-2	R6350A-2 R6335A-2 R6150J-2	R6P350A R6P335A	R6P355A	R7100A-3	R7P3180M R7S3180M	R9P3300M	R93150A
1	Cover	1	AJ101EQ	AJ101FB	AJ101K	AJ101KA	AJ101G	AJ101G	AJ101M	AJ101M
2	Bolt	1	BB617B	BB617B	BB617B	BB718	BB718	BB718	BB707	BB707
3	Impeller	1	AJ102E	AJ102FR	AJ102K	AJ102KA	AJ102GZ	AJ102GZ	AJ102M	AJ102M
4	Square Key	1	AB136	AB136	AB136	AB136	AC528	AC528	AC628M	AC528M
5	Shim Spacer	As Req.	AJ109	AJ109	AJ109	AJ169	AJ110	AJ110	BJ110	BJ110
7	Housing	1	AJ103EQ	AJ103FQ	AJ103K	AJ103KA	AJ103GA	AJ103GA	AJ103M	AJ103M
8	Muffler Box	1	-	-	AJ104K	AJ104K	AJ104GA	-	-	AJ104M
	Spring	2	AJ113DQ	AJ113FQ	AJ113FQ	AJ113FQ	AJ113G	-	-	AJ113M
	Foam	As Req.	(6)AJ112ER	(6)AJ112FC	(8)AJ112K	(8)AJ112K	(8)AJ112GA	-	-	(10)AJ112M
11	Muffler Extension	1	AJ106EQ	AJ106FR	-	-	-	-	-	

* Parts listed are for stock models. For specific OEM models consult the factory. When corresponding or ordering parts, please give complete model and serial numbers.

R1102, R2103, R2105, R3105-1,
R3105-12, R4110-2, R4P115, R5125-2, R6125-2

Low Voltage - Single Phase

Blue	P1	Line
Brown	P2	Tie Together
Black	5	Insulate
Orange	3	
White	2	Tie Together
Yellow	4	Line

High Voltage - Single Phase

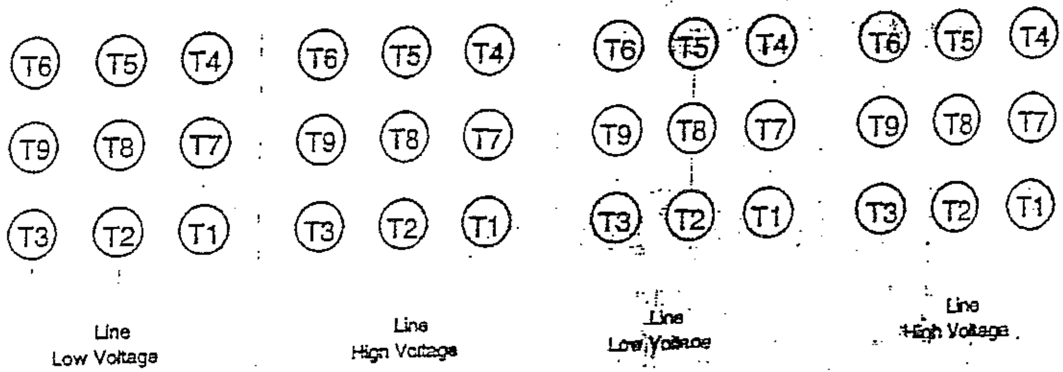
Blue	P1	Line
Brown	P2	Insulate
Black	5	
Orange	3	Tie Together
White	2	Insulate
Yellow	4	Line

Models
R2303A, R3305A-1, R3305A-13, R4310A-2,
R4P315A, R6350A-2, R6P350A, R6PP3110M,
R6PS3110M, R7100A-3, R7P3180M, R7S3180M, R93150A

NOTE: Models R6P355A, R4P3060A and R4P3060 [illegible] have two additional leads labeled "J" for an external thermal motor protection circuit.

Connections for 3 Phase, 9 Leads

Model R9P3300M Only

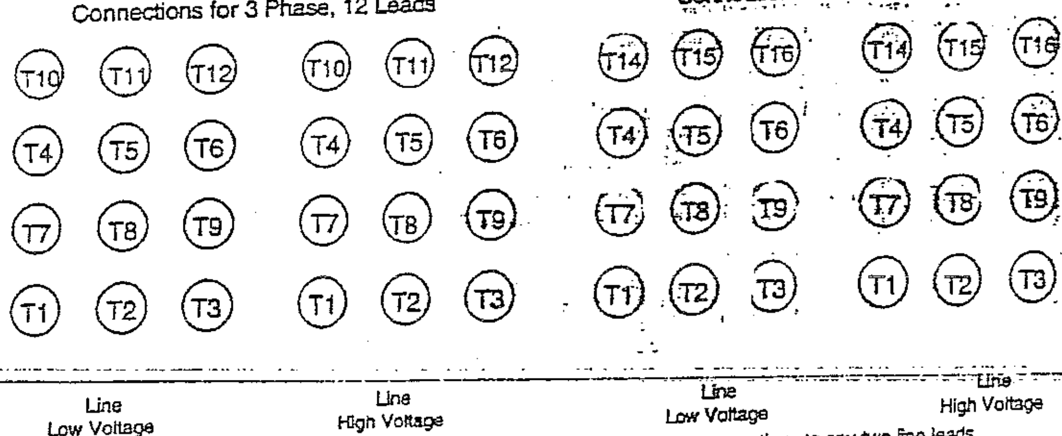


Models R6335A-2, R6P335A

Connections for 3 Phase, 12 Leads

Models R5325A-2, R6325A-2

Connections for 3 Phase, 12 Leads

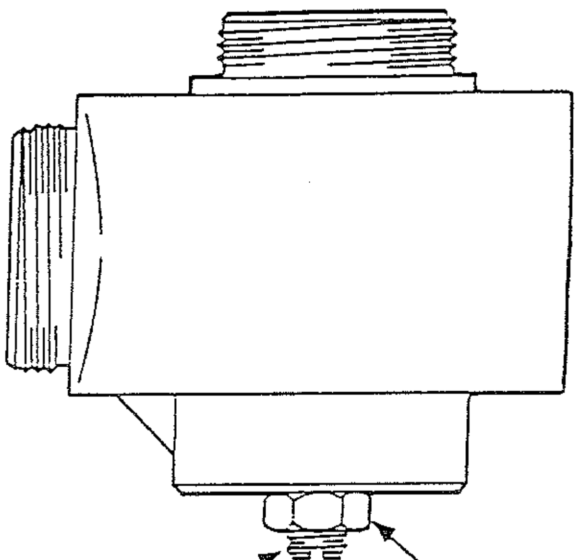


To reverse rotation on any three phase motor, interchange any two external motor line connections to any two line leads.

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE DIAGNOSIS	POSSIBLE REMEDY
Abnormal sound	Impeller damaged or contaminated by foreign material	Replace or clean impeller Install adequate filtration
Increase in sound	Foreign material or heat can destroy muffler foam	Replace foam muffler elements Filter foreign material
Blown Fuse	Electrical wiring problem	Have qualified person check that impeller turns Check fuse, wiring diagram, or wiring capacity
Unit very hot	Running at too high a pressure or vacuum	Install a relief valve and pressure or vacuum gauge

BLOWER PRESSURE/VACUUM RELIEF VALVE (AG258 or AG258F) OPERATING INSTRUCTIONS



AUTHORIZED SERVICE FACILITIES

Gast Manufacturing Corp
2300 Highway M-139
Benton Harbor, MI 49023
TEL: 616-926-6171
FAX: 616-927-0808

Gast Manufacturing Corp
505 Washington Ave
Carlstadt, NJ 07072
TEL: 201-933-8484
FAX: 201-933-5545

Brenner Fiedler & Assoc.
13824 Bentley Place
Cerritos, CA 90701
TEL: 800-843-5558
TEL: 310-404-2721
FAX: 310-404-7975

Gast Manufacturing Co., Ltd
Beech House, Knaves Beech
Business Centre, Loudwater
High Wycombe, Bucks HP 10 9SD
England
TEL: 011 44 628 532600
FAX: 011 44 628 532470

Wainbee Limited
215 Brunswick Blvd.
Pointe Claire, Quebec
Canada H9R 4R7
TEL: 514-697-8810
FAX: 514-697-3070

Wainbee Limited
5789 Coopers Avenue
Mississauga, Ontario
Canada L4Z 3S6
TEL: 416-213-7202
FAX: 416-213-7207

Japan Machinery Co. Ltd.
Central PO Box 1451
Tokyo, 100-91 Japan
TEL: 81-3-3573-5421
FAX: 81-3-3571-7865
or: 81-3-3571-7896

NOTE: General Correspondence should be sent to–
Gast Manufacturing Corp.
P O Box 97
Benton Harbor, MI 49022-0097

ISO 9001 CERTIFIED

KEEP THIS DOCUMENT FOR FUTURE REFERENCE

This is the hazard alert symbol: ⚠ When you see this symbol, be aware that personal injury or property damage is possible. The hazard is explained in the text following the symbol. Read the information carefully before proceeding.

The following is an explanation of the three different types of hazards:

⚠ DANGER Severe personal injury or death will occur if hazard is ignored.
⚠ WARNING Severe personal injury or death can occur if hazard is ignored.
⚠ CAUTION Minor injury or property damage can occur if hazard is ignored.

GENERAL INFORMATION

By setting a relief valve at a given pressure or vacuum duty you can be assured that no harm will come to the blower or products in your application from excessive duties. The AG258 & AG258F blower relief valves can be adjusted to limit the pressure and/or vacuum level and maintain adequate air flow through the blower to prevent damage from excessive at.

⚠ WARNING Operating Regenair Regenerative blowers with more than 1 HP motors, and insufficient air flow can result in damage to the blower by excessive heating of the air passing through the blower.

INSTALLATION

⚠ WARNING When installing the pressure or vacuum relief valve, all power sources to the electric motor and any accessory devices should be disconnected and all rotating parts should be at a standstill or bodily injury could result.

⚠ CAUTION For units with air flows exceeding 200 CFM the AG258F relief valve should be used to provide proper air flow through the blower.

⚠ CAUTION Relief valve is heavy, dropping valve could cause bodily injury.

The valve is position sensitive. The recommended installation position is with the adjusting screw positioned vertically down. Fine adjustments to the limiting vacuum can be made by rotating the valve body up to 20 degrees from the vertical position.

OPERATION/ADJUSTMENT

The vacuum relief valve will have to be adjusted to limit the vacuum to the blower. The course adjustment of the relief valve is accomplished by loosening the lock nut on the adjusting screw and turning the adjusting screw with the blade of a screwdriver. Turning the adjusting screw clockwise will increase the relief valve setting, and counter clockwise will decrease the setting. Hold the screwdriver in place when retightening the lock nut.

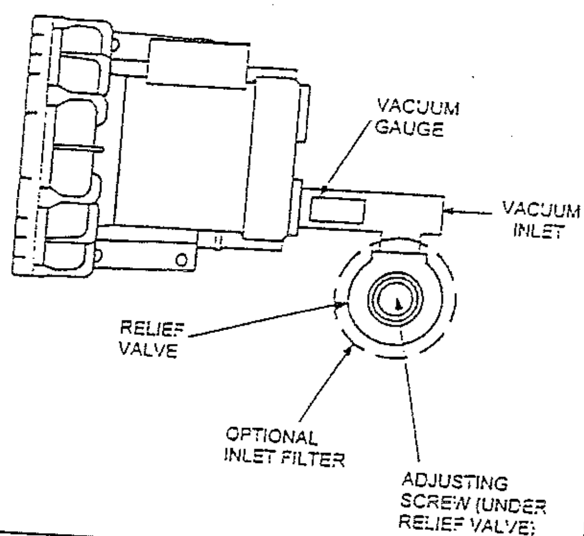
The use of the Gast pressure gauge (part# AE133, or AE133A) or vacuum gauge (part#AE134) will provide and accurate setting.

MAINTENANCE

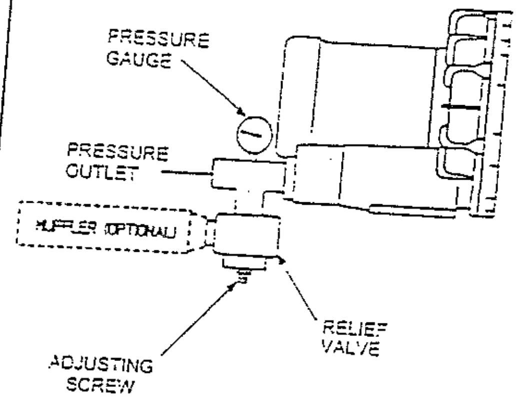
⚠ WARNING All power to the motor must be de-energized and disconnected before servicing. Failure to do so could result in severe personal injury.

All components of the valve are made of corrosion resistant metal. In normal operation the only maintenance required is cleaning the valve with Gast Flushing Solvent (AH255A). Often the valve need not be disassembled to clean. Particular attention should be given to cleaning the small hole through the center of the piston. If this becomes clogged the valve will not function properly. A pin or small diameter wire may be used to clean the blocked hole.

TOP VIEW - VACUUM SETUP



SIDE VIEW - PRESSURE SETUP

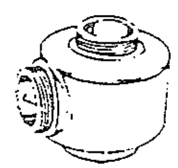


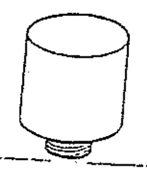
Accessories for GAST REGENAIR Blowers

Relief Valve

By setting a relief valve at a given pressure/vacuum you can be assured that no harm will come to the blower or products in your application from excessive duties.

AG258



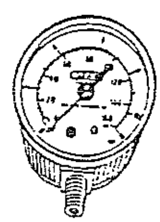


PV Series

- Pressure/Vacuum Relief Valve. $1\frac{1}{2}$" NPT. Adjustable 30-170 in. H_2O, 200 cfm max. Part #AG258
- Silencer for AG258 Relief Valve Part #AJ121D
- Pressure/Vacuum Relief Valve. $2\frac{1}{2}$"NPT, Adjustable for higher flows. Part #AG258F
- Silencer for AG258F Relief Valve, Part #AJ121G
- Pressure Relief Valve. $1\frac{1}{4}$" NPT, preset for 6.5 psi for 50 Hz. Part #PV065
- Pressure Relief Valve. $1\frac{1}{4}$" NPT. preset for 7.2 psi. for 60 Hz. Part #PV072
- Pressure Relief Valve. $1\frac{1}{4}$" NPT. preset for 8.4 psi, for 50 Hz. Part #PV084
- Pressure Relief Valve. $1\frac{1}{4}$" NPT, preset for 9.1 psi, for 60 Hz. Part #PV091
- Pressure Relief Valve. $1\frac{1}{4}$" NPT, preset for 9.8 psi, for 50 Hz. Part #PV098
- Pressure Relief Valve. $1\frac{1}{4}$" NPT, preset for 10.2 psi, for 60 Hz, Part #PV102

Pressure-Vacuum Gauge

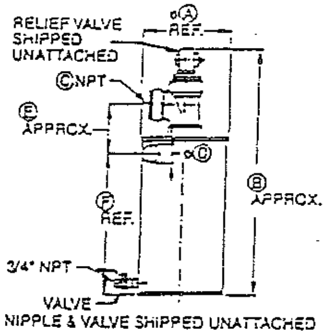
To monitor the system performance so as not to exceed maximum duties. Using two (one on each side of the filter) is a great way to know when the filter needs servicing.



- Pressure Gauge. Part# AJ496. 2 $\frac{5}{8}$" Dia., $\frac{1}{4}$" NPT. 0-60in. H_2O and 0-150 mbar
- Pressure Gauge. Part# AE133. 2 $\frac{5}{8}$" Dia., $\frac{1}{4}$" NPT. 0-160in. H_2O and 0-400 mbar
- Pressure Gauge. Part# AE133A. 2 $\frac{5}{8}$" Dia., $\frac{1}{4}$" NPT, 0-200in. H_2O
- Vacuum Gauge. Part# AJ497. 2 $\frac{5}{8}$" Dia., $\frac{1}{4}$" NPT, 0-60in. H_2O and 0-150 mbar
- Vacuum Gauge. Part# AE134, 2 $\frac{5}{8}$" Dia., $\frac{1}{4}$" NPT, 0-160 in. H_2O and 0-400 mbar

loisture Separators (for vacuum)

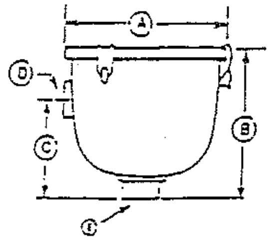
"he purpose of the mois- ıre separator is to remove ..ids from the gas stream ı a vacuum process. This elps protect the blower from corrosion and a build up of ıineral deposits.



Model No.	R4, R4P, R5 R2M, R3M	R4, R4P, R5, R6, R6M	R5, R6, R6P, R6PS	R6P, R6PP, R7, R7S
Part No.	RMS100	RMS200	RMS300	RMS400
Liquid Cap (gal.)	10	19	19	40
A (dia.)	14.3"	19.7"	19.7"	24"
Dim. B	41.5"	39"	39"	48"
C (NPT)	2"	2"	2.5"	3"
D (dia.)	2"	2"	2.5"	3"
Dim. E	7.5"	7.5"	7.5"	9.7"
Dim. F	26.5"	26.5"	26.5"	29"

Inline Filters (for vacuum)

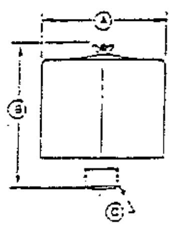
The impeller of a blower passes very close to the housing. It is recommended to have an inlet or inline filter to ensure troublefree life.



Model No.	R1	R2	R3, R1H	R4, R2H, R2M, R3M, R3H	SDR4, R4P, R5, R7H, R8H, R4H	SDR5, SDR6, R6, R5P, R9H, R5M, R6M, R7M	SDR6P, R6PP, R6PS, R7, R7S	R8M	R9M
Part No.	AJ151A	AJ151B	AJ151C	AJ151D	AJ151E	AJ151G	AJ151H	AJ151L	AJ151M
Dim. A	5.93"	7.38"	7.38"	7.38"	8.75"	8.00"	14.00"	14.00"	18.50"
Dim. B	4.50"	6.31"	6.31"	6.31"	10.25"	10.25"	26.50"	27.13"	28.13"
Dim. C	2.75"	4.62"	4.62"	4.62"	5.00"	5.50"	13.13"	18.5"	19.50"
Dim. D	1" FPT	1" FPT	1 1/4" FPT	1 1/2" FPT	2" FPT	2 1/2" FPT	3" MPT	4" MPT	5" MPT
Dim. E	1" FPT	1" FPT	1 1/4" FPT	1 1/2" FPT	2" FPT	2 1/2" FPT	3" MPT	4" MPT	5" MPT
Replacement Element	AJ135D	AJ135E	AJ135E	AJ135E	AJ135F	AJ135G	AJ135C	AJ135C	AJ135H
Micron	10	10	10	10	10	10	10	10	10

MPT = Male Pipe Thread FPT = Female Pipe Thread

Inlet Filters (for pressure)



Model No.	R1 & R2	R3	R4, R5, SDR4 & R4P	SDR5, R6, SDR6, R6P, R6PP R6PS	SDR6P, R7, R7P, R7S
Part No.	AJ126B	AJ126C	AJ126D	AJ126F	AJ126G
Dim. A	5.00"	6.00"	[illegible]	10.63"	10.00"
Dim. B	4.62"	[illegible]	[illegible]	4.81"	13.12"
Dim. C	1" MPT	1 1/4" MPT	1 1/2" MPT	2" FPT	2 1/2" MPT
Replacement Element	AJ134B	AJ134C	AJ134E	AG340	AJ135A
Micron	10	10	10	10	10

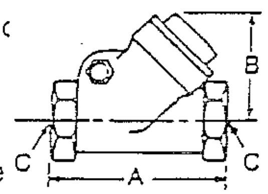
MPT = Male Pipe Thread FPT = Female Pipe Thread

All are heavy-duty for high amount of particulates.

Inlet filters for REGENAIR blowers are drip-proof when mounted as shown.

Horizontal Swing Type Check Valve

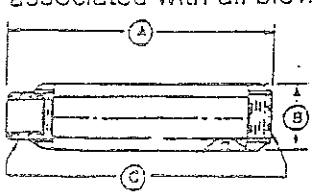
Designed to prevent backwash of fluids that would enter the blower. Also prevents air back-streaming if needed. They can be mounted with their discharge either vertical or horizontal. Valve will open with 3" of water pressure.



Model No.	R1 & R2	R3	R4, R5, SDR4, SDR5, R4P	R6, R6P, R6PS, SDR6,SDR6P	R7, R7S
Part No.	AH326B	AH326C	AH326D	AH326F	AH326G
Dim. A	3.57"	4.19"	4.50"	5.25"	8"
Dim. B	2.32"	2.69"	2.94"	3.82"	5.07"
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT

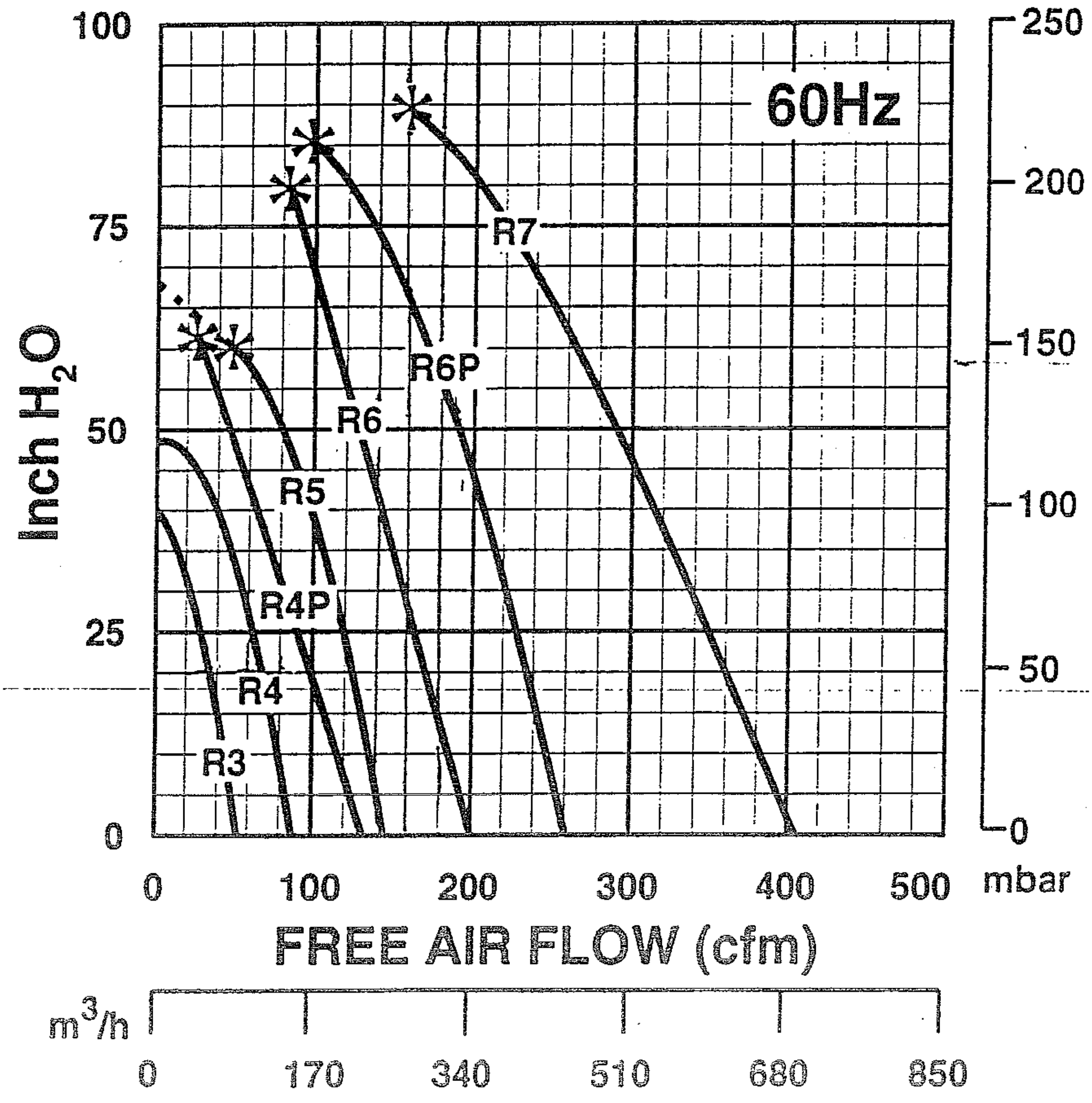
Mufflers

Designed to reduce noise by up to 5 dbA and remove high frequency sound associated with all blowers.



Model No.	R1 & R2	R3	R4, R5, SDR4, R4P	R6, SDR6P, SDR6, R6P, R6PP, R6PS	R7, R7P	R7S
Part No.	AJ121B	AJ121C	AJ121D	AJ121F	AJ121G	AJ121GE
Dim. A	7.46"	7.94"	12.75"	17.05"	17.44"	17.44"
Dim. B	2.38"	2.52"	3.25"	3.63"	4.25"	4.25"
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT	2 1/2" NPT

Vacuum

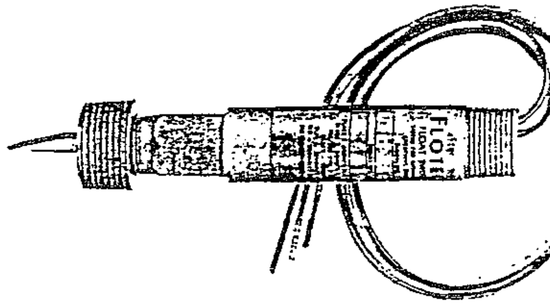


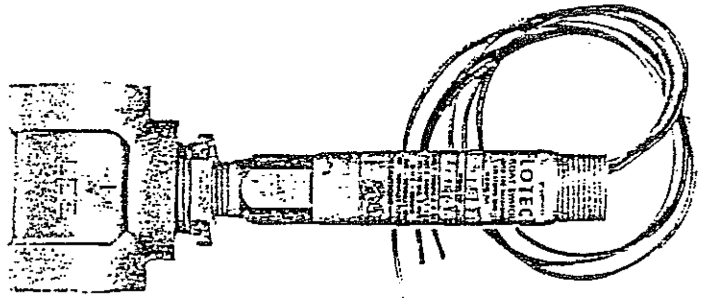
60Hz
R7
R6P
R6
R5
R4P
R4
R3
Inch H_2O
100
75
50
25
0
250
200
150
100
50
0
0
100
200
300
400
500
mbar
FREE AIR FLOW (cfm)
m^3/h
0
170
340
510
680
850

W.E. Anderson

FLOTECT. MODEL L-6 FLOAT SWITCH

Installation and Operating Instructions





Explosion-Proof; U.L. and C.S.A. Listed -
Class I, Groups *A, B, C & D
Class II, Groups E, F & G
CENELEC: EExd IIC T6 (T amb=75°C)
*(Group A, stainless steel body only)

PHYSICAL DATA

Temperature Limit: 220°F (105°C) maximum
Maximum Pressure: See chart below
Switches: One or two SPDT snap switches
Electrical Rating: U.L.: 5A @ 125/250 VAC.
C.S.A. and CENELEC: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC.
Optional ratings: MV option—Gold contacts for dry circuits. Rated 0.1A @ 125 VAC MT option: 400°F (205°C) 5A @ 125/250 VAC (not listed).
Wiring Connections: 3-18" (460mm) wire leads, 18 ga.
CENELEC models only: push-in type terminal blocks
Black = common, blue = N.O., red = N.C.
Minimum Specific Gravity:
Polypropylene float - 0.9
Round SS float - 0.7
Cylindrical SS float - 0.5
Switch Body: Brass 3/4" NPT conduit connection.
For SS switch body, change model no. to L6EPS.
Piping/Mounting Connection: 1" NPT
Installation: Horizontal, index arrow pointing down.
Weight: 1 lb. (.5 KG); w/external chamber 1-3/4 lb. (.8 KG)

WETTED MATERIALS CHART

Model	Brass	Bronze	Ceramic	Polypropylene	301SS	303SS	304SS
3-3-A	X		X		X		X
-S-3-B	X	X	X	X	X		
B-S-3-C	X		X		X		X
B-S-3-H	X	X	X		X		X
B-S-3-O	X		X	X	X		
S-S-3-A			X	X	X		X
S-S-3-C			X		X	X	X
S-S-3-L			X		X	X	X
S-S-3-O			X	X	X	X	
S-S-3-S			X	X	X	X	

MAXIMUM PRESSURE CHART

Model Number	Float	Pressure Rating PSIG (KG/CM²)
L6EPB-B-S-3-A	Cylindrical SS	200 (14)
L6EPB-B-S-3-B	Polypropylene	250 (18)
L6EPB-B-S-3-C	Round SS	350 (25)
L6EPB-B-S-3-H	Round SS	250 (18)
L6EPB-B-S-3-O	Polypropylene	1000 (70)
L6EPB-S-S-3-A	Cylindrical SS	200 (14)
L6EPB-S-S-3-C	Round SS	350 (25)
L6EPB-S-S-3-L	Round SS	350 (25)
L6EPB-S-S-3-O	Polypropylene	2000 (140)
L6EPB-S-S-3-S	Polypropylene	2000 (140)

INSTALLATION:

Unpack switch and remove any packing material found inside lower housing or float chamber.

Switch must be installed with body in a horizontal plane and arrow on side pointing down.

If switch has an external float chamber (tee), connect it to vertical sections of 1" NPT pipe installed outside vessel walls at appropriate levels. If unit has no external float chamber, it must be mounted in a 1" NPT half coupling welded to the vessel wall. The coupling must extend through the wall.

Inspect and clean wetted parts at regular intervals.

ELECTRICAL CONNECTIONS:

Connect wire leads in accordance with local electrical codes and switch action required. N.O. contacts will close and N.C. contacts will open when liquid level causes float to rise. They will return to "normal" condition on decreasing liquid level. Black = common, Blue = N.O. and Red C.

For units supplied with both internal and external grounds, the ground screw inside the housing must be used to ground the control. The external ground screw is for supplementary bonding when allowed or required by local code. Some CSA listed models are furnished with a separate green ground wire. Such units must be equipped with a junction box, not supplied but available on special order.

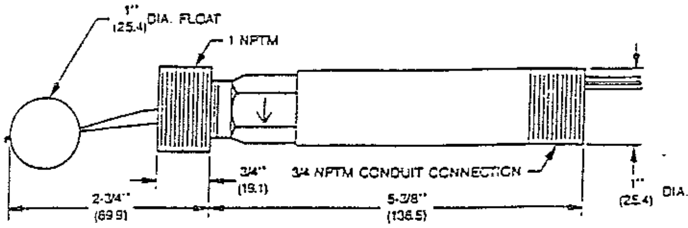
CENELEC certified models include a junction box. Cable should enter enclosure through an approved EX cable gland, not supplied. Push stripped and tinned leads into appropriate openings in terminal block(s). To connect fine stranded leads or to remove any wire, depress spring release with small screwdriver first.

All wiring, conduit and enclosures must meet applicable codes for hazardous areas. Conduits and enclosures must be properly sealed. For outdoor or other locations where temperatures vary widely, precautions should be taken to prevent condensation inside switch or enclosure. Electrical components must be kept dry at all times. CAUTION: To prevent ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed when in use.

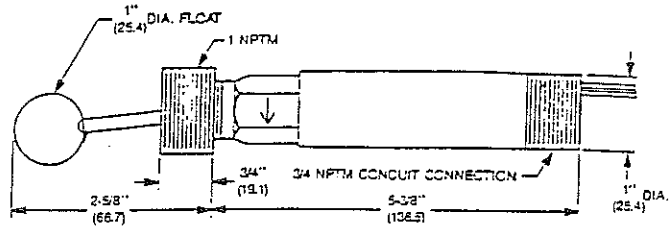
Dimensions on reverse

W.E. ANDERSON DIV., DWYER INSTRUMENTS, INC.
P.O. BOX 358 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/879-8000
Fax 219/872-9057

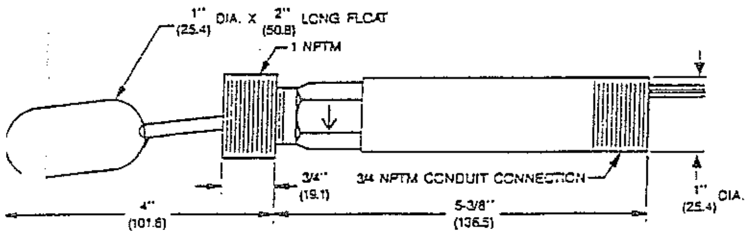
FLOTECT. MODEL L-6 FLOAT SWITCH — DIMENSION DRAWINGS



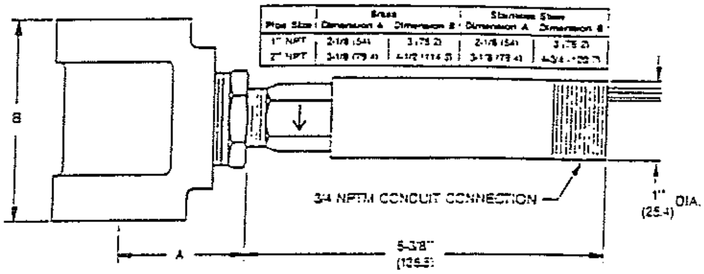
Polypropylene Float



Round Stainless Steel Float

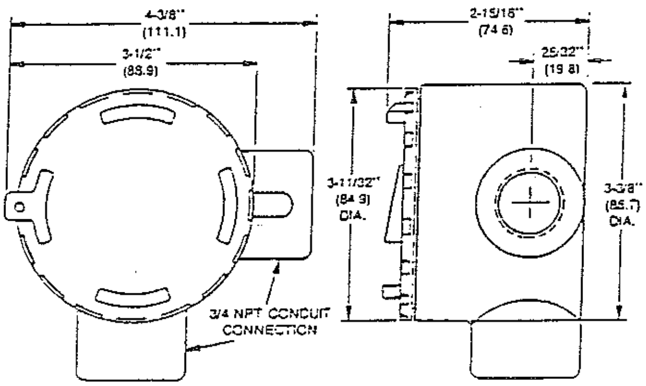


Cylindrical Stainless Steel Float



	Brass		Stainless Steel	
Pipe Size	Dimension A	Dimension B	Dimension A	Dimension B
1" NPT	2-1/8 (54)	3 (76.2)	2-1/8 (54)	3 (76.2)
2" NPT	3-1/8 (79.4)	4-1/2 (114.3)	3-1/8 (79.4)	4-3/4 (120.7)

With External Float Chamber (Tee)



CSA, CENELEC Conduit Enclosure

Limited Warranty: The Seller warrants all Dwyer instruments and equipment to be free from defects in workmanship or material under normal use and service for a period of one year from date of shipment. Liability under this warranty is limited to repair or replacement F.O.B. factory of any parts which prove to be defective within that time or repayment of the purchase price at the Seller's opinion provided the instruments have been returned, transportation prepaid, within one year from the date of purchase. All technical advice, recommendations and services are based on technical data and information which the Seller believes to be reliable and are intended for use by persons having skill and knowledge of the business, at their own discretion. In no case is Seller liable beyond replacement of equipment F.O.B. factory or the full purchase price. This warranty does not apply if the maximum ratings label is removed or if the instrument or equipment is abused, altered, used at ratings above the maximum specified, or otherwise misused in any way.

THIS EXPRESS LIMITED WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER REPRESENTATIONS MADE BY ADVERTISEMENTS OR BY AGENTS AND ALL OTHER WARRANTIES, BOTH EXPRESS AND IMPLIED. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE FOR GOODS COVERED HEREUNDER.

Buyer's Remedies: THE BUYER'S EXCLUSIVE AND SOLE REMEDY ON ACCOUNT OF OR IN RESPECT TO THE FURNISHING OF NONCONFORMING OR DEFECTIVE MATERIAL SHALL BE TO SECURE REPLACEMENT THEREOF AS AFORESAID. THE SELLER SHALL NOT IN ANY EVENT BE LIABLE FOR THE COST OF ANY LABOR EXPENDED ON ANY SUCH MATERIAL OR FOR ANY SPECIAL, DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES TO ANYONE BY REASON OF THE FACT THAT IT SHALL HAVE BEEN NON-CONFORMING OR DEFECTIVE.

W.E. ANDERSON DIV., DWYER INSTRUMENTS, INC.
P.O. Box 358
Michigan City, IN 46360
Phone: 219/879-8000
Fax: 219/872-9057

FR 82-440726-00
Printed in U.S.A. 10/93

MOISTURE SEPARATOR

GENERAL THEORY

The moisture separator removes liquids from the process stream in soil venting applications to help protect the blower from corrosion and mineral deposits caused by water.

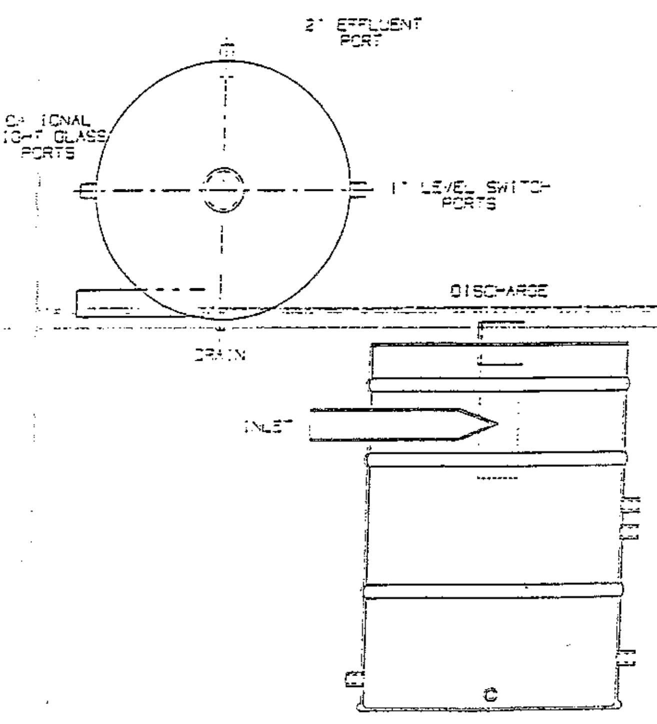
DESIGN INFORMATION

NES moisture separators operates on the principles of cyclonic action aided by velocity reduction. The moisture separator inlet pipe is set tangential to the tank wall, a stinger pipe extends down past the separator inlet is placed in the center of the tank. The moisture laden air stream is forced into a cyclonic rotation. The centrifugal force produced throws the water droplets to the outer wall of the separator where they fall and collect at the bottom. Additional efficency is produced when the velocity is reduced to values between 1500 fpm and 6000 fpm. For a separator of this type , moisture separation efficiency is typically 95% or greater for moisture droplets greater than 10 micron.

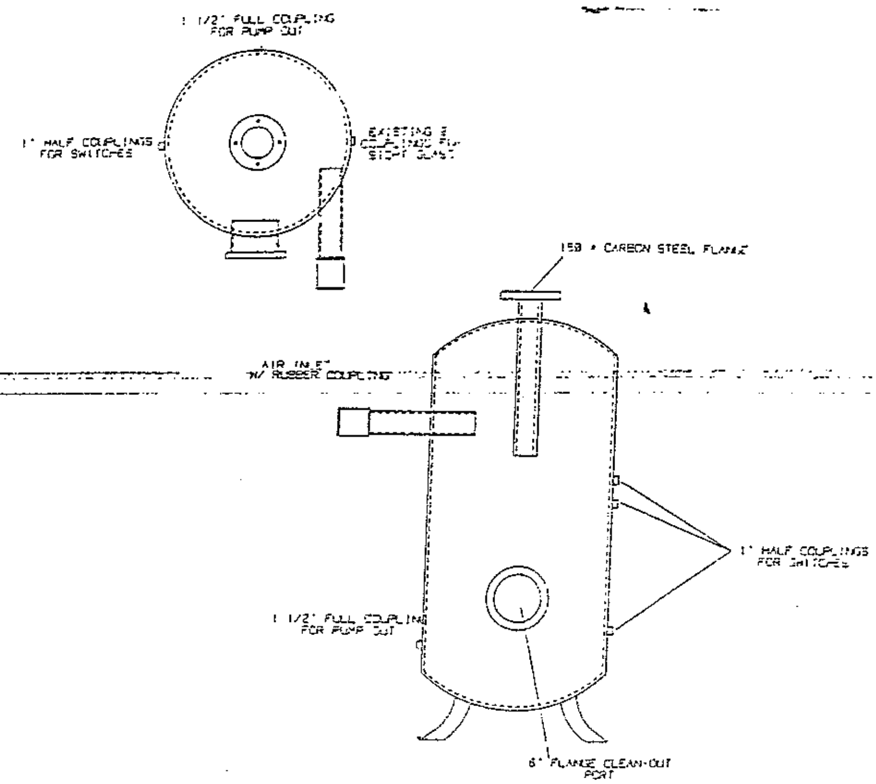
CONSTRUCTION

NES moisture separators are constructed of carbon steel with bronze drain valves, removable lid with EPDM gasket, mechanical ball and float assembly standard for drum style separators. Sight glass, emergency high level switch, and pump out switches are optional. Tank style separators are standard with carbon steel construction, bronze drain valves, flanged clean-out port, sight glass and emergency high level switch. Pump-out switches and mist eliminator are optional. All separators are primed and coated with a rust inhibitor to prevent corrosion.

TYPICAL DRAWINGS



DRUM STYLE SEPARATOR



TANK STYLE SEPARATOR

N A T I O N A L
ENVIRONMENTAL INC.
S Y S T E M S

36 Maple Avenue . Seekonk, Massachusetts 02771
Phone: 508 761-6611 Fax: 508 761-6898

AIR SPARGE UNIT

INSTALLATION, OPERATION, & MAINTENANCE MANUAL

Job Name: Langan – Queens, NY Job #: 00-A-249 Date: 09/25/2000

SYSTEM DATA

Flow	26 scfm	Pressure	6 psig
Motor Voltage	230 VAC	Phase	3
Horsepower	3		

INSTALLATION

- Remove the packaging from the Air Sparge unit (AS) and inspect. Verify that gauges and other components are not damaged.

- Secure the AS on a level, structurally sound surface.

- Connect sparing well piping to the outlet of the AS. All wells should be closed and the by-pass valve to atmosphere fully open. If a by-pass valve was not supplied by NES, it should be sized to allow the AS to operate without opening any wells.

- Have a licensed electrician, familiar with the installation of remediation equipment, install the control panel and make any necessary connections from the panel to the equipment (if not factory installed by NES). All electrical specifications/power requirements can be found above or within the electrical schematic section of this manual.

- Before operating the equipment, review all manufactures literature within this manual. Check all fluid levels, belt tension, motor couplings, piping, etc. Do not check rotation of electrical equipment until the manufactures literature is reviewed. Some equipment can not operate in a reverse direction without damage to the internals.

OPERATION

Turn on power and press start button. Allow motor to run for a few seconds with only the by-pass valve open. Check rotation.

If the relief valve is adjustable, it should be adjusted prior to opening the wells. Tighten the relief valve adjuster until it is completely closed. Adjust the AS pressure by closing the by-pass valve until the design operating pressure is achieved. Pick a point on the compressor curve, (located within this manual) with a higher pressure than the design point. Close the by-pass valve until that pressure is achieved. Adjust the relief valve until it starts to open and allow air out. Slowly close the fresh air dilution valve. The compressor should completely open the relief valve and never exceed the maximum pressure on the compressor curve. Secure the lock nut.

Temperature Switch Option

The temperature switch should be set before allowing the system to operate unattended. Setpoints are typically based on the maximum discharge temperature of blower, or the maximum temperature rating of down stream equipment. High discharge temperatures can usually be lowered by increasing the airflow through the compressor, or lowering the discharge pressure. All adjustments should be made after the unit has reached operating temperature. See manufactures literature.

Pressure Switch Option

The pressure switch should be set before allowing the system to operate unattended. Setpoints are typically based on the maximum discharge pressure of the compressor, or the maximum pressure rating of down stream equipment. High discharge pressures can usually be lowered by opening the by-pass valve. See manufactures literature.

Once all adjustments have been completed, air can be introduced into the wells. **Slowly** open the desired well(s) and close the fresh air dilution valve until the system design flowrate and/or pressure are achieved.

MAINTENANCE

The following should be checked periodically. Frequency is site specific. See manufactures literature for specific recommendations.

Fluid levels	Piping	Temperature switch
Filter	Belts/Couplings	Vacuum switch
Motor amperage	Level switches	

NOTES ABOUT THE CONTROLS

The motor that drives your ASU is controlled by a motor starter equipped with an undervoltage trip coil. The starter can be tripped for a number of conditions, i.e. low voltage, motor overload, or short circuit. In most cases if the control station is explosion proof the motor can be reset by pushing the start button, if the control station is non XP the motor starter reset is located within the panel on the starter itself.

The blower warranty becomes void if the high motor temperature switch (tstat) is not connected to the control circuit. Do not disconnect this device.

Included is a guide for troubleshooting motor related problems.

