COMMITMENT & INTEGRITY
DRIVE RESULTS

1520 Highland Avenue
Cheshire, Connecticut 06410
www.woodardcurran.com

T 888.265.8969
T 203.271.0379
F 203.271.7952

February 25, 2015

Mr. Matthew Hubicki
DER, Bureau C
New York State Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, NY 12233-7014

Subject: Site Management Plan
Hangar D1 Bay 1B, Westchester County Airport, White Plains, New York
Site No. 360037

Dear Mr. Hubicki:

Attached please find the Site Management Plan (SMP) for the above referenced project revised in accordance with Department comments relayed by electronic mail on September 16, 2014 pertaining to the August 2014 preliminary draft version of the SMP.

Thank you again for your time and assistance with revision of the SMP. Please let me know if there is anything else that I can provide to facilitate review of the document.

Sincerely,

WOODARD & CURRAN, INC.

Anne E. Proctor, PE
Principal Project Manager

Enclosure

copy: S. Karpinski – NYSDOH
S. Siu, A. Torrant – ExxonMobil (electronic copy)
J. Inserra – Westchester County Airport
E. Faulkner – Landmark Aviation
M. DeGloria – GES (electronic copy)

Westchester County Airport Hangar D1 Bay 1B

WESTCHESTER COUNTY, NEW YORK

Site Management Plan

NYSDEC Site Number: 360037

Prepared for:
ExxonMobil Oil Corporation

Prepared by:
Woodard & Curran
1520 Highland Avenue
Cheshire, CT 06410

Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date

FEBRUARY 2015

TABLE OF CONTENTS

CERTIFICATION v
SITE MANAGEMENT PLAN 1
1.0 Introduction and Description of Remedial Program 1
1.1 Introduction 1
1.1.1 General 1
1.1.2 Purpose 2
1.1.3 Revisions 3
1.2 Site Background 3
1.2.1 Site Location and Description 4
1.2.2 Site History 4
1.2.3 Geologic Conditions 5
1.3 Summary of Remedial Investigation Findings 6
1.4 Summary of Remedial Actions 8
1.4.1 Removal of Contaminated Materials from the Site 9
1.4.2 Site-Related Treatment Systems 10
1.4.3 Remaining Contamination 10
2.0 Engineering and Institutional Control Plan 12
2.1 Introduction 12
2.1.1 General 12
2.1.2 Purpose 12
2.2 Engineering Controls 13
2.2.1 Engineering Control Systems 13
2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems 13
2.3 Institutional Controls 13
2.3.1 Excavation Work Plan 15
2.3.2 Soil Vapor Intrusion Evaluation 16
2.4 Inspections and Notifications 17
2.4.1 Inspections 17
2.4.2 Notifications 17
2.5 Contingency Plan 18
2.5.1 Emergency Telephone Numbers 18
2.5.2 Map and Directions to Nearest Health Facility 19
2.5.3 Response Procedures 21
3.0 Site Monitoring Plan 22
3.1 Introduction 22
3.1.1 General 22
3.1.2 Purpose and Schedule 22
3.2 Cover System Monitoring 23
3.3 Media Monitoring Program 24
3.3.1 Groundwater Monitoring 24
3.3.1.1 Sampling Protocol 24
3.3.1.2 Monitoring Well Repairs, Replacement And Decommissioning 24
3.3.2 Soil Vapor, Indoor and Outdoor Air Monitoring 25

3.4 Site Wide Inspection 25
3.5 Monitoring Quality Assurance/Quality Control 26
3.6 Monitoring Reporting Requirements 27
4.0 Operation and Maitenance Plan 29
5.0 Inspections, Reporting and Certifications 30
5.1 Site Inspections 30
5.1.1 Inspection Frequency 30
5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports 30
5.1.3 Evaluation of Records and Reporting 30
5.2 Certification of Institutional Controls 30
5.3 Periodic Review Report 31
5.4 Corrective Measures Plan 33

LIST OF TABLES

1. Remedial Investigation Soil Contamination Summary

2. Monitoring Well Network

3. Groundwater Results (as of November 2014)

4. Remedial Investigation Soil Vapor Data

5. Soil Cleanup Objectives for the Site

6. Soil Sampling Results 2008 and 2012

7. Emergency and Other Contact Numbers (embedded)

8. Monitoring/Inspection/Reporting Schedule (embedded)

9. Soil Vapor Sampling Results

LIST OF FIGURES

1. Site Location Map

2. Groundwater Contour Map (November 2014 including site boundaries)

3. Geologic Cross Section A-A’

4A. Remedial Investigation Report Site Conceptual Model

4B. Remedial Investigation Report Soil Boring Locations

4C. Remedial Investigation Report Geoprobe Locations

4D. Remedial Investigation Report Soil Gas Sampling Locations

5. Soil Sampling Results 2008 and 2012

6. Baseline Post-Remediation Groundwater Quality (November 2014)

7. Area of Soil Vapor Intrusion Concern

8. Map Showing Route from the Site to the Hospital (embedded)

LIST OF APPENDICES

A. Site Documents (*pending as of this writing*):

B. SVE System Design Drawings

C. Excavation Work Plan

D. Health and Safety Plan and Community Air Monitoring Plan

E. Monitoring Well Boring and Construction Logs

F. Sampling and Inspection Forms

G. Quality Assurance Project Plan

CERTIFICATION

I, Anne E. Proctor, PE, certify that I am currently a registered professional engineer licensed by the State of New York and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

NYS Professional Engineer #	Date	Signature
070786	2/25/15	Anne E. Proctor

STATE OF NEW YORK
ANNE E. PROCTOR
070786
LICENSED PROFESSIONAL ENGINEER

SITE MANAGEMENT PLAN

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at Hangar D1 Bay 1B Westchester County Airport (hereinafter referred to as the "Site") under the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Order on Consent No. W3-0918-0204, Site # 3-60-037, which was executed on July 15, 2002.

1.1.1 General

ExxonMobil Oil Corporation (ExxonMobil) entered into an Order on Consent with the NYSDEC to remediate a 1.6 acre site located in Harrison, Westchester County, New York. This Order on Consent required the Remedial Party, ExxonMobil, to investigate and remediate contaminated media at the Site. A figure showing the Site location and boundaries of this 1.6-acre site is provided in Figure 1 and Figure 2. The boundaries of the Site are more fully described in the metes and bounds Site description that will be/is part of the Deed Restriction (Appendix A). ExxonMobil's responsibilities are limited to Hangar D1 Bay 1B as shown in the metes and bounds Site description and as related to previous operations during its use by ExxonMobil.

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 'remaining contamination." This Site Management Plan (SMP) was prepared to manage remaining contamination at the Site until the Deed Restriction is extinguished in accordance with Section X.A.2 of the Order on Consent. 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 Woodard & Curran, on behalf of ExxonMobil, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Deed Restriction for the Site.

1.1.2 Purpose

The Site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the Site remedy to control exposure to remaining contamination during the use of the Site to ensure protection of public health and the environment. A Deed Restriction to be granted to the NYSDEC, and recorded with the Westchester County Clerk, will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all ECs and ICs required by the Deed Restriction for contamination that remains at the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Deed Restriction and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; and (3) certification of results, and submittal of Periodic Review Reports.

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

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Deed Restriction. Failure to properly implement the SMP is a violation of the Deed Restriction, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the Order on Consent No. W3-0918-0204, Site # 3-60-037, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Deed Restriction for the Site (Appendix A), the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 SITE BACKGROUND

The airport began operations in 1952 and Hangar D was also constructed in 1952. During the first 30 years of operation, the airport Hangar D1 Bay 1B was managed by Gulf Oil under a long term lease with Westchester County. Mobil Oil Corporation (now ExxonMobil) leased the space in Hangar D1 Bay 1B from 1982 until 1990 as a base for corporate flight operations and other air travel related functions. The Hangar D1 Bay 1B space was used for routine aircraft maintenance. Other uses included analytical laboratories, an electronic laboratory, and a small paint booth used only for touch-up painting. On-site facilities also included administration offices, a pilot's briefing room, conference room and an executive lounge. Hangar D1 Bay 1B was used by Mobil until the lease was transferred to Texaco, Inc. (Texaco) in 1990. The Site is currently occupied by Landmark Aviation and used for aircraft operations.

During the lease transfer process, Texaco hired a consultant to perform an environmental review of the property. The investigation revealed that chlorinated volatile organic compounds (CVOCs) were present in the shallow soils beneath the Hangar D1 Bay 1B floor in the area where drums of chlorinated solvents had previously been stored.

These CVOCs, primarily 1,1,1-TCA and PCE, were used by Mobil and others for routine aircraft maintenance. The area on the east/southeast side of Hangar D1 Bay

1B, near the wall with Bay 2, was used for the storage of 55-gallon drums. This drum storage area was the suspected source of the contamination.

According to the Record of Decision (ROD), an underground No. 2 Fuel Oil tank was located behind (north of) the Hangar D building. No leaks were revealed during an integrity test performed on the tank (circa 2002).

1.2.1 Site Location and Description

The Site is located near the eastern boundary of the Westchester County Airport in Harrison, Westchester County, New York and is identified as Block 971 and Lot 8.1 on the Town Village of Harrison, New York Tax Map. The Site is an approximately 1.6-acre area bounded by an airport access road and parking to the north, runways to the south, and additional hangars to the east and west (see Figure 2). The boundaries of the Site are more fully described in Appendix A – Metes and Bounds.

1.2.2 Site History

From October 1990 through January 1991, a pre-leasing environmental assessment was completed for Texaco. The report of the findings was issued in January 1991. Also completed in January 1991 was a soil gas survey beneath the Hangar D1 Bay 1B floor slab. The results led to the need for additional investigation.

In March 1991, a subsurface investigation was conducted by Mobil Oil Corporation. The report was issued in May 1991 and revealed total CVOCs in the soil up to 54 parts per million (ppm) in the source area, where the solvent drums were previously stored.

In 1993, the NYSDEC placed the Texaco Hangar Site (Hangar D1 Bay 1B) on the New York State Registry of Inactive Hazardous Waste Disposal Sites (Registry) as a Class 2a site. Class 2a is a temporary designation for a site that requires additional investigation before a permanent listing can be assigned.

In 1994, a Preliminary Site Assessment (PSA) Consent Order was executed by Mobil Oil Corporation and the NYSDEC.

In May 1995, Preliminary Site Assessment activities were performed and the report of the findings (the PSA Report) was issued in August 1995. The results showed elevated levels of CVOCs in soils and groundwater. During the PSA, 122 soil samples were collected and the extent of the soil contamination was defined.

In November 1995, a Supplemental PSA was completed that delineated the horizontal extent of the shallow groundwater contamination. The report of the results was issued in February 1996.

In March 1996, the Site was reclassified to a Class 2 site due to the exceedance of groundwater standards and soil guidance values.

From 1996 to 2001, remedial investigation activities were conducted as described in Section 1.3 with the Remedial Investigation and Feasibility Study reports submitted to NYSDEC in December 2001. The ROD was issued by the NYSDEC in 2002. From 2003 to 2013, remedial actions were performed as described in Section 1.4.

1.2.3 Geologic Conditions

The surficial materials in the vicinity of the Site are comprised of various sands and compacted sand, silt and gravel deposits. Subsurface investigations completed at the Site revealed heterogeneous subsurface soils consisting of up to 15 feet of fill that was likely placed as part of the airport construction. The material consists of poorly sorted sand and silt with occasional pockets of cobbles. The fill overlies glacial and fluvial sands and silts, which in turn overlie Mica Schist bedrock.

A buried stream channel is located beneath the center and northeast side of Hangar D1 Bay 1B, approximately 20 feet below the ground. Bedrock in this area of the hangar is located approximately thirteen feet to thirty feet below grade. The stream channel generally trends north-south and terminates at Blind Brook, located immediately south of the airport. Bedrock from the center of the hangar to the southwest side of the hangar, which is not underlain by the former stream channel, is encountered at depths ranging from one foot to 11 feet below grade.

Groundwater that occurs in the unconsolidated fill material is primarily limited within the buried stream channel. Groundwater is located approximately 7 to 13 feet below ground surface. The groundwater flow in the unconsolidated fill material follows the trend of the buried stream channel, flowing to the south-southeast. The hydraulic gradient of the shallow groundwater across the Site is approximately 0.02 feet/foot and the average hydraulic conductivity is 0.000054 cm/s. A groundwater contour map is shown on Figure 2.

Blind Brook is located 5,000 feet south of the Site and flows south to Long Island Sound. Rye Lake, which is part of the Kensico Reservoir, is located approximately 3,500 feet west of the Site.

A geologic section is shown in Figure 3.

A groundwater flow figure is shown in Figure 2.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

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

The RI was conducted in four phases. The first phase was conducted in November 1996, the second phase between April 1997 and July 1997, the third phase between November 1999 and June 2000, and the fourth phase between August 2001 and November 2001. A report entitled Remedial Investigation, Hangar D, Bay 2[1], Westchester County Airport dated December 2001 has been prepared which describes the field activities and findings of the RI in detail.

Generally, the RI determined that chemical spills had resulted in the presence of a number of hazardous wastes, including CVOCs such as 1,1,1-trichloroethane (1,1,1-TCA) and tetrachloroethene (PCE), at the Site. The CVOC plume beneath Hangar D1 Bay 1B appears to have had several source areas including the former solvent storage area under the south-southeastern portion of the hangar bay (MW-02 area) and one or more additional source(s) upgradient of Hangar D1 Bay1B affecting the MW-01 area.

Below is a summary of Site conditions when the RI was performed from 1996 through 2001:

<u>Soil</u>

Soil investigations were conducted to assess the nature and extent of contamination beneath the Site and to assess background soil conditions in the vicinity of the Site. The extent of the soil contamination was defined by soil samples collected from beneath Hangar D1 Bay 1B and the adjacent downgradient Hangar D2.

The most frequently detected CVOCs in Site soils were 1,1,1-TCA with concentrations ranging from non-detect (ND) to 32 ppm, and PCE with concentrations ranging from ND to 24 ppm. In the initial phases of investigation, petroleum

[1] Hangar D1 Bay 1B is also referred to as Hangar D Bay 1, Hangar D Bay 1 (right half), Hangar D Bay 2 and the Texaco Hangar Site in various historic documents.

hydrocarbons were detected at low levels in soil samples. However, as stated in the ROD, subsequent investigations did not show significant levels of petroleum hydrocarbons above SCGs; therefore, petroleum hydrocarbons were not considered contaminants of concern for the Site.

The highest concentrations of CVOCs were detected from soil samples collected in the vicinity of the former solvent storage area, located along the southern wall of Hangar D1 Bay 1B. The highest contamination was concentrated in the top 6 inches of soil beneath the concrete slab. The contamination in the source area was fairly localized, with some lower levels of CVOCs detected northeast of the solvent storage area. Figure 4A shows soil impact as presented in the RI; concentrations of contaminants detected in soil are summarized in Table 1 and sample locations are depicted on Figures 4B and 4C. All concentrations met Restricted Commercial criteria for soil, and only PCE in sample B-4C in the top 6 inches of soil exceeded Restricted Residential criteria at a concentration of 24 ppm with a criterion of 19 ppm.

Site-Related Groundwater

Monitoring wells were installed at the Hangar D1 Bay 1B Site. The locations of the monitoring wells are shown on Figure 2 and a summary of well installation is included in Table 2. The multilevel monitoring wells (overburden, shallow bedrock and deeper bedrock) installed at Hangar D, and at the airport in general, indicate that CVOC concentrations are greatest in the deep overburden and shallow bedrock, and decrease with depth in the bedrock. Attenuation is occurring through dilution, dispersion and degradation within the plume.

The CVOCs detected most frequently included 1,1,1-TCA ranging from ND to 980 ppb, PCE ranging from ND to 571 ppb, TCE ranging from ND to 600 ppb, cis-1,2-DCE ranging from ND to 3,400 ppb, 1,1-DCA ranging from ND to 5,800 ppb and chloroethane ranging from ND to 5,500 ppb. All maximum concentrations were in samples from well MW-2 in the vicinity of the SVE system, with the exception of PCE that was measured at maximum concentration in a sample from well MW-13 near the upgradient Hangar D1 Bay 1B wall.

Original groundwater monitoring indicated that the groundwater plume originated below the MW-2 area (former solvent storage area) and extended south in the direction of groundwater flow. Sampling indicated that the plume had not reached the far southern end of Hangar D, where two off-site bedrock wells, MW-11D and MW-11S were located and destroyed during airport activities in 2008. Subsequent, additional wells installed at Hangar D1 Bay 1B and upgradient indicate the potential for additional sources upgradient of the former solvent storage area.

Concentrations of contaminants detected in monitoring wells since 1996 are summarized in Table 3. Figure 4A shows groundwater impact as presented in the RI, and well locations are depicted on Figure 2.

Site-Related Soil Vapor Intrusion

Soil gas samples were collected from beneath Hangar D1 Bay 1B. The results of the soil gas sampling showed a similar distribution of contaminants as the soil samples. The compounds with the highest concentrations were 1,1,1-TCA with results ranging from ND to 871 ppb and PCE with results ranging from ND to 168 ppb. Figure 4A shows areas of impact as presented in the RI; concentrations of contaminants detected in soil vapor at the time of the RI are summarized in Table 4 and sample locations are depicted on Figure 4D.

1.4 SUMMARY OF REMEDIAL ACTIONS

The Site was remediated in accordance with the NYSDEC-approved Remedial Action Work Plan dated January 2003 and the "Soil Vapor Investigation Work Plan" dated September 2005, the "Work Scope for a Supplemental Potassium Permanganate Application" dated October 2008, well installation work plans dated April 2011 and May 2013, and the "Trial SVE System Shut-Down and SVI Work Plan" dated November 2013.

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

1. Execution and recording of a Deed Restriction to restrict land use and prevent future exposure to any contamination remaining at the Site.

2. Installation and operation of a soil vapor extraction (SVE) system in the vicinity of well MW-02 (former solvent storage area) from February 2004 to September 2013.
3. In-situ chemical oxidation (Potassium Permanganate) additions in the vicinity of wells MW-01 and MW-02 in August 2001, September 2004 and November/December 2008.
4. Development and implementation of a Site Management Plan for long term management of remaining contamination as required by the Deed Restriction, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting;

Remedial activities were completed at the Site in September 2013.

1.4.1 Removal of Contaminated Materials from the Site

Soil Cleanup Objectives for the Site are Restricted Commercial Use in conjunction with remediation goals from the ROD as follows:

- Eliminate, to the extent practicable, exposures to soil and groundwater;
- Eliminate, to the extent practicable, the migration of contaminants into the groundwater;
- Eliminate, to the extent practicable, ingestion of groundwater affected by the Site that does not attain NYSDOH Part 5 Drinking Water Standards;
- Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria; and
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of contaminants to the waters of the state.

Operation of the SVE remediation system resulted in the removal of approximately 12.1 pounds of CVOCs and their breakdown products: 1,1,1-TCA, PCE, trichloroethene (TCE), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), cis-

1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), chloroethane and vinyl chloride.

A list of the soil cleanup objectives (SCOs) for the primary contaminants of concern (COCs) and applicable land use for this Site is provided in Table 5.