MOTOR TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
1. Motor does not start.	a) No power	Check circuit breaker Check wiring Check motor starter reset
	b) Alarm condition present	Correct alarm, Reset panel
	c) Short circuit	Check wiring.
	d) Bad motor	Check resistance of motor windings. Contact NES.
2. Motor starts but runs only for a while.	a) Motor overloaded	Check current draw with ammeter without load on motor, (dilution valve open)
	b) Optional alarm switch .	Check switch operation Check compressor operating point to compressor curve Check switch set point
	c) Motor temperature	Reduce ambient air temperature Check compressor operating point to blower curve
	d) Low voltage	Compare supply voltage to motor nameplate voltage

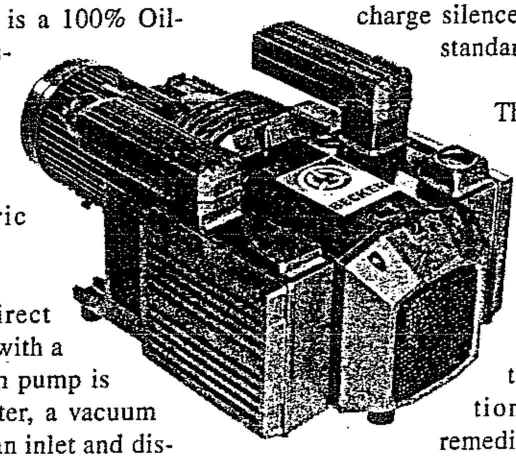
DTLF 250
DTLF 500

OIL-LESS COMPRESSORS

COMPRESSORS
BECKER

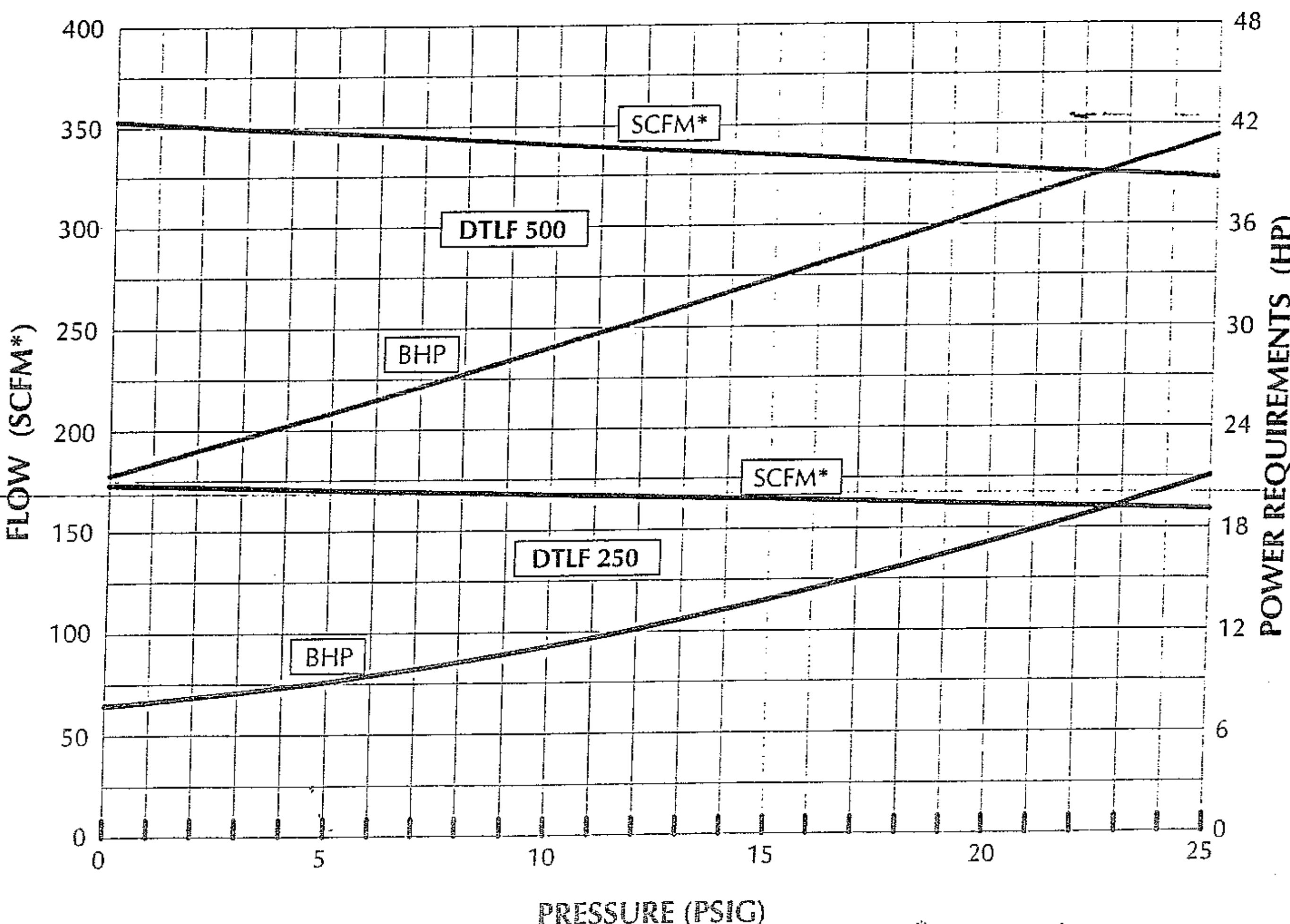
ISO 9001 Certified!
CE Compliant!

The Becker DTLF pump is a 100% Oil-less rotary vane low pressure compressor. It is designed to operate on a continuous basis throughout a pressure range from atmospheric pressure to 25 PSIG.



The DTLF pump is a direct drive unit and is supplied with a TEFC electric motor. Each pump is equipped with an inlet filter, a vacuum and pressure relief valve, an inlet and discharge silencer, and pump vibration isolators as standard equipment.

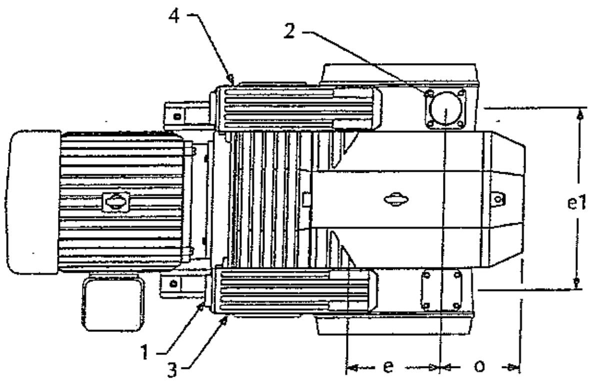
The Becker DTLF pump is ideal for requirements where air is the gas and where operation is 25 PSIG or below. Applications include those where blowers cannot reach a high enough pressure, or those where oil lubricated compressors discharge oil aerosols that contaminate. These applications include graphic arts, soil remediation, and pneumatic conveying.



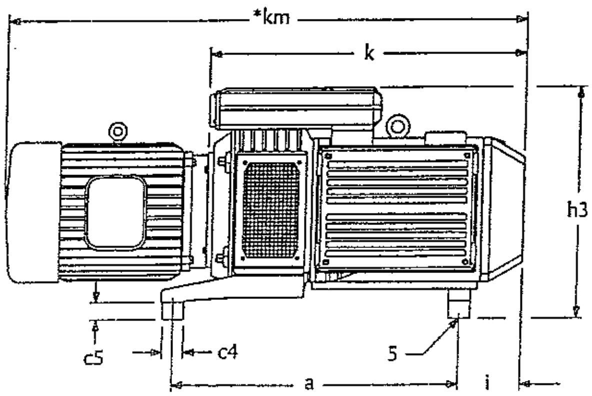
* @ 29.92" Hg Bar. Pr.; 68°F; 36% R.H.; 0.075#/ft³

Becker Pumps Corp • 1069 Evans Avenue • Akron, Ohio 44305 • Phone: (330) 633-1083 • Fax: (330) 633-1102

TECHNICAL DATA



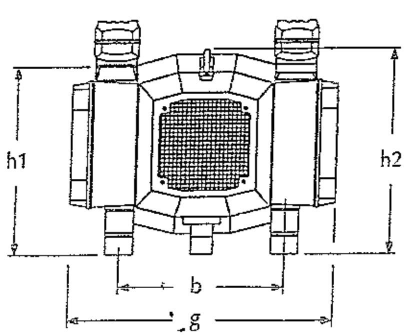
Top View



Side View

	DTLF 250	DTLF 500
Open Flow (SCFM @ 0 PSIG)	173	353
Horsepower—60 hz	20	50
Speed (RPM)—60 hz	1150	1150
Maximum Pressure (PSIG)	25.0	25.0
Weight (lbs.)—w/o motor	517	748
Weight (lbs.)—w/ motor*	1023	1600
Noise Level (dBA)	86	85
Inlet size (BSP, inches)	2.5	4
Dimensional Data	(Inches)	
a	25.4	30.25
b	15.0	18.9
c4	2.0	3.0
c5	1.6	2.0
e	8.5	10.6
e1	16.66	20.87
g	24.1	30.17
h1	16.87	20.86
h2	18.35	22.72
h3	21.0	27.96
i	4.92	6.5
k	28.25	33.0
*km	51.75	62.25
o	6.75	8.12

* May vary with motor type and manufacturer

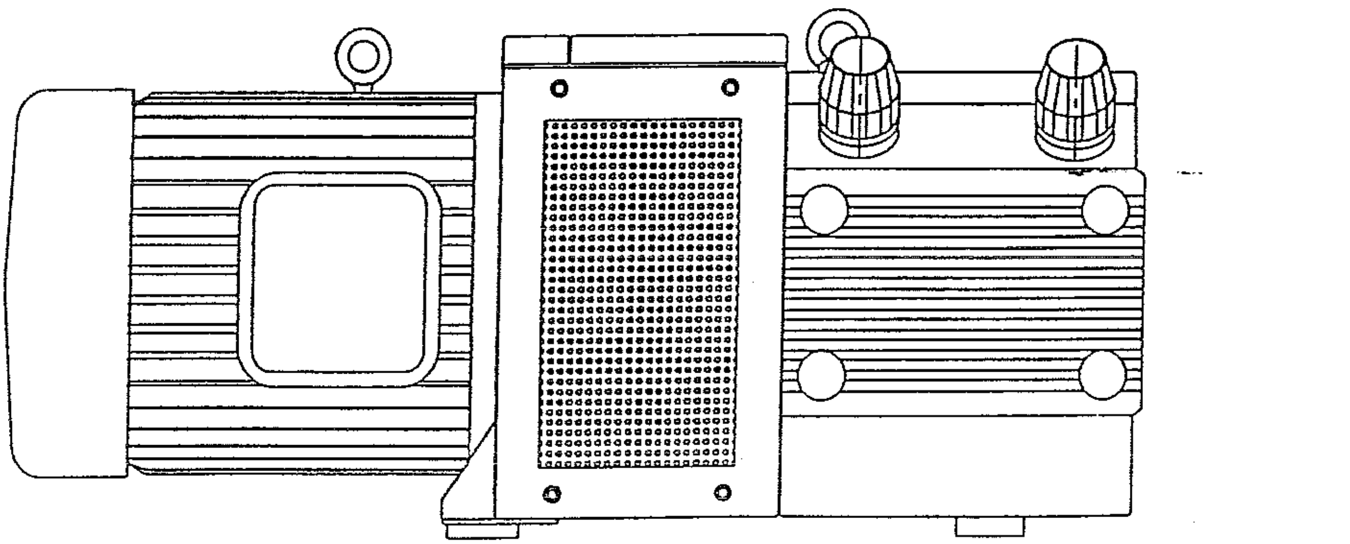


End View (Opposite Motor End)

1 - Inlet Port
2 - Discharge Port
3 - Inlet Silencer
4 - Pressure Relief Valve / Silencer
5 - Vibration Isolators

Becker Pumps Corporation
1069 Evans Avenue
Akron, Ohio 44305
(330) 633-1083
FAX (330) 633-1102

DVT/KVT/KDT 3.000
REPAIR & SERVICE
MANUAL



BECKER
Vacuum Pumps • Compressors

100 East Ascot Lane • Cuyahoga Falls, OH 44223
Tel: 330-928-9966 • Fax: 330-928-7065

2/00 ST

DVT, KVT, KDT 3.000

REPAIR & SERVICE MANUAL

This manual is intended to be used in conjunction with the current parts list for the appropriate model. Reference numbers used in this manual are position numbers shown on the parts list. The sealing compounds and greases referred to in this manual are the sealants and greases recommended by the pump manufacture. These are available through your Becker Pump Distributor.

Disassembly

1. Remove the 4 bolts (#188) from the motor flange (#182) and remove the motor and flange.
2. Remove the coupling disc. (#196)
3. Remove the shaft end screw from the rotor shaft. (#58)
4. Remove the coupling with fan (#56) and shaft key. (#47)
5. Remove the 4 socket head cap screws (#171) and protective hood (#161).
6. Loosen and remove the 3 socket head cap screws (#188) with spring washers from the connection flange (#50) and remove flange.
7. Remove the filter cover and remove the filter cartridges. (#68 and #69)
8. Remove the ring bolt. (#178)
9. Remove the 4 SHCS (#170) and remove air guide cover (#163)
10. Remove valves (#285 and 281 or 341 and 345)
11. Roll pump housing onto filter cover gasket surface.
12. Remove SHCS (#173) and rubber foot. (#175)
13. Remove canopy. (protective hood #161)
14. Remove 6 SHCS (#105) and cover (#103).
15. Remove dust separator (#91).
16. <u>**DVT/KVT/KDT 3.80:**</u>
    - Remove 2 SHCS (#79) and filter holder (#77).
    - Remove 4 SHCS (#131) and 4 SHCS (#129) to separate cooler (#121) from cover (#134) and filter housing (#61).
    - Separate after cooler (#88) from filter housing. (DVT/KDT only)
    - Remove 3 SHCS (#130) and cover (#134).
    - Remove 4 SHCS (#198) and filter housing (#61).

    <u>**DVT/KVT/KDT 3.100 & 3.140:**</u>
    - Remove 6 SHCS (#138) and 4 SHCS holding filter housing (#161) to pump body(#5)
    - Separate after cooler (#88) from filter housing. (DVT/KDT only)
    - Roll unit on to inlet port and remove 4 SHCS (#132) and remove cooler assembly (#123&121).
17. Remove 6 bolts (#41) from B-side endshield (#14/16). Screw 2 bolts in to threaded holes in endshield and tighten to pull endshield off locating pins.
18. Remove vanes (#11).
19. Remove 6 bolts (#41) from A-side endshield (#13/15). Screw 2 bolts in to threaded holes in endshield and tighten to pull endshield off locating pins. Remove A-side endshield and rotor assembly from housing.
20. Press rotor out of A-side endshield.

The unit is now completely disassembled. Thoroughly clean the unit in a suitable solvent, discarding gaskets, filters, and dust separator. After cleaning in solvent, degrease rotor, end shields, and cylinder with contact cleaner and blow dry with compressed air to remove all traces of solvent and grease.

Inspection

1. Inspect cylinder for chatter marks or scoring.
2. Inspect side shields. If heavily scored, replace.
   Note: Anytime a major component (end shield, rotor, or cylinder housing) is replaced, the rotor to cylinder clearance must be reset.
3. Inspect rotor for damage.

Reassembly

1. Replacement of A side bearing

- Remove the 3 internal hex head screws from bearing cap and remove cap. (# 42&18)
- Remove bearing, shaft seal (if unit is equipped with seal on A-side) and teflon tube seals. (#28,26&24)
- If unit does not have sealed bearings, fill new bearing with Amblygon TA15/2 grease.
- Install new shaft seal and teflon tube seals.
- Place bearing in seat in end shield and replace bearing cap, be sure to evenly tighten screws.

2. Replacement of B side bearing

- Remove the 3 internal hex head screws from bearing cap and remove cap. (#42&19)
- Remove bearing outer race with rollers and cage, shaft seal, and teflon tube seals. (#28,26, &24)
- Install new shaft seal and teflon tube seals.
- Fill new roller bearing half full with Amblygon grease and place in bearing seat in end shield.
- Replace bearing cap and be sure to evenly tighten internal hex head screws.
- Remove bearing retaining clip (#36).
- Remove bearing inner race from rotor end and replace with new race .
- Replace bearing retaining clip (#36).

Setting rotor to A side endshield clearance

1. With new bearings and shaft seals in A side endshield, place shim stack of 0.15mm to 0.20mm on A side of rotor shaft. Press endshield onto shaft and measure clearance between endshield and rotor. See table 2 for proper clearances. Add or subtract shims to obtain proper clearance.

Setting rotor to cylinder clearance

The following steps 1- 18 are only required if a major component of the pump has been replaced. (endshield, rotor, or pump housing.)

1. Place housing on work bench so that the minimum clearance area (the area of minimum rotor to cylinder clearance when the pump is fully assembled) is positioned at the bottom.
2. Remove locating pegs (#17) from both endshields. Mark endshields for suitable location of new holes for locating pegs.
3. Set rotor to endshield clearance using new bearings and shaft seals.
4. Insert gauge tape (feeler gauge, shim stock, paper, or non reinforced tape) of proper thickness, and approximately the same width as a rotor segment between two vane slots), into the cylinder. Make sure the rotor is supported by a single thickness of gauge tape above the cylinder.
5. Place rotor and A side endshield into housing making sure that rotor segment, not a vane slot, is resting on the gauge tape.
6. Install A side endshield bolts but do not fully tighten.
7. Install B side endshield bolts but do not fully tighten
8. Using moderate pressure, press down on endshield and center endshield bolts in holes, tighten bolts.
9. On 4.5mm drill bit mark drilling depth using peg as guide.
10. Drill holes in endshield to proper depth, taking care to keep drill perpendicular to endshield.
11. Repeat on opposite end.
12. Remove endshields and redrill holes in body with 4.9mm drill bit.
13. Using 5mm H7 reamer ream holes in endshields.
14. Ream holes in body using 5mm carbide reamer.
15. Install locating pegs in endshields and remove gauge tape from rotor and cylinder.
16. Reinstall A side endshield and rotor.
17. Install vanes and B side endshield.
18. Rotor to cylinder clearance is now reset, continue reassembling unit in normal manner.

Reassembly

1. Reinstall filter housing (#61) and after cooler (DVTs & KDTs only) with new gaskets.
2. Stand assembly on B-side endshield and install cooler (#121 on 3.80s or 123&121 on 3.100 and 3.140) with new gaskets.
3. On 3.80 replace cover (#134) and filter holder (#77) for dust separator.
4. With assembly still standing on B-side endshield reinstall connection flange (#50)

Reassembly continued

5. Reinstall shaft key (#47) and fan with coupling (#56)
6. Replace shaft end bolt and washer and fully tighten.
7. Replace cooler cover (#166 protective hood).
8. Replace protective hood (#161), foot (#175) and ring screw (#178&#132).
9. Install motor mounting flange (#182)
10. Check motor coupling distance and install new coupling disc.
11. Mount motor to pump; wire for correct voltage and rotation.
12. Test unit for 1 hour before installation.

Setting motor coupling distance

1. Place straight edge across the machined surface of the motor connection flange (# 50) and measure to the outer ring of the pump coupling. (#56)
2. Subtract 2mm (.080") from measurement obtained in step 1.
3. Place straight edge across motor coupling (#195) and push coupling on to motor shaft far enough to obtain the distance calculated in step 2 from outer ring of coupling to mating surface of motor adaptor ring. (#182)
4. Apply blue lock tite (Lock Tite # 242) to motor coupling set screw and tighten.
5. Attach motor to pump.

Unit testing

1. Check that motor is wired for correct voltage and frequency. Check motor for correct direction of rotation.

2. Operate pump under no load for approximately 20 minutes.

3. Place vacuum gauge and ball or gate valve on inlet port (on combined units also install pressure gauge and valve on discharge port). Adjust pump relief valves so that pump can not exceed rated vacuum and pressure. Check motor amperage. As unit warms up, amps will go down and vacuum and pressure may go up, so it may be necessary to reset valves.

4. When everything is operating properly continue test for 60 minutes.

Trouble Shooting

Problem	Possible Cause	Solution
Unit lacks sufficient vacuum or compressed air.	Clogged filters	Clean or change filters; add a higher capacity external filter in series with the existing internal filters.
	Stuck rotor vanes.	Disassemble unit and clean all oil traces from internal parts. Replace carbon vanes, since they become hygroscopic when exposed to oil. Chect for oil contamination in the suction line.
	Pressure or vacuum relief valves need adjusting.	Recalibrate valves.
	Leaks or restrictions in piping.	Open pipe connections and examine for internal contamination or buildup. Tighten all piping connections. Replace rubber hoses.
	Insufficient pump speed (RPM).	Check voltage and amperage to motor.
		Inspect motor and coupling halves. Check that the pump shaft turns freely.
	Clogged Ports.	Clean and open all ports.
	Defective gaskets.	Inspect gaskets for breakage or disintegration. Replace if necessary.

Problem	Possible Cause	Solution
Unit lacks sufficient vacuum or compressed air (cont.).	Line losses too high.	Piping diameter too small—replace with larger diameter. Check for clogged filter elements—replace if necessary.
	Carbon dust separator clogged.	Inspect, clean, or replace.
	Unit is operating at an elevated altitude.	Contact the factory for assistance. Performance may be reduced when operating above sea level.
Motor breakers trip constantly.	Defective motor.	Test motor and replace if necessary.
	Undersized circuit breaker.	Replace with correctly sized breaker.
	Heaters too small.	Replace with correctly sized heaters.
	Low motor voltage.	Check at motor terminals. Contact electric service provider.
	Ambient temperature too high.	Reduce ambient temperature to below 104°F.
	Stuck rotor.	Disassemble pump to determine reason. Replace all necessary parts.
	Clogged carbon dust separator—back pressure too high.	Clean or replace dust separator.
Unit runs rough and cannot be rotated manually.	Broken rotor vane.	Disassemble unit and replace vane. Check cylinder for wear.
	Worn coupling disc.	Remove motor and inspect rubber coupling disc and pins. Replace, if necessary, and realign.
	Siezed bearings.	Remove end shields and inspect bearings. Replace if necessary. Reshim bearings to maintain proper clearance.

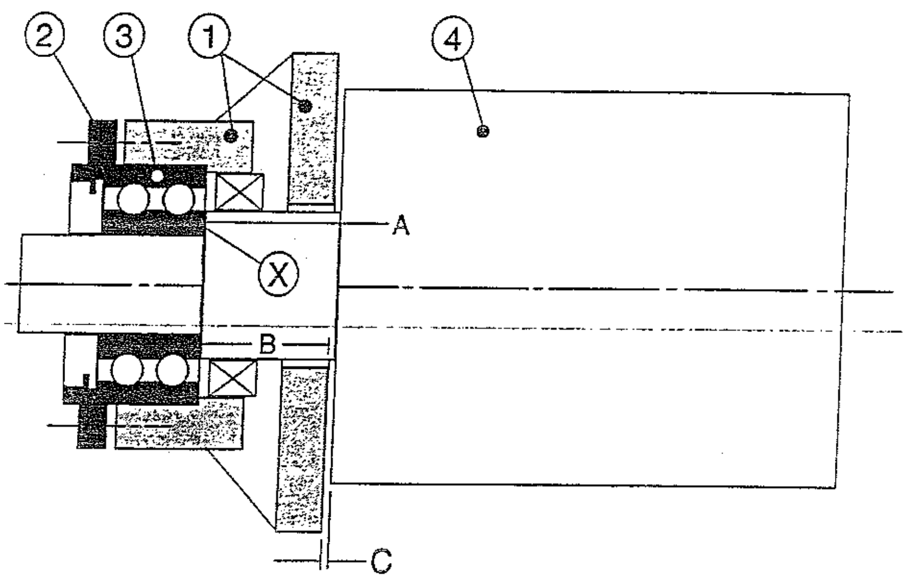
Problem	Possible Cause	Solution
Unit runs rough and cannot be rotated manually (cont.).	Oil in the cylinder.	Remove end shields and inspect cylinder. Clean oil and replace vanes. Clean unit thoroughly. Inspect piping; determine source of oil and eliminate.
	Locked rotor.	Remove end shields and inspect cylinder. Remove contamination.
Pump overheats.	Cooling ducts blocked.	Clean cooling ducts.
	Cooling fan broken.	Replace fan.

Repair Tolerances

Pump Type	Rotor Length	Cylinder Length	Cylinder Inside Dia.
DVT 3.80	169.685 - 169.710	169.975 - 170.000	118.000 - 118.035
DVT 3.100	249.571 - 249.600	249.971 - 250.000	118.000 - 118.035
DVT 3.140	239.571 - 239.600	239.971 - 240.000	142.000 - 142.040
KVT/KDT 3.80	169.655 - 169.680	169.975 - 170.000	118.000 - 118.035
KVT/KDT 3.100	249.541 - 249.570	249.971 - 250.000	118.000 - 118.035
KVT/KDT 3.140	239.541 - 239.570	239.971 - 240.000	142.000 - 142.040

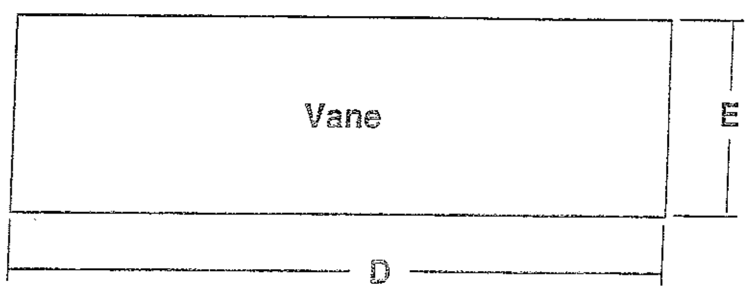
Pump Type	Vane Length (D)	Vane Width, (E) Min. New	Rotor to End Shield (C)	Rotor to Cylinder
DVT 3.80	169.75 - 169.78	27.0 - 39.0	0.04 - 0.07	0.09 - 0.11
DVT 3.100	249.61 - 249.65	27.0 - 39.0	0.04 - 0.07	0.09 - 0.11
DVT 3.140	239.66 - 239.70	32.0 - 49.0	0.05 - 0.08	0.09 - 0.11
KVT/KDT 3.80	169.75 - 169.78	27.0 - 39.0	0.04 - 0.07	0.09 - 0.11
KVT/KDT 3.100	249.61 - 249.65	27.0 - 39.0	0.04 - 0.07	0.09 - 0.11
KVT/KDT 3.140	239.66 - 239.70	32.0 - 49.0	0.05 - 0.08	0.09 - 0.11

Note: All dimensions are in Millimeters



Legend

X = Location of bearing shims
A = Shaft collar length
B = Depth to bearing in side shield
C = Tolerance required
1 = Side shield
2 = Bearing cap
3 = Bearing
4 = Rotor



N A T I O N A L
ENVIRONMENTAL INC
S Y S T E M S

36 Maple Avenue • Seekonk, Massachusetts 02771
508 761-6611 FAX 508 761-6898

Warranty

This warranty is a LIMITED warranty; anything in the warranty notwithstanding. Implied warranties for particular purpose and merchantability shall be limited to the duration of the express warranty. National Environmental Systems, Inc. (NES) expressly disclaims and excludes any liability of consequential or incidental damages for breach of any express or implied warranty.

NES equipment is warranted as to workmanship, material, and performance when properly installed, operated, and maintained provided that all original design parameters including water temperature, influent concentrations, flow rate, and other analyses provided represent actual field parameters at the time of operation, subject to verification by an EPA certified laboratory. All electrical connections must be installed by an electrician licensed within the state of installation and according to installation instructions provided in NES manuals. Should any part prove defective within twelve (12) months from date of invoice, it will be repaired or replaced at the discretion of NES without charge provided the original component is returned to NES. Exception to this warranty will be pump hoses and pump seals: these items will be subject to the same warranty except for a period of six (6) months from date of invoice. Due to the wide variety of possible applications and conditions of use, no express or implied warranty is made for carbon adsorption systems for performance, safety, or suitability for particular purpose. This warranty does not apply to used or rental equipment.

Replacements furnished under this warranty do not carry a new warranty. Replacements carry only the unexpired portion of the original warranty.

In order for this warranty to be effective, the owner must notify NES of the defective conditions within 5 working days after discovering the defect. This warranty does not apply to any product that has been subjected to negligence, alteration, accident, abuse, misuse, vandalism, civil disturbances, or acts of God. This warranty shall be void and have no effect if the equipment is not properly installed in accordance with all local ordinances, regulations, and the written installation, operation, and maintenance instructions supplied by NES or if 100% of the invoiced selling price has not been paid.

Please contact NES to be issued a Return Goods Authorization Number (RGA No.). No equipment or components will be accepted by NES without a valid RGA No. Any alteration or disassembly of equipment without proper authorization from NES voids all warranties stated herein.

If after inspection by an authorized NES representative, or after NES has received the product at the factory, NES determines that the product is defective under this warranty, NES may at its discretion repair or replace the product. REPAIR OR REPLACEMENT IS NES'S SOLE OBLIGATION WITH RESPECT TO DAMAGES, WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL. RESULTING FROM DEFECTIVE CONDITION OR USE OF THE PRODUCT. All charges or expenses for freight to and from the factory, removal and reinstallation of the product, or installation of a replacement product are the responsibilities of the owner.

This warranty does not apply when damage is caused by sand, silt, or abrasive materials pumped with the fluids, lightning, improper voltage supply, careless handling, improper installation, improper well design, or corrosion due to circumstances that were unknown to NES at the time of shipment. No allowance will be made for labor, freight, or other charges incurred by the customer.

Prices and Specifications are effective only in the continental USA and are subject to change without notice. **F.O.B. Point and Title:** All material is sold F.O.B. factory. Title to all material sold shall pass to buyer upon deliver by seller to carrier at shipping point.

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0010060

Work Order Summary

CLIENT:	Mr. Bill Stephanatos Langan Engineering & Environmental Services, Inc. River Drive Center One Elmwood Park, NJ 07407-1338	**BILL TO:**	Mr. Bill Stephanatos Langan Engineering & Environmental Services, Inc. River Drive Center One Elmwood Park, NJ 07407-1338
PHONE:	201-794-6900	**P.O. #**	1461902-04
FAX:	201-794-0366	**PROJECT #**	Dayton Plaza Rockaway, New York
DATE RECEIVED:	10/5/00		
DATE COMPLETED:	10/18/00		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	SVE	TO-14	Tedlar Bag
02A	AS	TO-14	Tedlar Bag
03A	Lab Blank	TO-14	NA

CERTIFIED BY: ____________________ Laboratory Director

DATE: 10/18/00

Certfication numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217, AZ ELAP - AZ0567

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
TO-14
Langan Engineering & Environmental Services, Inc.
Workorder# 0010060

Two 1 Liter Tedlar Bag samples were received on October 05, 2000. The laboratory performed analysis via EPA Method TO-14 using GC/MS in the full scan mode. The method involves concentrating up to 0.5 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis. See the data sheets for the reporting limits for each compound.

During the five point calibration, two low-level standards are used. The low-level standard for TO-14 compounds is spiked at 0.5 ppbv and represents the reporting limit for these compounds. The low-level standard for the non-TO-14 compounds is spiked at 2.0 ppbv and represents the reporting limit for these compounds. The TO-14 compounds are present in both standards but are excluded from reporting in the 2.0 ppbv standard since a lower level is already included in the curve.

Method modifications taken to run these samples include:

Requirement	*TO-14*	*ATL Modifications*
Internal standard retention times.	Not specified.	Within 0.50 minutes of most recent daily CCV internal standards
Internal standard recoveries.	Not specified.	Within 40% of the daily CCV internal standard area for blanks and samples.
Internal standard retention times.	Not specified.	Within 0.50 minutes of most recent daily CCV internal standards
Internal calibration criteria.	Not specified.	RSD of 30% or less for standard compounds, 40% or less for non-standard and polar compounds
Continuing calibration verification criteria	Not specified.	70 - 130% for at least 90% of standard compounds, 60 - 140% for at least 80% of non-standard and polar compounds
Response factor for quantitation.	Average response factor (ICAL).	Average response factor (ICAL).

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit(background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit.
N - The identification is based on presumptive evidence.

AIR TOXICS LTD.

SAMPLE NAME : SVE

ID#: 0010060-01A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	7100520	Date of Collection:	10/4/00
Dil. Factor:	40.0	Date of Analysis:	10/5/00

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	20	100	Not Detected	Not Detected
Freon 114	20	140	Not Detected	Not Detected
Chloromethane	20	42	Not Detected	Not Detected
Vinyl Chloride	20	52	Not Detected	Not Detected
Bromomethane	20	79	Not Detected	Not Detected
Chloroethane	20	54	Not Detected	Not Detected
Freon 11	20	110	Not Detected	Not Detected
1,1-Dichloroethene	20	81	Not Detected	Not Detected
Freon 113	20	160	Not Detected	Not Detected
Methylene Chloride	20	71	Not Detected	Not Detected
1,1-Dichloroethane	20	82	Not Detected	Not Detected
cis-1,2-Dichloroethene	20	80	1700	7000
Chloroform	20	99	Not Detected	Not Detected
1,1,1-Trichloroethane	20	110	Not Detected	Not Detected
Carbon Tetrachloride	20	130	Not Detected	Not Detected
Benzene	20	65	Not Detected	Not Detected
1,2-Dichloroethane	20	82	Not Detected	Not Detected
Trichloroethene	20	110	700	3800
1,2-Dichloropropane	20	94	Not Detected	Not Detected
cis-1,3-Dichloropropene	20	92	Not Detected	Not Detected
Toluene	20	76	Not Detected	Not Detected
trans-1,3-Dichloropropene	20	92	Not Detected	Not Detected
1,1,2-Trichloroethane	20	110	Not Detected	Not Detected
Tetrachloroethene	20	140	4700	33000
Ethylene Dibromide	20	160	Not Detected	Not Detected
Chlorobenzene	20	94	Not Detected	Not Detected
Ethyl Benzene	20	88	Not Detected	Not Detected
m,p-Xylene	20	88	Not Detected	Not Detected
o-Xylene	20	88	Not Detected	Not Detected
Styrene	20	86	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	20	140	Not Detected	Not Detected
1,3,5-Trimethylbenzene	20	100	Not Detected	Not Detected
1,2,4-Trimethylbenzene	20	100	Not Detected	Not Detected
1,3-Dichlorobenzene	20	120	Not Detected	Not Detected
1,4-Dichlorobenzene	20	120	Not Detected	Not Detected
Chlorotoluene	20	100	Not Detected	Not Detected
1,2-Dichlorobenzene	20	120	Not Detected	Not Detected
1,2,4-Trichlorobenzene	20	150	Not Detected	Not Detected
Hexachlorobutadiene	20	220	Not Detected	Not Detected
Propylene	80	140	Not Detected	Not Detected
1,3-Butadiene	80	180	Not Detected	Not Detected
Acetone	80	190	1800	4200

AIR TOXICS LTD.

SAMPLE NAME : SVE

ID#: 0010060-01A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	r100520	Date of Collection:	10/4/00
Dil. Factor:	40.0	Date of Analysis:	10/5/00

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	80	250	Not Detected	Not Detected
2-Propanol	80	200	Not Detected	Not Detected
trans-1,2-Dichloroethene	80	320	120	480
Vinyl Acetate	80	290	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	80	240	1500	4500
Hexane	80	290	Not Detected	Not Detected
Tetrahydrofuran	80	240	2200	6500
Cyclohexane	80	280	Not Detected	Not Detected
1,4-Dioxane	80	290	Not Detected	Not Detected
Bromodichloromethane	80	540	Not Detected	Not Detected
4-Methyl-2-pentanone	80	330	Not Detected	Not Detected
2-Hexanone	80	330	Not Detected	Not Detected
Dibromochloromethane	80	690	Not Detected	Not Detected
Bromoform	80	840	Not Detected	Not Detected
4-Ethyltoluene	80	400	Not Detected	Not Detected
Ethanol	80	150	Not Detected	Not Detected
Methyl tert-Butyl Ether	80	290	Not Detected	Not Detected
Heptane	80	330	Not Detected	Not Detected

Container Type: Tedlar Bag

Total VOCs ≅ 12.72 ppmV

Surrogates	% Recovery	Method Limits
1,2-Dichloroethane-d4	116	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

SAMPLE NAME : AS

ID#: 0010060-02A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	r100521	Date of Collection: 10/4/00
Dil. Factor:	40.0	Date of Analysis: 10/6/00

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	20	100	Not Detected	Not Detected
Freon 114	20	140	Not Detected	Not Detected
Chloromethane	20	42	Not Detected	Not Detected
Vinyl Chloride	20	52	Not Detected	Not Detected
Bromomethane	20	79	Not Detected	Not Detected
Chloroethane	20	54	Not Detected	Not Detected
Freon 11	20	110	Not Detected	Not Detected
1,1-Dichloroethene	20	81	Not Detected	Not Detected
Freon 113	20	160	Not Detected	Not Detected
Methylene Chloride	20	71	Not Detected	Not Detected
1,1-Dichloroethane	20	82	Not Detected	Not Detected
cis-1,2-Dichloroethene	20	80	1700	7000
Chloroform	20	99	Not Detected	Not Detected
1,1,1-Trichloroethane	20	110	Not Detected	Not Detected
Carbon Tetrachloride	20	130	Not Detected	Not Detected
Benzene	20	65	Not Detected	Not Detected
1,2-Dichloroethane	20	82	Not Detected	Not Detected
Trichloroethene	20	110	770	4200
1,2-Dichloropropane	20	94	Not Detected	Not Detected
cis-1,3-Dichloropropene	20	92	Not Detected	Not Detected
Toluene	20	76	Not Detected	Not Detected
trans-1,3-Dichloropropene	20	92	Not Detected	Not Detected
1,1,2-Trichloroethane	20	110	Not Detected	Not Detected
Tetrachloroethene	20	140	5900	40000
Ethylene Dibromide	20	160	Not Detected	Not Detected
Chlorobenzene	20	94	Not Detected	Not Detected
Ethyl Benzene	20	88	Not Detected	Not Detected
m,p-Xylene	20	88	Not Detected	Not Detected
o-Xylene	20	88	Not Detected	Not Detected
Styrene	20	86	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	20	140	Not Detected	Not Detected
1,3,5-Trimethylbenzene	20	100	Not Detected	Not Detected
1,2,4-Trimethylbenzene	20	100	Not Detected	Not Detected
1,3-Dichlorobenzene	20	120	Not Detected	Not Detected
1,4-Dichlorobenzene	20	120	Not Detected	Not Detected
Chlorotoluene	20	100	Not Detected	Not Detected
1,2-Dichlorobenzene	20	120	Not Detected	Not Detected
1,2,4-Trichlorobenzene	20	150	Not Detected	Not Detected
Hexachlorobutadiene	20	220	Not Detected	Not Detected
Propylene	80	140	Not Detected	Not Detected
1,3-Butadiene	80	180	Not Detected	Not Detected
Acetone	80	190	410	990

AIR TOXICS LTD.

SAMPLE NAME : AS

ID#: 0010060-02A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	r100521	Date of Collection:	10/4/00
Dil. Factor:	40.0	Date of Analysis:	10/6/00

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	80	250	Not Detected	Not Detected
2-Propanol	80	200	Not Detected	Not Detected
trans-1,2-Dichloroethene	80	320	110	440
Vinyl Acetate	80	290	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	80	240	470	1400
Hexane	80	290	Not Detected	Not Detected
Tetrahydrofuran	80	240	690	2100
Cyclohexane	80	280	Not Detected	Not Detected
1,4-Dioxane	80	290	Not Detected	Not Detected
Bromodichloromethane	80	540	Not Detected	Not Detected
4-Methyl-2-pentanone	80	330	Not Detected	Not Detected
2-Hexanone	80	330	Not Detected	Not Detected
Dibromochloromethane	80	690	Not Detected	Not Detected
Bromoform	80	840	Not Detected	Not Detected
4-Ethyltoluene	80	400	Not Detected	Not Detected
Ethanol	80	150	Not Detected	Not Detected
Methyl tert-Butyl Ether	80	290	Not Detected	Not Detected
Heptane	80	330	Not Detected	Not Detected

Total VOCs = 10,050

Container Type: Tedlar Bag

Surrogates	% Recovery	Method Limits
1,2-Dichloroethane-d4	111	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

SAMPLE NAME : Lab Blank

ID#: 0010060-03A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	r100504	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 10/5/00	

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Freon 12	0.50	2.5	Not Detected	Not Detected
Freon 114	0.50	3.6	Not Detected	Not Detected
Chloromethane	0.50	1.0	Not Detected	Not Detected
Vinyl Chloride	0.50	1.3	Not Detected	Not Detected
Bromomethane	0.50	2.0	Not Detected	Not Detected
Chloroethane	0.50	1.3	Not Detected	Not Detected
Freon 11	0.50	2.8	Not Detected	Not Detected
1,1-Dichloroethene	0.50	2.0	Not Detected	Not Detected
Freon 113	0.50	3.9	Not Detected	Not Detected
Methylene Chloride	0.50	1.8	Not Detected	Not Detected
1,1-Dichloroethane	0.50	2.0	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.50	2.0	Not Detected	Not Detected
Chloroform	0.50	2.5	Not Detected	Not Detected
1,1,1-Trichloroethane	0.50	2.8	Not Detected	Not Detected
Carbon Tetrachloride	0.50	3.2	Not Detected	Not Detected
Benzene	0.50	1.6	Not Detected	Not Detected
1,2-Dichloroethane	0.50	2.0	Not Detected	Not Detected
Trichloroethene	0.50	2.7	Not Detected	Not Detected
1,2-Dichloropropane	0.50	2.3	Not Detected	Not Detected
cis-1,3-Dichloropropene	0.50	2.3	Not Detected	Not Detected
Toluene	0.50	1.9	Not Detected	Not Detected
trans-1,3-Dichloropropene	0.50	2.3	Not Detected	Not Detected
1,1,2-Trichloroethane	0.50	2.8	Not Detected	Not Detected
Tetrachloroethene	0.50	3.4	Not Detected	Not Detected
Ethylene Dibromide	0.50	3.9	Not Detected	Not Detected
Chlorobenzene	0.50	2.3	Not Detected	Not Detected
Ethyl Benzene	0.50	2.2	Not Detected	Not Detected
m,p-Xylene	0.50	2.2	Not Detected	Not Detected
o-Xylene	0.50	2.2	Not Detected	Not Detected
Styrene	0.50	2.2	Not Detected	Not Detected
1,1,2,2-Tetrachloroethane	0.50	3.5	Not Detected	Not Detected
1,3,5-Trimethylbenzene	0.50	2.5	Not Detected	Not Detected
1,2,4-Trimethylbenzene	0.50	2.5	Not Detected	Not Detected
1,3-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
1,4-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
Chlorotoluene	0.50	2.6	Not Detected	Not Detected
1,2-Dichlorobenzene	0.50	3.0	Not Detected	Not Detected
1,2,4-Trichlorobenzene	0.50	3.8	Not Detected	Not Detected
Hexachlorobutadiene	0.50	5.4	Not Detected	Not Detected
Propylene	2.0	3.5	Not Detected	Not Detected
1,3-Butadiene	2.0	4.5	Not Detected	Not Detected
Acetone	2.0	4.8	Not Detected	Not Detected

AIR TOXICS LTD.

SAMPLE NAME : Lab Blank

ID#: 0010060-03A

EPA METHOD TO-14 GC/MS Full Scan

File Name:	r100504	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	10/5/00

Compound	Det. Limit (ppbv)	Det. Limit (uG/m3)	Amount (ppbv)	Amount (uG/m3)
Carbon Disulfide	2.0	6.3	Not Detected	Not Detected
2-Propanol	2.0	5.0	Not Detected	Not Detected
trans-1,2-Dichloroethene	2.0	8.0	Not Detected	Not Detected
Vinyl Acetate	2.0	7.2	Not Detected	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	6.0	Not Detected	Not Detected
Hexane	2.0	7.2	Not Detected	Not Detected
Tetrahydrofuran	2.0	6.0	Not Detected	Not Detected
Cyclohexane	2.0	7.0	Not Detected	Not Detected
1,4-Dioxane	2.0	7.3	Not Detected	Not Detected
Bromodichloromethane	2.0	14	Not Detected	Not Detected
4-Methyl-2-pentanone	2.0	8.3	Not Detected	Not Detected
2-Hexanone	2.0	8.3	Not Detected	Not Detected
Dibromochloromethane	2.0	17	Not Detected	Not Detected
Bromoform	2.0	21	Not Detected	Not Detected
4-Ethyltoluene	2.0	10	Not Detected	Not Detected
Ethanol	2.0	3.8	Not Detected	Not Detected
Methyl tert-Butyl Ether	2.0	7.3	Not Detected	Not Detected
Heptane	2.0	8.3	Not Detected	Not Detected

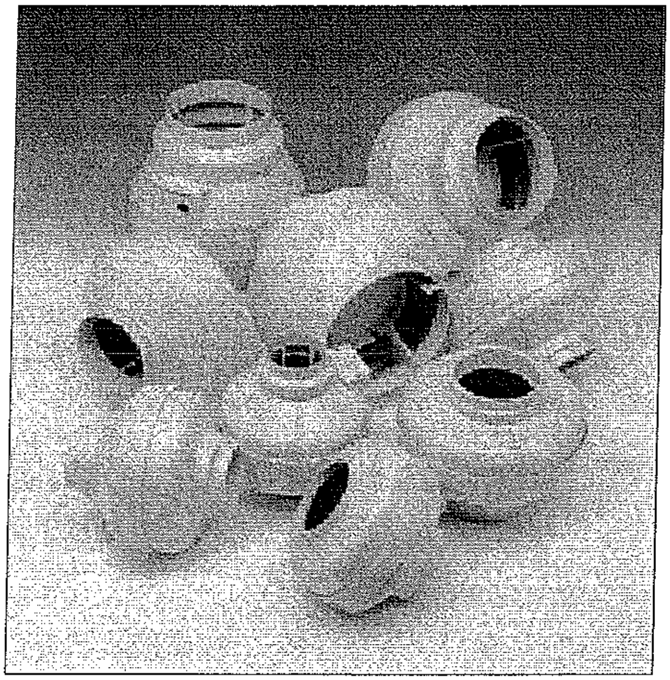
Container Type: NA

Surrogates	% Recovery	Method Limits
1,2-Dichloroethane-d4	118	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

Appendix B:

Maintenance and Support Documentation for the Sub-Slab Depressurization System

Fantech



INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR MODEL FR

INSTRUCTIONS POUR L'INSTALLATION ET L'ENTRETIEN DU MODÈLE FR

INSTRUCCIONES DE INSTALACION Y MANTENIMIENTO DEL MODELO FR

IMPORTANT: Read These Instructions Completely Before Installing Fan And Save These Instructions For Future Reference.

Items Included: One FR fan, one mounting bracket, mounting hardware

Regular Kits Also Include: Grill with mounting collar/backdraft damper combination, duct mounting clamps

Deluxe Kits Also Include: 2 Grills with mounting collar/backdraft damper combination, "wye" transition, duct mounting clamps, balancing damper

Additional Items Needed: Duct work, duct tape or mounting clamps, duct termination device (roof cap, louvered shutter, etc.)

Tools Required: Electric drill, drill bits, regular screwdriver, phillips screwdriver, razor knife, keyhole saw (optional)

Installing Mounting Bracket & Fan

1. When selecting fan mounting location, the following criteria should be considered: *a) mounting to minimize noise generated by fan operation; b) service accessibility*
   a) Mounting the fan as far as possible from the intake point will minimize fan operating noise from being transmitted back through the duct work. If the fan is to be used as a booster for moving the air between two rooms, a central point along the duct may be optimal. Insulated flexible type duct work (recommended for all bathroom exhaust applications) will result in much quieter operation. Fantech recommends minimum 8' of insulated flexible duct between any exhaust grill and fan for low noise level.
   b) Fan location should allow sufficient access for service.
2. Using the wood screws provided, attach the mounting bracket (NB or MB) to a support beam at the selected location. Fan mounting can be at any point along the duct and in any angle, however, vertical mounting is recommended to reduce condensation buildup in the fan. If a horizontal installation is necessary and condensation buildup may pose a problem, either wrap insulation around the fan or drill a ¼" hole in the bottom of the housing (along with an NPT insert [by others] and drain tubing) allowing condensation to drain.
3. Attach fan to the mounting bracket with the sheet metal screws provided. Wiring box should be positioned for easy access. Bracket is provided with rubber vibration isolation grommets to prevent the transmission of sound through the structure. Be careful not to overtighten. Also, care should be taken not to strip the plastic housing. Screws are self tapping and do not require pilot holes. However, pilot holes (no larger than 3⁄32") are recommended.
4. Connect duct work to inlet and outlet of fan using CB clamps or duct tape. When using insulated duct, it is recommended that the inner vinyl core be clamped or taped to the inlet and outlet and that the vapor barrier surrounding the insulation be duct taped to the fan housing.