1.4.2 Site-Related Treatment Systems

A SVE system was installed and started-up in February 2004 and operated until September 2013 (refer to Section 2.2.1). The SVE system was installed in the vicinity of well MW-02 to address CVOCs in soil from the former solvent storage area. The SVE system was housed in a free-standing wooden shed to the south immediately outside the Hangar D1 Bay 1B doors. The SVE system used a 5 horsepower blower manifolded to five vertical wells. The SVE system off-gas was treated by means of four 200-pound granular activated carbon (GAC) absorbers prior to discharge to atmosphere. The SVE system wells and shed are shown on Figure 2 and SVE system design drawings are included in Appendix B.

The In-situ Chemical Oxidation activities involved subsurface additions of Potassium Permanganate as follows:

- In August 2001, approximately 819 pounds of Potassium Permanganate were added to seven injection points in the vicinity of wells MW-01 and MW-02 as depicted on Figure 2.
- In September 2004, approximately 1,100 pounds of Potassium Permanganate were added to the 2001 injection points.
- In November and December 2008, approximately 110 pounds of Potassium Permanganate were added to four injection points in the vicinity of well MW-01 as depicted on Figure 2.

1.4.3 Remaining Contamination

CVOCs were detected in soils in the vicinity of the former drum storage area beneath the Hangar D1 Bay 1B floor. Soils in that area, as measured by resulting

concentrations in soil vapor and groundwater, have been remediated by operation of the soil vapor extraction system and additions of Potassium Permanganate.

The highest concentrations of CVOCs in groundwater are upgradient and along the northwest Hangar D1 Bay 1B wall (refer to Section 3.3.1).

CVOCs in soil vapor and indoor air samples include TCE and 1,1,1-TCA (refer to Section 3.3.2).

Table 6 and Figure 5 summarize the results of all soil samples at the Site after implementation of Remedial Actions. All results meet the SCOs for unrestricted use of the Site. Historic results met Restricted Commercial criteria for soil, and only PCE in sample B-4C in the top 6 inches of soil beneath the Hangar D1 Bay 1B floor in the vicinity of the SVE system exceeded Restricted Residential criteria at a concentration of 24 ppm with a criterion of 19 ppm (refer to Section 1.3).

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated groundwater 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

This plan provides:

- A description of all EC/ICs on the Site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Deed Restriction;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

2.2.1 Engineering Control Systems

On September 17, 2013, the SVE system was shut-down for routine maintenance activities and could not be restarted. Due to the operational status of the SVE blower, the "Trial SVE System Shut Down and Revised Soil Vapor Investigation Work Plan" was submitted to NYSDEC and NYSDOH on November 7, 2013 and approved with modifications on November 14, 2013. The SVE system remains off pending completion of monitoring per Section 3.2.1 and permission to permanently dismantle the system is granted in writing by the NYSDEC. For record purposes, SVE system design drawings are included in Appendix B.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC, until residual groundwater concentrations are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the Site to Restricted Commercial uses only. Adherence to these Institutional Controls on the Site is required by the Deed Restriction (Appendix A) and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Deed Restriction and this SMP by the Grantor and the Grantor's successors and assigns;

- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater, soil vapor and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Deed Restriction may not be discontinued without an amendment to or extinguishment of the Deed Restriction subject to approval of the NYSDEC.

The Site has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required by the Deed Restriction. Site restrictions that apply to the Controlled Property are:

- The property may only be used for Restricted Commercial use 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 and restricted residential use without additional remediation and amendment of the Deed Restriction, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use (refer to Figure 6);
- The potential for vapor intrusion must be evaluated for any buildings developed in the area noted on Figure 7, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the property are prohibited;
- The Site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and

environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

The Site has been remediated for Restricted Commercial use. Any future intrusive work that will encounter or disturb the remaining contamination will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix C to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the Site. A sample HASP is attached as Appendix D to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section C-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The Site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The Site owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Prior to the construction of any enclosed structures located over areas that contain remaining contamination and the potential for soil vapor intrusion (SVI) has been identified (see Figures 6 and 7), an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be installed as an element of the building foundation without first conducting an investigation. This mitigation system will include a vapor barrier and passive sub-slab depressurization system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and NYSDOH for approval. This work plan will be developed in accordance with the most recent NYSDOH "Guidance for Evaluating Vapor Intrusion in the State of New York". Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to the NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation. Validated SVI data will be transmitted to the property owner within 30 days of validation. If any indoor air test results exceed NYSDOH guidelines, relevant NYSDOH fact sheets will be provided to all tenants and occupants of the property within 15 days of receipt of validated data.

SVI sampling results, evaluations, and follow-up actions will also be summarized in the next Periodic Review Report.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted in accordance with Table 8 or as approved by the NYSDEC and/or NYSDOH, regardless of the frequency of the Periodic Review Report. 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 Deed Restriction;
- 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 Periodic Review Reporting section of this plan (Section 5).

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

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC Site Control Section Chief and Project Manager as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the Order on Consent, 6NYCRR Part 375, and/or Environmental Conservation Law.
- 60-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.

- Notice within 48-hours of any damage or defect to the foundation, structures or engineering control that reduces or has the potential to reduce the effectiveness of an Engineering Control and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

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

- At least 60 days prior to the change, the NYSDEC Site Control Section Chief and Project Manager will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the Order on Consent, and all approved work plans and reports, including this SMP
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 CONTINGENCY PLAN

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

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to the

qualified environmental professional. These emergency contact lists must be maintained in an easily accessible location at the Site.

Table 7: Emergency and Other 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
Remedial Party: ExxonMobil Oil Corporation.	(718) 404-0674
Qualified Professional: Woodard & Curran	(203) 271-0379

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

2.5.2 Map and Directions to Nearest Health Facility

Site Location: Hangar D1 Bay 1B, Westchester County Airport

Nearest Hospital Name: White Plains Hospital

Hospital Location: 41 E Post Road, White Plains, NY 10601

Hospital Telephone: (914) 681-0600

Directions to the Hospital:

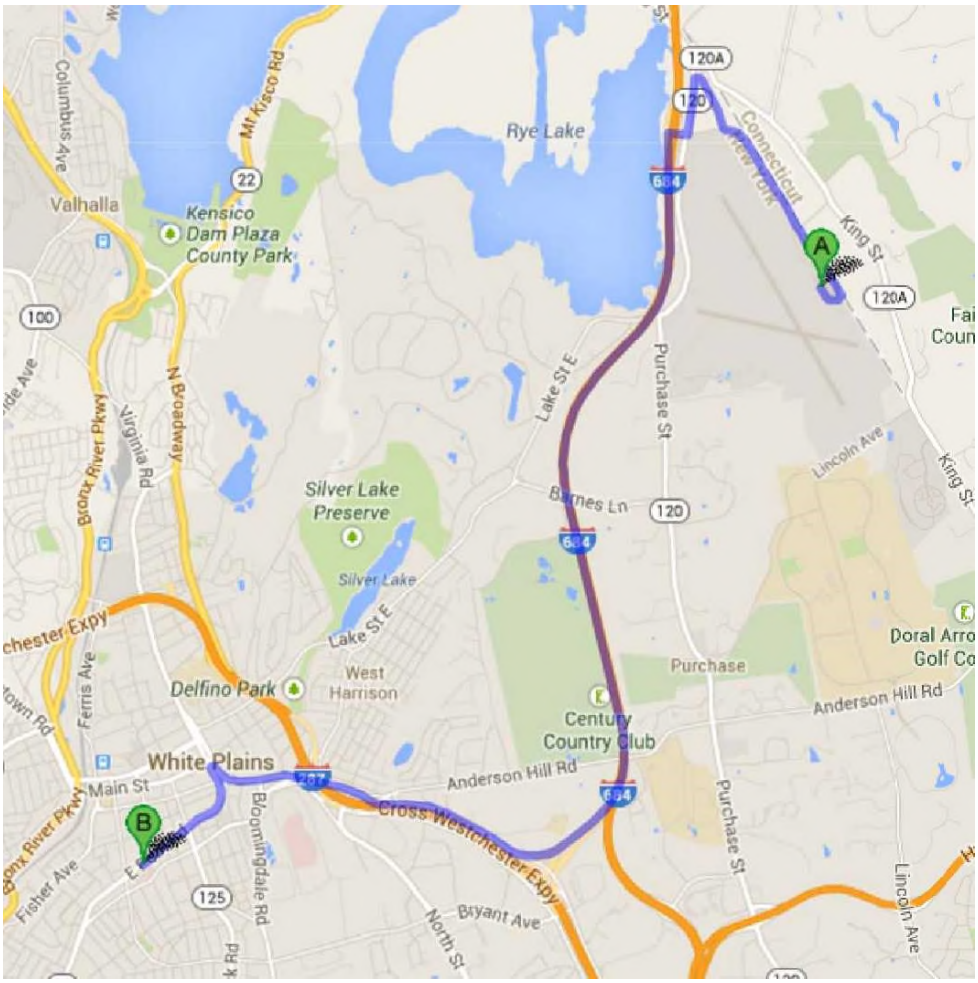
1. Head southeast on Airport Rd/Westchester Airport County Rd
2. At the traffic circle, continue straight to stay on Airport Rd
3. Continue onto New King St
4. Turn left onto NY-120 S/Purchase St
5. Take the 1st right onto Airport Rd

6. Turn left onto the Interstate 684 S ramp to Interstate 287
7. Merge onto I-684 S
8. Take the Interstate 287 W exit toward White Plains
9. Follow signs for Westchester Ave and merge onto Westchester Ave
10. Keep right to stay on Westchester Ave
11. Slight left to stay on Westchester Ave
12. Turn left onto S Broadway
13. Continue onto E Post Rd

Total Distance: 8.5 miles

Total Estimated Time: 17 minutes

Figure 8: Map Showing Route from the Site to the Hospital:



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 7). The list will also be posted prominently at the Site and made readily available to all personnel at all times.

Should a spill or release occur which is a threat to human health or the environment, the employee observing the spill will first conduct or request an evacuation of all people at risk. Employees must report any chemical spill or release per the applicable HASP requirements to the Project Manager, and coordinate any additional notifications required as dictated by the incident. In the event of a spill or release that is not an immediate threat to human health or the environment, Site personnel, per the applicable HASP requirements, may initiate containment and control measures. As appropriate, air monitoring will be implemented and personal protection equipment will be donned prior to initiating any containment and control measures. Depending upon the nature of the spill, containment and control measures may include using sorbent materials, constructing temporary containment, or containing leaks and transferring contents from one container to another.

In the event of an evacuation, the individual activating the evacuation shall verbally communicate to the other Site personnel that there is an emergency condition and that they should evacuate from the work area. If contact cannot be made verbally with the other Site personnel, any of the following systems can be used as long as the system is audible above background noise: Site vehicle horn, a whistle, an air horn, or other acceptable device. The system to be used for initiating an evacuation from the Site shall be discussed with the other Site personnel prior to beginning the work.

Site activities shall be those limited to the prevailing HASP. Any changes to the scope of work will require review of the HASP and this Contingency Plan, and amendments will include additional health and safety measures as warranted by those tasks.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site and all affected Site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

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;
- Monitoring well decommissioning procedures; and

- Inspection and periodic certification.

Quarterly monitoring of the performance of the remedy and overall reduction in contamination on-site has been conducted for 12 years (since 2001). Trends in contaminant levels in air, soil, and/or groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in Table 8 and outlined in detail in Sections 3.2 and 3.3 below.

Table 8: Monitoring/Inspection/Reporting Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Post-Remediation	Quarterly from November 2013 through November 2014, then Annually for 2 years (coincidental with 2015/2016 and 2016/2017 soil vapor/air sampling below)	Groundwater	VOCs by EPA Method 8260
Post-Remediation, Including Site-Wide Inspection	Semi-annually for 1 year (2013/2014 heating season), then Annually for 3 years (2014/2015,2015/2016, and 2016/2017 heating seasons)	Soil Vapor, Indoor and Outdoor Air	VOCs by EPA Method TO-15 Compendium List
Periodic Review Reports	Quarterly by the 10th of April, July, October and January through January 2015, then Annually for 2 years (60 days following receipt of analytical, on or about February 2016 and February 2017)	All data available during the reporting period	

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

3.2 COVER SYSTEM MONITORING

The remedial program does not include a cover system. Monitoring airport structures, such as the Hangar D1 Bay 1B floor, is included in Section 3.4.

3.3 MEDIA MONITORING PROGRAM

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy.

The network of monitoring wells has been installed to monitor both up-gradient and down-gradient groundwater conditions at the Site. The network of on-site wells has been designed based on the following criteria (see Table 2 and Figure 2):

- Wells were installed to sample groundwater in the overburden, and in shallow and deep bedrock.
- Wells were installed surrounding the Hangar D1 Bay 1B in upgradient, cross-gradient, and downgradient directions from the primary flow path to the southeast.

Baseline post-remedial groundwater quality conditions (November 2013) are included on Figure 6. Monitoring well construction logs are included in Appendix E.

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

Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix F. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Sampling protocols are included in the Quality Assurance Project Plan (QAPP) in Appendix G.

3.3.1.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally,

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

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

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of 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.

3.3.2 Soil Vapor, Indoor and Outdoor Air Monitoring

Soil vapor, indoor, and outdoor air monitoring will be performed on a periodic basis to assess the performance of the remedy. Post-remedial soil vapor conditions are included in Table 9 and sample locations are depicted on Figure 7. Sampling protocols are included in the QAPP in Appendix G.

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

3.4 SITE WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule in accordance with Table 8. During these inspections, an inspection form will be completed (Appendix F). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;

- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

3.5 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 G). 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;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary

assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

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

3.6 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 Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report will also be prepared if required by NYSDEC, subsequent to each sampling event. The report (or letter) will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (o be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and

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

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in Table 8. After completion of monitoring and reporting activities, a petition will be submitted to NYSDEC for a "No Further Action" decision document, to discontinue monitoring, and to dismantle the SVE system**.**

4.0 OPERATION AND MAITENANCE PLAN

The Site has been remediated and does not rely on any mechanical systems, such as sub-slab depressurization systems or air sparge/ soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP. Information on non-mechanical Engineering Controls is provided in Section 3 - Engineering and Institutional Control Plan.

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and of this SMP.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system which are contained in Appendix F. These forms are subject to NYSDEC revision.

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

5.1.3 Evaluation of Records and Reporting

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

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

5.2 CERTIFICATION OF INSTITUTIONAL CONTROLS

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

- The institutional control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;
- Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Site is compliant with the Deed Restriction.
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Respondent's Designated Site Representative.

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

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the Department in accordance with Table 8, beginning fifteen months after the Certificate of Completion or equivalent document (e.g., Satisfactory Completion Letter, No Further Action Letter, etc.) is issued. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period.

Media sampling results will also incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual Site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the Site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A Site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific ROD;
    - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
    - The overall performance and effectiveness of the remedy.

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

5.4 CORRECTIVE MEASURES PLAN

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

TABLES

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	B-1	B-1	B-2	B-3	B-3	B-4	B-5	B-5	B-5
Date	10/22/90	10/22/90	10/22/90	10/22/90	10/22/90	10/22/90	10/22/90	10/22/90	10/22/90
Consultant	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	18-24"	0-6"	0-6"	18-24"	0-6"	0-6"	60-66"	126-132"
Methylene Chloride	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Chloromethane	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
1,2 Dichloroethane	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
1,1 Dichloroethane	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
1,1,1 Trichloroethane	-	-	-	ND@1100	ND@1100	2700	-	-	-
Trichloroethene	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Tetrachloroethene	-	-	-	ND@1100	ND@1100	4800	-	-	-
trans-1,2-dichloroethene	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
cis-1,2-dichloroethene	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
1,1 Dichloroethene	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Bromodichloromethane	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Chloroethane	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Toluene	-	-	-	ND@1100	ND@1100	ND@1200	-	-	-
Total Extractable Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-
Total Volatile Organics	-	-	-	ND	ND	7500	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	2117
GC Fingerprint as Jet Fuel	68000	ND@56000	ND@57,000	-	-	-	-	-	-
Total Petroleum Hydrocarbons	180000	35000	120000	ND	ND	270000	52000	ND	ND

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	B-1A	B-1B	B-1C	B-1D	B-1A	B-1B	B-1C	B-1D
Date	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90
Consultant	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A
Location Type	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	0-6"	0-6"	0-6"	18-24"	18-24"	18-24"	18-24"
Methylene Chloride	-	-	-	-	-	-	-	-
Chloromethane	-	-	-	-	-	-	-	-
1,2 Dichloroethane	-	-	-	-	-	-	-	-
1,1 Dichloroethane	-	-	-	-	-	-	-	-
1,1,1 Trichloroethane	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-
Tetrachloroethene	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	-	-	-	-	-	-	-	-
1,1 Dichloroethene	-	-	-	-	-	-	-	-
Bromodichloromethane	-	-	-	-	-	-	-	-
Chloroethane	-	-	-	-	-	-	-	-
Toluene	-	-	-	-	-	-	-	-
Total Extractable Petroleum Hydrocarbons	-	-	-	-	-	-	-	-
Total Volatile Organics	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	ND@56000	ND@57000	ND@51000	1400000	ND@54000	ND@55000	ND@56000	ND@54000
Total Petroleum Hydrocarbons	ND	ND	ND	1100000	ND	ND	ND	ND

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	B-2A	B-2B	B-2C	B-2D	B-2A	B-2B	B-2C	B-2D	B-4A
Date	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90
Consultant	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	0-6"	0-6"	0-6"	18-24"	18-24"	18-24"	18-24"	0-6"
Methylene Chloride	-	-	-	-	-	-	-	-	ND@1100
Chloromethane	-	-	-	-	-	-	-	-	ND@1100
1,2 Dichloroethane	-	-	-	-	-	-	-	-	ND@1100
1,1 Dichloroethane	-	-	-	-	-	-	-	-	ND@1100
1,1,1 Trichloroethane	-	-	-	-	-	-	-	-	4700
Trichloroethene	-	-	-	-	-	-	-	-	ND@1100
Tetrachloroethene	-	-	-	-	-	-	-	-	10000
trans-1,2-dichloroethene	-	-	-	-	-	-	-	-	ND@1100
cis-1,2-dichloroethene	-	-	-	-	-	-	-	-	ND@1100
1,1 Dichloroethene	-	-	-	-	-	-	-	-	ND@1100
Bromodichloromethane	-	-	-	-	-	-	-	-	ND@1100
Chloroethane	-	-	-	-	-	-	-	-	ND@1100
Toluene	-	-	-	-	-	-	-	-	ND@1100
Total Extractable Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-
Total Volatile Organics	-	-	-	-	-	-	-	-	
Total Base Neutrals	-	-	-	-	-	-	-	-	14700
GC Fingerprint as Jet Fuel	ND@54000	ND@55000	ND@56000	ND@57000	ND@56000	ND@54000	ND@54000	ND@55000	550000
Total Petroleum Hydrocarbons	ND	240000	190000	87000	ND	34000	72000	ND	

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	B-4B	B-4C	B-4D	B-4A	B-4B	B-4C	B-4D	B-4A	B-4B
Date	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90	11/21/90
Consultant	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A	P&A
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	0-6"	0-6"	18-24"	18-24"	18-24"	18-24"	36-40"	36-40"
Methylene Chloride	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	1700	ND@1100	ND@1100	ND@1100
Chloromethane	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
1,2 Dichloroethane	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
1,1 Dichloroethane	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
1,1,1 Trichloroethane	ND@1200	30000	33000	ND@1100	ND@1100	ND@1100	1300	ND@1100	ND@1100
Trichloroethene	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
Tetrachloroethene	ND@1200	24000	17000	3800	ND@1100	2100	4700	ND@1100	ND@1100
trans-1,2-dichloroethene	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
cis-1,2-dichloroethene	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
1,1 Dichloroethene	ND@1200	ND@1100	1600	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
Bromodichloromethane	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
Chloroethane	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
Toluene	ND@1200	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100	ND@1100
Total Extractable Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-
Total Volatile Organics									
Total Base Neutrals	ND	54000	51600	3800	ND	3800	6000	ND	ND
GC Fingerprint as Jet Fuel	210000	20000	480000	330000	ND	140000	210000	58000	ND
Total Petroleum Hydrocarbons									