   NOTE: Steps 2 & 3 may be reversed.

Mount Bracket (NB).

Mount Fan.

Mount Bracket (MB).

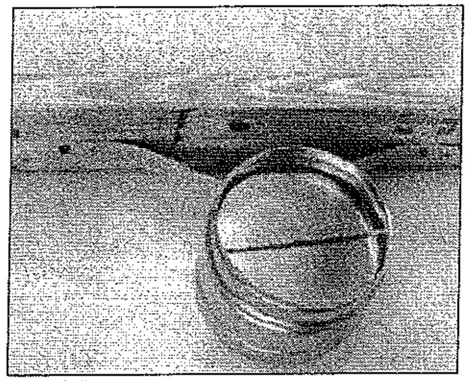
Mount Fan.

Installing DG Supply/Exhaust Grill

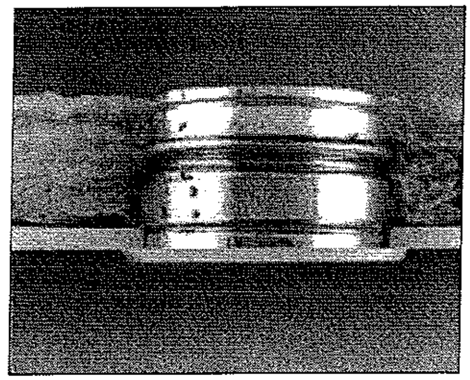
If a Vent/Light combination kit is purchased, the VLC vent/lights are supplied with a separate installation instruction replacing steps 1 through 4.

1. Select the grill mounting point within the area to be ventilated. To ease installation, locations of framing beams within the walls or joists supporting the ceiling should be considered. Collar/damper is provided with a perforated hanging strap for attachment directly to a beam or joist. Allow sufficient space between the collar/damper and the beam to attach the duct work. If the location of the grill does not allow direct attachment, a cross-member mounted to the framing should be used.
2. Place the mounting collar/damper in the selected location and trace a circle onto the surface. From the interior side of the room, cut through the surface. Please note: In order to assure a smoother finish when mounting through a sheetrock or tile type ceiling, it is recommended that a razor knife be used to make the cut.
3. From within the attic or crawl space, place the mounting collar into the hole until the edge of the collar is flush with the interior wall or ceiling surface. Attach collar to the support beam with the 2" wood screws provided. Attach duct work. Secure using CB or FC clamps and/or duct tape. When installing the damper into rigid type ducting, FC clamps or duct tape should be used.

   PLEASE NOTE: *When attaching flex duct to the collar/damper combination and an immediate elbow is necessary, be certain that the elbow is installed with a "soft" bend to allow damper blades to operate properly.*
4. Snap the grill into the mounting collar/damper. Grill should be pushed tightly into place for an airtight fit. If there is a gap between the collar and the ceiling it should be caulked to avoid air leakage. For subsequent cleaning the grill can be pulled out and cleaned.



Mount Collar



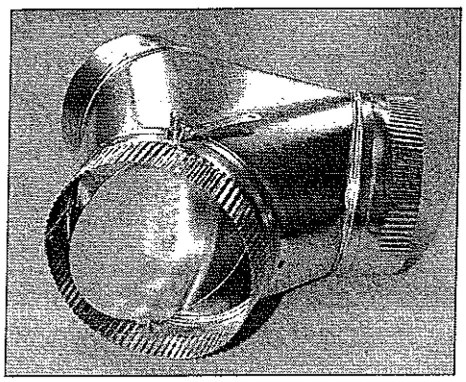
Side view grill and collar.

Installing DG Supply/Exhaust Grill

When installing a DLX kit, a balancing damper has been included to allow for adjustment of the system. The damper may be used where the grills will be connected using branches of unequal length or where the flow will need to be balanced for any reason.

To Install The Damper:

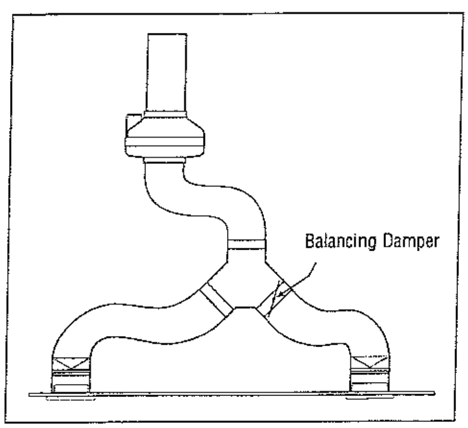
1. The Damper must be installed on the branch with the least restriction. This is generally the duct that is shortest or has the fewest bends.
2. Drill a 5/16" hole approximately 1½" from the edge on the flat side of the wye.
3. Place the washer over the threaded shaft on the damper.
4. Insert the damper, shaft first, into the hole just drilled.
5. Attach the handle using the wing nut.
6. Adjust the damper to balance airflow and tighten the wing nut to secure.



Wye with balancing damper.

Flexible Duct Installation Hints

Flexible insulated duct is strongly recommended where allowed by local code for bathroom exhaust applications, where ducting passes through unconditioned space or where noise is a factor. Failure to use insulation could result in excessive condensation buildup within the duct, and undesirable sound levels within the room. For the quietest possible installations, Fantech recommends a minimum of 8' of insulated flexduct between any exhaust grill and fan. When using flexible type duct work, duct should be stretched as tight and straight as possible. Failure to do so could result in dramatic loss of system performance. Flexible duct should be connected to the fan with CB type clamps or duct tape. All connections should be as airtight as possible to maximize system performance.



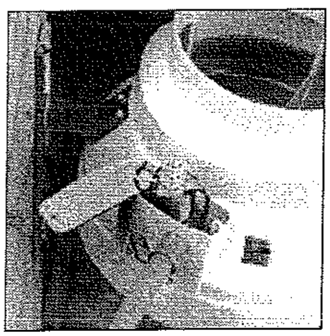
FR Series Fan and balancing damper.

Warning

DO NOT CONNECT POWER SUPPLY until fan is completely installed. Make sure electrical service to the fan is locked in "OFF" position

1. All units are suitable for use with solid-state speed control.
2. This unit has rotating parts and safety precautions should be exercised during installation, operation and maintenance.
3. **CAUTION**: "For General Ventilation Use Only. Do Not Use To Exhaust Hazardous Or Explosive Materials And Vapors."
4. **WARNING: To reduce the risk of fire, electrical shock, or injury to persons-observe the following:**
   a. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the factory.
   b. Before servicing or cleaning, switch power off at service panel and lock service panel to prevent fan from being switched on accidentally.
   c. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
   d. The combustion airflow needed for safe operation of fuel burning equipment may be affected by this unit's operation. Follow the heating equipment manufacturer's guidelines and safety standards such as those published by the National Fire Protection Association (NFPA), the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and the local code authorities.
   e. When cutting or drilling into wall or ceiling, do not damage electrical wires or other hidden utilities.
   f. Exhaust fans must always be vented to the outdoors.
   g. Install fan at least five feet above the floor.
   h. Acceptable for use over a bathtub or shower.
   i. NEVER place a switch where it can be reached from a tub or shower.
5. **WARNING!** Check voltage at the fan to see if it corresponds to the motor nameplate.

GUARDS MUST BE INSTALLED WHEN FAN IS WITHIN REACH OF PERSONNEL OR WITHIN SEVEN (7) FEET OF WORKING LEVEL OR WHEN DEEMED ADVISABLE FOR SAFETY.



Liquid tight wiring – Top View (For outside applications).

Romex wiring – Top View

Electrical Connection

1. Remove the screws securing the terminal box cover plate located on the side of the fan. All fan motor connections are pre-wired to an electrical terminal strip. A ⅜" romex type cable restraint connector will be needed to secure the wiring through the knockout provided on the side of the terminal box.
2. Bring incoming electrical service through the romex connector and the fan knockout. Be sure to place the connector nut over the wiring coming into the terminal box. There are two open ports on the terminal strip. Using a small regular screwdriver, tighten the neutral (white) wire of the incoming supply under the open terminal strip port labeled "N". Tighten the line (black) wire of the incoming supply under the open terminal strip port labeled "L". Since the fan motor is isolated within a plastic housing, grounding is not necessary.
3. Secure the romex connector. Secure the incoming supply with the romex connector. Replace the fan terminal box cover. All fan motor and capacitor connections have been pre-wired from the factory. No additional fan wiring is necessary.

Troubleshooting

If fan fails to operate, please check the following:

1. Consult wiring diagrams (see below) to assure proper connection.
2. Check motor lead wiring, capacitor leads and incoming supply leads to assure definite contact.
3. If possible, use a meter to test for continuity across the fan motor leads. In order to do this, the capacitor must be disconnected (do not test the capacitor - it will not meter continuity). If motor leads show continuity, consult factory for a replacement capacitor.

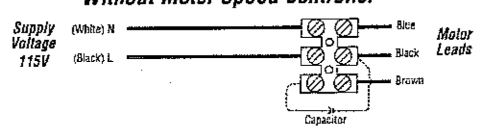
Maintenance Instructions

Since fan bearings are sealed and provided with an internal lubricating material, no additional lubrication is necessary.

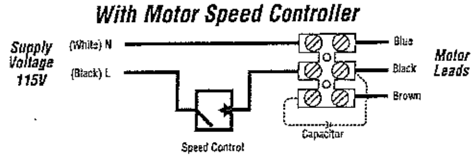
Wiring Diagrams

All Models

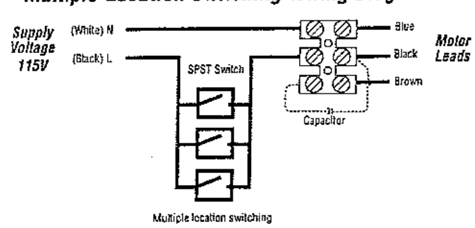
Without Motor Speed Controller



With Motor Speed Controller



Multiple Location Switching Wiring Diagram



Five (5) Year Warranty

This warranty supersedes all prior warranties

For factory return you must:

1) Have a return materials authorization (RMA) number. This number may be obtained by calling FANTECH, INC. at 1-800-747-1762. Please have bill of sale available.
2) The RMA number must be clearly displayed on the outside of the carton, or delivery will be refused.
3) All product being returned must be shipped prepaid and be accompanied with a copy of the bill of sale.
4) Product will be replaced/repaired and shipped back to buyer. No credits will be issued.

During the First Thirty (30) Days:

FANTECH, INC will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the FANTECH factory, together with a copy of the bill of sale and identified with RMA number.

During The First Three (3) Years

FANTECH, INC. will replace any product which has a factory defect in workmanship or material. Product must be returned to the FANTECH factory, together with bill of sale, and identified with an RMA number.

During Years Four (4) And Five (5):

FANTECH, INC. will repair or replace any product which has a factory defect in workmanship or material. Product must be returned to the FANTECH factory, together with a bill of sale, and identified with an RMA number.

The following warranties do not apply:

Damages from shipping, either concealed or visible. Claim must be filed with the carrier.

Damages resulting from improper wiring or installation.

Damages caused by acts of nature, or resulting from improper consumer procedures such as:

Improper maintenance,

Misuse, abuse, abnormal use, or accident, or

Incorrect electrical voltage or current.

Removal or alteration made on the FANTECH label control number or date of manufacture.

Any other warranty, expressed, written or implied, and to any consequential or incidental damages, loss of property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

Warranty validation:

The end user must keep a copy of the bill of sale to verify purchase date.

Fantech

United States
1712 Northgate Blvd.,
Sarasota, FL. 34234
Phone: 800.747.1762; 941.309.6000
Fax: 800.487.9915; 941.309.6099
www.fantech.net; info@fantech.net

Canada
50 Kanalflakt Way,
Bouctouche, NB E4S 3M5
Phone: 800.565.3548; 506.743.9500
Fax: 877.747.8116; 506.743.9600
www.fantech.ca; info@fantech.ca

Article #: 301078
Item #: 401444
Rev Date: 012605

Fantech

AUGUST 2007

FR SERIES
INLINE EXHAUST FANS

Fantech's versatile FR Series Inline Fans provide the ideal answer for a variety of air movement problems in residential and commercial applications. The fans feature a plastic housing constructed of UL-recognized, UV protected thermoplastic resin. This tough protective shell allows the fan to be mounted in outdoor and wet locations*. FR fans feature external rotor motors that have proven dependable year after year. Fan is fully caulked to prevent moisture from entering the housing.

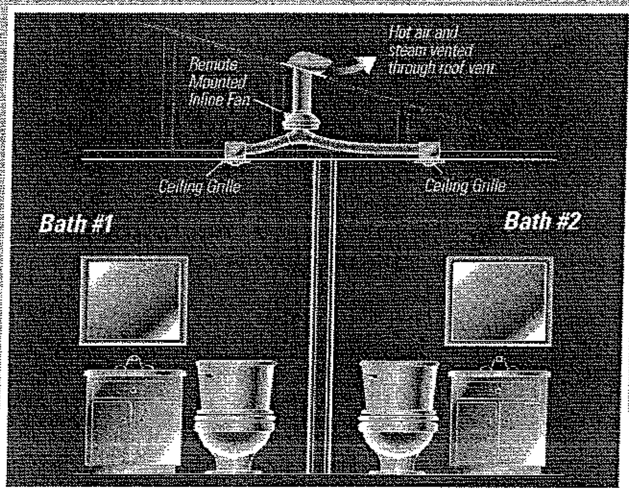
Applications

FR fans can be used for multiple point exhaust applications, crawl space venting or make-up air supply. They are also widely used as booster fans to move air from one room or area to another.

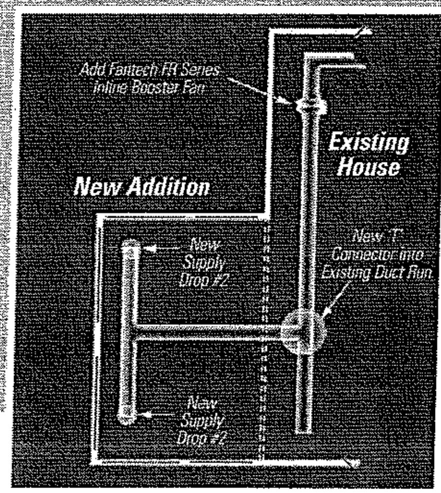
Look for the Energy Star Rated Models in Performance Data Chart on back page.

FIVE YEAR WARRANTY

DUAL BATH APPLICATIONS - COMMERCIAL OR RESIDENTIAL

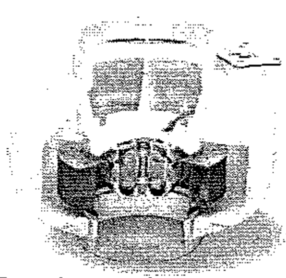


NEW ADDITION



EASY TO INSTALL.
LOADED WITH FEATURES:

- Prewired and supplied with a mounting bracket for easy installation
- UL Listed; CSA Certified
- Approved for residential and commercial applications and for wet locations
- Suitable for airstream temperatures up to 140° F
- Easy connection using external wiring box with waterproof gasket
- 122-649 CFM
- 4" to 10" duct diameters
- 100% speed controllable
- Five-year factory warranty



Fantech external rotor motor

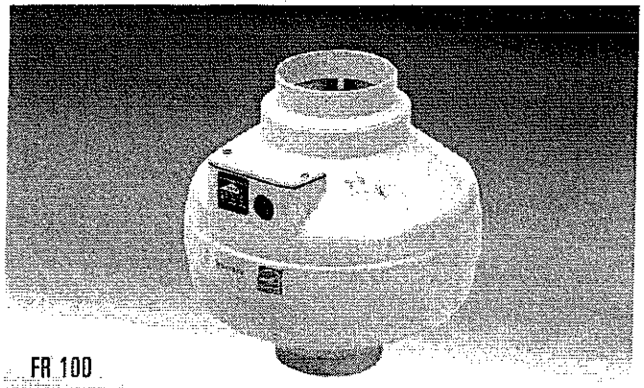
*The FR Series is not manufactured to operate with water running through the motor compartment, or to be used in applications where the fan would be buried underground. A UL-recognized waterproof conduit should be used for all outdoor applications to prevent moisture entry via knockout in wiring box.

IMPROVING INDOOR AIR QUALITY THROUGH BETTER VENTILATION

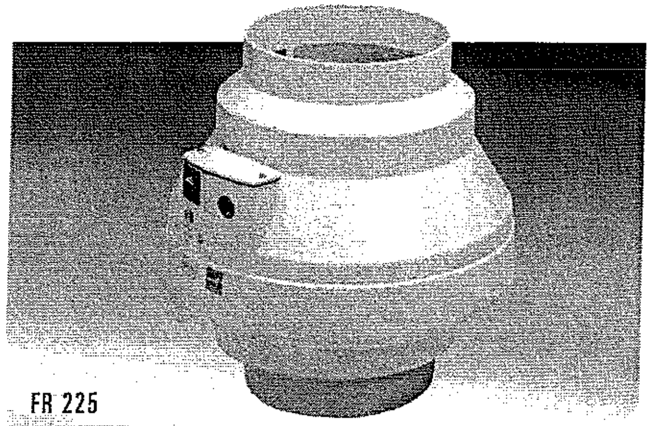
www.fantech.net

FR SERIES

INLINE EXHAUST FANS

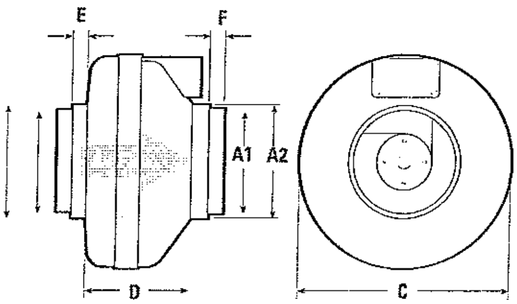


FR 100



FR 225

DIMENSIONAL DATA



Model	†A1	A2	C	D	E	F
FR 100	4	5	9½	6⅛	⅞	⅞
FR 110	4	5	9½	6⅛	⅞	⅞
FR 125	–	5	9½	6⅛	⅞	–
FR 140	6	6¼	11¾	5⅞	1	⅞
FR 150	6	6¼	11¾	5⅞	1	⅞
FR 160	6	6¼	11¾	5⅞	1	⅞
FR 200	8	10	13¼	6¼	1½	1½
FR 225	8	10	13¼	6¼	1½	1½
FR 250	–	10	13¼	6¼	1½	–

All dimensions in inches.
† Duct connections are ⅛" smaller than duct size.

FIVE YEAR WARRANTY

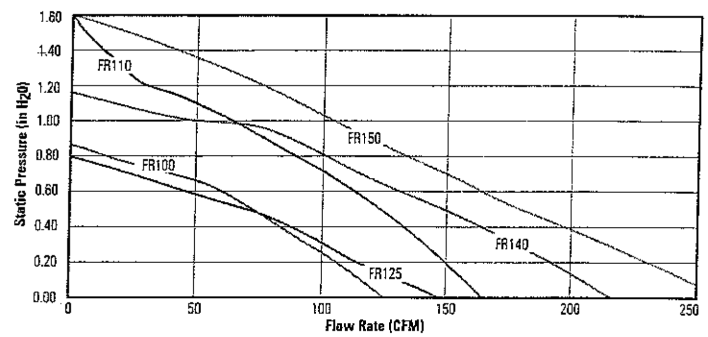
HVI CERTIFIED

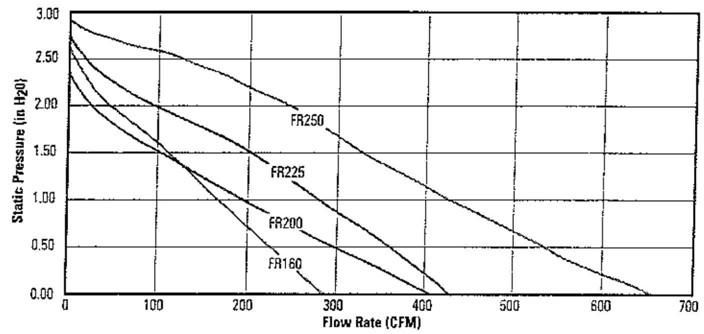
c UL us

c SP us

Look for the Energy Star Rated Models in Performance Data Chart.

AIR PERFORMANCE GRAPHS





PERFORMANCE DATA

Fan Model	Energy Star	RPM	Voltage	Rated Watts	Wattage Range	Max. Amps	Static Pressure in Inches W.G. 0"	.2"	.4"	.6"	.8"	1.0"	1.5"	Max. Ps	Duct Dia.
FR 100	✔	2900	115	19	13 – 19	0.18	122	100	78	55	15	—	—	0.87"	4"
FR 110	—	2900	115	80	62 – 80	0.72	167	150	133	113	88	63	4	1.60"	4"
FR 125	✔	2950	115	18	15 – 18	0.18	148	120	88	47	—	—	—	0.79"	5"
FR 140	✔	2850	115	61	47 – 62	0.53	214	190	162	132	99	46	—	1.15"	6"
FR 150	✔	2750	120	71	54 – 72	0.67	263	230	198	167	136	106	17	1.58"	6"
FR 160	—	2750	115	129	103 – 130	1.14	289	260	233	206	179	154	89	2.32"	6"
FR 200	✔	2750	115	122	106 – 128	1.11	408	360	308	259	213	173	72	2.14"	8"
FR 225	✔	3100	115	137	111 – 152	1.35	429	400	366	332	297	260	168	2.48"	8"
FR 250	—	2850	115	241	146 – 248	2.40	649	600	553	506	454	403	294	2.58"	10"

Performance shown is for installation type D - Ducted inlet, Ducted outlet. Speed (RPM) shown is nominal. Performance is based on actual speed of test. Performance ratings do not include the effects of appurtenances in the airstream.

Fantech **United States** 1712 Northgate Blvd. • Sarasota, FL 34234 • 1.800.747.1762 • www.fantech.net
Canada 50 Kanalflakt Way • Bouctouche, NB E4S 3M5 • 1.800.565.3548 • www.fantech.ca

Item #: 450399
Rev Date: 022508

Appendix C:

AS/SVE System Inspection Checklist

AS/SVE SYSTEM MONITORING CHECKLIST PAGE 1 OF 2

Date: ____________________________________

Name: ____________________________________ Title: ______________________________

Company: ____

	YES	NO
Rooftop AS/SVE emission points clear?	☐	☐
AS/SVE air compressor and blower operating?	☐	☐
Moisture separator tank high liquid level sensor operational?	☐	☐
SVE and AS high air temperature sensors operational?	☐	☐
Piping, hoses, and belts undamaged?	☐	☐
Any repairs/replacement needed? (If yes, describe below):	☐	☐

____
____
____
____
____
____
____
____

MEASUREMENTS:

Liquid level in the moisture separator	__________________
SVE Influent PID reading (before air dilution)	__________________
SVE Effluent PID reading	__________________
SVE Influent air temperature	__________________
SVE Effluent air temperature	__________________
SVE air velocity using air anemometer	__________________
SVE Influent vacuum before particulate filter	__________________
SVE Influent vacuum after particulate filter	__________________
Cumulative hour reading on SVE blower	__________________
AS influent temperature	__________________
AS effluent temperature	__________________
AS influent air pressure before particulate filter	__________________
AS influent air pressure after particulate filter	__________________
AS Effluent air pressure at blower	__________________
AS air velocity using air anemometer	__________________
AC current demand on blower	__________________

AS/SVE SYSTEM MONITORING CHECKLIST PAGE 2 OF 2

SYSTEM MANIFOLD MEASUREMENTS:

AS/SVE flow rate at Well #AS-1 ____________________

AS/SVE flow rate at Well #SVE-1 ____________________

AS/SVE flow rate at Well #AS-2 ____________________

AS/SVE flow rate at Well #SVE-2 ____________________

SVE vacuum at line connected to Well #SVE 1 ____________________

SVE vacuum at line connected to Well #SVE 2 ____________________

AS pressure at line connected to Well #AS 1 ____________________

AS pressure at line connected to Well #AS 2 ____________________

Attachments:

- ☐ Photographs / Sketch
- ☐ Invoice
- ☐ Receipt for replacement equipment
- ☐ Additional pages
- ☐ Other: ____

Appendix D:

SSD System Inspection Checklist

SSD SYSTEM MONITORING CHECKLIST

Date: ____

Name: ______________________________________Title: _________________________________

Company: ____

	YES	NO
Rooftop SSD emission points clear?	☐	☐
SSD fan operating?	☐	☐
Piping undamaged?	☐	☐
Negative pressure at all sampling points?	☐	☐
Effluent PID reading______________		
Repairs/replacement needed?	☐	☐

If yes, describe below:

Attachments:

- ☐ Photographs / Sketch
- ☐ Invoice
- ☐ Receipt for replacement equipment
- ☐ Additional pages
- ☐ Other: ____

Appendix E:

Soil Boring Logs and Well Construction Logs
for the Wells Included in the Monitoring Plan

THREE BRIDGES, NJ

PERMIT NO. NA- -

SHEET 1 OF 1

JOB NO. EMS-7432	CLIENT AEGON	PROJECT LOCATION DAYTON PLAZA QUEENS, NY
LOCATION OF WELL NE Corner of London French Cleaners		ELEVATION AND DATUM
DRILLING CONTRACTOR SUMMIT DRILLING	DRILLER Matt, Rich	INSPECTOR SEL
DRILLING RIG TYPE MOBILE B-59	SIZE AND TYPE OF BIT 4¼"	DATE STARTED 11-20-95 / DATE COMPLETED 11-20-95
SAMPLER TYPE H.S.A. SS/1⅞"	HAMMER WEIGHT 140 / DROP 30"	TOTAL DEPTH 13' / WATER LEVEL 4.95' btoc

SAMPLES NO.	BLOWS	DEPTH FT.	WATER	LITHOLOGY
		0–1		ASPHALT 4" BASE 8", crushed rock + sand, grey, dry OVM=0
	5→11 / 15 13	1–3		SAND, 5", fine, grey, glass chips, dry; FILL, 7" brick chips, coal, glass, sandy; SAND, 12", lt-grey, fine gr., trace pebs to ½"
2010 4.5-5.0' 2 jars	9→9 / 11 10	3–5	▽ (5)	SAND, 24", lt. grey, f-med. gr. OVM=0 moist to sl. wet at base
	5→5 / 9 10	5–7		Sand, 24", same, wet at 5' OVM=0
		7–13		Cuttings Sand, same

WELL CONSTRUCTION

2010 lock
Manhole 10"
Grout 0-1.5'
Riser -.3'-3.0', 2" PVC
Screen 3-13', .02", PVC
Sand 2-13' #2
Bentonite 1.5-2.0'

Water had strong SO_2 odor during development.

Yield ~ 10gpm

Temp. 52.1°F
Cond. 1537 us/cm
pH 6.52

THREE BRIDGES, NJ

PERMIT NO. NA-

SHEET 1 OF 1

JOB NO.	CLIENT	PROJECT LOCATION
EMS-7432	AEGON	Dayton Plaza Queens, NY

LOCATION OF WELL	ELEVATION AND DATUM
Northwest side of London French Cleaners	

DRILLING CONTRACTOR	DRILLER	INSPECTOR	
SUMMIT	Matt, Rich	SEL	
DRILLING RIG TYPE	SIZE AND TYPE OF BIT	DATE STARTED	DATE COMPLETED
Mobile B-59 H.S.A.	4 1/4"	11-20-95	11-20-95
SAMPLER TYPE	HAMMER WEIGHT / DROP	TOTAL DEPTH	WATER LEVEL
SS 1 7/8"	140 / 30"	13'	4.95' btoc

SAMPLES NO.	BLOWS	DEPTH FT.	LITHOLOGY
		0–1	ASPHALT 4" BASE 8", crushed rock, sandy clay
	10→10 / 11 13	1–3	SAND, 9", dk. grey, wood chips, brick, dry Fill, 9", clayey, coal, brick, sand, dk. grey SAND, 6", buff f-med, clear
8010 4.5-5.0' 2 jars	10→11 / 20 20	3–5	SAND, 24", sugar, f-med gr., clear, moist to v. moist base; buff to lt. grey OVM = 0
	5→4 / 4 3	5–7	SAND, 22", same, wet at 5'
		7–13	Cuttings SAND, same

WELL CONSTRUCTION

2010 Lock
Manhole 10"
Grout 0-1.5'
Bento 1.5-2.0'
Riser -.3'-3.0'
Screen 3-13', .02"
Sand 2.0-13', #2
2" dia; PVC

Yield ~ 10 gpm
Water had strong SO_2 odor during development.

Temp. 52.8° F
Cond. 1280 us/cm
pH 6.3

RECON SYSTEMS, INC.
THREE BRIDGES, NJ

WELL NO. [illegible]
PERMIT NO. N [illegible]

SHEET 1 OF 1

JOB NO.	CLIENT	PROJECT LOCATION
EMS-7432	AEGON	Dayton Plaza, Queens, NY

LOCATION OF WELL	ELEVATION AND DATUM
SE corner of London French Cleaners. Alley behind bldg.	

DRILLING CONTRACTOR	DRILLER	INSPECTOR
SUMMIT	Matt, Rick	SEL

DRILLING RIG TYPE	SIZE AND TYPE OF BIT	DATE STARTED	DATE COMPLETED
Mobile B-59	4 1/4" ID	11-20-95	11-20-95

SAMPLER TYPE	HAMMER WEIGHT	DROP	TOTAL DEPTH	WATER LEVEL
s/s 1 7/8"	140 lb	30"	12'	4.55' btoc

SAMPLES NO.	BLOWS	DEPTH FT.	WATER	LITHOLOGY
		0–1		ASPHALT, 4". Base, 8" crushed stone, sandy clay.
	6→5	1		Fill, 16", Sand, grey, rock with matted paper, brick, porcelain; wood jammed catcher; ovm = 0
	5 4	2		
	4→5	3		Sand, 6", gry, f-med, wood chunks, moist. Fill, 6", same as above. Sand, 6", wet, f-med, clean, loose. ovm = 0
3012 4-4.5' 2 jars	7 10	4	▽ (4.55')	
	10 10	5		SAND, 18", wet, f-med gr., salt & pepper, gry. ovm=0-18
	7 5	6		
		7–12		Cuttings. Sand, same
		13, 14, 15		

WELL CONSTRUCTION

2010 lock
Manhole 10" ID
Grout 0-1.3'
Bento. 1.3-1.5' pellets
Sand 1.5-12'; #2
Riser 2" PVC
Screen 2-12', .02"

Water had strong SO2 odor during development.

Yield ~ 10gpm

Temp. 51.9°F
Cond. 463 µS/cm
pH. 6.48

THREE BRIDGES, NJ

PERMIT NO. NA - -

SHEET 1 OF 1

JOB NO.	CLIENT	PROJECT LOCATION
EMS-7432	AEGON	Dayton Plaza Queens, NY
LOCATION OF WELL: SW corner of London French Cleaners Alley Behind Building.		ELEVATION AND DATUM

DRILLING CONTRACTOR	DRILLER	INSPECTOR	
SUMMIT	Matt, Rich	SEL	
DRILLING RIG TYPE: Mobile B-59 H.S.A.	SIZE AND TYPE OF BIT: 4¼" ID	DATE STARTED: 11-20-95	DATE COMPLETED: 11-20-95
SAMPLER TYPE: S/S 1⅞"	HAMMER WEIGHT: 140 / DROP: 30"	TOTAL DEPTH: 12.0'	WATER LEVEL: 4.85' btoc

SAMPLES NO.	BLOWS	DEPTH FT.	LITHOLOGY
		0–1	ASPHALT 4" Base, 8"; crushed rock, sandy clay, OVM=0
	5→5	1–2	SAND, 12" f-med, grey brown
	4 3	2–3	Fill, 4", brick, wood, conc. Jammed, moist, clayey
	4 6	3–4	Fill, 4", same but no jam. Sand, 16" grey brown to buff, v. moist to sl. wet base; OVM = 0
8010 4.2-4.7 2 jars	8 7	4–5	
	6 7	5–6	Sand, 16", grey, wet, salt & pepper, f-med. gr; clean. OVM = 0
	7 6	6–7	
		7–12	Cuttings Sand, same

WATER: ▽ 4.85'

WELL CONSTRUCTION

2010 lock
Manhole 10" ⌀
Grout 0-1.3'
Bento pellets 1.3-1.5'
Sand 1.5-12'; #2
Riser +.4' - 2.0'
Screen 2-12' .02" slot

Water had strong SO2 odor during development.
Yield ~ 10 gpm

Temp. 53.2°F
Cond. 836 uS/cm
pH 6.53

OV
B=

Summit
DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS
489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

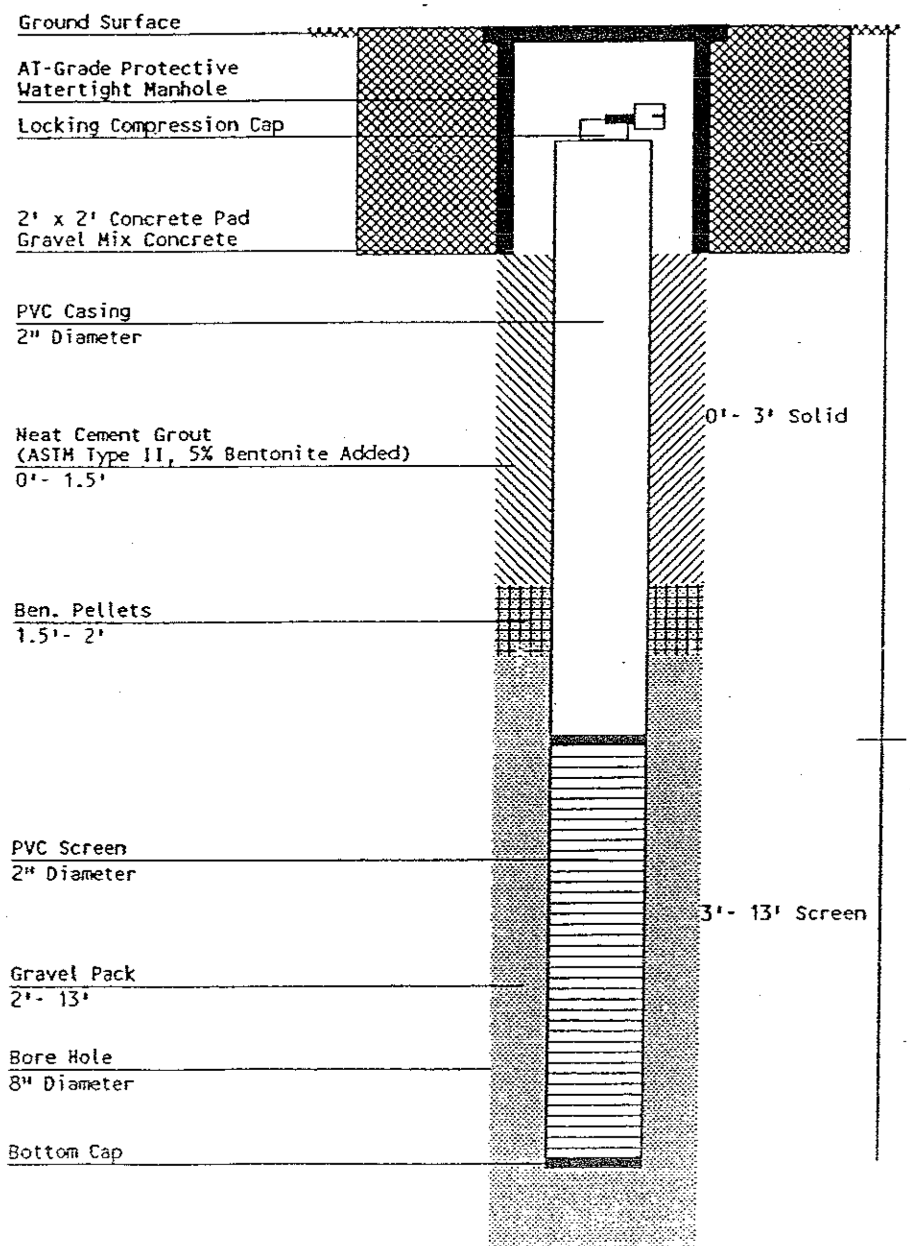
MW1 DATE DRILLED: 11/20/1995 COORD #1: PERMIT #1: 95112211:10:43
COORD #2: PERMIT #2: COUNTY:
E: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY XSTREET:
R: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY USE: Monitor

CASING: PVC OUTER CASING: SCREEN TYPE 1: PVC DRILLING METHOD: Auger
METER: 2" DIAMETER: SCREEN TYPE 2: SAMPLING METHOD: S/S
IGTH: 3' LENGTH: DIAMETER: 2" HOLE DIAMETER: 8"
LENGTH 1: 10' TOTAL DEPTH: 13'
ELL: 13' GAL PER MIN: 8 LENGTH 2:
PK SZ: Morie #2 STAT H2O LVL: 5' SLOT SIZE: .020
LLER: Matthew Raab DEVELOPMENT METHOD: Pump CASING SEAL: Portland & Pellets
ACE COMPLETION: M DEVELOPMENT TIME: 1/2 Hour OPEN HOLE:

EPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
1' - 3'	5-11-13-15
3' - 5'	9-9-11-10
5' - 7'	5-5-9-10

KS / SOILS IDENTIFICATION

- 6" Asphalt & stone.
- 5' Dark grey f/m sand some silt little to trace f/m gravel.
13' Grey f/m sand.



Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

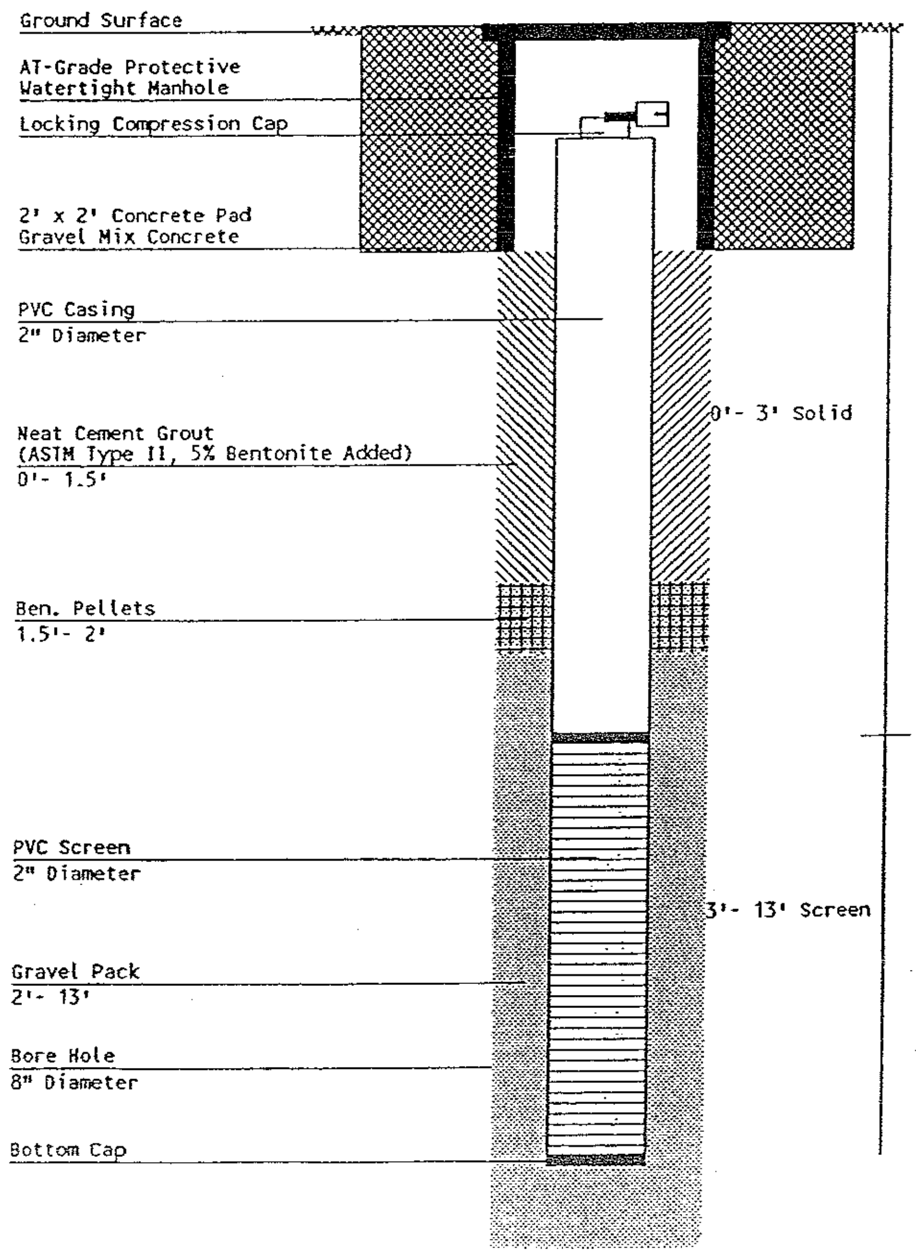
: MW2 DATE DRILLED: 11/20/1995 COORD #1: PERMIT #1: 95112211:16:30
COORD #2: PERMIT #2: COUNTY:
ITE: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY XSTREET:
'"IER: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY USE: Monitor

R CASING: PVC	OUTER CASING:	SCREEN TYPE 1: PVC	DRILLING METHOD: Auger
I..ETER: 2"	DIAMETER:	SCREEN TYPE 2:	SAMPLING METHOD: S/S
ENGTH: 3'	LENGTH:	DIAMETER: 2"	HOLE DIAMETER: 8"
		LENGTH 1: 10'	TOTAL DEPTH: 13'
WELL: 13'	GAL PER MIN: 8	LENGTH 2:	
EL PK SZ: Morie #2	STAT H2O LVL: 5'	SLOT SIZE: .020	
RILLER: Matthew Raab	DEVELOPMENT METHOD: Pump	CASING SEAL: Portland & Pellets	
''FACE COMPLETION: M	DEVELOPMENT TIME: 1/2 Hour	OPEN HOLE:	

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
1' - 3'	10-10-11-15
3' - 5'	10-11-20-20
5' - 7'	5-4-4-3

RKS / SOILS IDENTIFICATION

' - 6" Asphalt & stone.
" - 5' Dark grey f/m sand some silt little to trace f/m gravel.
13' Grey f/m sand.



SUMMIT DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

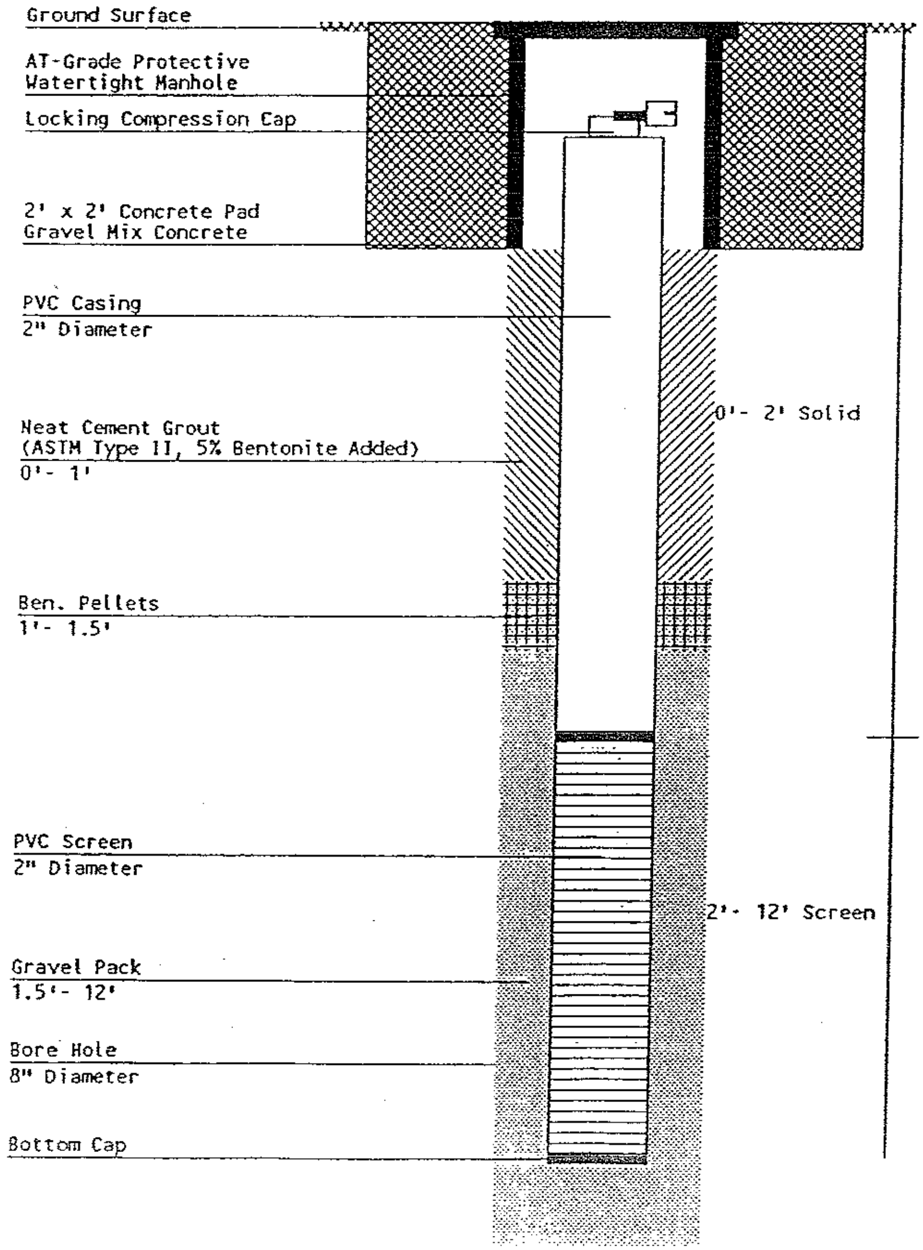
: MW3 DATE DRILLED: 11/20/1995 COORD #1: PERMIT #1: 95112211:17:40
COORD #2: PERMIT #2: COUNTY:
IE: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY XSTREET:
ER: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY USE: Monitor

R CASING: PVC OUTER CASING: SCREEN TYPE 1: PVC DRILLING METHOD: Auger
ETER: 2" DIAMETER: SCREEN TYPE 2: SAMPLING METHOD: S/S
NGTH: 2' LENGTH: DIAMETER: 2" HOLE DIAMETER: 8"
LENGTH 1: 10' TOTAL DEPTH: 12'
WELL: 12' GAL PER MIN: 10 LENGTH 2:
EL PK SZ: Morie #2 STAT H2O LVL: 5' SLOT SIZE: .020
ILLER: Matthew Raab DEVELOPMENT METHOD: Pump CASING SEAL: Portland & Pellets
FACE COMPLETION: M DEVELOPMENT TIME: 1/2 Hour OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
1' - 3'	6-5-5-4
3' - 5'	4-5-7-10
5' - 7'	10-10-7-5

RKS / SOILS IDENTIFICATION

6" Asphalt & stone.
- 5' Dark grey f/m sand some silt little to trace f/m gravel.
12' Grey f/m sand.



Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

L: MW4 DATE DRILLED: 11/20/1995 COORD #1: PERMIT #1: 95112211:19:08
COORD #2: PERMIT #2: COUNTY:
XSTREET:
ITE: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY
NER: Dayton Plaza Shop Ctr., Rockaway Beach Blvd., , Queens, NY
USE: Monitor

ER CASING: PVC
METER: 2"
ENGTH: 2'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD: S/S
HOLE DIAMETER: 8"
TOTAL DEPTH: 12'

WELL: 12'
VEL PK SZ: Morie #2
RILLER: Matthew Raab
RFACE COMPLETION: M

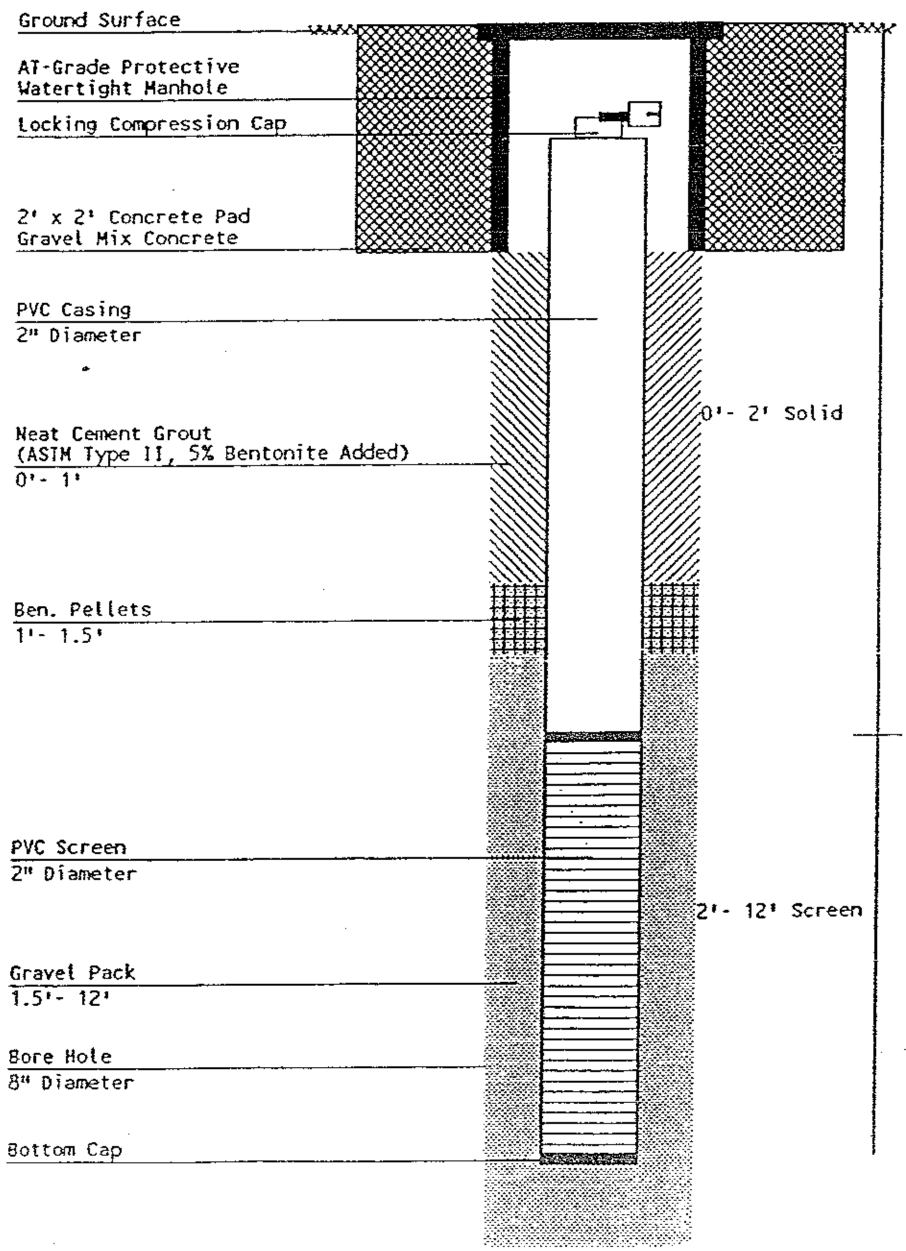
GAL PER MIN: 10
STAT H2O LVL: 5'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1/2 Hour

CASING SEAL: Portland & Pellets
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
1' - 3'	5-5-4-3
3' - 5'	4-6-8-7
5' - 7'	6-7-7-6

ARKS / SOILS IDENTIFICATION

)' - 6" Asphalt & stone.
5" - 5' Dark grey f/m sand some silt little to trace f/m gravel.
- 12' Grey f/m sand.



Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

L: MW5 DATE DRILLED: 1/30/1996
COORD #1:
COORD #2:
PERMIT #1: 962614:22:23
PERMIT #2:

: , 86-15 Rockaway Beach Blvd, , Queens, NY
WNER: , 86-15 Rockaway Beach Blvd, , Queens, NY

COUNTY:
XSTREET:
USE: Monitor

ER CASING: PVC
IETER: 2"
L..GTH: 2'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIAMETER: 8"
TOTAL DEPTH: 12'

WELL: 12'
VEL PK SZ: Morie #2
LER: John Vogt
JRFACE COMPLETION: M

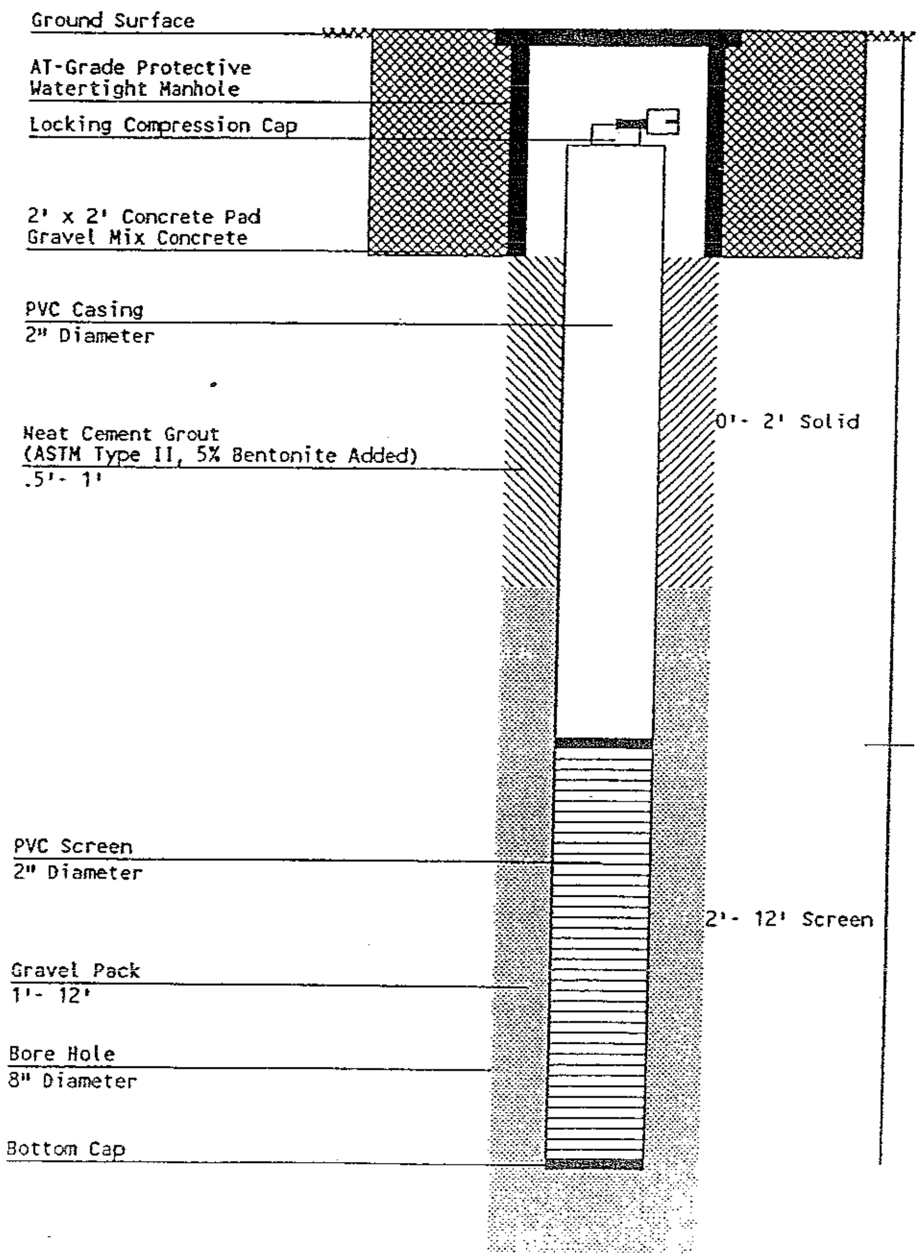
GAL PER MIN: 2
STAT H2O LVL: 5'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
2' - 4'	None Recorded

RKS / SOILS IDENTIFICATION

- 12' Tan fine sand.



5 JOHNSON DRIVE
RARITAN, NJ 08869

JOB NO.: 0M6-7511 CLIENT: AEGON
LOCATION OF WELL: HOLLAND AVE, ~~QUEENS, NY~~ ALLEY
DRILLING CONTRACTOR: SUMMIT
DRILLING RIG TYPE: MOBILE B-59
BIT TYPE: 4¼" ID HSA DRILLER: J. VOGT
SAMPLER TYPE: Split spoon
HAMMER WEIGHT: 140# DROP: 30"

PROJECT LOCATION: QUEENS, NY
ELEVATION AND DATUM: 5' AMSL
INSPECTOR: M. Weaver
DATE STARTED: 1-30-96
DATE COMPLETED: 1-30-96
TOTAL DEPTH: 12' below grade (bg)
WATER LEVEL: 5' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Asphalt 4" Base 8" crushed Stone, Sandy Clay, OVM = 0 Fill to 3'		
	11 13		2		SPOON 2-4' OVM=0	2	
MW-5	15 10	12"			Fill to 3' gray sand, rock, with matted paper, brick, wood 3-4' Sand, f-med gr. salt & pepper gray sand, v. moist		
			4		Drill to 12' OVM=0 4-12' Sand, gray, salt & pepper mix, wet	4	
			6			6	
			8			8	
			10			10	
			12			12	
			14			14	
			16			16	
			18			18	
			20			20	

Summit
DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

ELL: MW6 DATE DRILLED: 1/30/1996 COORD #1: PERMIT #1: 962614:26:11
COORD #2: PERMIT #2:
E: , 86-15 Rockaway Beach Blvd, , Queens, NY COUNTY:
OWNER: , 86-15 Rockaway Beach Blvd, , Queens, NY XSTREET:
USE: Monitor

NER CASING: PVC
METER: 2"
GTH: 2'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIAMETER: 8"
TOTAL DEPTH: 12'

T WELL: 12'
VEL PK SZ: Morie #2
LLER: John Vogt
SURFACE COMPLETION: M

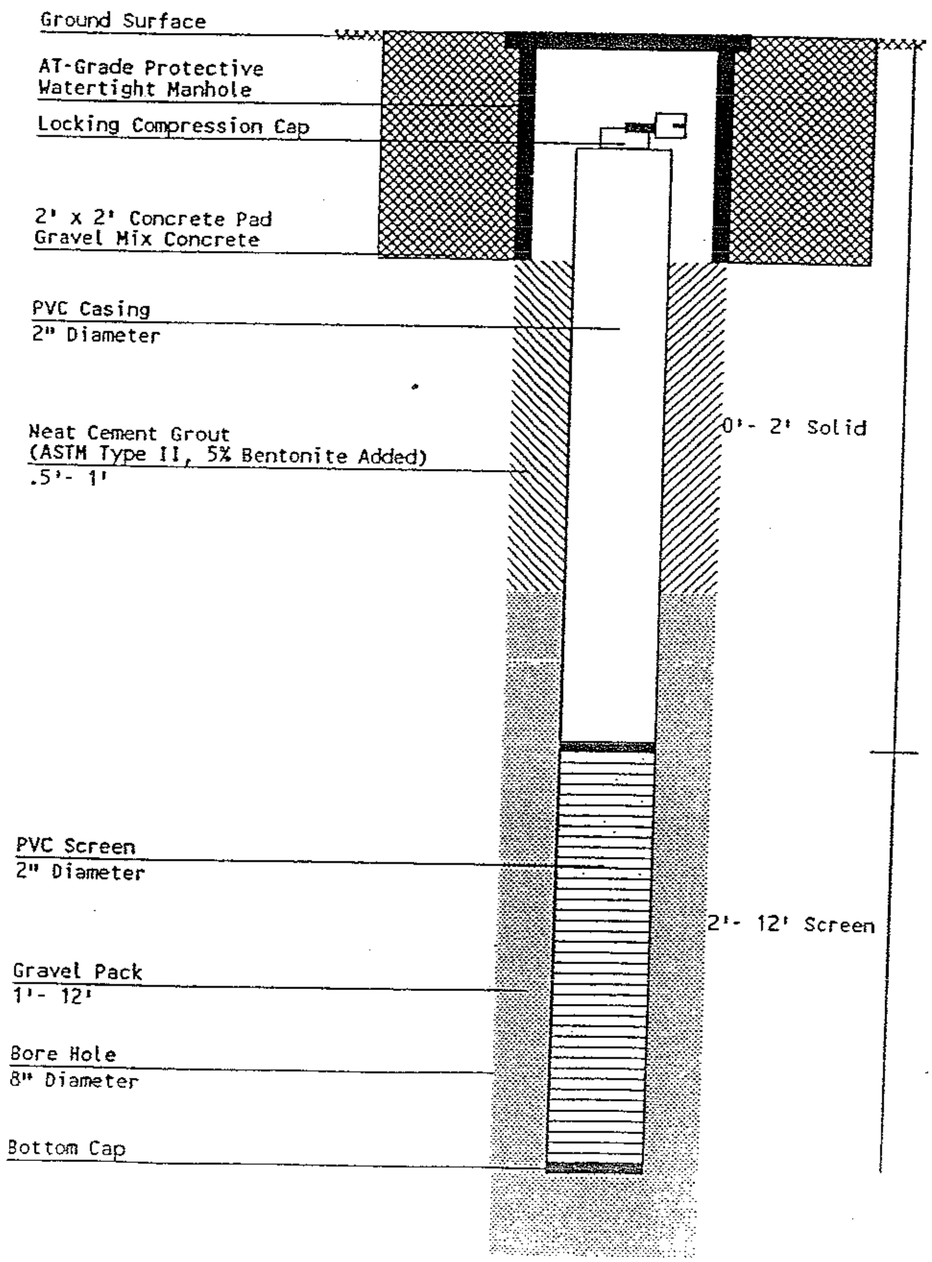
GAL PER MIN: 2
STAT H20 LVL: 5'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
2' - 4'	None Recorded

ARKS / SOILS IDENTIFICATION

' - 12' Tan fine sand.



5 JOHNSON DRIVE
RARITAN, NJ 08869

JOB NO.: BNG-7511 CLIENT: AEGON
LOCATION OF WELL: HOLLAND AVE ALLEY
DRILLING CONTRACTOR: SUMMIT
DRILLING RIG TYPE: MOBIL B-59
BIT TYPE: 4 1/4" ID HSA DRILLER: John Vogt
SAMPLER TYPE: Splitspoon
HAMMER WEIGHT: 140# DROP: 30"

PROJECT LOCATION: QUEENS, NY
ELEVATION AND DATUM: 5' AMSL
INSPECTOR: M. Weaver
DATE STARTED: 1-30-96
DATE COMPLETED: 1-30-96
TOTAL DEPTH: 12' below grade (bg)
WATER LEVEL: 4.83' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (Inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Asphalt, 4" Base 8" crushed stone Sandy clay, OVM = 0 Fill to 3'		
	16 15		2		Splitspoon 2-4' OVM = 0 2-3' Fill, Gray sand, rock, with paper, brick, wood 3-4' Sand, f-med salt & pepper gray sand, v. moist.	2	
mw-6	12 12	12"	4		Drill to 12' OVM = 0 4-12' Sand, salt & pepper gray sand, wet.	4	
			6			6	
			8			8	
			10		NOTE: After well was developed OVM = 17.4 in headspace.	10	
			12			12	
			14			14	
			16			16	
			18			18	
			20			20	

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

L: MW7 DATE DRILLED: 1/30/1996 COORD #1: PERMIT #1: 962614:30:22
COORD #2: PERMIT #2: COUNTY:
E: , 86-15 Rockaway Beach Blvd, , Queens, NY XSTREET:
WNER: , 86-15 Rockaway Beach Blvd, , Queens, NY USE: Monitor

ER CASING: PVC
METER: 2"
LENGTH: 2'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIAMETER: 8"
TOTAL DEPTH: 12'

WELL: 12'
VEL PK SZ: Morie #2
LLER: John Vogt
URFACE COMPLETION: M

GAL PER MIN: 2
STAT H2O LVL: 5'

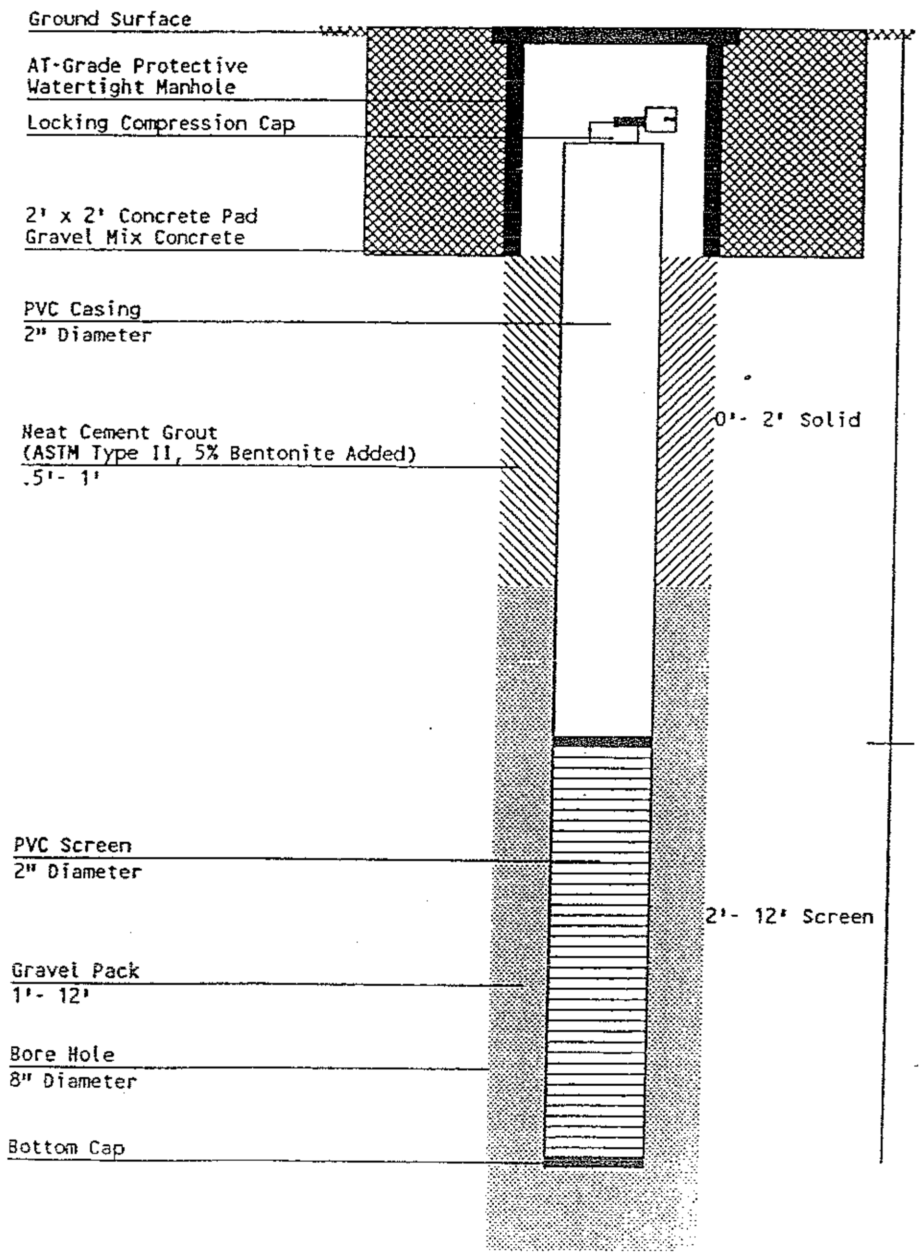
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
2' - 4'	None Recorded

L..ARKS / SOILS IDENTIFICATION

- 12' Tan fine sand.



5 JOHNSON DRIVE
RARITAN, NJ 08869

JOB NO.: ENG-731 CLIENT: AEGON
LOCATION OF WELL: HOLLAND AVE ALLEY
DRILLING CONTRACTOR: SUMMIT
DRILLING RIG TYPE: MOBIL B-59
BIT TYPE: 4 1/4" ID HSA DRILLER: J. VOGT
SAMPLER TYPE: Splitspoon
HAMMER WEIGHT: 140# DROP: 30"

PROJECT LOCATION: QUEENS, NY
ELEVATION AND DATUM: 5' AMSL
INSPECTOR: M. Weaver
DATE STARTED: 1-30-96
DATE COMPLETED: 1-30-96
TOTAL DEPTH: 12' below grade (bg)
WATER LEVEL: 5.36' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (Inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Asphalt 4" Base 8" crushed stone, silty clay, OVM=0		
					Fill to 3'		
	10 9		2		Splitspoon 2-4' OVM=0	2	
MW-7	9 11	6"			2-3' Fill gray sand, rock with paper, brick, wood		
			4		3-4' Sand, f-med gr. salt & pepper gray sand, v. moist	4	
					Drill to 12' OVM=0		
			6		4-12' Sand f-med gr salt & pepper gray sand wet	6	
			8			8	
			10			10	
			12			12	
			14			14	
			16			16	
			18			18	
			20			20	

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

LL: MW8 DATE DRILLED: 1/30/1996 COORD #1: PERMIT #1: 962614:38:04
COORD #2: PERMIT #2:
E: , 86-15 Rockaway Beach Blvd, , Queens, NY COUNTY:
OWNER: , 86-15 Rockaway Beach Blvd, , Queens, NY XSTREET:
USE: Monitor

ER CASING: PVC
METER: 2"
GTH: 2'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 2"
LENGTH 1: 10'
LENGTH 2:
SLOT SIZE: .020

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIAMETER: 8"
TOTAL DEPTH: 12'

T WELL: 12'
VEL PK SZ: Morie #2
LLER: John Vogt
URFACE COMPLETION: M

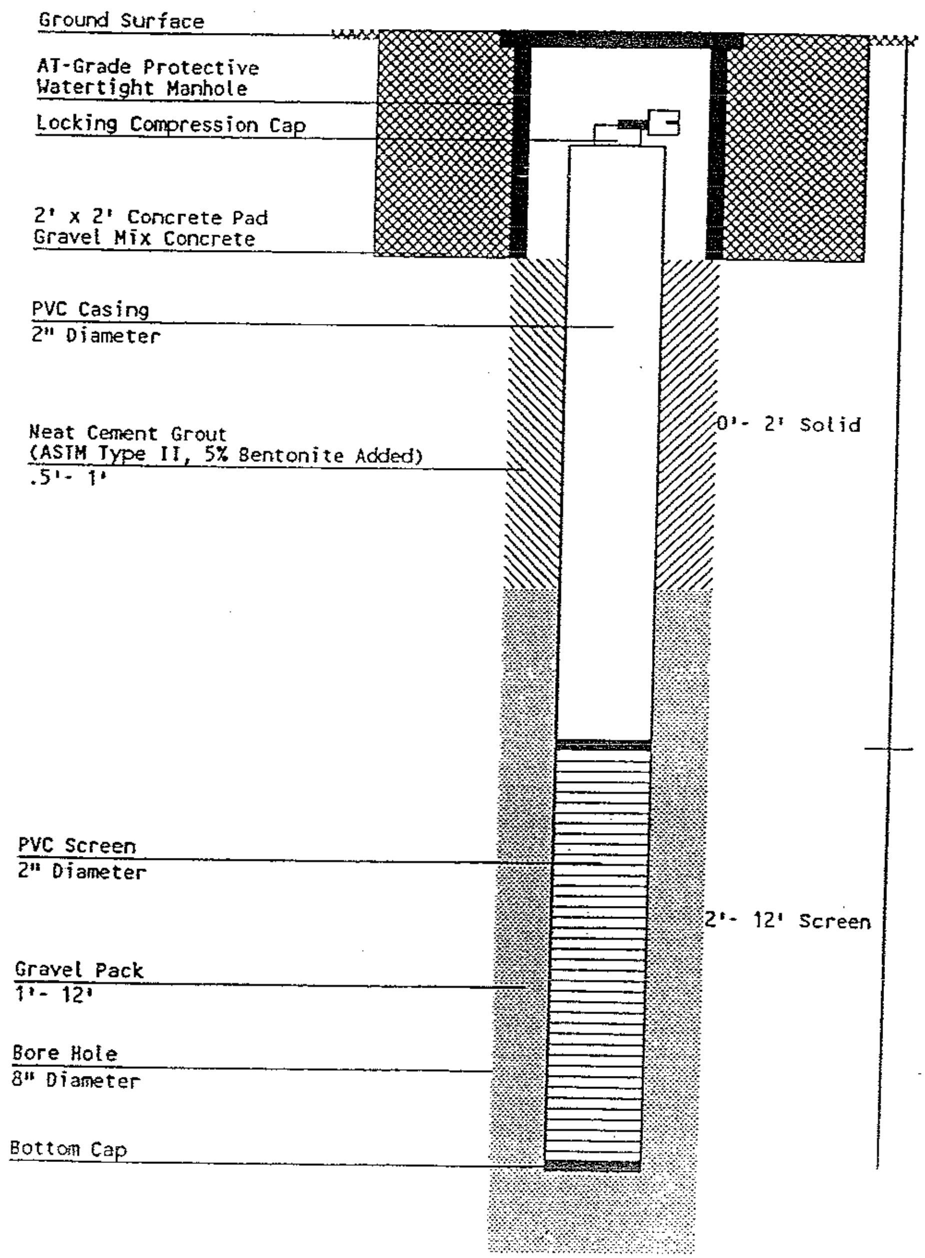
GAL PER MIN: 2
STAT H2O LVL: 5'
DEVELOPMENT METHOD: Pump
DEVELOPMENT TIME: 1 Hour

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
2' - 4'	None Recorded

ARKS / SOILS IDENTIFICATION

' - 12' Tan fine sand.



5 JOHNSON DRIVE
RARITAN, NJ 08869

JOB NO.: EML-7511 CLIENT: AEBON

LOCATION OF WELL: HOLLAND AVE ALLEY

DRILLING CONTRACTOR: SUMMIT

DRILLING RIG TYPE: MOBIL B-59

BIT TYPE: 4 1/4" ID HSA DRILLER: J. VOGT

SAMPLER TYPE: Split spoon

HAMMER WEIGHT: 140# DROP: 30"

PROJECT LOCATION: QUEENS, NY

ELEVATION AND DATUM: 5' AMSL

INSPECTOR: M. Weaver

DATE STARTED: 1-30-96

DATE COMPLETED: 1-30-96

TOTAL DEPTH: 12' below grade (bg)

WATER LEVEL: 4.56' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (Inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Asphalt, 4", Base 8", Crushed stone, Sandy clay ovm=0 Fill to 3'		
	5 14		2		Split spoon 2-4', ovm=0 Fill 2-3' Gray sand, rock with Brick, wood, Paper. Sand 3-4', f-med gr. salt & pepper gray sand, v. moist	2	
MW-8	13 10	12"	4		Drill to 12' OVM=0 4-12' Sand, same as above, wet	4	
			6			6	
			8			8	
			10			10	
			12			12	
			14			14	
			16			16	
			18			18	
			20			20	

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

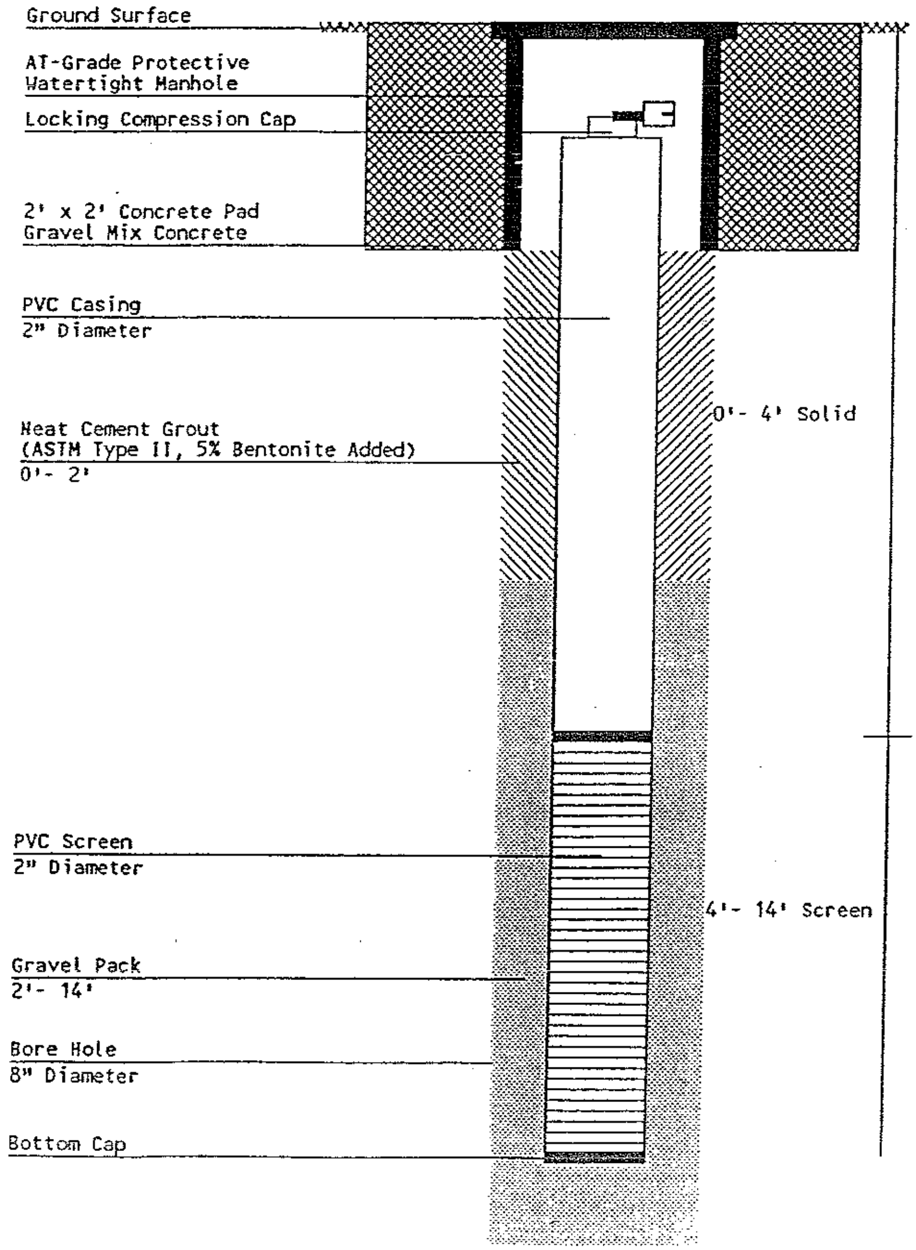
: MW9 DATE DRILLED: 1/30/1996 COORD #1: PERMIT #1: 962614:39:06
COORD #2: PERMIT #2: COUNTY:
: , 86-15 Rockaway Beach Blvd, , Queens, NY XSTREET:
NER: , 86-15 Rockaway Beach Blvd, , Queens, NY USE: Monitor

R CASING: PVC OUTER CASING: SCREEN TYPE 1: PVC DRILLING METHOD: Auger
ETER: 2" DIAMETER: SCREEN TYPE 2: SAMPLING METHOD:
ENGTH: 4' LENGTH: DIAMETER: 2" HOLE DIAMETER: 8"
LENGTH 1: 10' TOTAL DEPTH: 14'
WELL: 14' GAL PER MIN: 2 LENGTH 2:
EL PK SZ: Morie #2 STAT H2O LVL: 5' SLOT SIZE: .020
LER: John Vogt DEVELOPMENT METHOD: Pump CASING SEAL: Portland
RFACE COMPLETION: M DEVELOPMENT TIME: 1 Hour OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
4' - 6'	None Recorded

RKS / SOILS IDENTIFICATION

- 14' Tan fine sand.



5 JOHNSON DRIVE
RARITAN, NJ 08869

MONITORING WELL NO.: MW 1 PAGE / OF

JOB NO.: EMG-7511 CLIENT: AEGON	PROJECT LOCATION: QUEENS, NY
LOCATION OF WELL: HOLLAND AVE SIDEWALK	ELEVATION AND DATUM: 5' AMSL
DRILLING CONTRACTOR: SUMMIT	INSPECTOR: M. Weaver
DRILLING RIG TYPE: MOBIL B-59	DATE STARTED: 1-30-96
BIT TYPE: 4¼" ID HSA DRILLER: J. VOGT	DATE COMPLETED: 1-30-96
SAMPLER TYPE: Split Spoon	TOTAL DEPTH: 14' below grade (bg)
HAMMER WEIGHT: 140# DROP: 30"	WATER LEVEL: 6.26' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Concrete 4" Base 8" crushed stone, wood fill to 4'		
			2				
			4				
	9 10				SPOON 4-6' OVM=0 wood clogged spoon - f-med sand at base of spoon.		
MW-1	13 11	24"					
			6		Drilled to 14' OVM=0 Sand 6-14', f-med gr. salt & pepper grey sand, wet		
			8				
			10				
			12				
			14				
			16				
			18				

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

489 Union Avenue
Bridgewater, NJ 08807
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (908) 356-1009

WELL LOG

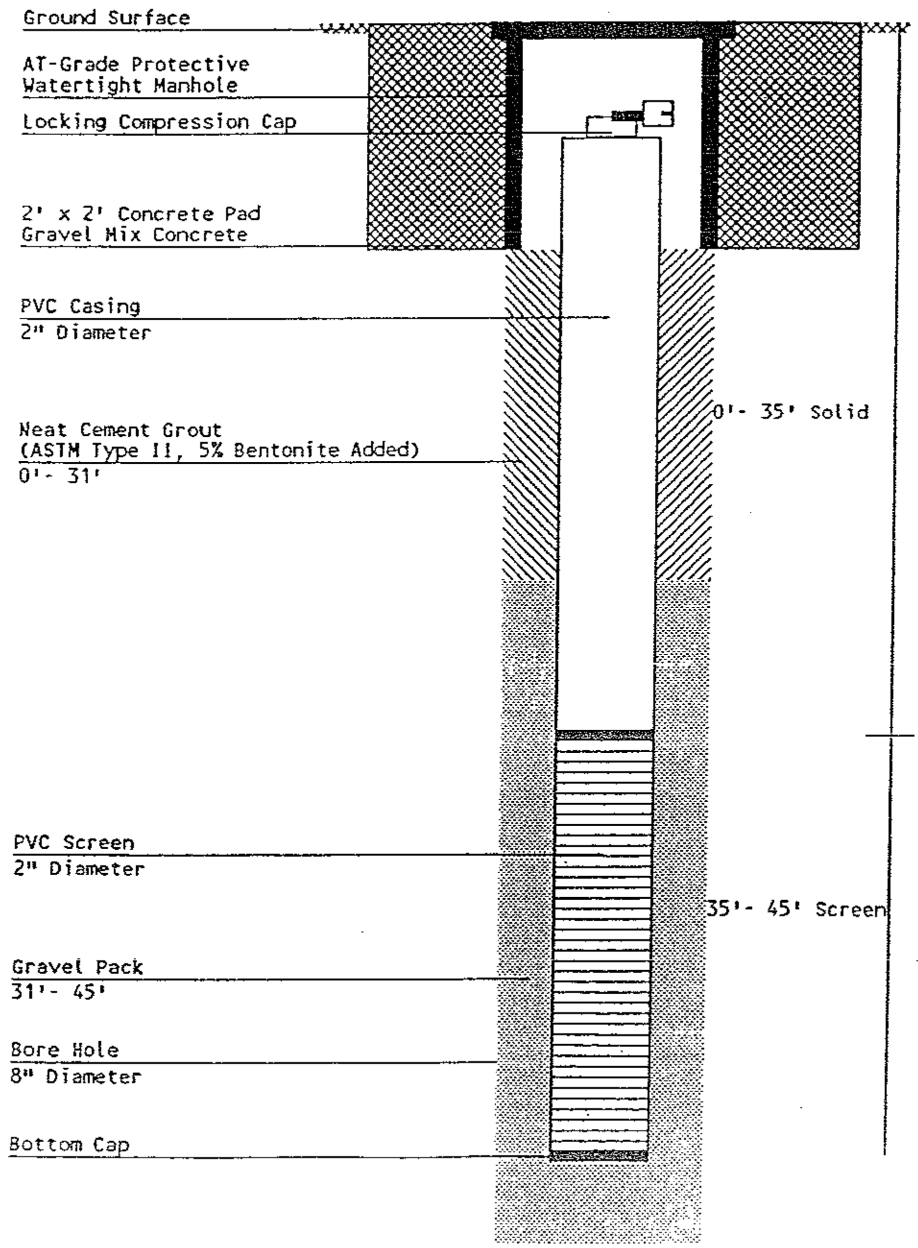
: DW1 DATE DRILLED: 1/31/1996 COORD #1: PERMIT #1: 962614:40:37
COORD #2: PERMIT #2: COUNTY:
, 86-15 Rockaway Beach Blvd, , Queens, NY XSTREET:
NER: , 86-15 Rockaway Beach Blvd, , Queens, NY USE: Monitor

CASING: PVC	OUTER CASING:	SCREEN TYPE 1: PVC	DRILLING METHOD: Auger
TER: 2"	DIAMETER:	SCREEN TYPE 2:	SAMPLING METHOD:
NGTH: 35'	LENGTH:	DIAMETER: 2"	HOLE DIAMETER: 8"
		LENGTH 1: 10'	TOTAL DEPTH: 45'
WELL: 45'	GAL PER MIN: 5	LENGTH 2:	
L PK SZ: Morie #2	STAT H2O LVL: 5'	SLOT SIZE: .020	
ILLER: John Vogt	DEVELOPMENT METHOD: Pump	CASING SEAL: Portland	
RFACE COMPLETION: M	DEVELOPMENT TIME: 1 Hour	OPEN HOLE:	

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

MARKS / SOILS IDENTIFICATION

45' Tan fine sand.



AECON SYSTEMS, INC.
5 JOHNSON DRIVE
RARITAN, NJ 08869

MONITORING WELL NO.: DW-1 PAGE 1 OF

JOB NO.: EMG-9521 CLIENT: AEBON
LOCATION OF WELL: HOLLAND AVE ALLEY
DRILLING CONTRACTOR: SUMMIT
DRILLING RIG TYPE: MOBIL B-59
BIT TYPE: 4 1/4" ID HSA DRILLER: J. VOGT
SAMPLER TYPE: —
HAMMER WEIGHT: — DROP: —

PROJECT LOCATION: QUEENS, NY
ELEVATION AND DATUM: 5' AMSL
INSPECTOR: M. Weaver
DATE STARTED: 1-31-96
DATE COMPLETED: 1-31-96
TOTAL DEPTH: 46' below grade (bg)
WATER LEVEL: 4.74' below top of casing

SAMPLE	BLOWS (0.5 foot)	RECOVERY (Inches)	DEPTH (feet)	LITH. TYPE	LITHOLOGY	DEPTH (feet)	WELL CONSTRUCTION
					Asphalt 4" Base 8" crushed Stone, silty clay ovm=0 Fill to 5'		
					5-10' Sand, f-med gr. salt & pepper gray sand, wet		
					10' Same but color change to olive green-brown, no fines, some fall in Fill from above.		
					15' Same as at 10' but no fall in fill.		
					20' Same but color change to dark bluish gray looks like wet beach sand, trace mica & organics (wood flakes), qtz gravel, shell frags.		
					25' Same but med. gray color		
					25' - 75' Same		
					NOTE: Drilled to 75' & had driller sample cuttings every 5' for observation only.		

Langan Engineering and Environmental Services, Inc.

WELL CONSTRUCTION SUMMARY

Well No. MW-10

PROJECT: Dayton Plaza Shopping Center	PROJECT NO.: 1461901
LOCATION: FAR Parkway, Queens, New York	ELEVATION AND DATUM (ground): Datum 0.0
DRILLING AGENCY: Aquafer Drilling & Testing	DATE STARTED: 5/21/98 DATE FINISHED: 5/21/98
DRILLING EQUIPMENT: CME - 75 (Truck Mounted)	DRILLER: Ken Kutamia
SIZE AND TYPE OF BIT: 4-1/4" ID Hollow Stem Auger	INSPECTOR: Youssef Awad

METHOD OF INSTALLATION

Drilled approximately 8-inch diameter borehole with 4-1/4 inch hollow stem auger to 18 feet. PVC screen and riser were inserted through the center of the augers to a depth of 16 feet. The annular space was filled with Morie sand, bentonite seal, and ready-mix conceete. The well was secured with a steel protective cover and locking cap.

METHOD OF WELL DEVELOPMENT

The well was pumped with a centrifugal pump at a rate of approximately 1-2 gallons per minute until the water ran clear. Approximately 25 gallons of water were purged.

TYPE OF CASING: PVC	DIAMETER: 2 inches	TYPE OF BACKFILL MATERIAL: Ready-mix Concrete
TYPE OF SCREEN: PVC	DIAMETER: 2 inches	TYPE OF SEAL MATERIAL: Bentonite
BOREHOLE DIAMETER: 8 inches +/-		TYPE OF FILTER MATERIAL: # 2 Morie Sand

	ELEVATION	DEPTH
TOP OF CASING: Flush Mount	0	0.0'
TOP OF SEAL	-2.5	2.5'
TOP OF FILTER	-4.5	4.5'
TOP OF SCREEN	-6	6.0'
BOTTOM OF BORING	-18	18.0'

SCREEN LENGTH: 10.0 feet

SLOT SIZE: 0.020 inch

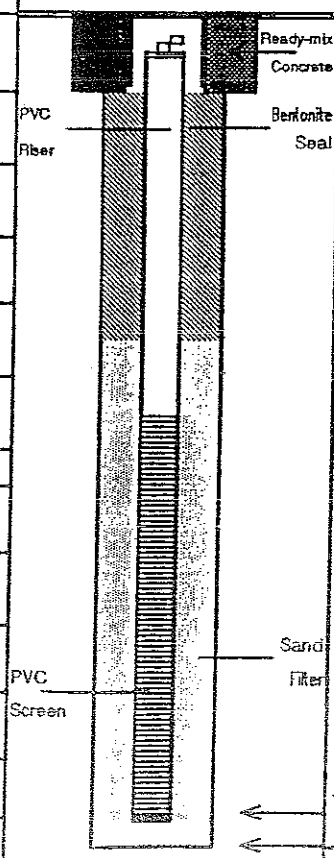
GROUNDWATER ELEVATIONS

ELEVATION	DATE

WELL DETAILS

Flush Mount

Steel Protective Cover



SOIL CLASSIFICATION	DEPTH (FT)
Asphalt Pavement	0.25
Fill	5.3
Beach Sand	18.0

Langan
Engineering and Environmental Services, Inc.

LOG OF BORING MW-10 **SHEET** 1 **OF** 2

PROJECT Dayton Plaza Shopping Center		PROJECT NO. 146190I	
LOCATION Far Parkway, NY		ELEVATION AND DATUM	
DRILLING AGENCY Aquafer Drilling & Testing		DATE STARTED 5/21/98	DATE FINISHED 5/21/98
DRILLING EQUIPMENT CME-75 (Truck Mounted)		COMPLETION DEPTH 18.0	ROCK DEPTH —
SIZE AND TYPE OF BIT 4 1/4" I.D. HSA		NO. SAMPLES DIST. 7, UNDIST. —, CORE —	
CASING —		WATER LEVEL FIRST 5.5', COMPL. 5.5', 24 HR. —	
CASING HAMMER	WEIGHT — DROP —	FOREMAN Ken Kutarnia	
SAMPLER Split Spoon 2" O.D. – 1 3/8" I.D.		INSPECTOR Youssef Awad	
SAMPLER HAMMER	WEIGHT 140 # Automatic DROP 30"		

	SAMPLE DESCRIPTION	DEPTH SCALE	NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	3" Asphalt over olive brown cmf Gravelly mf SAND, trace Silt (dry)	0–1					Started 1:15 PM H-Nu BKgd = 1.1 ppm
FILL	Brown Silty f SAND, trace f Gravel (dry)	1–3	S-1	SS	1.7	4 8 10 8	H-Nu = BKgd Dark brown band of 4" thick @ middle of sample Orange brown color 1" thick @ bottom
FILL	Brown to dark brown Silty f SAND, trace cmf Gravel, trace Sea Shell fragments (dry)	3–5	S-2	SS	1.0	4 4 1 1	H-Nu = 16.3 ppm
FILL	Top 4": Dark grey Silty f SAND, trace clay (slightly organic) (moist)	5–7	S-3	SS	1.8	3 2 3 4	H-Nu = 5.0 ppm @ top
Beach SAND	Bottom 18": Light greyish brown fm SAND, some Silt (wet)						H-Nu = BKgd @ bottom
Beach SAND	Light greyish brown fm SAND, some Silt (wet)	7–9	S-4	SS	0.8	1/12" 2 5	H-Nu = BKgd
Beach SAND	Same as above	9–11	S-5	SS	2.0	5 7 10 11	H-Nu = BKgd
Beach SAND	Light grey fm SAND, some Silt	11–13	S-6	SS	2.0	6 6 5 9	H-Nu = BKgd
Beach SAND	Same as above	13–14	S-7	SS	2.0	5 6	H-Nu = BKgd

08098

Engineering and Environmental Services, Inc.