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	B-4D	SB-1A	SB-1A (Dup)	SB-2C	SB-2F	SB-3C	SB-3G	MW-2/S-4	TB-21	TB-21
Date	11/21/90	5/18/95	5/18/95	5/18/95	5/18/95	5/18/95	5/18/95	10/18/96	6/13/91	6/13/91
Consultant	P&A	MP	MP	MP	MP	MP	MP	MP	LBG	LBG
Location Type	SB	Geoprobe	Geoprobe	Geoprobe	Geoprobe	Geoprobe	Geoprobe	SB	SB	SB
Sample Depth	36-40"	1.5-2.0	1.5-2.0	5.5-6.0	11.5-12.0	5.5-6.0	12.0-12.5	6 - 8 '	72-78"	90-96"
Methylene Chloride	ND@1100									
Chloromethane	ND@1100									
1,2 Dichloroethane	ND@1100									
1,1 Dichloroethane	ND@1100	6800	ND@0.25	ND@0.25	ND@0.25	15	ND@0.25	380	ND@50	ND@50
1,1,1 Trichloroethane	ND@1100	3900	ND@0.25	ND@0.25	ND@0.25	ND@0.25	ND@0.25	933	ND@50	ND@50
Trichloroethene	ND@1100	7	ND@0.25	ND@0.25	ND@0.25	ND@0.25	ND@0.25	59.3	ND@50	ND@50
Tetrachloroethene	ND@1100	450	ND@0.25	ND@0.25	ND@0.25	ND@0.25	ND@0.25	2380	ND@50	ND@50
trans-1,2-dichloroethene	ND@1100									
cis-1,2-dichloroethene	ND@1100	NA	53	32	ND@0.25	5.5	2.3	107	ND@50	ND@50
1,1 Dichloroethene	ND@1100									
Bromodichloromethane	ND@1100									
Chloroethane	ND@1100									
Toluene	ND@1100									
Total Extractable Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-
Total Volatile Organics		-	-	-	-	-	-	-	-	-
Total Base Neutrals	ND	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	49000	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons		-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-21	TB-21	TB-1	TB-1	TB-1	TB-1	TB-2	TB-2	TB-2	TB-2	TB-3	TB-3	TB-3	TB-3
Date	6/13/91	6/13/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	108-114"	126-132"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	36-42"	54-60"
Methylene Chloride														
Chloromethane			ND	ND	ND	ND	ND	ND	790	ND	ND	ND	1800	ND
1,2 Dichloroethane														
1,1 Dichloroethane	ND@50	ND@50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	ND@50	ND@50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND@50	ND@50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND@50	ND@50	120	56	ND	ND	ND	54	ND	ND	200	96	ND	ND
trans-1,2-dichloroethene														
cis-1,2-dichloroethene	ND@50	ND@50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane														
Toluene														
Total Extractable Petroleum Hydrocarbons	-	-	12	7.5	ND	7.4	ND	ND	6.9	4.9	6.3	5.7	ND	ND
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-4	TB-4	TB-4	TB-4	TB-5	TB-5	TB-5	TB-5	TB-6	TB-6	TB-6	TB-6	TB-7	TB-7	TB-7
Date	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/8/91	3/11/91	3/11/91	3/11/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	36-42"
Methylene Chloride															
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 Dichloroethane															
1,1 Dichloroethane	390	ND	ND	ND	230	180	ND	210	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	1300	290	200	50	460	320	ND	300	100	ND	ND	66	ND	240	ND
Trichloroethene	130	ND	ND	ND	78	55	ND	72	140	ND	ND	ND	ND	210	ND
Tetrachloroethene	2600	260	290	73	2300	1600	69	1700	790	ND	150	430	200	320	ND
trans-1,2-dichloroethene															
cis-1,2-dichloroethene	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	ND	ND	ND	210	ND
Chloroethane															
Toluene															
Total Extractable Petroleum Hydrocarbons	12	4.6			8300	4400	7800	10000	7400	ND	ND	700	13000	12000	5300
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-7	TB-8	TB-8	TB-9	TB-9	TB-9	TB-9
Date	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB
Sample Depth	54-60"	0-6"	18-24"	0-6"	18-24"	36-42"	54-60"
Methylene Chloride							
Chloromethane	ND	ND	ND	ND	ND	ND	ND
1,2 Dichloroethane							
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	150	ND	ND	ND	ND	ND
Tetrachloroethene	ND	790	ND	ND	ND	ND	ND
trans-1,2-dichloroethene							
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	150	ND	ND	ND	ND	ND
Chloroethane							
Toluene							
Total Extractable Petroleum Hydrocarbons	20000	8700	5300	4200	ND	ND	8600
Total Volatile Organics	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-10	TB-10	TB-10	TB-10	TB-11	TB-11	TB-11	TB-12	TB-12	TB-12	TB-12	TB-13	TB-13
Date	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	54-60"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"
Methylene Chloride													
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 Dichloroethane													
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	76	ND	ND	ND	86	ND	ND	ND	ND	ND	ND	630	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	600	120	ND	ND	410	190	ND	ND	ND	ND	ND	1300	150
trans-1,2-dichloroethene													
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane													
Toluene													
Total Extractable Petroleum Hydrocarbons	11000	10000	4600	ND	14000	13000	6600	ND	9800	5200	5100	27000	12000
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-13	TB-13	TB-14	TB-14	TB-14	TB-14	TB-15	TB-15	TB-16	TB-16	TB-16	TB-16	TB-17
Date	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/11/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	36-42"	54-60"	0-6"	18-24"	36-42"	54-60"	0-6"	18-24"	0-6"	18-24"	36-42"	54-60"	0-6"
Methylene Chloride													
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 Dichloroethane													
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	5600	180	190	280	120	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	3100	150	340	300	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene													
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane													
Toluene													
Total Extractable Petroleum Hydrocarbons	4400	ND	46000	27000	5000	ND	13000	5700	17000	12000	4200	ND	6600
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-17	TB-17	TB-17	TB-18	TB-18	TB-19	TB-19	TB-20	TB-20	TB-20	TB-20	TB-21	TB-21
Date	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	3/12/91	6/13/91	6/13/91
Consultant	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG	LBG
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	18-24"	36-42"	54-60"	0-6"	18-24"	0-6"	18-24"	0-6"	18-24"	36-42"	54-60"	72"-78"	90"-96"
Methylene Chloride													
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 Dichloroethane													
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1 Trichloroethane	ND	ND	ND	ND	ND	ND	ND	250	91	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	400	130	ND	ND	ND	ND
trans-1,2-dichloroethene													
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane													
Toluene													
Total Extractable Petroleum Hydrocarbons	5200	ND	ND	27000	6600	30000	4300	ND	ND	4600	ND	4800	6400
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

SITE MANAGEMENT PLAN TABLE 1 - REMEDIAL INVESTIGATION SOIL CONTAMINATION SUMMARY
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-1

SOIL ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	TB-21	TB-21	SB-101	SB-101	SB-101	SB-101	SB-101	SB-101	SB-101	SB-101
Date	6/13/91	6/13/91	11/8/99	11/8/99	11/8/99	11/8/99	11/8/99	11/8/99	11/8/99	11/8/99
Consultant	LBG	LBG	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD
Location Type	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sample Depth	108"-114"	126"-132"	0.5-2.5'	2.5-4.5'	4.5-6.5'	6.5-8.5'	8.5-10.5'	10.5-12.5	12.5-14.5'	14.5-16.5'
Methylene Chloride			ND@2	ND@2	ND@2	ND@2	ND@2	6	3	ND@3
Chloromethane	ND	ND	ND@2	ND@2	ND@2	ND@2	ND@2	ND@2	ND@3	ND@3
1,2 Dichloroethane			ND@2	ND@2	ND@2	ND@2	ND@2	ND@2	3	ND@3
1,1 Dichloroethane	ND	ND	ND@1	ND@1	ND@1	9	ND@1	340	74	49
1,1,1 Trichloroethane	ND	ND	2	4	ND@1	ND@1	ND@1	21	3	5
Trichloroethene	ND	ND	ND@1	2	ND@1	2	ND@1	7	2	4
Tetrachloroethene	ND	ND	43	100	9	85	1	37	8	1
trans-1,2-dichloroethene			ND@2	ND@2	ND@2	ND@2	ND@2	8	8	ND@3
cis-1,2-dichloroethene	ND	ND	ND@2	ND@2	ND@2	13	ND@2	400	400	39
1,1 Dichloroethene	ND	ND	ND@2	ND@2	ND@2	ND@2	ND@2	12	5	ND@2
Bromodichloromethane	ND	ND	ND@2	ND@2	ND@2	ND@2	ND@2	ND@2	ND@2	ND@2
Chloroethane			ND@3	ND@3	ND@3	ND@4	ND@3	133	26	34
Toluene			ND@1	ND@1	ND@1	ND@1	ND@1	2	2	ND@1
Total Extractable Petroleum Hydrocarbons	ND	ND	-	-	-	-	-	-	-	-
Total Volatile Organics	-	-	-	-	-	-	-	-	-	-
Total Base Neutrals	-	-	-	-	-	-	-	-	-	-
GC Fingerprint as Jet Fuel	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons	-	-	ND	ND	10	ND	ND	ND	ND	ND

1. All results are in ug/kg - parts per billion (ppb).
2. ND@2 indicates not detected at method detection limit

TABLE 2 - MONITORING WELL NETWORK

Westchester County Airport Hangar D1 Bay 1B
Site No. 360037

Location	Well ID	Date Installed	Well Diameter (inches)	Screen Slot Size	Total Depth (feet)	Depth to Rock (feet)[1]	Screened Interval (feet)	Top of Casing Elevation (feet)[2]	Well Type
Upgradient	MW-5	11/9/1999	2	10	15	--	5-15	411.83	Overburden
	MW-15S	6/10/2011	**3**	open	26.5	10	15-26.5	411.99	Rock
	MW-16	6/9/2011	2	20	12	9	5-12	411.69	Overburden
	MW-17S	6/9/2011	2	20	35	13	25-35	411.39	Rock
	MW-18	6/10/2011	2	20	15	--	5-15	411.81	Overburden
Bay 1A	MW-19	6/15/2012	2	10	15	15	5-20	412.29	Overburden
	MW-20	6/15/2012	2	10	12.5	9.5	3-12	411.75	Overburden
	MW-21	6/14/2012	Location obstructed by a concrete pipe, well not completed.						
	MW-22	6/14/2014	Refusal at 4.5', well not completed.						
	MW-23	6/14/2012	2	10	11	9.5	3.5-10.5	411.54	Overburden
	MW-24	6/15/2012	2	10	15	15	3-15	412.00	Overburden
Bay 1B (Site)	IP-1	11/22/2008	2	10	17	--	12-17	412.35	ISCO addition location.
	IP-2	11/22/2008	2	10	14	--	9-14	412.35	ISCO addition location.
	GP-2B	8/3/2001	1	Geoprobe	15			412.32	Overburden
	GP-03	8/3/2001	1	Geoprobe	15			412.29	Overburden
	MW-1	10/8/1996	2	10	14	14	4-14	412.01	Overburden
	MW-2	10/8/1996	2	10	16	16	6-16	411.66	Overburden
	MW-8S	5/31/2000	3	open	25	15	15-25	412.13	Overburden
	MW-8D	5/23/2000	3	open	45	13	35-45	412.20	Rock
	MW-12	11/22/2008	2	10	15	--	5-15	412.36	Overburden
	MW-13	11/22/2008	2	10	20	--	5-20	411.87	Overburden
	MW-14	11/23/2008	2	10	17	--	7-17	411.81	Overburden
Cross-gradient from Bay 1B	MW-9S	5/17/2000	3	open	20	7.5	7.5-20	411.53	Rock
	MW-9D	5/22/2000	3	open	40	3.5	30-40	411.77	Rock
Cross-gradient from Bay 2	MW-6	11/8/1999	2	10	20	20	15-20	409.72	Overburden
Bay 2	MW-3	10/7/1996	2	10	18	18	8-18	409.49	Overburden
	MW-4	10/7/1996	2	10	18	18	8-18	408.89	Overburden
	MW-7S	11/9/1999	2	10	25	13	15-25	409.16	Rock
	MW-7D	5/31/2000	3	open	45	11	35-45	409.34	Rock
	MW-10S	5/23/2000	3		37	25	27-37	409.43	Rock
	MW-10D	5/24/2000	3	open	55	25	45-55	409.40	Rock
Downgradient	MW-11S	6/6/2000	3	open	40	20	30-40	Well lost	Rock
	MW-11D	6/5/2000	3	open	60	20	50-60	Well lost	Rock

Notes:
1. "--" = Rock not recorded as being encountered on well log.
2. Vertical datum established from National Geodetic Vertical Datum of 1929 (NGVD 29).
3. Well proposed for post-remedial monitoring program to be sampled for Volatile Organic Compounds by EPA Method 8260.