JOB NO. 146901

DATE 5/21/98

LOG OF BORING NO. MW-10

SHEET 2 OF 2

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
Beach SAND	Light grey f m SAND, some Silt	14–15	S-7	SS	2.0	6 5	H-Nu = BKgd
		15–18					auger down to 18. to install the well pi
	Bottom of Borehole @ 18.0'	18–32					Finished 5:00 PM

WELL CONSTRUCTION SUMMARY

Well No. **MW-11**

PROJECT: Dayton Plaza Shopping Center	PROJECT NO.: 1461901
LOCATION: FAR Parkway, Queens, New York	ELEVATION AND DATUM (ground): Datum 0.0
DRILLING AGENCY: Aquafer Drilling & Testing	DATE STARTED: 5/21/98 DATE FINISHED: 5/21/98
DRILLING EQUIPMENT: CME - 75 (Truck Mounted)	DRILLER: Ken Kutarnia
SIZE AND TYPE OF BIT: 4-1/4" ID Hollow Stem Auger	INSPECTOR: Youssef Awad

METHOD OF INSTALLATION

Drilled approximately 10-inch diameter borehole with 4-1/4 inch hollow stem auger to 19 feet. PVC screen and riser were inserted through the center of the augers to a depth of 18 feet. The annular space was filled with Morie sand, bentonite seal, and ready-mix conceete. The well was secured with a steel protective cover and locking cap.

METHOD OF WELL DEVELOPMENT

The well was pumped with a centrifugal pump at a rate of approximately 1-2 gallons per minute until the water ran clear. Approximately 25 gallons of water were purged.

TYPE OF CASING: PVC	DIAMETER: 2 inches	TYPE OF BACKFILL MATERIAL: Ready-mix Concrete	
TYPE OF SCREEN: PVC	DIAMETER: 2 inches	TYPE OF SEAL MATERIAL: Bentonite	
BOREHOLE DIAMETER: 10 inches +/-		TYPE OF FILTER MATERIAL: # 2 Morie Sand	

	ELEVATION	DEPTH
TOP OF CASING: Flush Mount	0	0.0'
TOP OF SEAL	-4.3	4.3'
TOP OF FILTER	-5.3	5.3'
TOP OF SCREEN	-8	8.0'
BOTTOM OF BORING	-19	19.0'

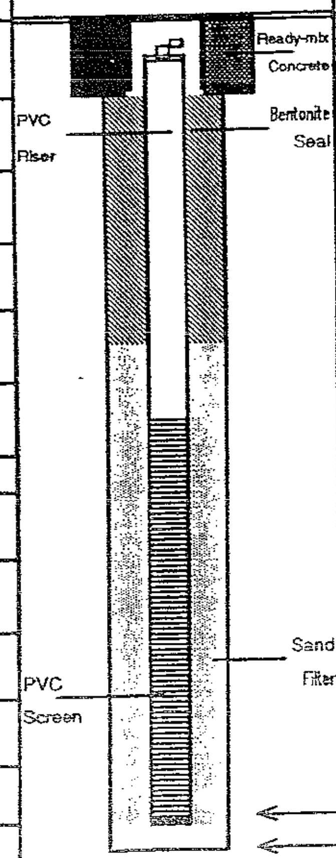
SCREEN LENGTH: 10.0 feet

SLOT SIZE: 0.020 inch

GROUNDWATER ELEVATIONS

ELEVATION	DATE

WELL DETAILS
Flush Mount
Steel Protective Cover



SOIL CLASSIFICATION	DEPTH (FT)
Asphalt Pavement	0.2
Fill	8.3
Beach Sand	19.0

Langan
Engineering and Environmental Services, Inc.

LOG OF BORING MW-11 **SHEET** 1 **OF** 2

PROJECT: Dayton Plaza Shopping Center	PROJECT NO. 1461901
LOCATION: Far Parkway, NY	ELEVATION AND DATUM
DRILLING AGENCY: Aquafer Drilling & Testing	DATE STARTED 5/21/98 — DATE FINISHED 5/21/98
DRILLING EQUIPMENT: CME-75 (Truck Mounted)	COMPLETION DEPTH 19.0' — ROCK DEPTH —
SIZE AND TYPE OF BIT: 4 1/4" I.D. HSA	NO. SAMPLES: DIST. 7 — UNDIST. — — CORE —
CASING: —	WATER LEVEL: FIRST 6.0' — COMPL. 8.0' — 24 HR. —
CASING HAMMER: WEIGHT — DROP —	FOREMAN: Ken Kutarnia
SAMPLER: Split Spoon 2" O.D. – 1 3/8" I.D.	INSPECTOR: Youssef Awad
SAMPLER HAMMER: WEIGHT 140 # Automatic DROP 30"	

Stratum	SAMPLE DESCRIPTION	DEPTH SCALE	NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	2" Asphalt over Olive brown cmf Gravely mf SAND, some Silt, trace Brick fragments (dry)	0–1					Started 9:30 AM H-Nu BKgd = 1.1 ppm
FILL	Top 12": Brown Silty f SAND, trace f Gravel, trace Asphalt fragments (dry) Bottom 2": Dark grey organic Sandy SILT, and Wood fragments (dry)	1–3	S-1	SS	1.2	4 4 4 3	H-Nu = BKgd
FILL	Brown & Light brown f SAND, some Silt, trace f Gravel, trace Cinders (dry - moist @ bottom)	3–5	S-2	SS	1.5	3 2 4 7	H-Nu = BKgd orange color @ middle for 1"
FILL	Brown mf SAND, some Silt (wet)	5–7	S-3	SS	1.6	5 2 3 3	H-Nu = BKgd Scattered Tan brown color @ Top half of sample scattered Grey brown color @ bottom half of sample
FILL / Beach SAND	Top 12": Greyish brown Silty f SAND some Clay (slightly organic), trace Root Mat (wet) Middle 4": Tan brown Silty f SAND, trace Root Mat (wet) Bottom 8": Light greyish brown fmc SAND, some Silt (wet)	7–9	S-4	SS	2.0	1 3 6 7	H-Nu = BKgd
Beach SAND	Light greyish brown f m c(-) SAND, some Silt (wet)	9–11	S-5	SS	1.5	1/12" 6 9	H-Nu = BKgd
Beach SAND	Light greyish brown f(+) m(-) SAND, some Silt (wet)	11–13	S-6	SS	2.0	5 7 12 33	H-Nu = BKgd
Beach SAND	Same as above	13–	S-7	SS	2.0	3 5	H-Nu = BKgd

Langan
Engineering and Environmental Services, Inc.

JOB NO. 1461901
DATE 5/21/98

LOG OF BORING NO. MW-11

SHEET 2 OF 2

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
Beach SAND	Light greyish brown f(+) m(-) SAND, some Silt	14–15	S-7	SS	2.0	11 13	H-Nu = BKgd
		16–18					Auger down to 19.0' to install the well pipe
	Bottom of Borehole @ 19.0'	19					Finished 1:05 PM
		20–32					

DW-1

Analytical Results

TABLE 2 (Continued)
Historical Ground Water Sampling Results
Dayton Plaza - Queens, NY

Sample Location Sample Date	NYSDEC GA Water Quality Criteria (ug/l)	MW-7 06/10/1998 ug/l	MW-8 01/30/1996 ug/l	MW-8 01/30/1996 ug/l	MW-9 06/10/1998 ug/l	DW-1 01/30/1996 ug/l
VOLATILE ORGANIC COMPOUNDS						
Tetrachloroethene	5	19	36	33	28	7
Trichloroethene	5	18	18	3	9.8	4
Trans-1,2-Dichloroethene	5	ND	5	ND	ND	ND
Cis-1,2-Dichloroethene	5	17	ND	ND	14	ND
Chloroethane	5	ND	ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND	2
Carbon Tetrachloride	5	ND	ND	ND	ND	ND
Bromoform	50	ND	ND	ND	ND	ND
Chlorobenzene	5	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND	ND	1
Bromodichloromethane	50*	ND	ND	ND	ND	1
Vinyl Chloride	2	ND	44	12	ND	ND

Sample Location Sample Date Units	GW-1 3/24/98 & 4/24/98 ug/L	GW-2 3/24/98 & 4/24/98 ug/L	GW-3 3/24/98 & 4/24/98 ug/L	GW-4 3/24/98 & 4/24/98 ug/L	GW-5 3/24/98 & 4/24/98 ug/L	GW-6 3/24/98 & 4/24/98 ug/L	GW-7 3/24/98 & 4/24/98 ug/L
VOLATILE ORGANIC COMPOUNDS							
Tetrachloroethene	220	4	26	94	0.07	18	0.5
Trichloroethene	14	0.2	24	4	0.02	1	ND
1,1,1-Trichloroethane	ND	0.03	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	10	ND	ND	20	ND

ug/l = micrograms per liter
ND = Not Detected
Shading indicated compound detected at concentration above NYSDEC WQS.

L a b o r a t o r y   R e p o r t

Recon Environmental Corp. Report Date 2/06/9.
Work Order No. 9602-00004.

Test Performed	Method	Results	Units	MDL	Tech	Analy. Date	Specification
16 DW-1			Sample Date 1/31/96				
Volatile Halocarbons 601	601, 40 CFR		ug/L		EMH	2/01/96	
Chloromethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Bromomethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Vinyl Chloride	EPA 601	ND	ug/L	1	EMH	2/01/96	
Dichlorodifluoromethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Chloroethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Methylene Chloride	EPA 601	ND	ug/L	1	EMH	2/01/96	
Trichlorofluoromethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,1-Dichloroethene	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,1-Dichloroethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Trans-1,2-Dichloroethene	EPA 601	ND	ug/L	1	EMH	2/01/96	
Chloroform	EPA 601	2	ug/L	1	EMH	2/01/96	
1,2-Dichloroethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,1,1-Trichloroethane	EPA 601	1	ug/L	1	EMH	2/01/96	
Carbon Tetrachloride	EPA 601	ND	ug/L	1	EMH	2/01/96	
Bromodichloromethane	EPA 601	1	ug/L	1	EMH	2/01/96	
1,2-Dichloropropane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Trans-1,3-Dichloropropene	EPA 601	ND	ug/L	1	EMH	2/01/96	
Trichloroethene	EPA 601	4	ug/L	1	EMH	2/01/96	
Cis-1,3-Dichloropropene	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,1,2-Trichloroethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Dibromochloromethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
2-Chloroethylvinyl ether	EPA 601	ND	ug/L	1	EMH	2/01/96	
Bromoform	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,1,2,2-Tetrachloroethane	EPA 601	ND	ug/L	1	EMH	2/01/96	
Tetrachloroethene	EPA 601	7	ug/L	1	EMH	2/01/96	
Chlorobenzene	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,4-Dichlorobenzene	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,3-Dichlorobenzene	EPA 601	ND	ug/L	1	EMH	2/01/96	
1,2-Dichlorobenzene	EPA 601	ND	ug/L	1	EMH	2/01/96	
17 DW-1			Sample Date 1/31/96				
Iron	200.7, EPA 1987	16.7	mg/l	0.007	TAL	2/05/96	
Calcium	215.1, EPA 1983	104	mg/L	0.01	CMT	2/05/96	
Manganese	200.7, EPA 1987	0.195	mg/L	0.005	TAL	2/05/96	
Magnesium	200.7, EPA 1987	32.7	mg/L	0.03	TAL	2/05/96	
18 DW-1			Sample Date 1/31/96				
Chloride	4500-CL-C SM 18TH.	420	mg/L	1.2	NP	2/02/96	
19 FIELD BLANK			Sample Date 1/30/96				
Volatile Halocarbons 601	601, 40 CFR		ug/L		EMH	2/01/96	
Chloromethane	EPA 601	ND	ug/L	1	EMH	2/01/96	

---- Continued on Next Page ----

Appendix F:

Quality Assurance Project Plan

LONDON FRENCH DRY CLEANING CO. SITE
85-15 ROCKAWAY BEACH BOULEVARD
ROCKAWAY BEACH, QUEENS COUNTY, NEW YORK 11693

NYSDEC VCP SITE NO: 241035

QUALITY ASSURANCE PROJECT PLAN

Prepared by:

Precision Environmental Inc.
36-15A 23rd Street
Long Island City, New York 11106

TABLE OF CONTENTS

1. 0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was developed by Precision Environmental Inc. (Precision). The QAPP details the protocols and procedures that will be implemented during proposed ground water sampling documented in the September 2008 Site Management (SMP) at the Dayton Shopping Plaza in Queens, New York. The primary objective of the QAPP is to provide quality assurance (QA) and maintain quality control (QC) for all sampling and testing conducted as part of the proposed SMP and to ensure that all activities are performed in a manner consistent with data quality objectives (DQO) described herein.

In summary, this QAPP identifies project responsibilities and prescribes guidance and specifications to satisfy QA/QC objectives and, thus, promote:

- collection of representative samples;
- generation of data that are valid for the objectives of the Monitoring Plan;
- consistent and complete documentation of all field activities performed; and
- accountability of all field and laboratory activities.

The QA/QC objectives will be achieved by:

- adhering to standard sample collection, sample handling and proper analytical protocols and procedures;
- implementing a sample tracking system and chain-of-custody protocol; confirming the quality of the sampling and analytical methods through quantitative and qualitative data assessment methods; and
- ensuring that all aspects of the measurement process, from field through laboratory, are documented to provide data that are technically sound and legally defensible.

This QAPP was developed following the guidance and protocols described in the documents listed in Section 12.0 (References).

2. 0 PROJECT OBJECTIVES / SCOPE OF WORK

Information regarding the subject property and data generated during implementation of previous environmental investigations is summarized in the SMP. As documented in the SMP, additional sampling is proposed as part of the following tasks.

- Groundwater monitoring of existing onsite wells MW-2, MW-3, MW-4, and MW-8 (as designated by ROD and the SMP) to document air sparge/soil vapor extraction system (AS/SVE) system effectiveness.
    - Pressure reading from sub-slab ventilation and AS/SVE systems will be taken to verify negative pressure beneath the building floor slab.

2.1. Project Objectives

The SMP was developed in accordance with the July 2002 Record of Decision (ROD) to manage residual contamination at the site. The AS/SVE system is in place to address soil and groundwater impacted by PCE and associated breakdown products.

The SMP includes a groundwater sampling program, pressure readings from the areas influenced by the sub-slab depressurization (SSD) system. This program will allow the effectiveness of the SSD system.

2.2. Scope of Work

The project objectives outlined above will be achieved through the following:

- monthly collection of sub-slab pressure readings from the SSD system, and
- collection and analysis of bi-annual ground water samples from the following existing facility monitoring wells: MW-2, MW-3, MW-4, and MW-8.

As specified in the SMP, an AS/SVE system has been installed and operated and shown to be effective in reducing VOC concentrations in groundwater. Bi-annual groundwater sampling and laboratory analysis will be conducted to provide effectiveness data for the system.

The groundwater monitoring wells designated by the ROD for sampling are shown on Figure 7 of the SMP.

2.3. End Use Data

The field and laboratory data generated for the AS/SVE system operation and effectiveness monitoring will be used in conjunction with historical site data to assess the effectiveness of the remedial system. The ground water laboratory analytical data will be compared to the following criteria to identify exceedences:

- The ground water data will be compared to the most current NYSDEC Groundwater Quality Standards (GWQS) and Guidance Values.

The laboratory analytical data, field pressure readings and qualitative field observations will be used to develop conclusions regarding the SSD and AS/SVE system performance and groundwater quality.

The level of analytical support must be carefully considered to ensure the data are of sufficient quality to satisfy the goals of the SMP. USEPA's "Data Quality

Objectives for Remedial Response Activities" (USEPA 540-G-87-0003) discusses five general levels of analytical support (designated Level I through Level V), which may be used depending on the intended uses of the data. One of these five levels of analytical support will be employed for the groundwater sampling component of the SMP (Level III).

3. 0 PROJECT MANAGEMENT / PROJECT TEAM

Precision will implement the SMP and this QAPP/ including supervision of field activities, health and safety, and the evaluation and interpretation of data. The following is a summary of the key project personnel and subcontractors and their primary responsibilities.

Rockaway Commons, LLC Project Manager:	**Manouchehn Malekan**
Precision Project Manager:	Michael Parpounas
Precision Project Geologist:	Frank Galdun, PG
Precision Project QA/QC Officer:	Andreas Andreou
Analytical Laboratory (ground water):	Chemtech Laboratories
Laboratory QA/QC (ground water):	Chemtech Laboratories

3.1. Rockaway Commons, LLC Project Manager

The Project Manager will serve as Rockaway Commons' representative in reviewing the progress of work, participating in field meetings, and review of all reports and submittals to NYSDEC. The Project Manager will also serve as the primary contact person with the Precision Project Manager.

3.2. Precision Project Manager

The Precision Project Manager will be responsible for coordinating implementation of the elements of the SMP. The Precision Project Manager will be responsible for ensuring completion of the status reports as well as participating, as needed, in major project meetings, during the course of the project.

The Project Manager will also be responsible for adherence to project schedules; development and monitoring of cost control measures; reviewing and assessing the adequacy of the performance of technical staff and laboratory subcontractors; maintaining full orderly project documentation; interacting with the Rockaway Commons Project Manager and NYSDEC during the progress of the project; and managing project specific problems and resolving project related issues.

3.3. Precision Project Geologist

The Precision Project Geologist will be responsible for implementing, the SMP including the periodic monitoring. The Precision Project Geologist will interact with the Precision Project Manager regarding issues with the Remedial System operation and monitoring.

3.4. Precision Project Quality Assurance and Quality Control Officer

The Project QA/QC Officer will be responsible for review of field and laboratory measurement and testing data for compliance with QA objectives (precision, accuracy and completeness criteria) as stated in this QAPP, and notification to the Precision Project Manager of any QC deficiencies.

3.5. Laboratory Quality Assurance and Quality Control Officer

The Laboratory QA/QC Officer will be responsible for quality control procedures and QC checks in the laboratory, and will ensure strict adherence to laboratory protocols. In addition, the Laboratory QA/QC Officer will be responsible for tracking the movement of each sample from the time the sampling program begins until the final analytical data are assembled in the report. Test result reports and data management reports, including analytical results, quality control data, chain-of-custody, the appropriate historical data, will be assembled by computer. All calculations will be given a final check by the Laboratory QA/QC Officer. The laboratory QA/QC officers will be designated by Chemtech.

3.6. Additional Subcontractors

The ground water samples will be analyzed by Chemtech of Mountainside, NJ (NYSDOH Certification No. 11376).

3.7. Project Documentation and Records

A project file will be maintained by the Precision Project Manager, which will contain complete project documentation. This file will include project work plans; field notebook(s); field logs and data records; photographs; maps and drawings; sample identification documents; chain-of-custody records; the entire analytical data package(s) provided by the laboratory including QC documentation; gas chromatograms; mass spectra; references and literature; report notes and calculations; progress and technical reports; correspondence; and other pertinent information. All such project records will be accessible to Rockaway Commons and NYSDEC.

4. 0 ANALYTICAL PROCEDURES

4.1. Analytical Methods

Groundwater samples will be analyzed in accordance with Level III Analytical Support, as outlined in Section 2.3 of this QAPP. The analyses will be performed in accordance with New York State Analytical Services Protocols (as updated)' and as described in the USEPA Contract Laboratory Protocol (CLP).

The water samples will be analyzed under EPA Method 8260 - Volatile Organic Compounds.

4.2. Sample Containers, Preservatives and Holding Times

The types of containers used for specified analyses as well as the required preservation and applicable holding times are detailed in Table 1 of this QAPP. All sample containers will be obtained from an approved analytical laboratory. Sample containers for the groundwater samples will be cleaned and quality controlled in accordance with OSWER Directive No. 9240.0-50A "Specifications and Guidance for Obtaining Contaminant Free Sample Containers". All sample preservatives will be added to the containers by the laboratory as appropriate.

4.3. Laboratory Documentation

It is required that the selected laboratory be a participant in USEPA's CLP. Upon request, the laboratory will supply to Precision and/or Rockaway Commons a copy its in-house Quality Assurance/Quality Control manual that is applicable to the analyses to be performed. The Quality Assurance/Quality Control manual will include, at a minimum, the following topics:

- Resumes;
- Personnel training and experience;
- Organizational structure;
- Equipment available;
- Reference materials/reagents;
- Control charts;
- Standard operating procedures;
- Data reduction/reporting;
- Chain-of-custody; and,
- Sample bottle preparation.

Also upon request, the laboratory will provide results of performance evaluation samples (within the previous six months) supplied by USEPA or a New York

State- certified program (e.g.. Analytical Services Program - ASP) for those parameters of interest to the project. In turn, the performance evaluation samples will be submitted to the laboratory.

Upon Precision/Rockaway Commons' request, the laboratory will undergo a technical systems audit performed by a party independent to the analysis in order to evaluate the laboratory's capability to perform the work. A copy of the resultant report will be sent to the Rockaway Commons Project Manager and Precision Quality Assurance Officer. A State audit report, outlining the laboratory's performance within the last year will be used, if available. Agreement from the laboratory to perform these tasks will be made before the field operations commence. Only after this information has been provided and found acceptable, will sampling and analysis begin.

5. 0 SAMPLING METHODS AND FIELD MEASUREMENTS

This section of the QAPP summarizes the procedures and requirements for the sampling specified in the SRIWP. The procedures for sample collection and field measurements are summarized below and include the following procedures:

- Monitoring well sampling
- Monitoring well synoptic water level and/or product measurements
- Decontamination

5.1. Monitoring Well Sampling

Bi-annual groundwater sampling of on onsite monitoring wells as specified in the ROD & SMP (MW-2, MW-3, MW-4, MW-8) will be conducted to assess system effectiveness. All sampling will be conducted using conventional sampling methods. All monitoring wells will be purged until three well volumes are removed from the well using a submersible, centrifugal or bladder pump. Once the monitoring well water level has sufficiently recovered, the sample will be collected with dedicated Teflon bailers and transferred to the laboratory provided bottles. The appropriate sample preservative will be added to the bottle by the laboratory.

5.2. Synoptic Water Level Survey

Prior to sampling the designated monitoring wells, a synoptic water level survey will be completed.

The water level measuring procedures are as follows:

- Open and screen each monitoring well head space with a PID.

- All measurements will be made relative to the marked survey datum (typically the top of the inner-most casing).
- The measurements will proceed from the anticipated least to most contaminated wells (based on existing data).
- Decontamination of the water level meter will be completed between monitoring wells as specified in Section 6.4.
- These data will be recorded in a logbook or data sheet along with the respective well number, date, time, and any pertinent comments.

5.3. Field Decontamination

Field decontamination of equipment for the RA activities is minimal. Decontamination procedures for groundwater sampling equipment will include non-phosphate soap and water rinse of water quality parameter probes and water level meters between uses. Dedicated tubing will be used for each monitoring well. The monitoring wells will be purged with centrifugal or dedicated bladder or submersible pumps, which will not require field decontamination. Sampling will be conducted using dedicated, laboratory decontaminated, Teflon bailers.

5.4. Field Documentation

Documentation of field observations and measurements will be primarily recorded in a field notebook. The field notebook will be project specific and will contain all field observations, notes, measurements, etc. Field log sheets may also be used as necessary, but will be considered secondary records.

5.5. Sample Handling and Custody

The sampling handling, from collection in the field to shipment to the off-site laboratory, including tracking and custody requirements are outlined in this section.

5.5.1 Sample Identification

Samples will be identified in a format consistent with previous sampling events. Each sample will be assigned a unique number and location ID that will be recorded on the following documents: the daily log, the label affixed to the sample container, and the chain-of-custody record. Location IDs need not be unique; however, the sample number must be unique. Duplicate samples will be identified as “DUP” and will also have a unique number. This method will ensure that the duplicates are submitted as blind samples to the analytical laboratory.

5.5.2 Sample Handling

Samples will be stored in on-site with ice as necessary, until they are shipped or picked up by the laboratory for analysis. Bottles will be packed tightly to protect the containers from damage during shipment. A chain-of- custody (COC) will accompany each shipment. Field personnel will be responsible for the security of the samples prior to shipment.

5.5.3 Sample Custody

Sample custody will be designed to assure that each sample is accounted for at all times. The program's sample custody procedures that will be followed during the sample handling activities from the field to the laboratory are summarized below. The laboratory is responsible for sample receipt from the designated shipping agent, completion of the COC documents, verification of proper sample preservation, recording cooler temperatures, maintaining samples in secure properly designated areas, and maintaining internal chain of custody documents. The laboratory will notify Precision immediately of any sample receipt issues that impact sample integrity and data quality. The objective of the sample custody identification and control system will be to assure, to the extent practicable, that:

- All samples scheduled for collection are uniquely identified;
- The correct samples are analyzed and are traceable to their records;
- Important sample characteristics are preserved;
- Samples are protected from loss or damage;
- Any alteration of samples (e.g., filtration, preservation) is documented; and
- A historic record of sample integrity is established.

The COC form will include:

- The sample number and the sample bottle identification number/ where applicable;
- The name(s) of the sampler(s) and the person shipping the samples;
- The purchase order number, if applicable;
- The project name and number;
- Signature of the Precision representative relinquishing the samples;
- The date and time the samples were delivered for shipping;
- The sample descriptions);
- The matrix of the sample;
- The number of containers;

- Analysis and preservation information; and
- Analytical data reporting requirements

Correction or revision to a COC will be made by drawing a single line through the original entry, writing the revision, then initialing and dating the new entry.

6. 0 EQUIPMENT CALIBRATION AND MAINTENANCE

A maintenance, calibration and operation program is implemented to ensure that routine calibration and maintenance is performed on all field instruments. The program provides instruments of the proper type, range, accuracy and precision to provide data compatible with the specified requirements and desired results. Calibration of measuring and testing instruments is performed internally using in-house reference standards or externally by agencies or manufacturers.

6.1. Responsibility

The Project QA/QC Officer is responsible for ensuring that the field instruments used in the investigations are calibrated and maintained according to manufacturer specifications. Field instrument instruction manuals describing calibration, maintenance and field operating procedures for these instruments will be available as needed for reference by field personnel and other project personnel. The Field personnel will be familiar with the field calibrations, operation and maintenance of the instruments, and will perform the prescribed field operating procedures outlined in the operation and field manuals accompanying the respective instruments. They will keep records of all field instrument calibrations and field checks in the field notebook.

6.2. Calibration

Field equipment, including water quality meters will be calibrated at the start of each day of fieldwork. More frequent calibration may be warranted based on changes in responsiveness of the instruments or apparently anomalous readings. Instruments that fail calibration or become inoperable during use will be removed from service and tagged to prevent inadvertent use. If site monitoring instruments should fail, the personnel will either provide replacement instruments or have the malfunction repaired immediately.

Calibration will be performed following manufacturers instruction as outlined in the instruction manuals for each field instruments. All field personnel shall have access to field equipment instruction manuals for all field instruments.

Records will be prepared and maintained for each piece of calibrated measuring and testing equipment to indicate that established calibration procedures have been followed (e.g. results of calibration, problems, corrective action).

7. 0 INTERNAL QUALITY CONTROL CHECKS

The QC samples discussed below will be collected during the field program and analyzed by the laboratory to assess laboratory and field QA/QC procedures and the data quality.

7.1. Laboratory Internal QC Checks

The laboratory selected to perform analyses will be certified by the New York State Department of Health in accordance with the Analytical Services Protocols (ASP) and/or CLP, and will also demonstrate their capability to perform CLP analyses. In general, ASP/CLP protocols or certification programs require the laboratory to specify the qualifications of personnel; list available instrumentation; analyze performance evaluation samples; and adhere to and document standard operating procedures and quality assurance plans.

It will be the responsibility of the Laboratory QA/QC Officer to document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Internal quality control checks, including replicates, spiked samples, duplicate samples, laboratory control samples, reagent specifications and checks, and calibration checks, are performed in accordance with the specific methodologies used. The minimum criteria used for analysis consists of a daily calibration, instrument blank analysis, and sample blank analysis. In addition, at least one spike, one duplicate and one control are analyzed daily for each parameter.

7.2. Field Internal QC Checks

For field quality assurance, three types of QA/QC samples will be collected: duplicate, field and trip blank samples.

Field Blanks

Field blanks will be collected throughout the sampling events. Field blanks measure incidental or accidental sample contamination occurring during the entire sampling process of collection, transport, sample preparation and analysis. Field blanks can also check on the laboratory water quality and potential method contamination. Field blanks will be collected by pouring demonstrated analyte-free water over decontaminated groundwater sampling equipment and into the appropriate sample containers. Field blanks will be analyzed for the same parameters as samples. Field blanks will be collected at a rate of one per day during groundwater sampling and will be analyzed for the same parameters analyzed on that particular sampling day.

Trip Blanks

A trip blank sample will accompany field samples at a rate of one per shipment on days when VOC ground water samples are collected. Trip blanks will originate at the contract laboratory, and will be labeled as trip blank. The water used for the trip blank must be the same as the method blank water used by the laboratory. The trip blanks will accompany the sample containers throughout transport and sampling activities, and will be returned to the laboratory with the field samples. As such, trip blanks will accompany each daily sample shipment containing well samples for volatile organic analysis. Trip blanks will be analyzed for volatile organic compounds.

8. 0 ASSESSMENT AND OVERSIGHT

8.1. Laboratory Performance and System Audits

The analytical laboratory will conduct internal quality control checks and audits in accordance with their internal operating procedures, method specific criteria and governing laboratory or certification programs. Procedures for laboratory performance and system audits will be outlined in the Laboratory Quality Assurance Plan (LQAP). The Laboratory QA Officer will be primarily responsible for conducting these audits. The LQAP will be available to the project team during the project.

The systems audit consists of evaluation of all components of the measurement systems to determine their proper selection and use. Systems audits are normally conducted prior to or shortly after systems are operational, and are then performed on a regularly scheduled basis. Performance audits are conducted periodically, and includes the analysis of performance evaluation samples.

8.2. Field Performance Audits

The QA/QC Officer or designee will be responsible for auditing project personnel. An audit will be conducted initially during the program to ensure that proper procedures are followed and that subsequent data will be valid. The audit will focus on the details of the QA program, and will evaluate the following:

- Project Responsibilities;
- Sample Custody Procedures;
- Document Control;
- Sample Identification System;
- Sampling Techniques;
- Adherence to the Approved QA Project Plan;
- Instrument Calibration;
- Decontamination Procedures; and
- Sample Packing and Shipping Procedures.

The audit will evaluate the implementation of the project QA program.

9. 0 DATA REDUCTION, VERIFICATION, USABILITY AND REPORTING

This section of the QAPP describes the process that will be followed to verify and alidate the project data and field activities. Data verification and validation activities will be performed to ensure that data collected are consistent with project quality objectives and measurement performance criteria.

9.1. Data Reduction

All data transformation and data reduction procedures will be clearly documented and placed in the project files. All data transformation and data reduction activities performed on the project data will be carefully monitored by both the Project Manager and QA Officer to ensure that data integrity is maintained.

9.2. Data Verification

Data verification and validation activities will be performed to ensure that data collected as part of the supplemental site characterization are consistent with project quality objectives and measurement performance criteria. Upon receipt of both electronic and hard copy analytical data, internal checks will be performed to detect possible errors. The data check will be performed by the QA Officer. General checks will include the following:

- Verification of all data requested versus received (check of data against COCs);
- Verification of completeness of data packages;
- Verification of cross references between primary and duplicate samples; and

For data that are generated in the field, the Field Team Leader will work closely with field personnel to evaluate accuracy and integrity of data collection activities. The Field Team Leader will review field sheets and field notes to verify consistency with field observations and activities.

Prior to release by the off-site laboratories, the data will be reviewed internally by the laboratory QA/QC Officer against all specific QA/QC parameters. The laboratory will use a system of sign-offs in which each analyst will acknowledge that their part of the analysis is complete. Any deviations will be documented and explained in the final laboratory analytical report. The laboratory is responsible for the final results and overall quality of the laboratory data.

9.3. Reconciliation with User Requirements

Based on comparison of the field and laboratory QC to the MFCs, the Project QC officer will evaluate how well the analytical data satisfies the DQl and will develop statements in the Supplemental Remedial Investigation Report regarding the usability of the data relative to the project objectives, and project specific DQOs and end use of the data.

10. 0 CORRECTIVE ACTION

If unacceptable conditions are identified as a result of audits or are observed during field sampling and analysis, the Project QA officer and the Project Manager will document the condition and initiate corrective procedures. The specific condition or problem will be identified, its cause will be determined, and appropriate action will be implemented.

Corrective actions may include, but are not limited to, the corrective action matrix presented below.

CORRECTIVE ACTION MATRIX	
Problem	Corrective Action
Sample exceeded holding time criteria.	Re-sample and re-analyze.
Field instruments are not within calibration limits.	Calibrate instrument and retest once and limits acceptable calibration has been obtained.
Procedures are observed that are not in accordance with the QAPP.	QA officer is notified and involved personnel are retrained.

The efficacy of any corrective action will be assessed by project management to ensure that the deficiency or problem has been adequately addressed.

Corrective actions will be documented in the project progress reports, which will be provided to O&R on a monthly basis.

11. 0 REFERENCES

- U.S. Environmental Protection Agency, *USEPA Requirements for Quality Assurance Project Plans, Development Press*, Office of Solid Waste and Emergency Response Directive 9355, 0-7B, March 1987,

- U.S. Environmental Protection Agency, *Data Quality Objectives for Remedial Response Activities*, Development Press, Office of Solid Waste and Emergency Response Directive 9355, 0-7B, March 1987.

- U.S. Environmental Protection Agency. 1986, Revision 1990. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, Third Edition. Office of Solid Waste and Emergency Response, Washington, D.C.

- U.S. Environmental Protection Agency, *USEPA* Contract Laboratory Program. *Statement of Work of Organics Analysis Multi-Media Multi-Concentration*, Document No. OLM01.0, 1991,

- U.S. Environmental Protection Agency, *USEPA Quality Manual for Environmental Programs* (May 2000, USEPA Order 5360),

- U.S. Environmental Protection Agency, *USEPA Checklist for Reviewing Quality Management Plans*, Version 2, September 2001.

TABLE 1
Proposed Analytical Methods and Analytes
Site Management Plan
Dayton Shopping Plaza – Queens , New York

Parameter	Matrix	Analytical Method	Sample Container	Sample Preservation	Holding Time
VOC	Groundwater	USEPA-8260	40 ml clear glass vial	HCl, 4^{o} C	14 days

Acronyms/Abbreviations
VOC - Volatile organic compounds
USEPA - United States Environmental Protection Agency
HCl - Hydrochloric acid
^{o} C - Degrees Celsius
ml - milliliter

Appendix G:

Site-Wide Inspection Form

SITE-WIDE INSPECTION CHECKLIST

Date: ______________________________

Name: ______________________________ Title: ______________________________

Company: ______________________________

	YES	NO
All property tenants are commercial occupants only?	☐	☐
Any usage or pumping of groundwater for any purpose?	☐	☐
Have any vegetable gardens been established?	☐	☐
SSD and AS/SVE systems operational?	☐	☐
SSD and AS/SVE system monthly checklists complete?	☐	☐
Maintenance and repairs (as necessary) completed on AS/SVE system As required by the Operation and Maintenance Plan?	☐	☐
SSD or AS/SVE deactivated during the past year (aside from deactivation for maintenance and/or repairs)?	☐	☐
Bi-annual groundwater sampling and analysis completed	☐	☐
Bi-annual; groundwater quality reports submitted to NYSDEC?	☐	☐
Groundwater monitoring wells in good condition?	☐	☐
Annual Certification Report completed and submitted to NYSDEC?	☐	☐
Any sever weather conditions or other incidents that initiated a Site-wide inspection over the past year?	☐	☐
Is the Site in compliance with the SMP?	☐	☐

If yes to any of the above, provide a discussion below with corrective measure that was initiated:

Attachments:

- ☐ Photographs / Sketch
- ☐ Invoice
- ☐ Receipt for replacement equipment
- ☐ Additional pages
- ☐ Other: ______________________________

Appendix H:

Operation, Maintenance and Effectiveness Monitoring Plan for the AS/SVE System.

OPERATION, MAINTENANCE AND EFFECTIVENESS MONITORING PLAN FOR THE REMEDIAL ACTION WORK PLAN

DAYTON SHOPPING PLAZA
86-15 ROCKAWAY BEACH BOULEVARD
QUEENS, NEW YORK
Site No. 2-41-035, Index No. W2-0942-02-10

Prepared For:

Rockaway Commons, LLC
48 East Old Country Road
Suite 203
Minneola, New York 11501

For Submittal to:

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

Steven A. Ciambruschini, P.G., L.E.P.

Bill N. Stephanatos, Ph.D., P.E., D.E.E.
New York State Professional Engineer's License No. 069175

STATE OF NEW YORK · BILL NICHOLAS STEPHANATOS · 069175 · LICENSED PROFESSIONAL ENGINEER

February 2003
1461904

Langan
Engineering & Environmental Services

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This Operation, Maintenance and Effectiveness Monitoring Plan (OMEMP) provides the procedures for operating, maintaining and monitoring the Air Sparging (AS) and Soil Vapor Extraction (SVE) System at the Dayton Shopping Plaza in Queens, New York (see Figure 1 of the RAWP). The design and construction details for the system are provided in the RAWP and will be referenced in this plan. The specific sampling procedures to be conducted during system operation are detailed in the RAWP Quality Assurance project Plan (QAPP). All major equipment (blowers, particulate filters, etc.) were installed inside a vacant retail space adjacent to the London French dry-cleaners. System monitoring gauges and sample ports are located at the piping manifolds.

1.1 Performance Objectives

The in-situ remediation system performance will be judged on the following three criteria:

- The comparison of the actual mass removal with the calculated mass removal for volatile organic compounds based on field screening and laboratory data,
- The attainment of asymptotic decline of concentrations of volatile organic compounds in the system exhaust, and
- The reduction of VOC concentrations in the on-site monitoring wells.

The remediation system will be augmented if the first and second criteria are not met. The effectiveness of the remediation system will be evaluated if the first and second criteria are met, but continued operation of the system does not produce a progressive reduction of the contaminant concentration in the ground water at the site.

2.0 SYSTEM MASS REMOVAL MONITORING

The volatile organic mass that is mobilized by the remediation system will be collected by the SVE system. Monitoring the SVE system influent allows for the accurate measurement of the total system mass removal and the specific removal rates from particular areas of the site. This monitoring will be necessary both to determine the effectiveness of the system and to ensure compliance with established air emission limitations.

The two parameters that must be measured and recorded to determine the mass removal rate of the SVE system are the airflow rate and the volatile organic compound concentration in the extracted air. The mass flow rate will be determined by measuring the air velocity inside the system piping with a thermal anemometer. All measurements with the thermal anemometer will be made through properly installed sampling ports in accordance with the instrument manufacturer's recommendations. The volatile organic concentrations will be measured by either collecting a Tedlar bag sample for laboratory analysis for specific compounds or with a photoionization detector (PID) for total volatile organic concentrations. Tedlar bag samples will be collected at least quarterly from the effluent line during the operation of the SVE systems. The Tedlar bag sampling and PID monitoring procedures are provided in the QAPP.

The laboratory analytical results and the PID field data will provide concentration values in parts per million by volume (ppmv). The volumetric concentrations will be converted to mass concentrations per unit volume via the ideal gas law. The resulting concentration will then be in milligram per cubic meter (mg/m^3). The airflow will be calculated by multiplying the air velocity in feet per minute by the cross sectional area of the pipe, in square feet, which results in actual cubic feet per minute (acfm). Combining the airflow rate with the mass concentrations per unit volume will determine the volatile organic mass removal rate for the SVE system. In the case of PID measured concentrations, assumptions will be made about the molecular weight of the mixture of volatile organic compounds based on recent laboratory results.

3.0 REMEDIATION SYSTEM MONITORING PROCEDURE

3.1 On-Site Monitoring

The remediation system blowers will be controlled by a control panel. The control panel includes the basic motor controls (hand-off-auto switch) and can integrate an array of inputs from system sensors and other panels. The system will be configured in accordance with the design system interlocks.

It will be possible to monitor the following system operating parameters:

- The operational status of the blower.
- The AC current demand of the blower motor.
- The status of the moisture separator tank high liquid level sensor.
- The status of the SVE high air temperature sensors.
- The status of the AS high air temperature sensors.

Standard system monitoring will consist of the following.

<u>In Equipment Room:</u>

1. Inspect the SVE blower. Verify that equipment is operating and there are no apparent system malfunctions.
2. Record the SVE influent and effluent air temperatures.
3. Record the SVE influent vacuums before and after particulate filter.
4. Record SVE air velocity using the air anemometer.
5. Record influent (before air dilution) and effluent volatile organic concentration.
6. Record liquid levels in the moisture separator.

7. Record the cumulative hour meter readings for the SVE blower.
8. Inspect the AS blower. Verify that equipment is operating and there are no apparent system malfunctions.
9. Record the AS influent and effluent air temperatures.
10. Record the AS influent air pressure before and after particulate filter and record the effluent air pressure of the blower.
11. Record AS air velocity using the anemometer.

At System Manifolds:

1. Record AS/SVE air flow rates from individual wells
2. Record SVE vacuum and AS air pressure applied to each individual line

Normal operating ranges will be established for flow rates, pressures, temperatures, and vacuums at each respective instrument and sampling location in order for the field personnel to determine if the system is operating appropriately. Except for the collection of Tedlar bag air samples, this monitoring procedure will be performed at each scheduled system monitoring.

4.0 REMEDIATION SYSTEM MAINTENANCE REQUIREMENTS

The majority of the remediation system equipment requires minimal maintenance. This will facilitate consistent operation at this remote installation. However, minor regular maintenance is required for some of the equipment. This section will discuss all the major system components and what maintenance is required for its operation.

4.1 Soil Vapor Extraction Blower

The SVE blower is a GAST regenerative blower Model No. RA4310A-2. The regular maintenance procedure for this unit us as follows:

- Inspect influent and effluent instrumentation.

4.2 SVE Blower Inlet Particulate Filter

The particulate filter condition should be inspected monthly. Clear any loose materials from filter cartridge. If filter cannot be cleared, then cartridge will be replaced.

4.3 SVE Moisture Separator

The SVE moisture separator unit is built into the SVE Blower unit. The regular maintenance procedure for this unit as follows:

- Inspect at every monitoring event.
- Drain accumulated liquid as necessary.

4.4 Air Sparging Blower

The air sparging blower is a Becker, Inc. TEFC oil-less rotary vane, low pressure, air compressor, model No. DTLF-250. The regular maintenance procedure for this unit us as follows:

- Inspect influent and effluent instrumentation.

4.5 SVE Blower Inlet Particulate Filter

The regular maintenance procedure for the inlet particulate filter is as follows:

- Inspect filter condition monthly.
- Clear any loose materials from filter cartridge.
- If filter cannot be cleared, then cartridge will be replaced.

5.0 REMEDIATION SYSTEM MONITORING AND MAINTENANCE SCHEDULE

As discussed in the RAWP, the AS/SVE system was started and operated through a tuning period prior to the initial startup in October 2000. However, because of its inactivity, the system will require more frequent monitoring initially after the system is restarted to re-establish normal operating ranges and to detect any operating problems. The system will require less frequent monitoring following this tuning period. Prior to system start-up, selected ground water monitoring wells will be sampled to document conditions prior to restart of the system.

5.1 Initial System "Start-Up"

An extensive start-up test will be conducted on the remediation system. The testing will consist of the following tasks:

5.1.1 Verify Equipment Performance

All equipment will be started and inspected in accordance with the manufacturer's recommendations. The equipment will be checked to ensure that it is performing within the design specifications. The following steps will be taken:

- Determine and record SVE blowers maximum operating flow rate and vacuum.
- Use SVE blowers to apply vacuums for verification of piping system integrity.
- Determine and record AS blower maximum operating flow rate and pressure.

- Use AS blowers to apply pressure for verification of piping system integrity.
- Determine and record vacuum/pressure losses through the system piping runs. Compare manifold readings to blower readings. Use portable gauges to record vacuum at well heads and compare to vacuum at the manifolds.

5.1.2 Verify Performance of System Interlocks

The combined AS/SVE systems utilize a series of control interlocks to ensure the safe operation of the remediation system. The interlocks serve to protect the remediation equipment from damage caused by abnormal operating conditions. The SVE blower will be automatically shut down under the follow conditions:

- If the high level sensor in the moisture separator tank is activated.
- If the high temperature sensor in the air discharge line is activate.
- If the blower motor's internal thermal overload protection is tripped.

In order to test the performance of these interlocks, the following procedure should be executed for the two independent systems. The following tests are performed with the SVE equipment in operation. The systems can be adjusted during this phase by using the dilution and purge valves so that subsurface air is not extracted.

- Turn down the adjustment set screw for the SVE temperature high temperature switch until system shuts down. Monitor the discharge temperature gauge to record the temperature at which the blower shuts down.

- Turn entire system off. Block the high liquid level sensor in the moisture separator in the full position. Verify that the system does not start.

5.1.3 Verify Performance of SVE and Air Sparging Wells

Each system point will be tested to verify that the appropriate radius of influence can be achieved.

- Operate one SVE well at a time at approximately the operating design parameters. Use air dilution valves to supplement influent air to blowers. Record resulting vacuum at appropriately screened existing monitoring wells in the vicinity of the operating SVE well. A minimum of three wells should be checked. Additionally, field-screening instruments will be used to determine the volatile organic compound concentration in the extracted air and the resulting air velocity in the system piping resulting from the use of each extraction well.
- Both the SVE and AS well data is to be tabulated and used to verify that the projected radii of influence (ROIs) can be achieved and to verify that the SVE system can maintain control of air sparging-generated VOC vapors.
- Operate one air sparging well at a time (with its corresponding SVE well) at approximately its design operating parameters. Check that the airflow rate and pressure requirements are approximately those projected in the system design. Measure and record the change in groundwater dissolved oxygen concentration, air pressure, and air volatile organic concentrations at the surrounding monitoring wells. Three sparging wells should be checked. As with the SVE system, check and record the resulting VOC concentrations and air velocities in the SVE system during this phase.

- Operate the entire system; check subsurface vacuum and pressure response, dissolved system concentrations and VOC levels at monitor wells within the target area.

5.1.4 Determine Removal Rates for Remediation System

Following verification that the system equipment can again operate at the design specifications, the system will be checked to determine the potential volatile organic compound removal rate. The data collected during the well performance checks will be used to determine the maximum removal rate for the remediation system. This information will be verified during the start-up testing by configuring the system to operate with the maximum estimated volatile organic compound removal rate. A Tedlar bag air sample will be collected from the SVE effluent under these conditions. The laboratory analytical results for this sample, along with field screening data, will be used to determine if the system has the potential to exceed the air discharge limitations. If so, appropriate operating guidelines will be established to ensure compliance with relevant air emissions standards. Tedlar bag air samples will be collected in accordance with the QAPP.

5.1.5 Establish Target Operating Parameters for System

The data collected during the SVE start-up testing will used to determine ranges for normal system operation. These ranges will be chosen to maximize the remediation system's removal efficiency while maintaining compliance with air emissions limitations. The system's operating parameters will be adjusted periodically based on current data. These adjustments will be made to maintain efficient mass removal as soil and groundwater volatile organic concentrations decline.

5.2 Routine System Monitoring

Following start-up testing, and the establishment of target operating ranges, the system will be put into continuous operation. The system will be monitored with routine site inspections. The system will be monitored once per week for the first four weeks of operation in accordance with the monitoring procedure outlined in Section 3.0 of this report. The measured operating parameters will be compared to the established acceptable ranges and adjustments will be made as necessary. Following the first four weeks of operation, and assuming that the system appears to operate consistently, the monitoring schedule will be changed monthly thereafter.

5.3 Monitoring Well Sampling

In addition to the emissions monitoring discussed above, ground water sampling of existing onsite monitoring wells will provide additional data on the system effectiveness. Semi-annual sampling of monitoring wells MW-3, MW-5, MW-7, MW-9 and annual sampling of all eleven shallow monitoring wells and deep monitoring well (DW-1) is proposed. Prior to sampling, a synoptic water level survey of all site monitoring wells will be completed. Monitoring well measurements and sampling will be completed in accordance with the QAPP. An initial sampling event will be completed prior to restarting the system to establish conditions prior to system operation and then the sampling will continue on a semi-annual basis.

5.4 Reporting

The operational status and significant modifications of the remediation system, operating data will be compiled and evaluated in annual Status Reports.

The Status Reports will include the following data:

- System operating status summary,
- Soil vapor extraction system discharge sampling data,
- VOC mass removal calculations,
- System operating performance data (flows, pressures, hours of operation),
- VOC removal trend evaluation and
- Ground water VOC level trend evaluation.

Monthly progress reports documenting system performance will also be provided to NYSDEC.

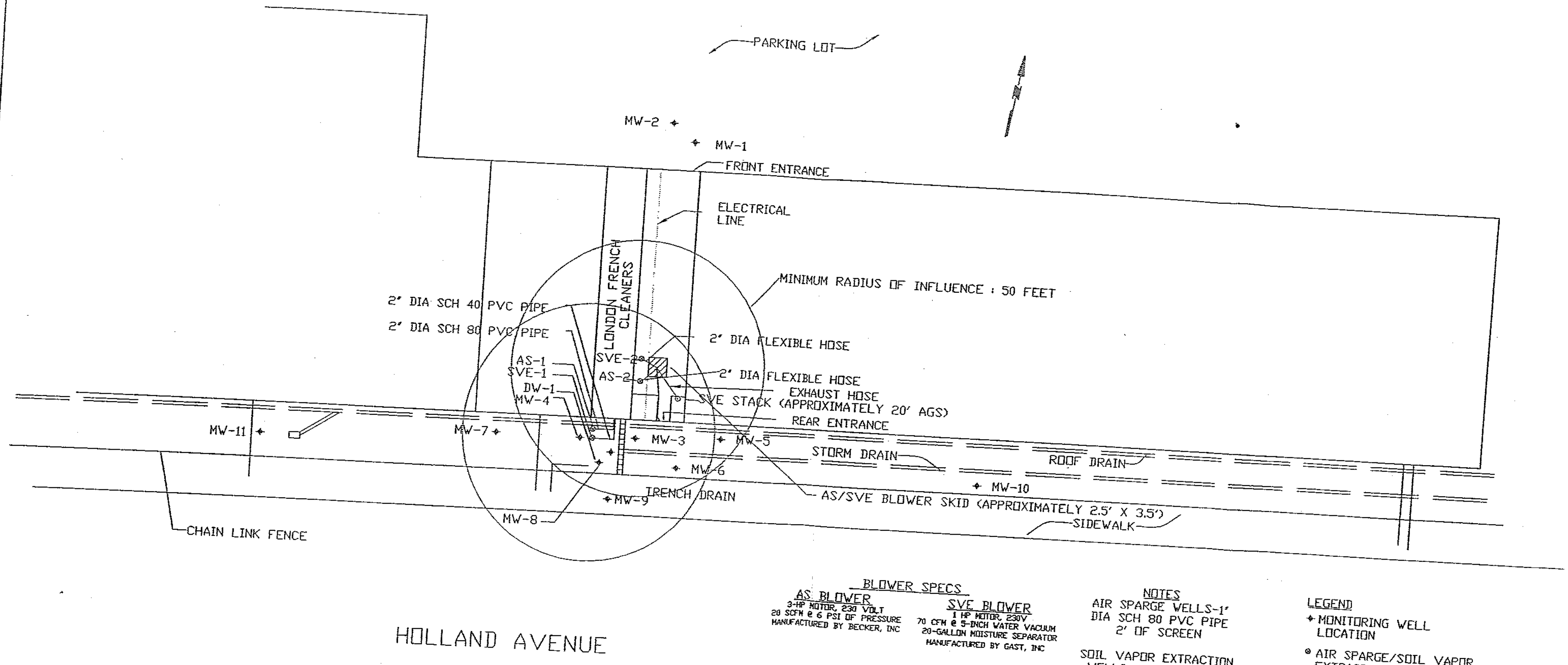
G:\Data9\1461901\Office Data\Reports\RAWP\Omemp\ASSVEOMplan.doc

TABLES

TABLE 1
Summary of Operation, Maintenance and Effectiveness Monitoring Program
Air Sparging and Soil Vapor Extraction System
Dayton Shopping Plaza - Queens, NY

System Component & Action	Frequency: Startup	Frequency: Weekly for one month	Frequency: Monthly	Frequency: Quarterly	Frequency: Semi-Annual	Method	Analysis
SVE Wells							
Measure VOC concentration from SVE-1	X	X	X			PID	Total VOC in ppm
Measure VOC concentration from SVE-2	X	X	X			PID	Total VOC in ppm
Measure Vacuum in SVE-1	X	X	X			System Gauge	Vacuum (in-H2O)
Measure Vacuum in SVE-2	X	X	X			System gauge	Vacuum (in-H2O)
EXHAUST							
Measure VOC concentration from exhaust port	X	X	X			PID	Total VOC in ppm
Measure SVE exhaust flow rate	X	X	X			Thermal anemometer	SVE flow rate in cfm
Measure SVE exhaust pressure	X	X	X			System gauge	Exhaust pressure in psig
Collect emission sample for lab analysis	X			X		Tedlar Bag (see QAPP)	USEPA TO-14 (see QAPP)
SVE BLOWER							
Measure SVE system blower vacuum	X	X	X			System gauge	Blower vacuum (in-H2O)
Measure SVE blower temperature	X	X	X			System thermometer	Blower temperature °F
Check/Clean/Replace Air filter	X		(2)			See owners manual	NA
AS BLOWER							
Measure AS system blower vacuum	X	X	X			System gauge	Blower vacuum (in-H2O)
Measure AS system blower temperature	X	X	X			System thermometer	Blower temperature °F
MISCELLANEOUS							
Check/empty water separator reservoir	X	X	X			open separator	record volume in gallons
Check system hoses	X		X			Visual inspection	NA
Monitoring well sampling	(3)				X	see QAPP	VOCs (see QAPP)

NOTES:
(1) Startup air emission sample was collected prior to October 2000 startup. Resample will be at the discretion of Project Engineer
(2) Air filter will be check monthly, cleaned and replaced as needed.
(3) Initial ground water sampling will be completed prior to restarting system.



BLOWER SPECS

AS BLOWER
3-HP MOTOR, 230 VOLT
20 SCFM @ 6 PSI OF PRESSURE
MANUFACTURED BY BECKER, INC

SVE BLOWER
1 HP MOTOR, 230V
70 CFM @ 5-INCH WATER VACUUM
20-GALLON MOISTURE SEPARATOR
MANUFACTURED BY GAST, INC

NOTES
AIR SPARGE WELLS-1" DIA SCH 80 PVC PIPE
2' OF SCREEN

SOIL VAPOR EXTRACTION WELLS-2" DIA SCH 40 PVC PIPE
2.5' OF SCREEN (SVE-1)
3' OF SCREEN (SVE-2)

LEGEND
+ MONITORING WELL LOCATION
⊙ AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION

Langan Engineering and Environmental Services (201) 794-6900 Elmwood Park,NJ Doylestown,PA. Miami,FL	Project DAYTON SHOPPING PLAZA AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM LAYOUT QUEENS NEW YORK
	Job No. 1461904 | Date 29 JAN 03 | Scale 1"=20' | Dwg. No.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

Appendix B

QUALITY ASSURANCE PROJECT PLAN FOR THE REMEDIAL ACTION WORK PLAN

DAYTON SHOPPING PLAZA
86-15 ROCKAWAY BEACH BOULEVARD
QUEENS, NEW YORK
Site No. 2-41-035, Index No. W2-0942-02-10

Prepared For:

Rockaway Commons, LLC
48 East Old Country Road
Suite 203
Mineola, New York 11501

For Submittal to:

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

Steven A. Ciambruschini, P.G., L.E.P.

Bill N. Stephanatos, Ph.D., P.E., D.E.E.
New York State Professional Engineer's License No. 069175

February 2003
1461904

Langan
Engineering & Environmental Services

Elmwood Park, NJ • New York, NY • Miami, FL • New Haven, CT • Doylestown, PA • Philadelphia, PA

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont)

LIST OF TABLES

LIST OF ATTACHMENTS

Appendix B

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was developed by Langan Engineering and Environmental Services, Inc. (Langan). The QAPP details the protocols and procedures that will be implemented during proposed air and ground water sampling documented in the February 2003 Remedial Action Workplan (RAW) at the Dayton Shopping Plaza in Queens, New York. The primary objective of the QAPP is to provide quality assurance (QA) and maintain quality control (QC) for all sampling and testing conducted as part of the proposed Remedial Action Workplan and to ensure that all activities are performed in a manner consistent with data quality objectives (DQO) described herein.

In summary, this QAPP identifies project responsibilities and prescribes guidance and specifications to satisfy QA/QC objectives and, thus, promote:

- collection of representative samples;
- generation of data that are valid for the objectives of the investigation;
- consistent and complete documentation of all field activities performed during the investigation; and
- accountability of all field and laboratory activities.

The QA/QC objectives will be achieved by:

- adhering to standard sample collection, sample handling and proper analytical protocols and procedures;
- implementing a sample tracking system and chain-of-custody protocol;
- confirming the quality of the sampling and analytical methods through quantitative and qualitative data assessment methods; and
- ensuring that all aspects of the measurement process, from field through laboratory, are documented to provide data that are technically sound and legally defensible.

This QAPP was developed following the guidance and protocols described in the documents listed in Section 12.0 (References).

2.0 PROJECT OBJECTIVES / SCOPE OF WORK

Information regarding the subject property and data generated during implementation of previous environmental investigations is summarized in the RAWP. As documented in the RAWP, additional sampling is proposed as part of the following tasks.

- Air monitoring within the existing on-site building to document potential migration of chlorinated volatile organic compounds into the building from impacted shallow ground water;
- Air monitoring conducted during operation of the AS/SVE system to document system effectiveness; and
- Ground water monitoring of existing onsite wells to document AS/SVE system effectiveness.

2.1 Project Objectives

A Remedial Action Workplan was developed in accordance with the Voluntary Cleanup Agreement executed between Rockaway Commons LLC and NYSDEC to address the remedial system design, operation of monitoring of an Air Sparging and Soil Vapor Extraction (AS/SVE) System. The AS/SVE system is designed to address soil and ground water impacted by tetrachloroethene (PCE) and associated breakdown products.

The proposed Remedial Action Workplan includes a facility air-sampling program and an Operation, Maintenance and Effectiveness Monitoring Program (OMEMP) for operation of the AS/SVE system. This QAPP includes field and laboratory measurements for the facility air-sampling and OMEMP.

2.2 Scope of Work

The project objectives outlined above will be achieved through the following:

- collection and analysis of three air-samples from three retail spaces within the shopping plaza,
- collection and analysis one air-sample from outside of the London French (LF) dry-cleaning facility,
- collection and analysis of semi-annual ground water samples from selected existing facility monitoring wells,
- periodic field screening and laboratory emissions samples to verify system effectiveness,

As specified in the RAWP, an AS/SVE system has been installed and operated and shown to be effective in reducing VOC concentrations in ground water. An OMEMP has been proposed which will include semi-annual ground water monitoring, system diagnostic procedures, and emissions sampling to provide maintenance and effectiveness data for the system.

In addition, collection of a total of four air-samples has been proposed to investigate the potential for soil gas migration into the site facility from the ground water plume.

The proposed air-sampling locations and ground water monitoring network are shown on Figures 2 and 3 of the RAWP. The rationale for selection of each sampling location is discussed in the RAWP.

2.3 End Use Data

The field and laboratory data generated for the AS/SVE system operation and effectiveness monitoring will be used in conjunction with historical site data to assess the effectiveness of the remedial system. The ambient air, emissions and ground water laboratory analytical data will be compared to the following criteria to identify exceedences:

- The ambient air data will be compared to the New York State Department of Health (NYSDOH), Bureau of Toxic Substance Assessment (BTSA), Indoor Health Assessment Section (IHAS) criteria;

- The emissions data will be compared to the New York Department of Environmental Conservation, Division of Air Quality, Annual Guideline Concentrations or the Short-term Guideline Concentrations;
- The ground water data will be compared to the most current NYSDEC Ground Water Quality Standards (GWQS) and Guidance Values.

The laboratory analytical data, field PID-measurements for total VOCs and qualitative field observations will be used to develop conclusions regarding the system performance and ground water quality.

The level of analytical support must be carefully considered to ensure the data are of sufficient quality to satisfy the goals of the Remedial Action. USEPA's "Data Quality Objectives for Remedial Response Activities" (USEPA 540-G-87-0003) discusses five general levels of analytical support (designated Level I through Level V), which may be used depending on the intended uses of the data. Three of these five levels of analytical support will be employed for different components of the Remedial Action, as follows:

- <u>Level IV: Contract Laboratory Procedures (CLP) Routine Analytical Services (RAS)</u> - Level IV is characterized by rigorous QA/QC protocols and documentation. All ground water samples will be analyzed using Level IV procedures and protocols.
- <u>Level III: Laboratory Analysis</u> – Level III uses methods other than CLP RAS, this level primarily supports engineering studies using standard USEPA-approved procedures. The air and emissions samples will be analyzed using Level III procedures and protocols.
- <u>Level I: Field Screening.</u> - This level is characterized by the use of portable instruments, such as a PID, which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. All routine air monitoring (as discussed in the Health and Safety Plan) and system screening will be conducted using Level I analytical support.

The laboratory reports will follow the NYSDEC Category B reporting requirements.

3.0 PROJECT MANAGEMENT / PROJECT TEAM

Langan will implement the RAWP and this QAPP, including supervision of field activities, health and safety, and the evaluation and interpretation of data.

The following is a summary of the key project personnel and subcontractors and their primary responsibilities.

Rockaway Commons, LLC Project Manager:	**Manouchehn Malekan**
Langan Project Manager:	Steven Ciambruschini, PG, LEP
Langan Project Engineer:	Bill Stephanatos, PhD, PE, DEE
Langan Project QA/QC Officer:	Marshall King
Field Supervisor:	Craig Peterson
Site Health and Safety Officer:	Craig Peterson
Analytical Laboratory (ground water):	Accutest Laboratories, Inc.
Analytical Laboratory (air):	Air Toxics LTD
Laboratory QA/QC (ground water):	Accutest Laboratories, Inc.
Laboratory QA/QC (air):	Air Toxics LTD
Laboratory Data Validation:	Severn Trent Laboratories

3.1 Rockaway Commons, LLC Project Manager

The Project Manager will serve as Rockaway Commons' representative in reviewing the progress of work, participating in field meetings, and review of all reports and submittals to NYSDEC. The Project Manager will also serve as the primary contact person with the Langan Project Manager.

3.2 Langan Project Manager

The Langan Project Manager will be responsible for coordinating implementation of the elements of the RAWP. The Langan Project Manager will be responsible for ensuring completion of the status reports as well as participating, as needed, in major project meetings, during the course of the project.

The Project Manager will also be responsible for adherence to project schedules; development and monitoring of cost control measures; reviewing and assessing the adequacy of the performance of technical staff and laboratory subcontractors;

maintaining full orderly project documentation; interacting with the Rockaway Commons Project Manager and NYSDEC during the progress of the project; and managing project specific problems and resolving project related issues.

3.3 Langan Project Engineer

The Langan Project Engineer was responsible for the AS/SVE system design, installation and operation. The Langan Project Engineer will be responsible for review the OMEMP data and adjusting the system accordingly to meet system goals. The Langan Project Engineer will also be responsible for any system modifications if necessary to achieve the remedial objectives. The Langan Project Engineer will interact with the Langan Project Manager regarding issues with the AS/SVE system and remedial objectives.

3.4 Langan Field Supervisor

The Langan Field Supervisor will be responsible for implementing, the RAWP including the periodic monitoring as dictated in the OMEMP. The Langan Field Supervisor will interact with the Langan Project Manager and Langan Project Engineer regarding issues with the Remedial System operation and monitoring.

3.5 Langan Project Quality Assurance and Quality Control Officer

The Project QA/QC Officer will be responsible for review of field and laboratory measurement and testing data for compliance with QA objectives (precision, accuracy and completeness criteria) as stated in this QAPP, and notification to the Langan Project Manager of any QC deficiencies. The data validation for all the testing results will be completed by Severn Trent Laboratories

3.6 Laboratory Quality Assurance and Quality Control Officer

The Laboratory QA/QC Officer will be responsible for quality control procedures and QC checks in the laboratory, and will ensure strict adherence to laboratory protocols. In addition, the Laboratory QA/QC Officer will be responsible for tracking the movement of each sample from the time the sampling program begins until the final analytical data are assembled in the report. Test result reports and data management reports, including analytical results, quality control data, chain-of-custody, the appropriate historical data, will be assembled by computer. All calculations will be given a final check by the Laboratory QA/QC Officer. The QA/QC officers from Aava Pro-Tech Laboratories (ground water samples) and Air Toxics LTD (air samples) will be designated by their respective companies.

3.7 Additional Subcontractors

The ground water samples will be analyzed by Accutest Laboratories of Dayton, NJ (NYSDOH Certification No. 10983). The air and emissions samples will be analyzed by Air Toxics LTD of Folsom California (NYELAP-11291).

3.8 Project Documentation and Records

A project file will be maintained by the Langan Project Manager, which will contain complete project documentation. This file will include project work plans; field notebook(s); field logs and data records; photographs; maps and drawings; sample identification documents; chain-of-custody records; the entire analytical data package(s) provided by the laboratory including QC documentation; gas chromatograms; mass spectra; data validation notes; references and literature; report notes and calculations; progress and technical reports; correspondence; and other pertinent information. All such project records will be accessible to Rockaway Commons and NYSDEC.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

Data Quality Indicators (DQI) are qualitative and quantitative descriptors used to interpret the degree of acceptability or usability of data. The primary DQIs are precision, accuracy (bias), representativeness, comparability and completeness. Of these DQIs precision and accuracy are quantitative measures, and representativeness, completeness, and comparability are qualitative measures of data quality.

Within a quantitative and qualitative context, the DQIs with respect to data quality are measured through the use of Measurement Performance Criteria (MPC). In order to assess whether the MPC are met for each DQI, both laboratory and field QC samples will be collected. The QC samples include field duplicates; laboratory matrix spike/matrix spike duplicates; field, lab and trip blanks; and laboratory control samples such as surrogates. The QC sample requirements are discussed in Sections 8.1 and 8.2. To assess precision, comparability, and representativeness, QC samples include field duplicates and laboratory matrix spike/matrix spike duplicates. Matrix spikes, blanks and laboratory control samples are use to assess accuracy; and blanks, and split-samples and sampling procedures are used to assess representativeness.

The MPC and their use in the data validation process are described in Section 10.0 of this QAPP.

4.1 Data Precision

Precision is a measure of mutual agreement among individual measurements of the same property. Precision is measured by analyzing field duplicate and laboratory duplicate samples. The relative percent difference or RPD of duplicate measurements can be used to evaluate analytical precision. The smaller the RPD, the greater is the analytical precision. Relative Percent Difference is calculated from initial and duplicate sample analytical results using the following equation.

$$RPD\% = \frac{(C_1 - C_2)}{(C_1 + C_2) \div 2} \times 100$$

Where:

C1 = The larger of the two observed values.
C2 = The smaller of the two observed values.

Both spike recovery and RPD can be determined using the analytical results of matrix spike and matrix spike duplicate samples (MS/MSD).

Duplicate samples will be used to assess the overall effects of the sample collection and analysis procedures on precision; some samples will be collected in duplicate. One of the duplicates will be given a "coded" identifier and will be submitted as a 'blind' duplicate, along with the original sample for analysis. Comparisons of the results from the original sample and the blind duplicate will allow for an evaluation of the precision RPD. One coded field duplicate will be collected for every 20 environmental samples per media. Matrix spike and matrix spike duplicate samples will also be collected.

The referenced analytical methods cite precision control limits or give guidance on how to establish precision control limits. Control limits are typically generated from multiple analyses and inter-laboratory comparison studies. Control limits are method, compound, and matrix dependent.

Acceptable levels of laboratory precision will vary according to the sample matrix, the specific analytical methods, and the analyte concentration relative to the method detection limit (MDL). Quality assurance objectives for precision will also be supported through the use of written laboratory standard operating procedures (SOPs) and properly calibrated instruments. Laboratory precision will be assessed by the analysis of matrix spike/matrix spike duplicate and/or laboratory duplicates. Laboratory precision is evaluated using USEPA guidelines for the specific method reference in concert with laboratory SOPs and this project-specific QAPP.

4.2 Data Accuracy

Accuracy/Bias is the degree of agreement of a measurement with an accepted reference or true value. The difference is usually expressed as a percentage. Accuracy is a measure of the bias of a system. In the field, routine calibration checks are performed to assess the accuracy of field instrumentation measures. The accuracy/bias of laboratory analytical measures is evaluated through the analysis of method blanks, sample matrix spikes, matrix spike duplicates, sample surrogate recoveries, performance evaluation samples, and Laboratory Control Samples. Accuracy/Bias-contamination is assessed by trip blanks, equipment blanks, method blanks, and instrument blanks that evaluate how the data is affected by contamination.

Accuracy may be expressed as a percent difference (%D) calculated by the following equation:

$$\%D = \frac{(V_t - V_m)}{V_t} \times 100$$

Where:

V_t = the true or real value expected.

V_m = the measured or observed value.

This same relationship holds for the expression of accuracy as a percent recovery (%R) of a known method analyte or surrogate spike:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

Where:

SSR	=	the spiked sample result.
SR	=	the unspiked sample result.
SA	=	the value of the spike added.

Acceptable levels of accuracy and precision will be achieved by close adherence to all sampling procedures, sample preservation, sampling implement, decontamination procedures, and analytical methodology. Failure to achieve acceptable levels of accuracy and precision will trigger the implementation of a corrective action as described in Section 11.0 of this QAPP.

The objective for field measurement accuracy is to achieve and maintain the manufacturer's specifications for field equipment. The objective for accuracy of laboratory determinations is to maintain a system, which can be demonstrated to achieve measurements that are within accuracy criteria.

4.3 Data Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variation, or environmental condition. Representativeness will be controlled by the consistent collection and analysis of samples according to standardized procedures. Representativeness can be assessed through the measures of precision and accuracy. Field documentation, field duplicate analyses, laboratory QC sample results, and data trend analysis all provide indices for the evaluation of data representativeness.

The degree that the data collected during the RA represent actual conditions at the site is a function of the:

- number and location of data collection points;
- choice of parameters for physical and chemical analysis; and
- choice of specific technologies for data collection.

Samples taken must be representative of the population. The sampling program has been developed on a "biased" sampling approach. The sample locations have been selected based on locations where known or suspected constituents associated with contaminants of concern may be present at the site and the results of previous investigations.

Representativeness of specific samples will be achieved by the following:

- Using appropriate sampling procedures, sample containers, and equipment;
- Using appropriate analytical methodologies for the parameters and detection limits required;
- Analyzing the sample within the appropriate holding time; and
- Properly preserving and storing the samples.

Dedicated sampling devices will be used to eliminate the potential for cross-contamination. A trip blank, which consists of a VOC vial filled with deionized, analyte-free water at the laboratory, will be used to document possible cross contamination during storage and transportation of ground water samples to the laboratory. A blank tedlar bag will also be analyzed during each air sampling event (except for Suma-canister sampling).

The laboratory will make every reasonable effort to assure that samples are adequately homogenized prior to taking aliquots for analysis in accordance with SOP, so that the reported results are representative of the sample received. It must be recognized that excess handling may expose the sample to significant risk of contamination or volatilization, therefore, sampling handling will be minimized in accordance with SOP.

4.4 Data Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system relative to the amount that would be expected to be obtained under correct, normal conditions. Valid data are data that are soundly founded as evidenced by the successful attainment of the Data Quality Objectives set forth for their determination.

$$Completeness(A\%) = \frac{Valid}{Total} \times 100$$

Where:

Valid = No. valid values reported for parameter y
Total = No. of samples collected for analysis for y

Based on site accessibility, it is believed that 100 percent of the proposed samples can be collected. It is expected that the laboratory will provide data meeting QC acceptance criteria for 95 percent of all samples analyzed. The laboratory and project data validation subcontractors will review the laboratory data for completeness. Corrective actions to achieve a complete data set may include any of the following: 1) re-analysis; 2) re-extraction; and or 3) resampling.

The QA objective for completeness will be optimized by employing and evaluating QC checks throughout the analytical process so that sample data can be assessed for validity of results and to allow for reanalysis within the hold time, when possible, where QC indicates a problem.

4.5 Data Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data generated from this site should be comparable with similar sample matrix measurements made by others during as previous site investigations.

To assure that the measurements are comparable, sample collection and analysis will follow standard analytical methods where specified; also, standard reporting units will be used for all data. Aqueous sample data for organic and inorganic analytes will be reported in micrograms per liter (µg/l). Air sample data will be reported in parts per billion (pbv) and micrograms per meter (UG/M^3).

The comparability objective for this project will be attained by:

- Using standard methodologies;
- Reporting results from similar matrices in consistent units;
- Applying appropriate levels of QC within the context of the Laboratory Quality Assurance Program; and
- Participating in inter-laboratory performance evaluation studies in support of laboratory certification to document general laboratory performance.

4.6 Traceability

Traceability is defined as the ability to reconstruct and review all aspects of the measurement system through available documentation.

Field activities should have the following documentation to support traceability:

- Standard Operating Procedures;
- Field notebooks;
- Names of field personnel; and
- Field personnel training records.

The field measurements should be supported by the following additional documentation:

- Instrument identification numbers;
- Instrument calibration records;
- Instrument precision and accuracy data as measured in the field;
- Source and concentration of the standards; and
- Instrument maintenance records.

Laboratory data traceability documentation exists in two forms: that which links final numerical results to authoritative measurement standards, and that which explicitly describes the history of each sample from collection to analysis. The sample history will be provided by the subcontract laboratory as part of the analytical laboratory report.

5.0 ANALYTICAL PROCEDURES

5.1 Analytical Methods

Air, emissions and ground water samples will be analyzed in accordance with Level III, Level III and Level IV Analytical Support, as outlined in Section 2.1 of this QAPP. The analyses will be performed in accordance with New York State Analytical Services Protocols (as updated) and as described in the USEPA Contract Laboratory Protocol (CLP).

Level I Analytical Support will be utilized for PID headspace screening and air-monitoring analysis for VOCs as outlined in Section 2.1 of this QAPP.

The methodologies will include Target Compound List (TCL) volatile organic compounds with a library search (TCL-VOC+10) using Method NYSASP 95-1 for ground water sampling. The air-samples will be analyzed for tetrachloroehtne, trichloroethene, 1,1-dichloroethene (cis & trans) and vinyl chloride using USEPA Method TO-15. System emissions samples will be analyzed for TCL-VOCs using method USEPA TO-15.

5.2 Sample Containers, Preservatives and Holding Times

The types of containers used for specified analyses as well as the required preservation and applicable holding times are detailed in Table 1 of this QAPP. All sample containers will be obtained from an approved analytical laboratory. Sample containers for the ground water samples will be cleaned and quality controlled in accordance with OSWER Directive No. 9240.0-50A "Specifications and Guidance for Obtaining Contaminant Free Sample Containers". All sample preservatives will be added to the containers by the laboratory as appropriate. Air and emissions sample containers will be cleaned and quality controlled in accordance with USEPA Standard Operating Procedure No. 1703 (Attachment A) and USEPA Method TO-15.

5.3 Laboratory Documentation

It is required that the selected laboratory be a participant in USEPA's CLP. Upon request, the laboratory will supply to Langan and/or Rockaway Commons a copy of its in-house Quality Assurance/Quality Control manual that is applicable to the analyses to be performed. The Quality Assurance/Quality Control manual will include, at a minimum, the following topics:

- Resumes;
- Personnel training and experience;
- Organizational structure;
- Equipment available;
- Reference materials/reagents;
- Control charts;
- Standard operating procedures;
- Data reduction/reporting;
- Chain-of-custody; and,
- Sample bottle preparation.

Also upon request, the laboratory will provide results of performance evaluation samples (within the previous six months) supplied by USEPA or a New York State-certified program (e.g., Analytical Services Program – ASP) for those parameters of interest to the project. In turn, the performance evaluation samples will be submitted to the laboratory.

Upon Langan / Rockaway Commons' request, the laboratory will undergo a technical systems audit performed by a party independent to the analysis in order to evaluate the laboratory's capability to perform the work. A copy of the resultant report will be sent to the Rockaway Commons Project Manager and Langan Quality Assurance Officer. A State audit report, outlining the laboratory's performance within the last year will be used, if available. Agreement from the laboratory to perform these tasks will be made before the field operations commence. Only after this information has been provided and found acceptable, will sampling and analysis begin.

6.0 SAMPLING METHODS AND FIELD MEASUREMENTS

This section of the QAPP summarizes the procedures and requirements for the sampling specified in the SRIWP. The procedures for sample collection and field measurements are summarized below and include the following procedures:

- System field screening for volatile organic compounds
- Air-sampling using SUMMA Canisters
- Air-sampling using Tedlar Bags
- Monitoring well sampling
- Monitoring well synoptic water level and/or product measurements
- Decontamination

6.1 Air Sampling

Air sampling will be completed for two purposes including documenting the AS/SVE system effectiveness/operation and as part of the facility ambient air sampling program proposed in the RAWP. The air sampling will be accomplished using three methods including a PID, Tedlar bags and SUMMA canisters as discussed below.

6.1.1 System Field Screening

As discussed in the OMEMP manual, part of the system monitoring procedures will include recording the SVE influent volatile organic concentration from individual operating wells using a 11.7 e.v. photo-ionization detector (PID). The PID will be connected to the sampling port for each individual well along the manifold using Tygon tubing. The PID will be turned on and allowed to measure the influent VOC concentration until the PID reading has stabilized. The tubing will be disconnected and the sampling port will be closed. The Tygon tubing will not adsorb VOC, which could bias the readings, however, dedicated tubing will be used for each reading event and sampling port.

6.1.2 Tedlar Bag Sampling

Initial Tedlar bag samples were collected in October 2000 from the SVE effluent to establish target operating parameters for the AS/SVE system. Additional samples will be collected at the discretion of the Project Engineer as part of the system startup. The Tedlar bag samples will be collected from the SVE effluent ports, as specified in the OMEMP manual. One sample will be collected with the AS system on and one sample will be collected with the AS system off. The samples will be collected using USEPA Standard Operating Procedure (SOP) No. 2102 dated 21 October 1994 (Attachment A). However, as stated in the OMEMP, one sample will be collected with the AS system on and as such a vacuum pump will not be necessary. The Tedlar bag will be connected to the sampling port and allowed to fill passively under the influence of the system airflow.

6.1.3 SUMMA Canister Sampling

As specified in the RAWP, four SUMMA canister samples will be collected within to and outside of the onsite building. Sampling procedures will be completed in accordance with the NYSDOH-BTSA-IHAS guidelines and

USEPA SOP No. 1704 dated 27 July 1995. The samples will be collected using the subatmospheric pressure sampling method with a fixed orifice capillary or adjustable micrometering valve as specified in the USEPA SOP 1704. Based on the NYSDOH-BTSA-IHAS recommendations the SUMMA canisters will set up to collect a 2-hour sample.

6.2 Monitoring Well Sampling

Semi-annual ground water sampling of on onsite monitoring wells as specified in the OMEMP (MW-3, MW-5, MW-7, MW-9) will be conducted on a semi-annual basis to assess system effectiveness. Annual sampling of all onsite monitoring wells will also be conducted. All sampling will be conducted using conventional sampling methods. All monitoring wells will be purged until three well volumes are removed from the well using a submersible, centrifugal or bladder pump. Field parameters including temperature, pH, specific conductance, oxidation-reduction potential (ORP), and dissolved oxygen (DO) will be measured during ground water sampling. Once the monitoring well water level has sufficiently recovered, the sample will be collected with dedicated Teflon bailers and transferred to the laboratory provided bottles. The appropriate sample preservative will be added to the bottle by the laboratory.

6.3 Synoptic Water Level Survey

Prior to sampling the monitoring wells within the OMEMP monitoring network, a synoptic water level survey of all site monitoring wells will be completed.

The water level measuring procedures are as follows:

- Open and screen each monitoring well head space with a PID.
- All measurements will be made relative to the marked survey datum (typically the top of the inner-most casing).
- The measurements will proceed from the anticipated least to most contaminated wells (based on existing data).

- Decontamination of the water level meter will be completed between monitoring wells as specified in Section 6.4.
- These data will be recorded in a logbook or data sheet along with the respective well number, date, time, and any pertinent comments.

6.4 Field Decontamination

Field decontamination of equipment for the RA activities is minimal. Decontamination procedures for ground water sampling equipment will include non-phosphate soap and water rinse of water quality parameter probes and water level meters between uses. Dedicated tubing will be used for each monitoring well. The monitoring wells will be purged with centrifugal or dedicated bladder or submersible pumps, which will not require field decontamination. Sampling will be conducted using dedicated, laboratory decontaminated, Teflon bailers.

Air and emission sampling will be accomplished using dedicated pre-cleaned equipment and therefore field decontamination will not be required.

6.5 Field Documentation

Documentation of field observations and measurements will be primarily recorded in a field notebook. The field notebook will be project specific and will contain all field observations, notes, measurements, etc. Field log sheets may also be used as necessary, but will be considered secondary records.

6.6 Sample Handling and Custody

The sampling handling, from collection in the field to shipment to the off-site laboratory, including tracking and custody requirements are outlined in this section.

6.6.1 Sample Identification

Samples will be identified in a format consistent with previous sampling events. Each sample will be assigned a unique number and location ID that will be recorded on the following documents: the daily log, the label affixed to the sample container, and the chain-of-custody record. Location IDs need not be unique; however, the sample number must be unique. Duplicate samples will be identified as "DUP" and will also have a unique number. This method will ensure that the duplicates are submitted as blind samples to the analytical laboratory.

6.6.2 Sample Handling

Samples will be stored in on-site with ice as necessary, until they are shipped or picked up by the laboratory for analysis. Bottles will be packed tightly to protect the containers from damage during shipment. A chain-of-custody (COC) will accompany each shipment. Field personnel will be responsible for the security of the samples prior to shipment.

6.6.3 Sample Custody

Sample custody will be designed to assure that each sample is accounted for at all times. The program's sample custody procedures that will be followed during the sample handling activities from the field to the laboratory are summarized below. The laboratory is responsible for sample receipt from the designated shipping agent, completion of the COC documents, verification of proper sample preservation, recording cooler temperatures, maintaining samples in secure properly designated areas, and maintaining internal chain of custody documents. The laboratory will notify Langan immediately of any sample receipt issues that impact sample integrity and data quality. The objective of the sample custody identification and control system will be to assure, to the extent practicable, that:

- All samples scheduled for collection are uniquely identified;
- The correct samples are analyzed and are traceable to their records;
- Important sample characteristics are preserved;
- Samples are protected from loss or damage;

- Any alteration of samples (e.g., filtration, preservation) is documented; and
- A historic record of sample integrity is established.

The COC form will include:

- The sample number and the sample bottle identification number, where applicable;
- The name(s) of the sampler(s) and the person shipping the samples;
- The purchase order number, if applicable;
- The project name and number;
- Signature of the Langan representative relinquishing the samples;
- The date and time the samples were delivered for shipping;
- The sample description(s);
- The matrix of the sample;
- The number of containers;
- Analysis and preservation information; and
- Analytical data reporting requirements

Correction or revision to a COC will be made by drawing a single line through the original entry, writing the revision, then initialing and dating the new entry.

7.0 EQUIPMENT CALIBRATION AND MAINTENANCE

A maintenance, calibration and operation program is implemented to ensure that routine calibration and maintenance is performed on all field instruments. The program provides instruments of the proper type, range, accuracy and precision to provide data compatible with the specified requirements and desired results. Calibration of measuring and testing instruments is performed internally using in-house reference standards or externally by agencies or manufacturers.

7.1 Responsibility

The Project QA/QC Officer is responsible for ensuring that the field instruments used in the investigations are calibrated and maintained according to manufacturer specifications. Field instrument instruction manuals describing calibration, maintenance and field operating procedures for these instruments will be available as needed for reference by field personnel and other project personnel.

The Field personnel will be familiar with the field calibrations, operation and maintenance of the instruments, and will perform the prescribed field operating procedures outlined in the operation and field manuals accompanying the respective instruments. They will keep records of all field instrument calibrations and field checks in the field notebook.

7.2 Calibration

Field equipment, including PID and water quality meters will be calibrated at the start of each day of fieldwork. More frequent calibration may be warranted based on changes in responsiveness of the instruments or apparently anomalous readings. Instruments that fail calibration or become inoperable during use will be removed from service and tagged to prevent inadvertent use. If site monitoring instruments should fail, the personnel will either provide replacement instruments or have the malfunction repaired immediately.

Calibration will be performed following manufacturers instruction as outlined in the instruction manuals for each field instrument including PID and water quality meters. All Field personnel shall have access to field equipment instruction manuals for all field instruments.

Records will be prepared and maintained for each piece of calibrated measuring and testing equipment to indicate that established calibration procedures have been followed (e.g. results of calibration, problems, corrective action).

8.0 INTERNAL QUALITY CONTROL CHECKS

The QC samples discussed below will be collected during the field program and analyzed by the laboratory to assess laboratory and field QA/QC procedures and the data quality.

8.1 Laboratory Internal QC Checks

The laboratory selected to perform analyses will be certified by the New York State Department of Health in accordance with the Analytical Services Protocols (ASP) and or CLP, and will also demonstrate their capability to perform CLP analyses. In general, ASP/CLP protocols or certification programs require the laboratory to specify the qualifications of personnel; list available instrumentation; analyze performance evaluation samples; and adhere to and document standard operating procedures and quality assurance plans.

It will be the responsibility of the Laboratory QA/QC Officer to document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Internal quality control checks, including replicates, spiked samples, duplicate samples, laboratory control samples, reagent specifications and checks, and calibration checks, are performed in accordance with the specific methodologies used. The minimum criteria used for analysis consists of a daily calibration, instrument blank analysis, and sample blank analysis. In addition, at least one spike, one duplicate and one control are analyzed daily for each parameter.

Matrix spike and matrix spike duplicate (MS/MSD) analyses will be collected and submitted to assess laboratory QA/QC. MS/MSD will be run at a frequency of one per twenty samples. The MS and MSD will be collected as separate samples and, thus two volumes of aqueous organic samples will be collected in addition to the routine sample.

8.2 Field Internal QC Checks

For field quality assurance, three types of QA/QC samples will be collected: duplicate, field and trip blank samples.

Field Blanks

Field blanks will be collected throughout the sampling events. Field blanks measure incidental or accidental sample contamination occurring during the entire sampling process of collection, transport, sample preparation and analysis. Field blanks can also check on the laboratory water quality and potential method contamination. Field blanks will be collected by pouring demonstrated analyte-free water over decontaminated soil and/or ground water sampling equipment and into the appropriate sample containers. Field blanks will be analyzed for the same parameters as samples. Field blanks will be collected at a rate of one per day during ground water sampling and will be analyzed for the same parameters analyzed on that particular sampling day. Field blanks will not be collected for any of the air-sampling.

Field Duplicates

The standard frequency for obtaining duplicate samples is one for every twenty samples. Duplicate samples serve as check on the overall precision of the sampling and analytical methods. Duplicates will be collected in identical, laboratory prepared sample bottles, and will be analyzed for the same parameters. One set of samples will be given the sample identifier indicative of the sample location and the second set of sample bottles will be given a false sample identifier to disguise the identity of the replicated sample (i.e., blind duplicate). Actual sample identifiers for duplicate samples will be noted in the field notebook. Duplicate samples will only be collected during ground water sampling and not be collected during any of the proposed air-sampling.

Trip Blanks

A trip blank sample will accompany field samples at a rate of one per shipment on days when VOC ground water samples are collected. Trip blanks will originate at the contract laboratory, and will be labeled as trip blank. The water used for the trip blank must be the same as the method blank water used by the laboratory. The trip blanks will accompany the sample containers throughout transport and sampling activities, and will be returned to the laboratory with the field samples. As such, trip blanks will accompany each daily sample shipment containing well samples for volatile organic analysis. A blank Tedlar bag or Summa canister filled by the laboratory with accompany the respective air samples collected at the site. Trip blanks will be analyzed for volatile organic compounds.

9.0 ASSESSMENT AND OVERSIGHT

9.1 Laboratory Performance and System Audits

The analytical laboratory will conduct internal quality control checks and audits in accordance with their internal operating procedures, method specific criteria and governing laboratory or certification programs. Procedures for laboratory performance and system audits will be outlined in the Laboratory Quality Assurance Plan (LQAP). The Laboratory QA Officer will be primarily responsible for conducting these audits. The LQAP will be available to the project team during the project.

The systems audit consists of evaluation of all components of the measurement systems to determine their proper selection and use. Systems audits are normally conducted prior to or shortly after systems are operational, and are then performed on a regularly scheduled basis. Performance audits are conducted periodically, and includes the analysis of performance evaluation samples.

9.2 Field Performance Audits

The QA/QC Officer or designee will be responsible for auditing project personnel. An audit will be conducted initially during the program to ensure that proper procedures are followed and that subsequent data will be valid. The audit will focus on the details of the QA program, and will evaluate the following:

- Project Responsibilities;

- Sample Custody Procedures;
- Document Control;
- Sample Identification System;
- Sampling Techniques;
- Adherence to the Approved QA Project Plan;
- Instrument Calibration;
- Decontamination Procedures; and
- Sample Packing and Shipping Procedures.

The audit will evaluate the implementation of the project QA program.

10.0 DATA REDUCTION, VERIFICATION, VALIDATION, USABILITY AND REPORTING

This section of the QAPP describes the process that will be followed to verify and validate the project data and field activities. Data verification and validation activities will be performed to ensure that data collected are consistent with project quality objectives and measurement performance criteria.

10.1 Data Reduction

All data transformation and data reduction procedures will be clearly documented and placed in the project files. All data transformation and data reduction activities performed on the project data will be carefully monitored by both the Project Manager and QA Officer to ensure that data integrity is maintained.

10.2 Data Verification

Data verification and validation activities will be performed to ensure that data collected as part of the supplemental site characterization are consistent with project quality objectives and measurement performance criteria.

Upon receipt of both electronic and hard copy analytical data, internal checks will be performed to detect possible errors. The data check will be performed by the QA Officer. General checks will include the following:

- Verification of all data requested versus received (check of data against COCs);
- Verification of completeness of data packages;
- Verification of cross references between primary and duplicate samples; and

For data that are generated in the field, the Field Team Leader will work closely with field personnel to evaluate accuracy and integrity of data collection activities. The Field Team Leader will review field sheets and field notes to verify consistency with field observations and activities.

Prior to release by the off-site laboratories, the data will be reviewed internally by the laboratory QA/QC Officer against all specific QA/QC parameters. The laboratory will use a system of sign-offs in which each analyst will acknowledge that their part of the analysis is complete. Any deviations will be documented and explained in the final laboratory analytical report. The laboratory is responsible for the final results and overall quality of the laboratory data.

10.3 Data Usability / Validation

Acceptance criteria for all field and laboratory internal QA samples (field blanks, duplicates, MS/MSD) will be those specified in the corresponding analytical methodologies. It is noted that a full data validation will not be completed for the RA, rather a less rigorous data usability assessment will be performed.

The data usability evaluation will be completed following the protocols defined in the NYSDEC *Guidance for the Development of Data Usability Summary Reports (September, 1997)*. Data usability evaluation will be completed to confirm that all QC data is within control limits of the measurement performance criteria (MPC).

Critical functions for determining the usability of generated data are:

- strict adherence to the analytical methods;
- assurance that the instrumentation employed was operated in accordance with defined operating procedures;

- assurance that quality parameters built into the analytical procedures have been adhered to; and
- confirmation that the DQOs have been met.

The procedures for assessing the precision, accuracy and completeness of data have been presented in Sections 4.0 of the QAPP. It will be the responsibility of the Project QA/QC Officer and the Laboratory QA/QC Officer to ensure that these procedures are followed. The data validation will be completed by Severn Trent Laboratories

10.4 Reconciliation with User Requirements

Based on comparison of the field and laboratory QC to the MPCs, the Project QC officer will evaluate how well the analytical data satisfies the DQI and will develop statements in the Supplemental Remedial Investigation Report regarding the usability of the data relative to the project objectives, and project specific DQOs and end use of the data.

11.0 CORRECTIVE ACTION

If unacceptable conditions are identified as a result of audits or are observed during field sampling and analysis, the Project QA officer and the Project Manager will document the condition and initiate corrective procedures. The specific condition or problem will be identified, its cause will be determined, and appropriate action will be implemented.

Corrective actions may include, but are not limited to, the corrective action matrix presented below.

CORRECTIVE ACTION MATRIX	
Problem	**Corrective Action**
Sample exceeded holding time criteria.	Re-sample and re-analyze.
Field instruments are not within calibration limits.	Calibrate instrument and retest once an acceptable calibration has been obtained.
Procedures are observed that are not in accordance with the QAPP.	QA officer is notified and involved personnel are retrained.

The efficacy of any corrective action will be assessed by project management to ensure that the deficiency or problem has been adequately addressed.

Corrective actions will be documented in the project progress reports, which will be provided to O&R on a monthly basis.

12.0 REFERENCES

U.S. Environmental Protection Agency, *USEPA Requirements for Quality Assurance Project Plans*, Development Press, Office of Solid Waste and Emergency Response Directive 9355, 0-7B, March 1987.