February 2015

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
GP-02B	8/08/01	5 U	110	10	5 U	280	16	5 U	150	43	6	5 U	5 U	615
MW-01 Area	9/20/01	9	100	9	5 U	260	19	5 U	90	43	8	5 U	5 U	538
	11/29/01	6	99	10	5 U	260	19	5 U	72	59	7	5 U	5 U	532
	2/07/02	6.4	95.9	7.4	2 U	284	15.8	5 U	10.5	24.6	10.2	5 U	2 U	455
	5/13/02	5.8	110	12.4	2 U	283	18.9	2.9 J	136	79.3	16.7	5 U	2 U	665
	8/29/02	7.6	119	9.7	2 U	305	19.1	1.1 J	74.5	68.9	31.7	5 U	2 U	637
	11/14/02	1.3 U	99.2	9.2	1.1 U	299	16	0.19 U	90.5	71	20	0.37 U	1.1 U	605
	2/12/03	4.4 J	101	9.3	0.62 J	NA	16.9	0.094 U	127	91.2	21.9	0.18 U	0.53 U	372
	5/15/03	4.2	99.1	6.5	U	NA	12.6	1.1	80.7	79.3	21.5	U	U	305
	8/13/03	3.5	77.2	5.7	U	NA	12	U	50.5	67	19.5	U	U	235
	11/13/03	2.9	60.1	2.3	U	NA	7.1	0.41 J	8.4	17.2	31.2	U	U	130
	2/09/04	3.2	76.8	4.4	U	NA	12.3	U	11.7	40	24.7	U	U	173
	5/28/04	U	97.8	6.3	U	NA	13.7	U	8.8	51.3	16.5	U	U	194
	8/09/04	U	94.8	5.4	U	NA	13.6	U	8.1	50.3	14.2	U	U	186
	10/27/04	U	96.9	5.4	U	NA	13.9	U	2.8	21.7	14.8	U	U	156
	12/16/04	U	81.6	6.2	U	NA	13.1	U	2 J	17.1	11.5	U	U	132
	3/17/05	U	24.7	3.2	U	NA	2.5	13.9	151	21.4	U	U	U	217
	6/22/05	U	60.7	1.3	U	257	8.1	U	0.73 J	7.8	4.3	U	U	340
	9/13/05	1.1	81.6	3.2	U	269	14.2	U	0.34 J	2.9	14.8	U	U	387
	12/20/05	U	79	3.2	U	370	13.9	U	U	5.3	10.3	U	U	482
	3/13/06	U	56.4	1.8 J	U	314	10	U	U	3.6	5.6	U	U	391
	6/22/06	1.1 U	54.2	2.4	0.59 U	328	9.1	0.55 U	0.55 U	4.3	8.1	0.43 U	0.53 U	406
	9/06/06	U	50	1.6 J	U	326	9.3	U	U	4.1	4	U	U	395
	12/04/06	0.56 U	65.2	3	0.29 U	374	13.8	0.28 U	0.28 U	2.6	8.1	0.22 U	0.27 U	467
	3/13/07	0.56 U	65.1	4	0.29 U	390	15.9	0.28 U	0.28 U	2.8	11.1	0.22 U	0.27 U	489
	6/11/07	0.67 U	38.5	0.87 J	0.29 U	244	8	0.3 U	0.28 U	0.5 J	3.7	0.25 U	0.21 U	296
	9/04/07	0.67 U	51.3	2	0.29 U	321	12	0.3 U	0.28 U	0.77 J	8.7	0.25 U	0.21 U	396
	12/14/07	0.67 U	15.4	0.74 J	0.29 U	110	4.2	0.3 U	0.28 U	0.38 J	3.7	0.25 U	0.21 U	134
	3/12/08	0.67 U	50.8	2.7	0.29 U	312	13.4	0.3 U	0.28 U	3.1 B	13.7	0.25 U	0.21 U	396
	6/16/08	0.22 U	40.8	1.9	0.35 U	283	12.7	0.24 U	0.29 U	1.9	14.6	0.16 U	0.16 U	355
	9/11/08	0.22 U	43.3	1.9	0.35 U	213	10.9	0.24 U	0.29 U	1.8	0.21 U	0.16 U	0.16 U	271
	12/19/08	0.22 U	32.8	1.5	0.35 U	226	10.7	0.24 U	0.47 JB	2.6	9.4	0.16 U	0.16 U	283
	2/24/09	0.22 U	32.1	1.2	0.35 U	200	9.4	0.24 U	0.29 U	1.5	14.5	0.16 U	0.16 U	259
	5/11/09	0.22 U	38.1	1.6	0.35 U	282	11.3	0.24 U	0.49 J	1.6	16.2	0.16 U	0.16 U	351
	8/11/09	0.37 U	34.6	1.3	0.33 U	245	11.1	0.26 U	0.27 U	3.3	14.1	0.23 U	0.30 U	309
	11/09/09	0.37 U	28.8	1.1	0.33 U	193	9.4	0.26 U	0.69 J	1.7	12.3	0.23 U	0.30 U	247
	2/22/10	0.37 U	31.5	1.5	0.33 U	238	11.5	0.26 U	0.27 U	2.4	16.6	0.23 U	0.30 U	302
	5/20/10	0.37 U	24.3	0.87 J	0.33 U	198	8.8	0.26 U	1.1	1.5	13.9	0.23 U	0.30 U	248
	8/12/10	0.37 U	25.6	1.4 B	0.33 U	183	9.7	0.26 U	0.32 J	0.99 J	17.0	0.23 U	0.30 U	238
	11/12/10	0.37 U	29.7	1.0	0.33 U	181	10.2	0.26 U	1.6	1.4	22.9	0.23 U	0.30 U	248
	2/17/11	0.37 U	21.4	0.77 J	0.33 U	157	8.0	0.26 U	0.27 U	1.7	14.3	0.23 U	0.30 U	203
	6/16/11	0.37 U	23.4	0.92 J	0.18 U	156	9.4	0.24 U	0.32 U	2.1	18.9	0.21 U	0.20 U	211
	8/18/11	0.37 U	18.4	1.00	0.18 U	143	8.0	0.24 U	0.69 J	1.9	14.0	0.21 U	0.20 U	187
	11/03/11	0.37 U	17.9	0.70 J	0.18 U	132	8.8	0.24 U	0.32 U	0.56 J	12.5	0.21 U	0.20 U	172
	2/15/12	1.0 U	12.1	1.0 U	1.0 U	46.4	5.64	1.0 U	4.62	1.14	6.18	1.0 U	5.0 U	76
	5/16/12	1.0 U	15.5	1.0 U	1.0 U	77.5	7.07	1.0 U	1.0 U	1.0 U	9.50	1.0 U	5.0 U	110
	8/08/12	1.0 U	16.6	1.0 U	1.0 U	90.9	7.51	1.0 U	1.0 U	1.0 U	10.80	1.0 U	5.0 U	126
	11/05/12	1.0 U	15.5	1.0 U	1.0 U	84.1	9.00	1.0 U	4.41	2.82	9.09	1.0 U	5.0 U	125
	2/21/13	1.0 U	13.3	0.45 J	1.0 U	87.2	5.5	1.0 U	1.4	11.0	7.5	1.0 U	0.73 J	127
	5/15/13	1.0 U	10.7	0.37 J	1.0 U	72.5	5.5	1.0 U	1.2	6.0	6.0	0.87 J	2.0 U	103
	8/26/13	1.0 U	12.4	1.0 U	1.0 U	92.4	6.5	1.0 U	3.1	7.3	7.6	1.0 U	2.0 U	129
	11/11/13	1.0 U	11.1	1.0 U	1.0 U	63.9	6.4	1.0 U	5.2	11.3	5.6	1.0 U	2.0 U	104
	2/19/14	1.0 U	12.1	0.45 J	1.0 U	63.5	6.5	1.0 U	1.7	24.2	8.5	1.0 U	2.0 U	117
	5/20/14	1.0 U	11.0	1.0 U	1.0 U	83.8	5.9	1.0 U	3.4	23.2	7.3	1.0 U	2.0 U	135
	8/06/14	1.0 U	13.1	1.0 U	1.0 U	101	6.3	1.0 U	1.8	25.0	9.0	1.0 U	2.0 U	156
	11/17/14	1.0 U	12.7	0.59 J	1.0 U	91.9	5.8	1.0 U	2.4	24.2	9.8	1.0 U	2.0 U	147
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
GP-03	8/20/01	5 U	120	19	5 U	260	16	58	330	48	5	5 U	5 U	856
MW-01 Area	9/20/01	5	110	11	5 U	260	18	11	140	52	7	5 U	5 U	614
	11/29/01	5 U	97	13	5 U	220	15	23	240	55	5 U	5 U	5 U	663
	2/06/02	3.2 J	117	12.6	2 U	240	12.9	27.4	237	58.6	5.2	5 U	2 U	714
	5/13/02	2.7 J	102	9.2	2 U	204	10.5	25.8	221	63.6	5.1	5 U	2 U	644
	8/29/02	3.9 J	117	9.3	2 U	226	12.8	17.6	163	66.1	6.6	5 U	2 U	622
	11/14/02	0.65 U	81.1	7.9	0.57 U	180	8.7	13	190	62.4	4.6	0.18 U	0.53 U	548
	2/12/03	2.4 J	84.9	8.4	0.57 U	NA	9.5	13.5	186	85.3	5	0.18 U	0.53 U	395
	5/15/03	1.8	84.7	7.3	U	NA	7.9	22.7	199	74.6	6.3	U	U	404
	8/13/03	2.2	95	8.3	U	NA	8.6	18.4	185	95.7	8	U	U	421
	11/13/03	12.3	64.1	3.5	U	NA	9.2	4	23.2	32.9	128	U	U	277
	2/09/04	3.1	76.9	6.6	U	NA	9.3	13.8	157	94.8	22.4	U	U	384
	5/27/04	U	84.3	8.1	U	NA	7.3	23.6	167	101	10.3	U	U	402
	8/09/04	U	80.5	6.9	U	NA	7.9	18.1	174	100	8.5	U	U	396
	10/27/04	2.3	88.4	6.8	U	NA	10	20	176	113	5.7	U	U	422
	12/16/04	2.3	79.1	7.1	U	NA	9.3	17.8	168	93.9	5.9	U	U	383
	3/17/05	2	70.6	7.5	U	NA	8.5	21.5	208	109	6.4	U	U	434
	6/22/05	1.9	71.9	5.9	U	197	8	19.6	228	122	6.3	U	U	661
	9/12/05	1.9	77.4	6.9	U	223	10.3	19.7	240	137	6.2	U	U	722
	12/19/05	1.1	65	5.7	U	258	8	16.8	246	123	3.8	U	U	727
	3/13/06	U	39.7	1.9	U	131	3.7	4.6	42.1	37.2	2.2	U	U	262
	6/22/06	1.1	54.1	4.4	0.29 U	208	6.7	11.8	221	129	4.3	0.22 U	0.27 U	640
	9/06/06	0.76 J	51.7	4.7	U	213	8	10.2	183	116	3.7	U	U	591
	12/05/06	0.56 U	51.6	4.6	0.29 U	193	8.1	11.7	199	139	4.6	0.22 U	0.27 U	612
	3/12/07	0.56 U	49.6	4.8	0.29 U	211	9.3	9.3	213	128	3.9	0.22 U	0.27 U	629
	6/11/07	0.67 U	42.8	3.5	0.29 U	190	7.7	7.6	185	103	3.4	0.25 U	0.21 U	543
	9/04/07	0.67 U	47.9	3.9	0.29 U	199	8.2	9.3	183 B	104	4.0	0.25 U	0.21 U	559
	12/13/07	0.67 U	35.3	2.9	0.29 U	178	7.5	6.0	194	106	2.9	0.25 U	0.21 U	533
	3/12/08	0.67 U	39.0	3.5	0.29 U	183	7.8	6.4	157	112 B	3.7	0.67 J	0.21 U	513
	6/16/08	0.22 U	31.0	2.7	0.35 U	162	7.6	5.8	192	98.2	3.9	0.86 J	0.16 U	504
	9/11/08	0.22 U	30.8	2.3	0.35 U	155	6.3	5.3	149	104	0.21 U	0.53 J	0.16 U	453
	12/19/08	0.22 U	30.1	1.9	0.35 U	151	6.3	3.8	95.5 B	79	3.9	0.32 J	0.16 U	372
	2/24/09	0.22 U	26.0	1.7	0.35 U	142	5.9	4.2	128	96.5	4.5	0.16 U	0.16 U	409
	5/11/09	0.22 U	34.2	2.4	0.35 U	187	7.1	5.2	127	92.5	5.0	0.32 J	0.16 U	461
	8/11/09	0.37 U	29.7	2.0	0.33 U	183	7.2	4.3	162	119	4.6	0.23 U	0.30 U	512