U.S. Environmental Protection Agency, *Data Quality Objectives for Remedial Response Activities*, Development Press, Office of Solid Waste and Emergency Response Directive 9355, 0-7B, March 1987.

U.S. Environmental Protection Agency. 1986, Revision 1990. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, Third Edition. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, USEPA Contract Laboratory Program. *Statement of Work of Organics Analysis Multi-Media Multi-Concentration*, Document No. OLM01.0, 1991.

U.S. Environmental Protection Agency, *USEPA Quality Manual for Environmental Programs* (May 2000, USEPA Order 5360).

U.S. Environmental Protection Agency, *USEPA Checklist for Reviewing Quality Management Plans,* Version 2, September 2001.

g:\data9\1461901\office data\reports\rawp\qapp\rawpqapp.doc

TABLES

Table 1
Proposed Analytical Methods and Analytes
Remedial Action Work Plan
Dayton Shopping Plaza – Queens, New York

Parameter	Matrix	Analytical Method	Sample Container	Sample Preservation	Holding Times
TCL - VOC	Ground Water	NYSASP 95-1	(3) 40 ml clear glass VOA	HCl, 4°C	14 days
PCE, TCE, DCE VC	Air	USEPA TO-15	(1) 2-L SUMMA Canister	4°C	14 days
TCL-VOC	Air	USEPA TO-15	(1) 1-L Tedlar bags	4°C	14 days

Acronyms/Abbreviations

VOC – Volatile organic compounds
PCE – Tetrachloroethene
TCE – Trichloroethene
DCE – Dichloroethene
VC – vinyl chloride
USEPA – United States Environmental Protection Agency
TCL – Target Compound List
HCl – hydrochloric acid
°C – Degrees Celsius
NYSASP – New York State Analytical Services Protocol
L – Liter
ml - milliliter

ATTACHMENT A

STANDARD OPERATING PROCEDURES

TEDLAR BAG SAMPLING

SOP#: 2102
DATE: 10/21/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define the use of Tedlar bags in collecting gaseous grab samples. Tedlar bags are used to collect both volatile and semi-volatile organic compounds, including halogenated and non-halogenated species. The sensitivity of the method is primarily dependent on the analytical instrument and the compounds being investigated.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

When collecting gaseous samples for analysis it is often necessary to obtain a representative grab sample of the media in question. The Tedlar bag collection system allows for this and consists of the following items:

C the Tedlar bag complete with necessary fittings
C a box in which the vacuum is created
C a sampling pump to create the necessary vacuum
C an appropriate Teflon and Tygon tubing

The Tedlar bag is placed into the vacuum box and the fitting is inserted into Teflon tubing. The Teflon tubing is the path through which the gaseous media will travel. The pump is attached to the Tygon tubing, which is part of the vacuum fitting on the vacuum box. The pump evacuates the air in the vacuum box, creating a pressure differential causing the sample to be drawn into the bag. The sample introduced into the Tedlar bag never passes through the pump. The flow rate for the pump must be defined prior to sampling (usually 3 liters/minute [L/min] for bag sampling).

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The Tedlar bags most commonly used for sampling have a 1-liter volume. When the sampling procedure is concluded, the Tedlar bags are stored in either a clean cooler or a trash bag to prevent photodegradation. It is essential that sample analysis be undertaken within 48 hours, as after that time compounds may escape or become altered.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Contamination is a major concern since many of the compounds in question will be present in the parts per billion range. In order to minimize the risk of cross contamination, the following factors should be considered:

1. Proximity of the bags to sources of potential contamination during transportation and storage. The further away from the source(s) the bags are, the less likely the chances of external contamination.

2. Bags must be attached only to clean Teflon tubing.

3. Once the bag has been collected, affix the sample label to the edge of the bag. Adhesives found in the label may permeate the bag if placed on the body of the bag. Fill out labels with a ballpoint pen as permanent

markers contain volatile compounds that may contaminate the sample.

4. Due to the chemical structure of Tedlar, highly polar compounds will adhere to the inner surface of the bag. Also, low molecular weight compounds may permeate the bag. Real-time monitors such as the organic vapor analyzer (OVA), photoionization detector (HNU), and combustible gas indicator (CGI) are used as screening devices prior to sampling. The information gathered is written on the sample label to inform the individuals performing the sample analysis.

The Tedlar bag sampling system is straightforward and easy to use. However, there are several things to be aware of when sampling.

1. The seal between the top half and the bottom half of the vacuum box must be air tight in order to allow the system to work.

2. Check the O-ring gasket to see if it is in place with the proper fit. O-rings that have been stretched out will not remain in place, thus requiring constant realignment.

3. Check that all the fittings associated with the vacuum joints are securely in place. The fittings can be pushed loose when inserting the valve stem into the Teflon tubing.

4. Occasionally, a corner of the Tedlar bag will jut out between the two halves of the vacuum box, thus impairing the seal. Since the bags will hold only a given volume, over-inflation will cause the bags to burst.

5.0 EQUIPMENT/APPARATUS

The following items must be operational to perform Tedlar bag sampling:

C Vacuum box - must be clean, Teflon tubing replaced, and equipped with extra O-rings
C Pump(s) - must be charged, in good working order, and set with the appropriate flow rate of 3 L/min
C Tedlar bags - must be free of visible contamination and preferably new
C Chain of Custody records, custody seals
C Sample labels
C Air Sampling Worksheets
C Opaque trash bags

6.0 REAGENTS

This section is not applicable to this SOP.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes or flagging to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

7.2 Field Operation

Tedlar bags are stored in boxes of ten. The valve is in the open position when stored. Occasionally, a piece of debris will clog the valve, necessitating the closing of the valve stem to clear. The valve stem is closed by pulling the stem out. If the valve stem is difficult to pull, it helps to spin the valve stem simultaneously.

1. Remove the Tedlar bag from the carton.

2. Insert the valve stem into the Teflon tube which runs through the vacuum box (Figure 1, Appendix A).

3. Place the Tedlar bag in the vacuum box. Seal the vacuum box by applying pressure to the top and bottom (ensure that the O-ring is in place and unobstructed).

4. Connect the sampling pump to the evacuation tube.

5. Connect the intake tube to the desired source or place the intake tube into the media of concern.

6. Turn on the sampling pump.

7. Allow the bag to fill (visual observation and sound of laboring pump).

8. Turn off the sampling pump and remove the evacuation tube from the pump.

9. Remove bag and pull the valve stem out.

10. Lock the valve stem.

11. Label the bag using either a tag or a sticker placed on the edge of the bag. Do not write on the bag itself.

12. Place Tedlar bag in a clean cooler or opaque trash bag to prevent photodegradation.

7.3 Post-Operation

1. Once the samples are collected, transfer bags to the laboratory for analysis.

2. When transferring the Tedlar bags, a chain of custody form must accompany the samples. Personnel should be aware that some of the compounds of concern will degrade within a few hours of sampling.

3. For the time prior to analysis, samples may be stored in a clean cooler or opaque trash bag with a trip blank (a Tedlar bag filled with "zero air") and the chain of custody form.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instruction as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

Depending upon the Quality Assurance Work Plan (QAWP) requirements, a background sample consisting of upgradient/downgradient, beginning/ending of day or combination, may be collected. It may also be desirable to change sample train tubing between sample locations.

Tedlar bag standards must be filled on site to identify the contaminants' degradation from the time the sample is collected until analysis. Trip blanks, Tedlar bags filled with "zero air", must accompany sample bags at a minimum rate of one per day to identify possible contamination during handling. For each lot of Tedlar bags, a minimum of one bag must be filled with "zero air" and then analyzed for the parameter(s) of interest to detect contamination due to the Tedlar bag itself which may produce false positive results. Duplicate Tedlar bags should be collected at a minimum rate of five percent of the total number of samples or one per sampling event.

10.0 DATA VALIDATION

Results of the quality control samples (trip and lot blanks) will be evaluated for contamination. This information will be utilized to qualify the environmental sample results according to the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.

12.0 REFERENCES

Gilian Instrument Corp., Instruction Manual for Hi Flow Sampler: HFS113, HFS113T, HFS113U, HFS113UT, 1983.

NJDEP, Field Sampling Procedures Manual, Hazardous Waste Programs, February, 1988.

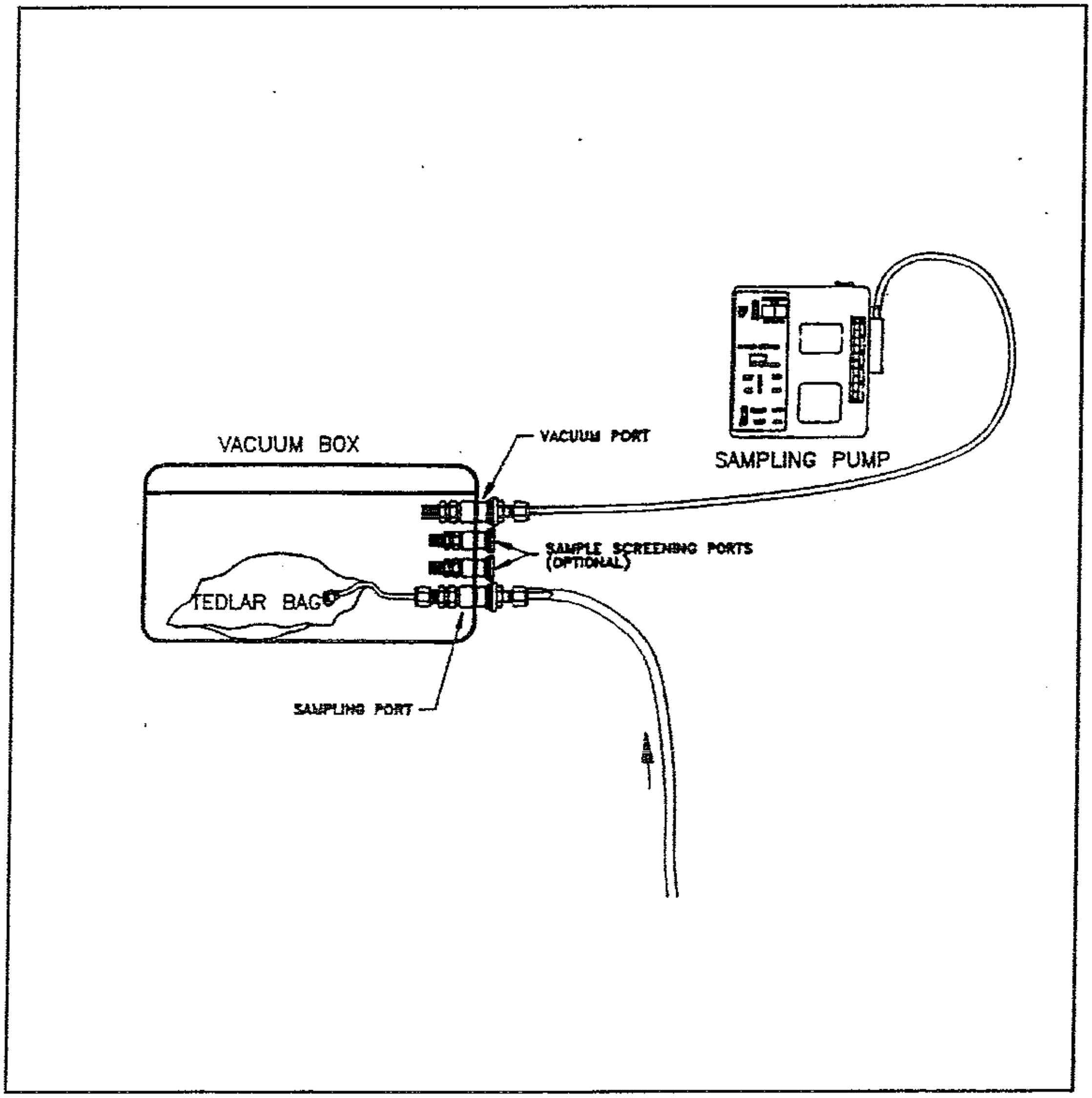
Roy F. Weston, Inc., Weston Instrumentation Manual, Volume I, 1987.

U.S. EPA, Characterization of Hazardous Waste Sites - A Methods Manual: Volume II, Available Sampling Methods, 2nd Edition, EPA-600/ 4-84-076, December, 1984.

APPENDIX A

Figure

FIGURE 1 - Tedlar Bag Sampling Apparatus



1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe a procedure for sampling of volatile organic compounds (VOCs) in ambient air. The method is based on samples collected as whole air samples in Summa passivated stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by mass-selective detector or multidetector techniques. This method presents procedures for sampling into canisters at final pressures both above and below atmospheric pressure (respectively referred to as pressurized and subatmospheric pressure sampling).

This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and subatmospheric pressure canisters. The organic compounds that have been successfully collected in pressurized canisters by this method are listed in the Volatile Organic Compound Data Sheet (Appendix A). These compounds have been measured at the parts per billion by volume (ppbv) level.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Both subatmospheric pressure and pressurized sampling modes use an initially evacuated canister. Both modes may also use a mass flow controller/vacuum pump arrangement to regulate flow. With the above configuration, a sample of ambient air is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated Summa passivated canister. Alternatively, subatmospheric pressure sampling may be performed using a fixed orifice, capillary, or adjustable micrometering valve in lieu of the mass flow controller/vacuum pump arrangement for taking grab samples or short duration time-integrated samples. Usually, the alternative types of flow controllers are appropriate only in situations where screening samples are taken to assess for future sampling activities.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

After the air sample is collected, the canister valve is closed, an identification tag is attached to the canister, and the canister is transported to a laboratory for analysis. Upon receipt at the laboratory, the canister tag data is recorded. Sample holding times and expiration should be determined prior to initiating field activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, all other sampling equipment (e.g., pump and flow controllers) should be thoroughly cleaned.

5.0 EQUIPMENT/APPARATUS

The following equipment/apparatus (Figure 1, Appendix B) is required:

5.1 Subatmospheric Pressure Sampling Equipment

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100 or equivalent).

2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.

3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).

4. Particulate matter filter - 2-µm sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).

5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.

6. Fixed orifice, capillary, or adjustable micrometering valve - used in lieu of the electronic flow controller/vacuum pump for grab samples or short duration time-integrated samples.

5.2 Pressurized Sampling Equipment

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100).

2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.

3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).

4. Particulate matter filter - 2-µm sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).

5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.

6.0 REAGENTS

This section is not applicable to this SOP.

7.0 PROCEDURE

7.1 Subatmospheric Pressure Sampling

7.1.1 Sampling Using a Fixed Orifice, Capillary, or Adjustable Micrometering Valve

1. Prior to sample collection, the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).

2. A canister, which is evacuated to 0.05 mm Hg and fitted with a flow restricting device, is opened to the atmosphere containing the VOCs to be sampled.

3. The pressure differential causes the sample to flow into the canister.

4. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). The sampling duration depends on the degree to which the flow is restricted.

5. A critical orifice flow restrictor will have a decrease in the flow rate as the pressure approaches atmospheric.

6. Upon sample completion at the location, the appropriate information is recorded on the

Canister Sampling Field Data Sheet.

7.1.2 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Andersen Sampler Model 87-100)

1. Prior to sample collection the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).

2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the VOCs to be sampled.

3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.

4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.

5. The initially evacuated canister is filled by action of the flow controlled pump to near atmospheric pressure.

6. A digital time-program is used to pre-select sample duration and start and stop times.

7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

7.2 Pressurized Sampling

7.2.1 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Anderson Sampler Model 87-100)

1. Prior to sample commencement at the location, the appropriate information is completed on the Canister Sampling Field Data Sheet.

2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the VOCs to be sampled.

3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.

4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.

5. The initially evacuated canister is filled by action of the flow controlled pump to a positive pressure not to exceed 25 psig.

6. A digital time-programmer is used to pre-select sample duration and start and stop times.

7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

8.0 CALCULATIONS

1. A flow control device is chosen to maintain a constant flow into the canister over the desired sample period. This flow rate is determined so the canister is filled to about 88.1 kPa for subatmospheric pressure sampling or to about one atmosphere above ambient pressure for pressurized sampling over the desired sample period. The flow rate can be calculated by:

$$F \, ' \, \frac{(P)(V)}{(T)(60)}$$

where:

F	=	flow rate (cm^3/min)
P	=	final canister pressure, atmospheres absolute
V	=	volume of the canister (cm^3)
T	=	sample period (hours)

For example, if a 6-L canister is to be filled to 202 kPa (two atmospheres) absolute pressure in 24 hours, the flow rate can be calculated by:

$$F = \frac{(2)(6000)}{(24)(60)} = 8.3cm^3/\text{min}$$

2. If the canister pressure is increased, a dilution factor (DF) is calculated and recorded on the sampling data sheet.

$$DF = \frac{Ya}{Xa}$$

where:

Xa	=	canister pressure (kPa, psia) absolute before dilution.
Ya	=	canister pressure (kPa, psia) absolute after dilution.

After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The following general quality assurance procedures apply:

1. All data must be documented on standard chain of custody records, field data sheets, or site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety practices. Specifically, pressurizing of Summa canisters should be performed in a well ventilated room, or preferably under a fume hood. Care must be taken not to exceed 40 psi in the canisters. Canisters are under pressure, albeit only 20-30 psi, and should not be dented or punctured. They should be stored in a cool dry place and always be placed in their plastic shipping boxes during transport and storage.

12.0 REFERENCES

1. Ralph M. Riggin, Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air, EPA-600/4-83-027 U. S. Environmental Protection Agency, Research Triangle Park, NC, 1983.

2. W. A. McClenny, J. D. Pleil, T. A. Lumpkin and K. D. Oliver, "Update on Canister-Based Samplers for VOCs," Proceedings of the 1987 EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, May, 1987 APCA Publication VIP-8, EPA 600/9-87-010.

3. J. F. Walling, "The Utility of Distributed Air Volume Sets When Sampling Ambient Air Using Solid Adsorbents," Atmospheric Environ., 18:855-859, 1984.

4. J. F. Walling, J. E. Bumgarner, J. D. Driscoll,C. M. Morris, A. E. Riley, and L. H. Wright, "Apparent Reaction Products Desorbed From Tenax Used to Sample Ambient Air," Atmospheric Environ., 20:51-57, 1986.

5. Portable Instruments User's Manual for Monitoring VOC Sources, EPA-340/1-88-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington, D.C., June 1986.

6. R. A. Rasmussen and J. E. Lovelock, Atmospheric Measurements Using Canister Technology, J. Geophys. Res., 83: 8369-8378, 1983.

7. R. A. Rasmussen and M. A. K. Khalil, "Atmospheric Halocarbon: Measurements and Analysis of Selected Trace Gases," Proc. NATO ASI on Atmospheric Ozone, BO: 209-231.

8. EPA Method TO-14 "Determination of Volatile Organic Compounds (VOC's) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis", May 1988.

APPENDIX A

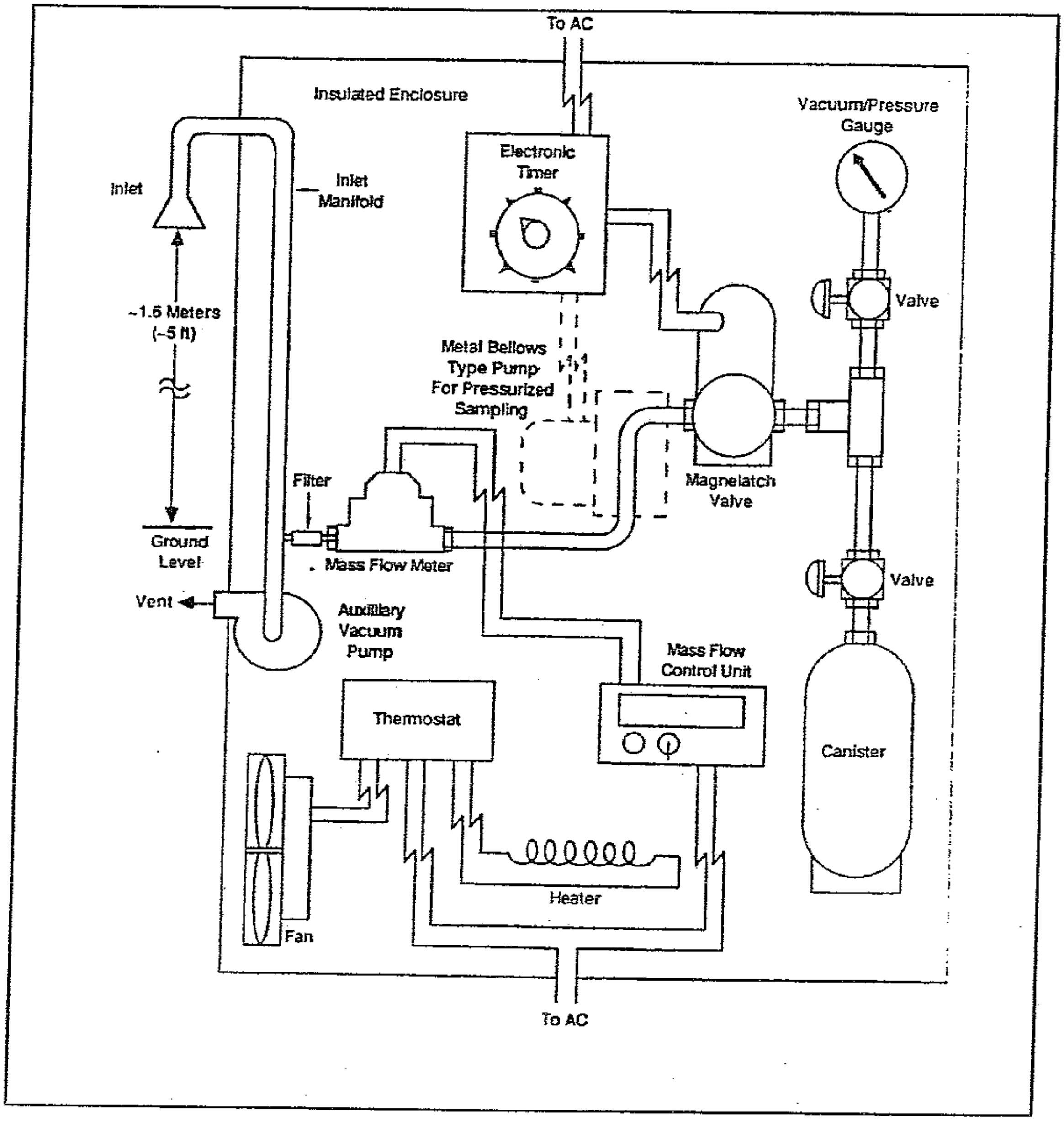
Volatile Organic Compound Data Sheet

TABLE 1. VOLATILE ORGANIC COMPOUND DATA SHEET

COMPOUND (SYNONYM)	FORMULA	MOLECULAR WEIGHT	BOILING POINT (°C)	MELTING POINT (°C)	CAS NUMBER
Freon 12 (Dichlorodifluoromethane)	Cl_2CF_2	120.91	-29.8	-158.0	
Methyl chloride (Chloromethane)	CH_3Cl	50.49	-24.2	-97.1	74-87-3
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	$ClCF_2CClF_2$	170.93	4.1	-94.0	
Vinyl chloride (Chloroethylene)	$CH_2{=}CHCl$	62.50	-13.4	-1538.0	75-01-4
Methyl bromide (Bromomethane)	CH_3Br	94.94	3.6	-93.6	74-83-9
Ethyl chloride (Chloroethane)	CH_3CH_2Cl	64.52	12.3	-136.4	75-00-3
Freon 11 (Trichlorofluoromethane)	CCl_3F	137.38	23.7	-111.0	
Vinylidene chloride (1,1-Dichloroethene)	$C_2H_2Cl_2$	96.95	31.7	-122.5	75-35-4
Dichloromethane (Methylene chloride)	CH_2Cl_2	84.94	39.8	-95.1	75-09-2
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	CF_2ClCCl_2F	187.38	47.7	-36.4	
1,1-Dichloroethane (Ethylidene chloride)	CH_3CHCl_2	98.96	57.3	-97.0	74-34-3
cis-1,2-Dichloroethylene	$CHCl{=}CHCl$	96.94	60.3	-80.5	
Chloroform (Trichloromethane)	$CHCl_3$	119.38	61.7	-63.5	67-66-3
1,2-Dichloroethane (Ethylene dichloride)	$ClCH_2CH_2Cl$	98.96	83.5	-35.3	107-06-2
Methyl chloroform (1,1,1-Trichloroethane)	CH_3CCl_3	133.41	74.1	-30.4	71-55-6
Benzene (Cyclohexatriene)	C_6H_6	78.12	80.1	5.5	71-43-2
Carbon tetrachloride (Tetrachloromethane)	CCl_4	153.82	76.5	-23.0	56-23-5
1,2-Dichloropropane (Propylene dichloride)	$CH_3CHClCH_2Cl$	112.99	96.4	-100.4	78-87-5
Trichloroethylene (Trichloroethene)	$ClCH{=}CCl_2$	131.29	87	-73.0	79-01-6
cis-1,3-Dichloropropene (cis-1,3-dichloropropylene)	$CH_3CCl{=}CHCl$	110.97	76		
trans-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	$ClCH_2CH{=}CHCl$	110.97	112.0		
1,1,2-Trichloroethane (Vinyl trichloride)	$CH_2ClCHCl_2$	133.41	113.8	-36.5	79-00-5
Toluene (Methyl benzene)	$C_6H_5CH_3$	92.15	110.6	-95.0	108-88-3
1,2-Dibromoethane (Ethylene dibromide)	$BrCH_2CH_2Br$	187.88	131.3	9.8	106-93-4
Tetrachloroethylene (Perchloroethylene)	$Cl_2C{=}CCl_2$	165.83	121.1	-19.0	127-18-4
Chlorobenzene (Phenyl chloride)	C_6H_5Cl	112.56	132.0	-45.6	108-90-7
Ethylbenzene	$C_6H_5C_2H_5$	106.17	136.2	-95.0	100-41-4
m-Xylene (1,3-Dimethylbenzene)	$1,3-(CH_3)_2C_6H_4$	106.17	139.1	-47.9	
p-Xylene (1,4-Dimethylxylene)	$1,4-(CH_3)_2C_6H_4$	106.17	138.3	13.3	
Styrene (Vinyl benzene)	$C_6H_5CH{=}CH_2$	104.16	145.2	-30.6	100-42-5
1,1,2,2-Tetrachloroethane	$CHCl_2CHCl_2$	167.85	146.2	-36.0	79-34-5
o-Xylene (1,2-Dimethylbenzene)	$1,2-(CH_3)_2C_6H_4$	106.17	144.4	-25.2	
1,3,5-Trimethylbenzene (Mesitylene)	$1,3,5-(CH_3)_3C_6H_6$	120.20	164.7	-44.7	108-67-8
1,2,4-Trimethylbenzene (Pseudocumene)	$1,2,4-(CH_3)_3C_6H_6$	120.20	169.3	-43.8	95-63-6
m-Dichlorobenzene (1,3-Dichlorobenzene)	$1,3-Cl_2C_6H_4$	147.01	173.0	-24.7	541-73-1
Benzyl chloride (α-Chlorotoluene)	$C_6H_5CH_2Cl$	126.59	179.3	-39.0	100-44-7
o-Dichlorobenzene (1,2-Dichlorobenzene)	$1,2-Cl_2C_6H_4$	147.01	180.5	-17.0	95-50-1
p-Dichlorobenzene (1,4-Dichlorobenzene)	$1,4-Cl_2C_6H_4$	147.01	174.0	53.1	106-46-7
1,2,4-Trichlorobenzene	$1,2,4-Cl_3C_6H_3$	181.45	213.5	17.0	120-82-1
Hexachlorobutadiene (1,1,2,3,4,4-Hexachloro-1,3-butadiene)					

APPENDIX B

FIGURE 1. Subatmospheric/Pressurized Sampling Equipment



APPENDIX C

Canister Sampling Field Data Sheet

Page ___ of ___

SUMMA AIR SAMPLING WORK SHEET

Site: ______________________________ Site#: __________________________
Samplers: _______________ Work Assignment Manager: __________________________
Date: ____________________________ Project Leader: __________________________

Sample #					
Location					
SUMMA ID					
Orifice Used					
Analysis/Method					
Time (Start)					
Time (Stop)					
Total Time					
SUMMA WENT TO AMBIENT	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO
Pressure Gauge					
Pressure Gauge					
Flow Rate (Pre)					
Flow Rate (Post)					
Flow Rate (Average)					

MET Station On-site? Y / N

General Comments:

APPENDIX C

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
FOR THE
REMEDIAL ACTION WORK PLAN

DAYTON SHOPPING PLAZA
86-15 ROCKAWAY BEACH BOULEVARD
QUEENS, NEW YORK
Site No. 2-41-035, Index No. W2-0942-02-10

Prepared For:

Rockaway Commons, LLC
48 East Old Country Road
Suite 203
Mineola, New York 11501

For Submittal to:

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

Steven A. Ciambruschini, P.G., L.E.P.

Bill N. Stephanatos, Ph.D., P.E., D.E.E.

February 2003
1461904

Langan
Engineering & Environmental Services

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont)

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 PROJECT IDENTIFICATION

The following information identifies the subject project and selects key personnel.

Client:	Rockaway Commons, LLC 48 Old Country Road Suite 203 Mineola, NY 11501
Site:	Dayton Shopping Plaza 85-15 Rockaway Beach Boulevard Queens, NY
Project:	Remedial Action
Langan Project Manager:	Steven Ciambruschini, PG, LEP
Site Health and Safety Officer/ Field Safety Officer:	Craig Peterson
Langan Health and Safety Officer:	Robert Y. Koto, P.G.
Version:	1.0
Version Date:	February 2003

The Langan Site Health and Safety Officer (SHSO) may assign an alternate, qualified Field Safety Officer (FSO) to perform his or her duties, however, the SHSO shall continue to have overall responsibility for implementation of the field health and safety program.

2.0 INTRODUCTION

This Health and Safety Plan (HASP) establishes guidelines and requirements for personnel safety during the completion of Remedial Action as documented in the February 2003 Remedial Action Work Plan within previous identified areas of environmental concern at the Dayton Shopping Plaza located in Queens, New York (hereafter referred to as the "site"). This HASP was prepared by Langan Engineering and Environmental Services, Inc. (Langan). Where applicable, this HASP also incorporates health and safety requirements of OSHA General Industry Standards (29 CFR 1910) and Construction Standards (29 CFR 1926) relating to the potential contamination at the site. Langan is responsible for providing a health and safety representative to oversee implementation of this HASP. Langan personnel working at the site will comply with the requirements of this HASP. The project manager, site engineer, site health and safety officer, or other designated representative shall be responsible for informing all individuals assigned to work on the site, or visit the site beyond the clean/support zone, of the contents of this plan. As discussed in Section 11.0 all Langan personnel must sign the HASP. By signing the HASP Acknowledgment Form, individuals are recognizing the site Health and Safety hazards, known or suspected, and the protocols required to minimize exposure to such hazards.

This HASP was prepared in accordance with the following documents and/or guidelines:

- Occupational Safety and Health Administration (OSHA) regulations for hazardous site workers and general construction (29 CFR 1910.120 and 29 CFR 1926);
- National Institute for Occupational Safety and Health/OSHA/U.S. Coast Guard/U.S. Environmental Protection Agency, <u>Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities</u>, October 1985;
- U.S. Department of Health and Human Services, June 1997, Public Health Service, Centers for Disease Control, NIOSH, <u>NIOSH Pocket Guide to Chemical Hazards</u>;

- OSHA, "Permissible Exposure Limits," §29 CFR Part 1910, Subpart-Z, Toxic and Hazardous Substances; and,
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2001.

The level of protection and the procedures specified in this HASP represent the minimum health and safety requirements to be observed by site personnel engaged in remedial activities. Unknown conditions may exist, and known conditions may change. Therefore, this HASP should be considered a dynamic document. Its contents may change or undergo revision to reflect changes in project scope and site conditions. Any necessary revision to the Health and Safety procedures will be recorded in the Field Procedure Change Authorization Form (Attachment A), and will require authorization from Rockaway Commons' and Langan's SHSO/FSO, and/or Project Manager.

Should an employee find themselves in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedures(s) and either personally take the appropriate preventative or corrective measures, or immediately notify the SHSO or Project Manager of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority.

THE ULTIMATE RESPONSIBILITY FOR THE HEALTH AND SAFETY OF THE INDIVIDUAL EMPLOYEE RESTS WITH THE EMPLOYEE AND HIS OR HER COLLEAGUES. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above and to follow-up the verbal notification by completing the Unsafe Conditions and Practices Form provided in Attachment B, a copy of which will be provided to Langan's SHSOs.

"Extenuating" circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, never justify unsafe work practices or procedures. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to compromise health and safety standards, and be especially safety conscious. ALL SITE PERSONNEL ARE EXPECTED TO CONSIDER "SAFETY FIRST" AT ALL TIMES.

2.1 Site Location/Conditions

The Dayton Shopping Plaza consists of a 4.6 acre site located at 85-15 through 88-07 Rockaway Beach Boulevard in Queens, New York (Figure 1).

The site is currently occupied by a one-story shopping center building and adjoining asphalt paved parking areas. Dry cleaning operations are currently conducted near the central portion of the onsite building in retail space occupied by the London French Cleaners (LFC) (86-15 Rockaway Beach Boulevard). The retail space has been occupied by LFC for approximately seventeen years. Currently one self-contained dry cleaning unit is located in the LFC facility. The unit was installed in 1997. Prior to 1997, filters and spent tetrachloroethene (PCE) were stored onsite in 15-gallon and 55-gallon drums.

2.2 Environmental Investigations

The following is a chronology of the previous remedial activities and corresponding reports for the subject property:

- Phase I Environmental Site Assessment - RECON Environmental Corp. (RECON) (2/17/1995);
- Phase II Environmental Site Assessment - RECON Environmental Corp. (4/13/1996);
- Remedial Investigation - RECON Environmental Corp. (4/1/1996);
- Supplemental Remedial Investigation-Langan (1/5/1999);
- Phase II Remedial Investigation Report – Langan (2/29/2000)
- Installation and operation of an AS/SVE system – Langan (October 2000 to June 2001)

- Start-up Report Soil Vapor Extraction/Air Sparging Remedial System – Langan (2/5/01)
- Air Sparging/Soil Vapor Extraction Remedial System Semi-Annual Status Report (October 200 to June 2001)- Langan (8/20/01)

The reports document investigations conducted to delineate the extent of tetrachloroethene (PCE) and associated breakdown products in soil and ground and installation and operation of an air sparging/soil vapor extraction system on-site. Upon request, copies of these reports will be made available to on site personnel coordinating activities covered by this HASP.

2.3 Project Organization and Personnel

Project personnel and their respective roles are described below.

Mr. Steven Ciambruschini is Langan's Project Manager. Mr. Ciambruschini has the responsibility for all work on the project relating to health and safety, including achieving objectives, staffing, scheduling and budgeting. Mr. Ciambruschini or his designee is also responsible for supervision of on-site health and safety field work activities. Mr. Ciambruschini's business address and telephone number are:

Langan Engineering and Environmental Services, Inc.
619 River Drive
Center One
Elmwood Park, New Jersey 07407
Phone: 201-794-4549
Fax: 201-794-0366

Craig Peterson (201) 913-4325 or other appointee is Langan's Site SHSO, FSO, and site supervisor. Mr. Peterson or other appointee has the responsibility of executing the RA Work Plan and implementing the HASP.

2.4 Key Personnel Responsibilities and Authorities

Langan's Project Manager has the following responsibilities:

- To ensure that the project is performed in a manner consistent with the Health and Safety program;

- to provide the SHSO with project information related to health and safety matters and development of the HASP;
- to implement the HASP; and
- to ensure compliance with this HASP by field personnel.

Langan's Project Manager has the authority to take the following actions:

- to temporarily suspend field activities, if the health and safety of field personnel are endangered; and
- to temporarily suspend any individual from field activities for infractions of the HASP.

The Langan Site Health and Safety Officer (SHSO), and their alternate Field Safety Officer (FSO), has the following responsibilities:

- to direct health and safety activities of field personnel;
- to report safety-related incidents or accidents to the Langan Project Manager;
- to assist the Langan Project Manager in all aspects of implementing the HASP;
- to maintain health and safety equipment on site, as specified in the HASP;
- to inspect health and safety activities on site, as specified in the HASP, and report results to Langan's Project Manager;
- to monitor compliance with approved HASP;
- to assist the Langan Project Manager in ensuring that proper health and safety equipment is available for the project;
- to approve personnel to work on this site with regard to health and safety training.
- to assure that the project is being performed by personnel in a manner consistent with their respective HASPs;
- to supply and maintain the proper health and safety equipment and supplies; and

- to provide access to field project files to allow health and safety audits to be performed, or incidents to be investigated.

The SHSO and/or FSO has the authority to take the following actions:

- to temporarily suspend field activities, if health and safety of field personnel are endangered;
- to temporarily suspend any individual from field activities for infractions of the HASP;
- to suspend work or otherwise limit exposures to personnel if a HASP appears to be unsuitable or inadequate;
- to direct site personnel to change work practices if they are deemed to be hazardous to health and safety; and
- to remove field personnel from the project if their actions or condition endangers their health and safety or the health and safety of co-workers.

2.5 Subcontractors

No on-site subcontractor services will be required for tasks identified in the RAWP. However, if utilized, each subcontractor shall develop and implement their own HASP, which identifies a lead individual responsible for H&S compliance for each of their employees, lower-tier subcontractors, and consultants. The subcontractor's HASP will be at least as stringent as this Langan HASP. The subcontractor must be familiar with and abide by the requirements outlined in their own HASP. A subcontractor may elect to adopt Langan's HASP as its own provided that it has given written notification to Langan, but where Langan's HASP excludes provisions pertinent to the subcontractor's work (e.g. confined space entry), the subcontractor must provide written addendums to this HASP. Additionally, the subcontractor must:

- Ensure their employees are trained in the use of all appropriate PPE for the tasks involved;

- Notify Langan of any hazardous material brought onto the job site, the hazards associated with the material, and must provide a MSDS for the material;
- Have knowledge of, understand, and abide by all current federal, state, and local health and safety regulations pertinent to the work;
- Ensure their employees have received current training in the appropriate levels of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER);
- Ensure their employees have been medically cleared to work in Hazardous Waste Sites and to wear a respirator, if necessary;
- Ensure their employees have been fit-tested within the year on the type respirator they will wear; and,
- Ensure that its employees have been briefed on this HASP and have signed the Compliance Agreement (Section 11.0).

3.0 SCOPE OF WORK

The project objectives outlined in the RAWP and QAPP will be achieved through the following:

- collection of four air-samples from three retail spaces within the shopping plaza,
- collection one air-sample from outside of the London French (LF) dry-cleaning facility,
- collection of semi-annual ground water samples from existing facility monitoring wells,
- collection of periodic field screening and laboratory emissions samples to verify effective operation of the air sparge/soil vapor extraction system,

As specified in the RAWP, an AS/SVE system has been installed and operated on-site. An Operation Maintenance and Monitoring Plan has been proposed which will include semi-annual ground water monitoring, system diagnostic procedures, and emissions sampling to provide maintenance and effectiveness data for the system.

In addition, a total of five air-samples have been proposed to investigate the potential for soil gas migration into the site facility.

4.0 HAZARD ASSESSMENT

This section provides an assessment of general hazards that may be encountered during field activities at the site. Site hazards that potentially could be encountered during fieldwork include chemical hazards, physical hazards, and biological hazards. Each of these groups of potential hazards is addressed below.

4.1 General Hazard Assessment

A general hazard assessment was conducted for the required fieldwork described in Section 3.0, and the following potential hazards have been identified:

- Skin and eye contact with contaminants;
- Incidental ingestion of contaminants;
- Inhalation of dusts;
- Physical hazards associated with the use of heavy equipment;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Biological hazards;
- Chemical hazards;
- Utilities (explosive and electrical hazards);
- Flammable hazards;
- Drum handling; and,
- Use of personal protective equipment (PPE).

For reference, Table 1 shows the site-related contaminants of concern (COCs) and the exposure limits. Specific chemical, physical and biological hazards are discussed in detail below.

Mitigation and controls will include, as needed, work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

4.2 Chemical Hazards

The following chemical hazard evaluation for the proposed remedial action is based on the available site information discussed in Section 2.2 and summarized in Table 1. The evaluation has been conducted to identify materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

4.2.1 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Incidental or inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials;
- Skin and eye contact with contaminants at the site and decontamination activities; and,
- Inhalation of dusts.

For personnel the potential for exposure to the site chemicals is expected to be low to moderate. Any potential exposure is primarily expected to occur through inhalation and/or dermal contact and secondarily through accidental ingestion.

4.2.2 Control of Exposure to Chemical Hazards

Real time air monitoring for volatile organic compounds and total dust will be conducted as needed based on task, to assess employee exposure during remedial activities. The use of personal protective equipment, implementation of dust suppression measures, along with good personal hygiene practices and proper decontamination procedures will significantly reduce any potential for exposure to chemicals.

4.3 Physical Hazards

The following physical hazards could potentially be encountered during the construction activities:

- heat stress;
- cold exposure;
- working near heavy equipment;
- noise exposure;
- slip, trip, and fall hazards;
- use of PPE;
- other physical hazards.

These hazards are further described below.

4.3.1 Heat Stress

Working in hot conditions and/or in protective clothing can greatly increase the likelihood of developing heat stress. This can result in health effects ranging from transient heat cramps to serious illness or death. Workers shall monitor themselves and others for signs of heat stress. The signs and symptoms of heat stress are as follows:

1. Heat rash (caused by continuous exposure to heat or humid air) including:
   - reddish blotches
2. Heat cramps (caused by heavy sweating with inadequate electrolyte replacement) including:
   - muscle spasms
   - pain in hands, feet, and abdomen

3. Heat exhaustion (from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration) including:
   - pale, cool, moist skin
   - heavy sweating
   - dizziness
   - nausea, and
   - fainting

4. Heat stroke (from failure of body temperature regulation) including:
   - red, hot, usually dry skin
   - lack of or reduced perspiration
   - nausea
   - dizziness and confusion
   - strong, rapid pulse
   - coma

This is a medical emergency and requires immediate professional medical attention.

4.3.2 Cold Exposure

Personnel exposed to cold temperatures and cool, windy conditions may experience cold stress in the form of frost bite. Workers will monitor themselves and others for signs of frost bite.

Signs of cold stress include yellow or white patches of skin on the fingertips, nose and ears. These areas will feel numb. The affected parts should be rewarmed by placing hands under armpits, or staying in a warm environment. Do not rub the affected parts or submerse in warm or hot water. The person will not return to work until additional protection (e.g., gloves, hard hat liner) is obtained. Personnel are encouraged to change into dry socks after the lunch break as perspiration held by the socks prompts cooling of the feet. Should clothing become wet, the person must change into dry clothes before resuming work. Wet clothing can lead to hypothermia.

4.3.3 Confined Space

Confined space entry is not anticipated as part of the remedial action activities. The HASP will be modified accordingly if confined space entry is necessary.

4.3.4 Working Near Heavy Equipment

Personnel working in the immediate vicinity of heavy equipment specifically the AS/SVE system mechanical equipment (i.e. blowers) may encounter physical hazards resulting from contact with equipment. Field personnel should be aware of the presence of these hazards at all times and take appropriate precautions when working with the equipment.

The following are general work practices to be utilized when working near or with the AS/SVE equipment:

- Hand tools maybe required for general maintenance and system operation as such all hand tools must be kept in good condition, all damaged tools must be either repaired or replaced immediately and personnel must use the right tool for the right job.
- The site and AS/SVE equipment area is adequately cleared and kept clean and free of slip, trip and fall hazards.
- Personnel must be aware of the operation of the AS/SVE system and must know how to shut off the equipment in an emergency.
- The equipment presents a potential electrocution hazard and as such personnel must be aware of the electrical component of the AS/SVE system and use appropriate precaution.
- Lock-out Tag-out procedures must be utilized when performing maintenance on the AS/SVE system as appropriate.

4.3.5 Noise Exposure

The remedial action activities will not present a noise exposure hazard. The AS/SVE system equipment operate at a noise level below the OSHA 8-hour Time Weight Average (TWA) of 85 decibels. However, if noise levels of any operation exceeds, the OSHA standard, a hearing protection program meeting the requirements of 29 CFR 1910.95 will be implemented.

4.3.6 Slip, Trip, and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, facility equipment contribute to tripping hazards. Elevated work is not anticipated, however, if the need arises the HASP will be modified accordingly. Applicable OSHA standards for fall protection (29 CFR 1910.21 through 29 CFR 1910.32) shall apply, as necessary.

4.3.7 Hand and Power Tools

In order to complete the various tasks for the project, personnel may utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable tools. Tools powered by gasoline or diesel will be minimized and special precautions will be taken when transporting and using fuels. Spill prevention and mitigation equipment will be utilized in instances when fuel powered equipment is used at the site.

4.3.8 Use of Personal Protective Equipment (PPE)

Personal protective equipment increases physical exertion and impairs visibility, hearing and manual dexterity. Working in PPE also increases the chances of heat stress.

4.3.9 Utilities (Electrocution, Fire and Explosion Hazards)

The RAWP does not require intrusive work such as drilling or excavation and as such the possibility of encountering underground utilities is not a hazard associated with the RAWP. If intrusive work will be required, the HASP will be modified accordingly to address the potential for underground utility hazards.

4.3.10 Drum Handling

Drum handling will be limited to the storing of purge water from monitoring well sampling and AS/SVE moisture trap accumulations. The movement and opening of drums for sampling is not anticipated, however, if necessary drum sampling will be done in accordance with 29 CFR 1910.120(j). Accidents may occur during handling of drums and other hazardous waste containers. Hazards include detonation, fires, explosions, vapor generation, and physical injury resulting from moving heavy containers by hand and working around stacked drums, heavy equipment, and deteriorated drums. OSHA regulations (29 CFR Parts 1910 and 1926) include general requirements and standards for storing, containing, and handling chemicals and containers, and for maintaining equipment used for handling materials. USEPA regulations 40 CFR Part 265 stipulates requirements for types of containers, maintenance of containers and containment structures, and design and maintenance of storage areas.

4.4 Biological Hazards

The site is in an urban setting and the probability of personnel being impacted by biological hazards such as poisonous plants and insects is minimal. However, the following section addresses these hazards.

Insects, including bees, wasps, hornets, mosquitoes, and spiders, may be present at this site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition, in addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Personnel that have been bitten or stung by an insect at the site should notify the SHSO/FSO of such immediately.

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease. This flu like illness is out of season, commonly happening between May and October when ticks are more active. Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. Early signs may include an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis. If personnel feel sick or have signs similar to those above, they should notify the SHSO/FSO immediately. There aren't any heavily wooded areas on site or within close proximity to the site, however, It is recommended that personnel check themselves when in areas that could harbor deer ticks, wear light color clothing and visually check themselves and their buddy when coming from the site as a precaution. If a tick is found biting an individual, the SHSO/FSO should be contacted immediately. The tick can be removed by pulling gently at the head with tweezers. The affected area should then be disinfected with an antiseptic wipe.

The following is a list of preventive measures for mitigating exposure to insects and poisonous plants:

- Apply insect repellent prior to fieldwork and or as often as needed throughout the shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- Field personnel who may have insect or plant allergies (i.e. bee sting) should provide this information to the SHSO/FSO prior to commencing work, and will have allergy medication on site.

The SHSO/FSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the site.

5.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

This section deals with general health and safety programs and procedures that are required to be used during SRI activities.

5.1 Medical Surveillance Program

All personnel engaged in field activities on this project must have baseline physical examinations and be participants in their employer's medical surveillance program. This program must meet the requirements of 29 CFR 1910.120(f).

In the unlikely event of an exposure event occurring, the affected employee will be sent for any necessary evaluation and treatment at the designated hospital.

5.2 Training

Pursuant to 29 CFR 1910.120, site workers conducting activities documented in the RAWP and this HASP will have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise authorized to work by the SHSO/FSO. Annual eight-hour refresher training will be required of all workers to maintain their qualifications for site work. At the discretion of the SHSO/FSO, three days of directly supervised on-the-job training may suffice. This training will address the duties the employees are expected to perform.

During the initial site briefing, those individuals that have received first aid, CPR, and blood borne pathogen training will be identified. The training will be consistent with the requirements of the American Red Cross Association. If no CPR or first aid trained personnel are available, local medical and emergency medical facilities and personnel will be utilized as necessary.

5.3 Incident Reporting

Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the SHSO/FSO. The SHSO/FSO must follow-up the verbal notification by completing the Unsafe Conditions and Practices Form provided in Attachment B.

Should employees find themselves in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedure(s) and either personally take the appropriate preventative or corrective measures, or immediately notify the SHSO/FSO of the nature of the hazard. In the event of an immediately dangerous or life-threatening situation (IDLH), the employee always has "stop work" authority.

All accidents must immediately be reported to the SHSO/FSO. Injuries or illnesses meeting the definition of an OSHA Recordable Injury or Illness will be logged on the OSHA 200 and the OSHA 101 or equivalent record completed. The OSHA 200 log for the site will be maintained on site. Copies will be provided to the SHSO/FSO.

If anyone on site witnesses a near-accident they must complete the Incident Report (Attachment C) and submit it to the Langan Health & Safety Officer within 72 hours. Near accidents are incidents that, depending on the circumstances, could have resulted in death, personal injury and/or property/equipment damage.

5.4 Excavations

Entry into on-site excavations beyond what is permissible under OSHA 29 CFR 1926 Subpart P (i.e., excavation standard) by field personnel is not anticipated for the proposed scope of work. The HASP will be modified accordingly if entry into excavations becomes necessary.

5.5 General Work Practice Guidelines

The following work practice guidelines are intended to prevent injuries and adverse health effects. These guidelines represent the minimum standard procedures for reducing potential risks associated with various aspects of this project, and are to be followed by on-site personnel at all times.

- Do not handle soils or any other potentially contaminated items unless wearing appropriate gloves. Treat all soil and water as if it were contaminated.
- Always make an effort to approach any potentially contaminated feature/facility from upwind.

- Smoking, eating, drinking, chewing tobacco or toothpicks, storing food or food containers, or having open fires will not be permitted on site during intrusive activities. Eating, drinking, and smoking are permitted only in areas designated by the SHSO/FSO. Thoroughly wash hands and, if necessary, face before eating or putting anything in your mouth (*i.e.,* avoid hand-to-mouth contamination). Good personal hygiene will be practiced by field personnel to avoid ingestion of contaminants.
- Be alert to potentially changing exposure conditions, for example, as evidenced by perceptible odors or oily sheen on water.
- Be alert to the symptoms of fatigue and heat/cold stress and their effects on the normal caution and judgment of personnel.
- Hearing protection is available and should be included in the standard field and utilized during designated activities.
- Always use an appropriate level of personal protective equipment. Insufficient levels of protection can result in preventable exposure; excessive levels of safety equipment can impair efficiency and increase the potential for accidents to occur.
- Be aware of the effect of inclement weather (*e.g.,* rain, snow, ice, lightning) has on site safety. Be prepared to suspend activities as conditions warrant.
- Extreme caution must be used when activities occur near overhead utility lines.
- Personnel will bring to the attention of the SHSO/FSO any observed or known unsafe condition or practice associated with work activities that they are unable to correct themselves.
- Personnel will leave the work area immediately and notify the SHSO/FSO if potential hazards are identified.
- Personnel must avoid unnecessary contamination (*e.g.,* avoid walking through known or suspected "hot" zones, kneeling or sitting on the ground, leaning against potentially contaminated drums or equipment, etc.)
- Personnel will use the "Buddy System" (*i.e.,* working in pairs) when on-site. Buddies will prearrange hand signals for communication (see Section 5.15).

Visual contact will be maintained between crew members at all times. Crew members must observe each other for symptoms of potential overexposure.

- Entry and exit to the site is through designated gates only.
- Work areas will be kept clear and uncluttered. Debris and other trip, slip or fall hazards will be removed as frequently as feasible.

5.6 Respiratory Protection

Based on the current analytical data, respiratory protection is not contemplated as necessary for the planned work. Respiratory protection will be utilized, if necessary, in accordance with the Respiratory Protection Program. The Respiratory Protection Program requires respirator users to be medically qualified, have current fit tests and have completed respiratory protection use training. Documentation of fit tests must be provided to the SHSO for any on-site field personnel. Medical qualification, fit test, and training records must be kept on site.

5.7 OSHA Information Poster/ OSHA 200 Log

A copy of the OSHA information poster will be present at the site. In accordance with the Occupational Safety and Health Act of 1970, it will be posted at full size (11 in x 17 in) in any vehicle used for the field work.

5.8 Initial Site Safety Meeting and Signing of Safety Briefing Form

Upon arrival at the site, the SHSO/FSO will meet with the contractors involved with on-site construction related activities to confirm the following site specific information:

- Directions from the job site to emergency medical facilities;
- Telephone numbers of the emergency personnel and Langan Project Manager; and
- The primary and alternate emergency assembly and evacuation routes.

Contractors/subcontractor will be responsible for attending an initial site safety meeting with the SHSO and/or FSO before work activity starts. During this meeting, it will be verified that all personnel have been provided with or have reviewed a HASP for the work activities to be performed for this project, the HASP will be reviewed, discussed, and any questions answered.

On-site personnel following the HASP will sign the "HASP Compliance Agreement" (see Section 11.0). Individuals refusing to sign the Form will not be allowed to conduct work which will disturb on-site soils.

The SHSO/FSO will conduct a daily safety briefing for all on-site personnel conducting SRI field activities and will complete Health and Safety Briefing Form (see Attachment D).

5.9 Site Safety Briefings

During field operations, the SHSO/FSO will hold site safety briefings as needed to review and plan health and safety aspects of scheduled work. All field personnel who are following this HASP are required to attend these briefings. Documentation of all such safety meetings is required.

5.10 Hazard Communication Program

Compliance with the requirements of the OSHA Hazard Communication Standard is required by OSHA Regulations 29 CFR 1910.120. All personnel who will be required to work on site will be required to attend an initial on-site briefing conducted by the SHSO/FSO where each known contaminant on the site is discussed and the action levels are reviewed.

Material Safety Data Sheets (MSDS) will be available in the project area for all products brought on site. These safety data will be reviewed during the initial site safety meeting. The SHSO will maintain a MSDS file. Additional training for safe use of these materials during site safety meetings and briefings will be conducted as required.

5.11 Underground and Overhead Structures

As discussed in Section 4.3.9, intrusive work is not part of the RAWP. If howev becomes necessary, the HASP will be modified accordingly to ad underground and overhead utility hazards.

5.12 Traffic Control

Some of the RAWP activities will require the work within a traffic area. The facility has active traffic within the parking areas. The proposed RAWP activities will occur inside unoccupied retail spaces and within retail loading zones behind the facility, therefore traffic will be less than the other parts of the site. However, during site activities taking place outside of the site facility, field personnel must wear traffic vests and utilize high visibility cones and/or flashing lights.

5.13 First Aid Kit and Eye Wash Stations

A basic first aid kit will be available at the site during completion of all site work. This kit will be of an appropriate size in relation to the number of personnel on site and will include latex gloves, CPR barrier and eye wash solution.

For tasks involving a high potential for eye contact with hazardous materials, a portable eye wash station capable of dispensing solution for a minimum of 15 minutes will be made available near the task.

5.14 Communications

Verbal communication between site workers should be adequate. Constant communication between Project Managers, Site Supervisors and the SHSO/FSO will be possible through use of cellular phones. Although not anticipated, if the protective equipment requirements are changed to include respiratory protection, the field team will review the following basic hand signal communications during a safety briefing prior to donning respiratory protection equipment.

HAND SIGNAL	MEANING
Hand gripping throat	Cannot breathe.
Grips partner's wrist or points to Contamination Reduction Zone	Leave area immediately.
Hands on top of head	Need assistance
Thumbs up	O.K., I understand.

Thumbs down	No, I don't understand
"Stick Break" with Fists	Take a break. Stop work.

6.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

Atmospheric air monitoring results are used to establish or revise work zones and levels of personal protective equipment. Site-specific action levels will be used for this decision-making process.

All manufacturer instructions for monitoring instrumentation and calibration will be available on site. A calibration log is provided in Attachment E of this HASP. Instrument action levels for air monitoring are provided in Table 2.

It is not anticipated that personal monitoring will be required for this project.

6.1 Work Area Monitoring

Air monitoring shall be conducted at the following times or as specified by the site supervisor:

- Upon initial entry to rule out IDLH conditions
- When the possibility of an IDLH condition or flammable atmosphere has developed
- As an on-going check of the levels of contaminants in the breathing zone
- When work is initiated on a different portion of the site
- When contaminants other than those previously identified are encountered
- When a different operation is initiated
- When work involves the handling of leaking drums or containers or, when working in areas with obvious liquid contamination

Air monitoring will consist, at a minimum, of the criteria listed on Table 2. This data will be made available for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications.

6.2 Community Air Monitoring Requirements

The New York State Department of Health (NYSDOH) has issued guidelines on community air monitoring of fugitive dust emissions and VOCs during intrusive activities at contaminated sites (e.g. excavation, drilling, etc.). These guidelines are contained within the Department's Generic Community Air Monitoring Program (CAMP) document. The proposed RAWP activities will not involve intrusive work and the only ambient air monitoring will be done during the ground water sampling and AS/SVE system monitoring. The monitoring well head space and breathing zone will be screened during the ground water sampling. A community air-monitoring program will be implemented as discussed below. Because the RAWP activities will not include intrusive work, dust monitoring will not be included as part of the program. However, if conditions warrant, the HASP will be modified to include dust monitoring as part of the community air-monitoring program.

6.2.1 General

- Conduct real-time air monitoring for VOCs during AS/SVE and ground water sampling,
- Monitoring frequency depends on weather/wind conditions, level of activity, and as specified below.
- Monitor and record direction and estimated speed of prevailing wind daily and as conditions change.

6.2.2 VOC Monitoring

- Prior to initiating work and periodically during work, establish background VOC levels around and upwind of the work area. Record all later VOC levels relative to background, (i.e., ppm above background).
- Monitor the breathing zone at the downwind perimeter of the Work Zone/Decontamination Zone, including the ambient air in the AS/SVE equipment room,
- In general, monitor every 30 minutes during particular activity,

- If VOC levels exceed 10 ppm (above background) at locations noted above, immediately conduct further downwind monitoring at the nearest public exposure point (e.g., property line).
- Record levels in field notebook.
- Suggested Action Level for discontinuing work: Strong, irritating odors and/or any sustained detectable VOC levels (above background) at nearest public exposure point.
- If Action Level exceeded, terminate work and continue to monitor.
- Notify owner.
- Continue work when VOC levels are reduced below the Action Levels and unacceptable odors have dissipated.
- If detectable VOC levels and/or odors persist at nearest public exposure point, stop work and reassess procedures.
- Once activities have terminated, and if odors are acceptable and VOC levels are below the Action Levels, monitoring may be terminated. Monitoring should be conducted for a minimum of 15 minutes after work is terminated to demonstrate that odors and VOC levels (if any) have stabilized.

6.2.3 Dust Monitoring

As discussed previously dust monitoring will not be required.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Definition of Levels of Protection

The following scheme will be used to designate the required levels of respiratory protection and PPE: D, Modified Level D, and C. These levels of protection are described in Table 3.

7.2 Determination of Levels of Protection

The level of protection selected is based primarily on:

- The type, toxicity, and measured concentration of the chemical substance; and
- The potential or measured exposure to substances in the air, splashes of liquid, or other direct contact.

The level of protection for activities where there is little chance of exposure or contact with potential site contaminants will be Level D. Modified Level D will be worn for activities where there may be incidental skin contact with soil, waste, or groundwater. Modified Level D will consist of Level D, with nitrile gloves for any material handling.

The level of protection to be worn by field personnel will be determined and controlled by the SHSO/FSO. The level of protection may be upgraded or downgraded depending upon air monitoring results, visual signs of contamination or physical degradation of the PPE being used.

This HASP provides only for Level D or Level C protection. The need for Level B respiratory protection and PPE is not expected during project work and is, therefore, not covered by this HASP. Level C procedures are included herein as a contingency.

In the event of an emergency, workers must wear appropriate levels of protection for that activity. The SHSO/FSO would determine the appropriate level of protection at the time of the emergency. All intrusive work would be shut down during these activities.

7.3 On-Hand Safety Equipment

The following personnel protection and first aid equipment shall be available in the support vehicles/areas for the field crew:

- Fire extinguisher, rated at least 1A, 10BC;
- Standard Industrial First Aid Kit, fully stocked;
- Portable emergency Eyewash Unit/access to clean water (capable of providing at least 15 minutes of continuous flushing ability); and,
- Field wash equipment.

8.0 SITE CONTROL MEASURES

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized personnel. At the end of each work day, the site should be secured or guarded to prevent unauthorized entry.

8.1 Designation of Work Zones

On-site safety zones are not required because intrusive field activities will not be completed as part of the RAWP. If intrusive work will be completed, the HASP will be modified to address work zone designations.

8.2 Contamination Control Procedures

There may be on-site areas where contaminated media may be encountered. It is very important that all site workers avoid and minimize contamination and use good hygiene practices. Good hygiene practices include washing hands and face prior to eating, drinking and at the end of the work day, and making provisions to keep used PPE, dirty boots and clothing outside of vehicles and clean areas.

Intrusive work is not part of the RAWP and as such personnel decontamination will not be routinely required. However, personnel and equipment that have been on site will be decontaminated prior to leaving the area as necessary. All decontamination procedures and facilities will be under the control of the SHSO/FSO.

8.2.1 Personnel Decontamination

The field personnel should wash their hands and face, remove gross contamination on boots and clothing on site.

Decontamination (decon) facilities will be located near the decon pad if necessary. Additional field decontamination stations will be established at the location of excavations to facilitate personnel and equipment decontamination that have been involved with on-site work. This field decontamination setup will consist of two tubs on the ground, one a wash tub and one a rinse tub. Typically, the RAWP will be done in Level D and as such, the PPE will be removed and placed in appropriate receptacles for disposal.

Decontamination steps if necessary are:

Step 1: Equipment drop	Deposit equipment (*e.g.*, hand tools, monitoring instruments, etc.) on plastic drop cloth.
Step 2: Outer garment, boots	Wash outer garment, boots, outer gloves with a soapy gloves wash water solution and scrub brushes. Personnel will then proceed to the next station.
Step 3: Outer garment, boots	Rinse outer garment, boots, outer gloves with clear gloves rinse water.
Step 4: Remove outer gloves	Remove outer gloves. Deposit in provided container with plastic liner.
Step 5: Cartridge/respirator change	If workers have left the work zone only to change cartridges or respirator, this is the last step in the decon procedure. New outer gloves are now donned, joints taped and worker returns to exclusion zone.
Step 6: Suit & boot removal	Remove boots and protective suite and deposit in provided container with plastic liner.
Step 7: Respirator Removal	Remove respirator. Deposit in provided container. Avoid touching face with hands.

Step 8: Wash and rinse inner-	Wash and rinse inner gloves.
Step 9: Remove inner gloves	Remove inner gloves and deposit in provided container with plastic liner. Avoid touching the outside of the gloves during removal.
Step 10: Field wash	Wash hands and face thoroughly. Shower as soon as reasonable.

8.2.2 Equipment Decontamination

As discussed in the RAWP, field equipment decontamination will be limited because dedicated pre-decontaminated equipment will be used whenever possible. The type of equipment used during ground water sampling can be decontaminated within a plastic bucket or tub. Decontamination fluids will be collected and drummed and temporarily stored on site. No fluids will be permitted to spill onto the ground or enter sanitary drains. Equipment and materials used during field activities will be removed from the site as expeditiously as practical. At the conclusion of the fieldwork, a general site cleanup will be performed.

9.0 EMERGENCY RESPONSE PLAN

Site personnel will familiarize themselves with the location of the nearest phone, medical facilities and evacuation routes upon arrival at the site. Evacuation routes will be covered in the daily site briefings.

If an unanticipated, potentially hazardous situation arises such as medical emergency, fire, visible contamination, or unusual or excessive odors, site personnel will cease operation, move away to a safe area, follow the established procedures. When help arrives, site personnel will defer all emergency response authority to appropriate responding agency personnel.

Emergency notification telephone numbers are in Attachment F of this document.

9.1 Emergency Alerting Procedures

Personnel will operate using the "buddy system" on site. Each individual will maintain visual/aural contact with another individual or group at all times. Separate groups will be aware of any other group(s) locations at all times.

9.2 Medical Emergency

In the event of a serious medical emergency, site personnel will contact 911, inform them of the nature of the emergency, and then notify the SHSO/FSO.

Injured or ill personnel will be decontaminated if their medical condition permits it, prior to arrival of the emergency response personnel. If the injured or ill person cannot be moved, emergency personnel will be provided with a briefing on the potential contaminants and appropriate personal protective equipment when they arrive on site. All nearby intrusive activities will be stopped during the emergency.

Any personnel responding to an incident involving blood or other potentially infectious materials will assume all "source personnel" are infectious and will utilize "Universal Precautions" and comply with 1910.1030 "Bloodborne Pathogens."

9.2.1 Potential Chemical Exposures

If personnel experience any of the following symptoms, they should cease work and report the occurrence to the SHSO/FSO promptly:

- skin, eye, or respiratory system irritations;
- skin rashes/burns;
- headaches, dizziness;
- nausea/GI tract problems;
- muscle spasms/tremors;
- nervous system problems;
- chills; and
- fatigue.

The SHSO/FSO will evacuate the area (upwind if possible) and evaluate affected personnel for signs and symptoms of exposure. Appropriate first aid measures will be taken moving the person to fresh air and then transport to the local hospital (Figure 2) for a complete physical examination soon as possible. The work activity will not resume until the atmospheric conditions are evaluated and additional protective measures taken, if necessary. Note that the above symptoms are not necessarily caused by chemical exposure.

9.2.2 Injury or Unknown Illness

Should any person be injured or become ill, initiate the following emergency response plan and notify the SHSO/FSO as soon as possible.

1. Proceed to nearest first aid.
2. Remove outer protective garments and gross contamination, (additional decontamination can be postponed until the injured is stabilized).
3. If necessary, wash injury area with soap and water.
4. Provide immediate emergency treatment of injuries.
5. Transport to hospital for additional evaluation.

9.2.3 Hospital Directions

The closet hospital to the site is listed below:

St. John's Episcopal Hospital
11504 Rockaway Beach Blvd
Far Rockaway, NY 11694-2312 US

The driving directions are as follows:

- Start out going Southwest on ROCKAWAY BEACH BLVD toward BEACH 99TH ST. and proceed for 0.18 miles.
- Turn RIGHT onto BEACH 102ND STREET and proceed for 0.06 miles
- Turn LEFT onto ROCKAWAY BEACH BOULEVARD and proceed for 0.74 miles. The hospital is on the left-hand side of the road.

- The total distance is 0.98 miles and total estimated travel time is 2 minutes.

The SHSO/FSO will confirm the directions to the hospital prior to SRI field activities, being alert for construction and road closures.

9.3 Fire and Explosions

Fire prevention is the best contingency plan. There is no smoking on the site and care should be exercised to avoid idling a vehicle over dry grass or other combustible materials. Fire extinguishers will be located on site at intrusive activity and inspected weekly. Carbon dioxide or dry chemical fire extinguishers are effective for fires involving wood, grass, or flammable liquids. They are appropriate only for small, localized fires. No attempt should be made to use these extinguishers for well-established fires or large areas or volumes of flammable liquids.

In the event of fire:

1. If the situation can be easily controlled with available fire extinguishers without jeopardizing the health and safety of site personnel, take immediate action to do so.
2. Immediately notify site emergency personnel and the local fire department at 911 for backup.
3. Evacuate the area until the situation is resolved.

If the fire cannot easily be controlled or in the event on an explosion:

1. Immediately notify site emergency personnel and the local fire department.
2. Clear the area of all personnel working in the immediate vicinity.
3. Isolate the fire to prevent spreading, if possible.

9.4 Chemical Spills/ Releases, Disposal and Removal

All chemical spills will be immediately reported to the SHSO/FSO. All spills will be contained and cleaned up before work resumes. Adequate absorbent materials will be on hand to address the type and quantity of chemical brought on site. The materials being used to contain the spill can be absorbed and transferred into proper containers for disposal. The spill area will be returned to its original (pre-spill) condition. Spilled materials will be drummed and moved to the staging area.

9.5 Unforeseen Circumstances

The Health and Safety procedures specified in this plan are based on the best information available at the time. Unknown conditions may exist and known conditions may change. This plan cannot possibly account for every unknown or anticipate every contingency. If personnel suspect or encounter areas of substantially higher levels of contamination, or should any situation arise which is obviously beyond the scope of the safety procedures specified herein, work activities will be modified or halted pending discussion with the SHSO and implementation of appropriate protective measures.

9.6 Accident and Incident Reports

If an incident or accident occurs on site, the SHSO and Project Manager will be notified and the Incident Report (Attachment C) will be completed. The report will be completed by an eyewitness along with assistance from the SHSO. The report will be forwarded to the Project Manager as soon as possible for further investigation or follow-up.

9.7 Emergency Contacts

Emergency notification telephone numbers are summarized in Attachment F. These numbers will be posted at the site or will readily available with other emergency information.

10.0 APPROVAL PROCESS

Revisions to the HASP must be approved by the SHSO, Rockaway Commons, LLC Project Manager and Langan Project Manager before implementation.

This Health and Safety Plan for field activities relating to the site is hereby approved by the following personnel:

Rockaway Commons, LLC Project Manager- ______________ Date:____________

Langan Project Manager - ____________ Date:____________

Langan SHSO - ____________ Date:____________

11.0 COMPLIANCE AGREEMENTS

All Langan personnel who will be working on the site, must read the HASP and sign the attached.

HASP COMPLIANCE AGREEMENT

By signing you are indicating that you have read and understand the HASP, received a site orientation and agree to follow the safety procedures outlined herein.

Name Date

____

____

____

____

____

____

____

____

____

____

____

____

12.0 REFERENCES

Advanstar Communications Inc. Brown's Directory of North American and International Gas Companies. 2002.

Hughes & Fowler Publishers. *Bird's-eye View of Middletown, N.Y.* 1922.

RECON Environmental Corporation, 1995. Phase I Environmental Assessment.

TABLES

TABLE 1
CONTAMINANTS OF CONCERN
DAYTON SHOPPING PLAZA
QUEENS, NEW YORK

Contaminant	Skin Absor Haz.	PEL[a]	TLV[b]	REL[c]	STEL[d]	IDLH[e]	Odor Thres-hold	IP[f]
Benzene[i,j]	Yes	1 ppm	0.5 ppm	0.1 ppm	5 ppm	500 ppm	61 ppm	9.25 eV
Carbon Tetrachloride[i,j]	Yes	10 ppm	5 ppm	2 ppm	25 ppm	200 ppm	140-584 ppm	11.47 eV
Chlorobenzene	Yes	75 ppm	10 ppm	NA[k]	NA[k]	1000 ppm	1.3 ppm	9.07 eV
Chloroethane	Yes	1000 ppm	1000 ppm	1000 ppm	NA[k]	3800 ppm	4.2 ppm	10.97 eV
Chloroform	Yes	50 ppm	10 ppm	2 ppm	50 ppm	500 ppm	133-276 ppm	11.42 eV
(cis & trans) 1,2-Dichloroethene (DCE)	No	200 ppm	200 ppm	200 ppm	NA[k]	1000 ppm	17 ppm	NA
Tetrachloroethene (PCE)[h]	Yes	100 ppm	25 ppm	Low as possible	100 ppm	150 ppm	47 ppm	9.32 eV
Trichloroethene (TCE)[j]	No	100 ppm	50 ppm	25 ppm	100 ppm	1000 ppm	82 – 110 ppm	9.45 eV
Vinyl Chloride (VC)[i,j]	No	1 ppm	5 ppm	Low as possible	NA	NA	NA	10.00 eV

Note:

a OSHA Permissible Exposure Limit (PEL). PCE & TCE averaged over an 8-hour period, not to exceed 200 ppm over any 15-minute period or 300-ppm for 5 minutes over any 3-hour period. DCE averaged over an 8-hr time period. VC averaged over an 8-hr period not to exceed 15 ppm over any 15-minute period.

b American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV). Averaged over an 8-hr period.

c National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL). Averaged over a 10-hr period.

d Short-Term Exposure Limit

e Immediately Dangerous to Life & Health

f Ionization Potential taken from HNU Systems, Inc., United Kingdom Copyright 1997-1999. (http://www.hnu.co.uk/downloads/ips.pdf)

h Suspected carcinogen in humans

i Known carcinogen in humans

j Known mutagen

k NA – Not available

l All information other than ionization potential taken from NJ Department of Health and Senior Services, Division of Epidemiology, Environmental and Occupational Health – Right-to-Know Fact Sheets for individual chemicals. (http://www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm)

G:\Data9\1461901\Office Data\Reports\RAWP\HASP\TABLE 1-DaytonHASP.doc

TABLE 2
INSTRUMENTATION ACTION LEVELS
DAYTON SHOPPING PLAZA
QUEENS, NEW YORK

Instrument	Action Level	Level of Protection / Action Required
PID	≤ 1 ppm within the work area	Level D
	> 1 ppm within the work area sustained for five minutes	Check for PCE with colorimetric tubes
	> 2.5 ppm within work area sustained for five minutes	Level C with minimum half face APR with combination organic vapor/HEPA (P100) cartridges
	> 15 ppm within work area sustained for five minutes	Level C with minimum full face APR with combination organic vapor/HEPA (P100) cartridges
	> 50 ppm within work area sustained for five minutes	Stop Work/Re-evaluate PPE level
Colormetric Tube – PCE	> 1 ppm within the work area	Level C with minimum half face APR with combination organic vapor/HEPA (P100) cartridges
	> 10 ppm within the work area	Level C with minimum full face APR with combination organic vapor/HEPA (P100) cartridges
	> 50 ppm within the work area	Stop Work / Backfill source of emissions and re-evaluate.

*PID readings are taken at personnel breathing zone height.

TABLE 3
PERSONAL PROTECTIVE EQUIPMENT
DAYTON SHOPPING PLAZA
QUEENS, NEW YORK

Respiratory Protection:

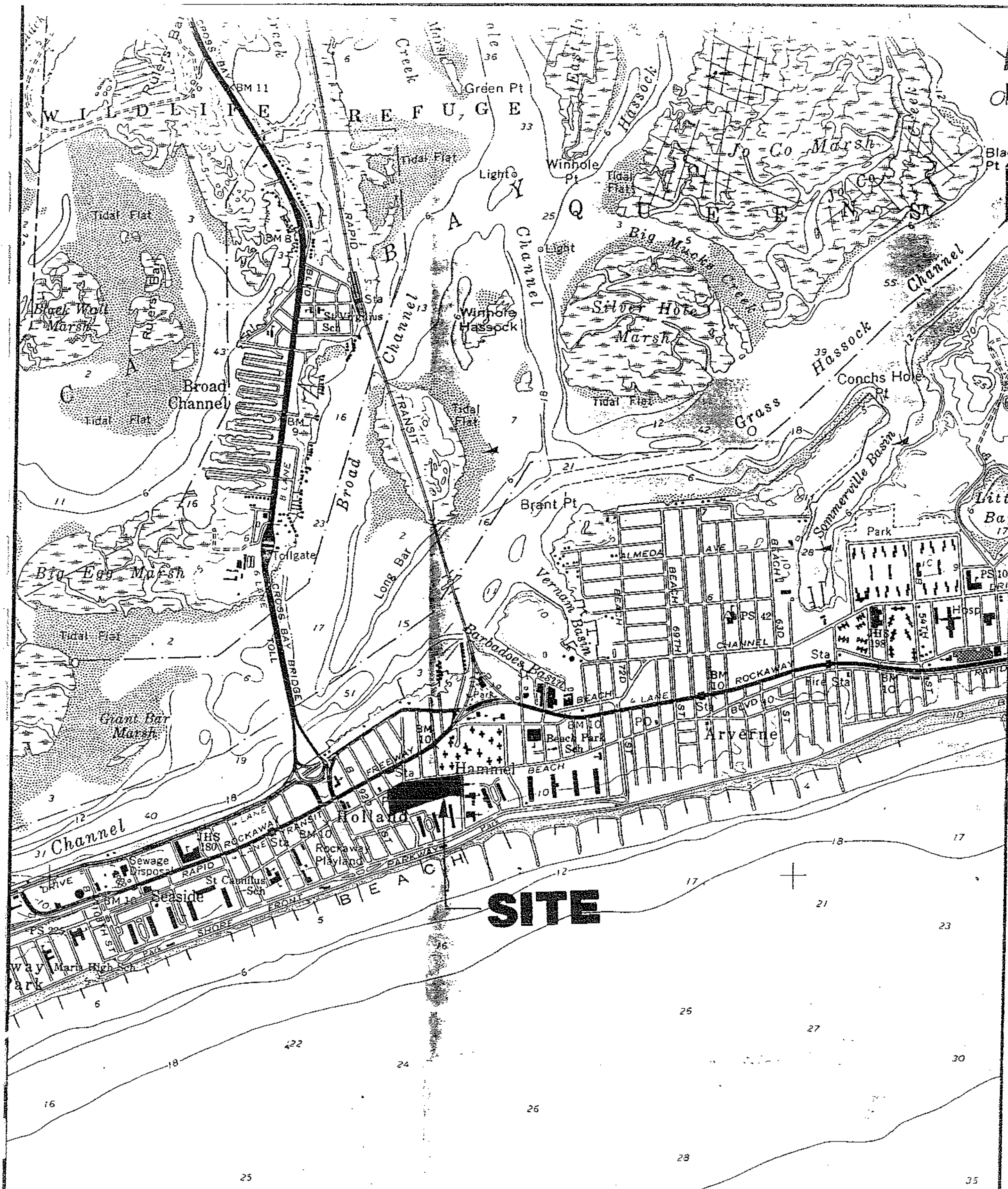
Level D:	No respirator required.
Level C:	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols) and organic vapor cartridges. The respirator will be NIOSH-approved.
Level C - supplemental by task	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols), acid gas, organic vapor cartridges. The respirator will be NIOSH-approved.

Personal Protective Clothing:

Level D:	Hard-hat, traffic vest (if working on or adjacent to the roadway), long sleeve work shirt & work pants, safety glasses or goggles, steel-toed boots, hearing protection (if needed).
Level D - supplemental PPE by task	Drilling of Monitoring Wells: Latex inner surgical gloves and outer nitrile or neoprene gloves Ground Water sampling: Latex inner surgical gloves and outer nitrile or neoprene gloves
Level C:	Polycoated Tyvek disposable suit or equivalent, Outer Gloves: Nitrile or neoprene, Inner gloves: Latex Surgical, Chemically resistant outer boots, Hard-hat, Traffic Vest (whenever working on or adjacent to the roadway).

G:\Data9\1461901\Office Data\Reports\RAWP\HASP\TABLE 3-DaytonHASP.doc

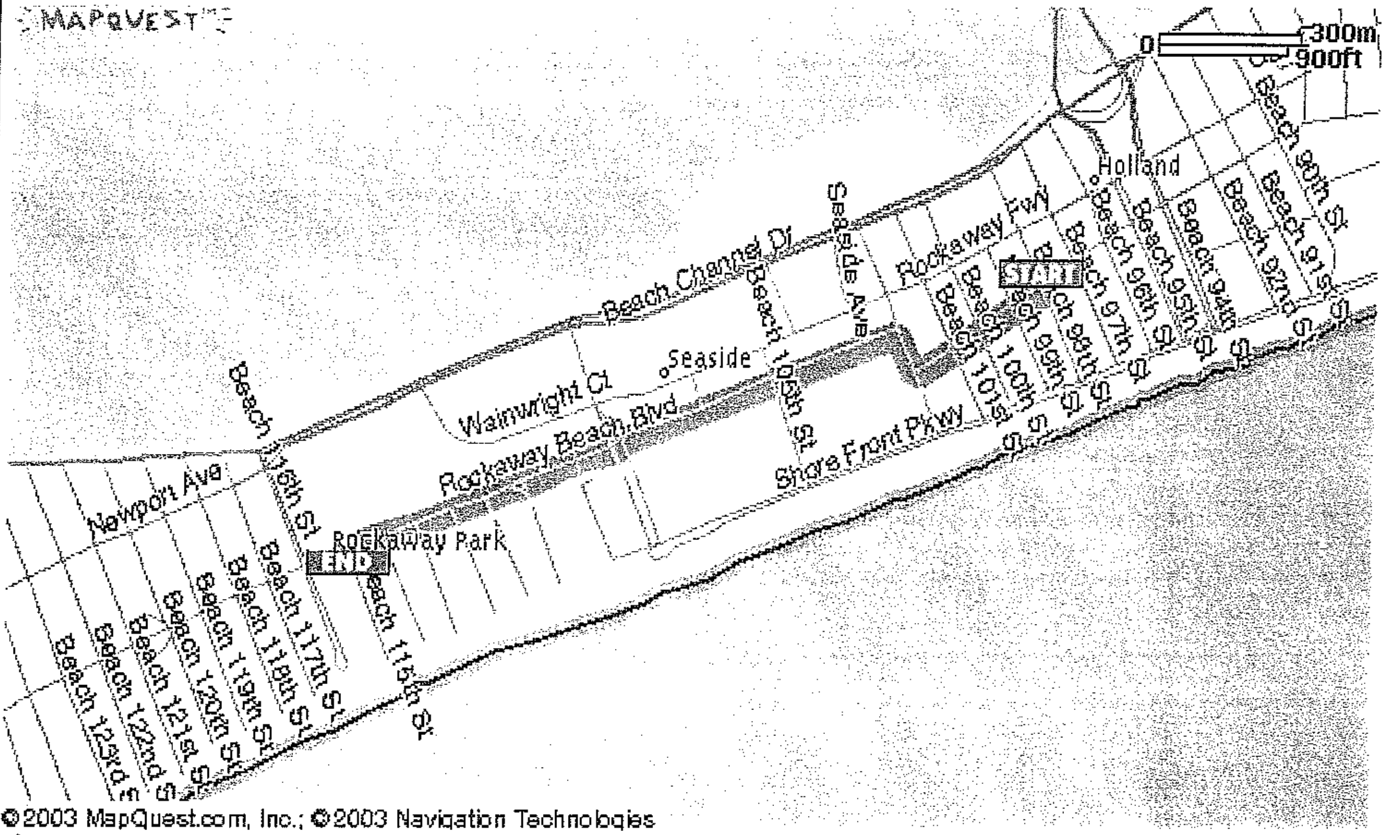
FIGURES



MAP REFERENCE:FAR ROCKAWAY,N.Y. U.S.G.S. MAP (DATED 1969)

Langan Engineering and Environmental Services (201) 794-6900 (215) 348-7101 Elmwood Park, NJ Doylestown, PA.	Project **DAYTON PLAZA** **85-15 THRU 88-07 ROCKAWAY BEACH BLVD.** QUEENS **SITE LOCATION MAP** NEW YORK

Job No.	Date	Scale	Dwg. No.
1461901	7/10/98	1"=2000'	1



Site:
Dayton Plaza
85-15 Rockaway Beach Blvd
Rockaway, NY 11694 US

Hospital
St. John's Episcopal Hospital
11504 Rockaway Beach Blvd
Far Rockaway, NY 11694-2312 US

Driving Directions

1.Start out going Southwest on ROCKAWAY BEACH BLVD toward BEACH 99TH ST.	0.18 Miles
2.Turn RIGHT onto BEACH 102ND ST.	0.06 Miles
3.Turn LEFT onto ROCKAWAY BEACH BLVD.	0.74 Miles

Total Distance: 0.98 miles
Total Estimated Time: 2 minutes

Langan
Engineering and Environmental Services
- ELMWOOD PARK, NJ – NEW YORK, NY – MIAMI, FL – PHILADELPHIA, PA – DOYLESTOWN, PA – NEW HAVEN, CT -

Hospital Route – St. Johns Episcopal Hospital
Dayton Shopping Plaza

Queens — New York

Project	SCALE	DATE	
1461904	N.T.S.	1/29/03	FIGURE 2

ATTACHMENT A

HASP Charge Authorization Form

ATTACHMENT A
HASP CHANGE AUTHORIZATION FORM

Section to be changed:__________________________________

Duration of Authorization Requested   Date:________________

________ Today only

________ Duration of Task

______ Other (Specify)______________________________________

Description of Procedures Modification:

____

____

Justification:

____

____

____

____

Person Requesting Change

____

Name

____

Title

____

Signature

____

Verbal Authorization Received From:

____

Name   Time

____

Title

Approvals:

____

Langan Project Manager

____

Langan HSO

____

Rockaway Commons,LLC Project Manager

____

Langan SSO

ATTACHMENT B

Unsafe Conditions and Practices Form

UNSAFE CONDITIONS AND PRACTICES FORM

DESCRIPTION OF CIRCUMSTANCES REGARDING UNSAFE CONDITION OR PRACTICE: ______________________________

____

____

____

____

IS THIS CONDITION EXISTING OR POTENTIAL?: ______________________________

REPORTED TO: ______________________________

REPORTED BY: ______________________________

DATE REPORTED: ______________________________

COMMENTS: ______________________________

____

____

____

ATTACHMENT C

Health and Safety Briefing Form

ATTACHMENT C
HEALTH AND SAFETY BRIEFING FORM

The following personnel were present at a pre-job safety briefing conducted at __________ (time) on ______________ (date) at ______________________________ (location), and have read this Health and Safety Plan for the Remedial Action Work Plan at the Dayton Shopping Plaza and are familiar with its provisions:

Name	Signature
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________

Fully charged ABC class fire extinguisher available on Site? __________

Fully stocked First Aid Kit available on Site? __________

All project personnel advised of location of nearest phone? __________

All project personnel advised of location of designated medical facility? __________

____

Name of Field Team Leader or Site Safety Officer

____

Signature   Date

ATTACHMENT D

Calibration Log

ATTACHMENT D

PID/FID CALIBRATION LOG

Date	Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calib Reading	Performed By:

ATTACHMENT E

Incident Report

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date:____________________

Employee's Name:__________________________ Employee No:_____________
Sex: M _____ F _____ Age: ______

Region:______________________________________Location:___________________

Project: ____________________________________ Project No: _________________

Incident:____

Type: Possible Exposure ______ Exposure _______ Physical Injury _______

Location:____

Date of Incident: _______________________ Time of Incident: _________________

Date of Report Incident: ____

Person(s) to Whom Incident was Reported: ___________________________________

Weather Conditions During Incident: Temperature _________Humidity _________

Wind Speed and Direction: _______________ Cloud Cover: ___________________

Clear: _________________________________ Precipitation: _________________

Materials Potentially Encountered: ____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):

____

____

Radiological:____

Other:____

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

____

____

____

____

____

Did you receive medical care? Yes ____ No ____ If so, when ________________

Where? On Site ________________ Off Site ________________

By Whom: Name of Paramedic: ________________________________

Name of Physician: ________________________________

Other:____

If Off Site, name facility (hospital, clinic, etc):____________________________

____

Length of stay at the facility?____________________________________

Was the Site Safety Officer contacted? Yes _______ No _______ When?_________

Was the Corporate Health and Safety Officer contacted? Yes _______ No_______

If so, who was the contact?____________________________________

Did the exposure/injury result in permanent disability? Yes _______ No ________

If so, explain:____

____

____

____

Has the employee returned to work? Yes _________ No _________

List the names of other persons affected during this incident:

____

____

____

____

List the names of persons who witnessed the exposure/injury incident:

____

____

____

____

Possible cause of the exposure/injury incident: ______________________

____

____

____

____

____

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

____

Was the operation being conducted under an established Health and Safety Plan?

Yes __________ No __________ If yes, attach a copy. If no, explain

____

____

____

____

____

Describe protective equipment and clothing used by the employee:

____

____

____

____

____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

____

____

____

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

Where exactly on site or off site did the exposure/injury occur?

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

Name of person(s) initiating report, job title, phone number:

Employee Signature | Date

Site Safety Officer Signature or
Field Team Leader Signature | Date

ATTACHMENT F

EMERGENCY NOTIFICATION NUMBERS

ATTACHMENT F
EMERGENCY NOTIFICATION NUMBERS

The following list provides names and telephone numbers for emergency contact personnel.

Fire:	911			
Police:	911			
Ambulance:	911			
Hospital: St. John's Episcopal Hospital	718.474.2070			
Address: 11504 Rockaway Beach Blvd				
Chemical Trauma Capabilities?	**Yes:**	X	**No:**	
Decontamination Capabilities?	**Yes:**	X	**No:**	
Directions From Site to Hospital:	Start out going Southwest on ROCKAWAY BEACH BLVD toward BEACH 99TH ST., Turn RIGHT onto BEACH 102ND ST. and Turn LEFT onto ROCKAWAY BEACH BLVD.			
Note: See Figure 2 for route to hospital. Distance from the site to the hospital is: 0.98 mile The approximate driving time is: 2 minutes				
Poison Control Center:	800.336.6997			
Electric Company: Long Island Power Authority	1.800.490.0075			
Gas Company: Long Island Power Authority	1.800.490.0045			
Water Company: NYC DEP	718.595.7000			
National Response Center:	800.424.8802			
Center for Disease Control:	404.639.3311 (24-hour)			
Pesticide Information Service:	800.424.9346			
ATF (explosion information)	202.927.8310			
Chemtrec:	800.424.9300			
State Environmental Agency: NYSDEC Spills	800.457.7362			
U.S. EPA Region Name: II	Region Number: 212.637.3000			
Langan Project Manager:	Steven Ciambruschini 201.398.4549			
Langan Corporate Health & Safety Officer:	Robert Y. Koto 201.398.4566			
Site Health and Safety Officer:	Craig Peterson 201.794.6900 x4280			
Client Contact: Rockaway Commons, LLC	Manouchehn Malekan 718.XXX.XXXX			

APPENDIX D
AIR DISCHARGE CALCULATIONS

Air Sampling Results and Air Compliance Calculations
Dayton Shopping Plaza
Queens, New York

Compound	Molecular Weight	Off-Gas Concentration (AS off) (ppbv)	Off-gas Concentration (AS on) (ppbv)	Emission Rate (2) During Start-up (lb/hr)	Emission Rate After 1-mo of Start-up (4) (lb/hr)	AGC/SGC	Qc = AGC/200 (5)
cis-1,2-Dichloroethene	97	1,700	1,700	0.0016	0.00016	1,900/--	9.5
Trichloroethene	131.4	700	770	0.0010	0.00010	0.45/54,000	0.0023
Tetrachloroethene	165.8	4,700	5,900	0.0097	0.00097	1/1000	0.005
Trans-1,2-Dichloroethene	97	120	110	0.0001	0.00001	0.1/--	0.0005
Acetone(1)	58.1	1,800	410	0.0002	0.00002	28,000/180,000	140
2-Butanone (1)	72.1	1,500	470	0.0003	0.00003	1,000/59,000	5
Tetrahydrofuran (1)	72.1	2,200	690	0.0005	0.00005	1,400/74,000	7
TOTAL VOCs		**12,720**	**10,050**				

NOTES:

1. These compounds are components of the PVC primer and PVC cement used to glue the piping.
2. Emission rate was calculated using the formula: Emission (lb/hr) = C_{gas} * MW * Q_{cfm} * 3.66x10^{-6}/24
3. Emission rate was calculated to be about 65 cfm.
4. After one-month of start-up, the VOC concentrations were reduced by more than one order of magnitude (about 30 times). For conservative calculations, it is assumed that the annual emission rate is only 10 times less the start-up emission rate.
5. NYSDEC DAR-1, page B-18, Section IV.G. states that for NYC, the emissions are acceptable if hourly emission rate is less than Q_c.

Appendix I:

Site Summary Data

Appendix I

SITE SUMMARY
LONDON FRENCH DRY CLEANING CO. SITE
NYSDEC VCP SITE NO. 241035

SITE SUMMARY	REMEDIAL PARTY IMPLEMENTING THE SMP	SITE LOCATION	CURRENT REMEDIAL STATUS	CONTACT NAME AND PHONE NUMBER
London French Dry Cleaning Co. is a commercial dry cleaner that has caused groundwater contamination by releases of perchloroethylene through poor chemical handling practices. The dry cleaner currently operates within Dayton Shopping Plaza, which consists of a single-story multi-tenant community shopping center. The property was entered into the NYSDEC Voluntary Cleanup Program. Groundwater remediation has been conducted by installing and operating an air sparge/soil vapor extraction system. The extent and severity of the contaminant plume was limited and the remediation has been successful in reducing contaminant concentrations to residual levels. The remediation system continues to operate as required under the NYSDEC ROD. In addition, a sub-slab depressurization system was installed and has successfully reduced volatile organic vapor concentrations in indoor air within the building. This system also remains in operation as required by the ROD. Currently, four groundwater monitoring wells have been selected for groundwater sampling and laboratory analysis to monitor residual contaminant concentrations over time.	Rockaway Commons LLC c/o Malachite Group Ltd. 48 E. Old Country Rd. Mineola, NY 11501	London French Dry Cleaning Co. Dayton Shopping Plaza 85-15 Rockaway Beach Blvd. Rockaway Beach, NY 11693	The bulk of the groundwater remediation has been successfully completed although the air sparge/soil vapor extraction system remains in operation to address residual contamination.	Manouchehr Malekan Rockaway Commons LLC (516) 877-1677