	11/09/09	0.37 U	21.7	0.97 J	0.33 U	146	5.0	2.0	97.3	78.5	2.5	0.23 U	0.30 U	354
	2/22/10	0.37 U	28.1	2.6	0.33 U	188	7.7	3.9	193	115	4.6	0.25 J	0.30 U	543
	5/20/10	0.37 U	24.0	2.0	0.33 U	138	6.5	2.9	115	82.9	4.4	0.23 U	0.30 U	376
	8/12/10	0.37 U	20.9	1.9 B	0.33 U	136	6.0	2.3	141	92.5	4.2	0.23 U	0.30 U	405
	11/12/10	0.37 U	25.8	1.7	0.33 U	164	6.8	2.4	117	107	6.5	0.23 U	0.30 U	431
	2/17/11	0.37 U	20.3	1.4	0.33 U	152	6.1	2.2	107	91.1	4.8	0.23 U	0.30 U	385
	6/16/11	0.37 U	19.8	1.8	0.18 U	139	6.1	2.2	129	82.1	6.0	0.21 U	0.20 U	386
	8/18/11	0.37 U	17.8	1.7	0.18 U	128	5.7	1.6	101	73.7	6.8	0.21 U	0.20 U	336
	11/03/11	0.37 U	14.5	1.4	0.18 U	136	5.5	1.4	84.9	87.8	4.9	0.21 U	0.20 U	336
	2/15/12	1.0 U	15.4	1.06	1.0 U	109	6.23	1.0 U	59	63	7.89	1.0 U	5.0 U	262
	5/16/12	1.0 U	13.4	1.0 U	1.0 U	99.5	4.72	1.46	102	59	5.86	1.0 U	5.0 U	286
	8/08/12	1.0 U	17.1	1.23	1.0 U	144	5.02	2.31	145	79.6	8.03	1.0 U	5.0 U	402
	11/05/12	1.0 U	14.2	1.0 U	1.0 U	115	6.06	1.53	135	68	4.72	1.0 U	5.0 U	345
	2/21/13	1.0 U	14.2	1.2	1.0 U	137	3.7	1.8	120	68	6.6	1.0 U	2.0 U	353
	5/15/13	1.0 U	17.0	0.89 J	1.0 U	144	5.9	0.89 J	71.3	69.8	12.6	0.82 J	2.0 U	323
	8/26/13	1.0 U	15.3	1.0	1.0 U	143	5.5	1.1	114	72	9.6	1.0 U	2.0 U	362
	11/12/13	1.0 U	16.0	1.0	1.0 U	162	5.5	1.3	133	93.3	12.2	1.0 U	2.0 U	424
	2/17/14	1.0 U	13.4	0.88 J	1.0 U	113	4.6	1.0	109	76.5	14.8	1.0 U	2.0 U	333
	5/20/14	1.0 U	12.3	0.77 J	1.0 U	133	4.0	1.5	138	75.5	8.1	1.0 U	2.0 U	373
	8/06/14	1.0 U	13.5	0.92 J	1.0 U	135	4.3	1.3	138	82.7	12.6	1.0 U	2.0 U	388
	11/17/14	1.0 U	12.0	0.65 J	1.0 U	113	3.8	0.39 J	38.5	44.6	14.7	1.0 U	2.0 U	228
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-01	10/23/96	5 U	220	23	5 U	444	29	31	135	36	13	NA	5 U	931
MW-01 Area	11/21/96	8 U	160	12	8 U	465	24	24	79	28	8 U	NA	18	810
	7/24/97	11	220	20	2 U	710	34	17	21	19	14	NA	12	1078
	12/16/97	7	180	18	2 U	480	34	19	50	22	12	NA	2 U	822
	8/12/98	7	170	24	2 U	530	39	17	59	23	15	NA	2 U	884
	11/22/99	7	140	18	2 U	460	29	19	33	42	10	NA	2 U	758
	7/11/00	5	120	18	5 U	380	18	19	60	80	7	5 U	5 U	707
	10/24/00	4 J	110	17	1 U	440	19	17	50	67	7	1 U	2 U	731
	3/27/01	5	120	17	5 U	480	23	25	72	64	8	5 U	5 U	814
	8/08/01	5 U	120	15	5 U	480	22	13	30	52	8	5 U	5 U	740
	9/20/01	15	69	5 U	5 U	120	6	5 U	5 U	5 U	5 U	5 U	5 U	210
	11/16/01	5 U	49	5 U	5 U	210	10	5 U	5 U	5 U	5 U	5 U	5 U	269
	2/06/02	10.5	64.1	4	2 U	287	16.3	5 U	1.1	1.4	7.7	5 U	2 U	392
	5/10/02	4.9 J	78.3	4.5	4 U	350	15.6	10 U	2 U	2.8	7.4	10 U	4 U	464
	8/29/02	5.3	94.4	5.4	2 U	350	13.5	5 U	1 U	5.3	27	5 U	2 U	501
	11/12/02	1.3 U	82.9	5.2	1.1 U	357	12.9	0.19 U	0.78 U	3.5	19.4	0.37 U	1.1 U	481
	2/11/03	2.7 J	70.7	6.4	0.57 U	NA	10.8	0.094 U	0.39 U	3.6	20.2	0.18 U	0.53 U	114
	5/15/03	U	78.9	5.8	U	NA	11	1	U	20.5	19.9	U	U	137
	8/13/03	1.3	88.5	6.5	U	NA	13	1.1	U	16.1	28	U	U	155
	11/11/03	1.2	90.8	6.2	U	NA	11.8	1.4	U	15.2	30.5	U	U	157
	2/09/04	1.4	85.7	6.6	U	NA	12.1	1.4	U	17.2	29.7	U	U	154
	5/27/04	U	90.8	7.7	U	NA	18	U	1.4	27.5	51.8	U	U	197
	8/09/04	U	90	6.2	U	NA	17.4	1.1	0.5 J	19	31.9	U	U	166
	3/17/05	2.6	43.6	1.9	U	NA	18	U	0.91 J	1.4	91.4	U	U	160
	6/20/05	2.6	49.4	1.3	U	172	16.1	U	0.58 J	2.3	85.3	U	U	330
	9/12/05	2.7	64.1	2.7	U	197	32.2	U	0.54 J	1.3	113	U	U	414
	12/19/05	U	49.8	1.6	U	166	26.6	U	0.59 J	2.5	86.5	U	U	334
	3/13/06	U	46	U	U	166	23.5	U	0.81 J	1.2	63.2	U	U	301
	6/22/06	0.56 U	39.7	0.95 J	0.29 U	87.1	20.4	0.28 U	0.28 U	1.1	77.9	0.22 U	0.27 U	227
	9/06/06	0.63 J	47	1.6	U	192	25.7	U	U	0.8 J	57.2	U	U	325
	12/04/06	0.56 U	42.5	0.84 J	0.29 U	103	22.5	0.28 U	0.28 U	0.43 J	49	0.22 U	0.27 U	218
	3/12/07	0.56 U	30.2	0.83 J	0.29 U	78	21.1	0.28 U	0.28 U	2.1	30.5	0.22 U	0.27 U	163
	6/11/07	0.67 U	29.8	0.67 J	0.29 U	81.5	21.7	0.3 U	0.28 U	0.41 J	26.7	0.25 U	0.21 U	161
	9/04/07	0.67 U	26.3	0.65 J	0.29 U	72.7	0.32 U	0.3 U	0.28 U	0.26 U	26.4	0.25 U	0.21 U	126
	12/12/07	0.67 U	27.1	0.7 J	0.29 U	99.2	25.4	0.3 U	0.98 J	0.6 J	23.1	0.25 U	0.21 U	177
	3/12/08	0.67 U	25.3	0.72 J	0.29 U	95	21.5	0.3 U	0.28 U	3.2 B	16.3	0.25 U	0.21 U	162
	6/16/08	0.52 J	18.6	0.29 U	0.35 U	30.7	19.8	0.24 U	0.29 U	0.28 J	14.4	0.16 U	0.16 U	84
	9/11/08	0.22 U	15	0.29 U	0.35 U	44	19	0.24 U	0.29 U	0.18 U	8.5	0.16 U	0.16 U	87
	12/19/08	0.22 U	14	0.53 J	0.35 U	74.6	20	0.24 U	0.29 U	1.5	9.4	0.16 U	0.16 U	120
	2/24/09	0.22 U	13.8	0.29 U	0.35 U	65.9	15.5	0.24 U	0.29 U	0.53 J	12.2	0.16 U	0.16 U	108
	5/11/09	0.22 U	19.1	0.77 J	0.35 U	115	22.9	0.24 U	0.51 J	3.1	10.8	0.16 U	0.16 U	172
	8/11/09	0.37 U	15.4	0.40 U	0.33 U	72.1	21.9	0.26 U	2.7	2.2	13.9	0.23 U	0.30 U	128
	11/09/09	0.37 U	13.9	0.40 U	0.33 U	67.8	19.4	0.26 U	0.27 U	1.1	16.5	0.23 U	0.30 U	119
	2/22/10	0.37 U	11.6	0.40 U	0.33 U	51.0	18.7	0.26 U	0.27 U	0.51 J	10.5	0.23 U	0.30 U	92
	5/20/10	0.37 U	7.6	0.40 U	0.33 U	17.1	12.5	0.26 U	0.49 J	0.69 J	6.3	0.23 U	0.30 U	45
	8/12/10	0.37 U	8.4	0.5 JB	0.33 U	44.4	19.2	0.26 U	0.27 U	0.24 U	7.9	0.23 U	0.30 U	80
	11/12/10	0.37 U	14.3	0.76 J	0.33 U	122.0	21.3	0.26 U	1.5	2.7	11.0	0.23 U	0.30 U	174
	2/17/11	0.37 U	13.3	0.56 J	0.33 U	140.0	14.1	0.26 U	0.27 U	9.8	8.1	0.23 U	0.30 U	186
	6/16/11	0.37 U	9.5	0.28 U	0.18 U	49.1	17.1	0.24 U	0.32 U	0.74 J	11.1	0.21 U	0.20 U	88
	8/18/11	0.37 U	7.8	0.28 U	0.18 U	45.3	18.6	0.24 U	0.32 U	0.28 J	10.5	0.21 U	0.20 U	82
	11/03/11	0.37 U	4.8	0.28 U	0.18 U	8.2	10.9	0.24 U	0.32 U	0.21 U	3.4	0.21 U	0.20 U	27
	2/15/12	1.0 U	4.39	1.0 U	1.0 U	8.51	11.2	1.0 U	1.0 U	1.0 U	6.07	1.0 U	5.0 U	30
	5/16/12	1.0 U	5.45	1.0 U	1.0 U	50.2	12.9	1.0 U	1.0 U	1.0 U	5.27	1.0 U	5.0 U	74
	8/09/12	1.0 U	7.96	1.0 U	1.0 U	73.2	12.2	1.0 U	1.63	17.3	9.77	1.0 U	5.0 U	122
	11/05/12	1.0 U	10.7	1.0 U	1.0 U	105.0	18.6	1.0 U	3.1	25.6	8.89	1.0 U	5.0 U	172
	2/21/13	1.0 U	11.1	0.73 J	1.0 U	123	11.6	1.0 U	2.2	44.3	10.3	1.0 U	2.0 U	203
	5/15/13	1.0 U	2.0	1.0 U	1.0 U	6.7	2.3	1.0 U	2.6	3.1	0.89 J	0.23 J	2.0 U	18
	8/26/13	1.0 U	4.9	1.0 U	1.0 U	51.8	8.0	1.0 U	0.32 J	11.3	5.20	1.0 U	2.0 U	82
	11/11/13	1.0 U	6.4	1.0 U	1.0 U	69.1	11.3	1.0 U	1.4	9.4	8.1	1.0 U	2.0 U	106
	2/17/14	1.0 U	7.5	1.0 U	1.0 U	71.1	10.1	1.0 U	3.8	15.6	8.7	1.0 U	2.0 U	117
	5/20/14	1.0 U	8.4	1.0 U	1.0 U	107.0	10.7	1.0 U	2.2	17.0	8.9	1.0 U	2.0 U	154
	8/06/14	1.0 U	8.6	1.0 U	1.0 U	89.2	11.4	1.0 U	1.0 U	11.7	13.1	1.0 U	2.0 U	134
	11/17/14	1.0 U	8.6	0.55 J	1.0 U	94.7	8.9	1.0 U	0.51 J	5.7	8.6	1.0 U	2.0 U	128
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-02	10/23/96	895	1980	89	10 U	610	10 U	802	76	61	10 U	NA	10 U	4513
MW-02 Area	11/21/96	949	1500	58	10 U	544	10 U	835	59	47	10 U	NA	98	4090
	7/24/97	5500	5800	190	10 U	1800	10 U	580	64	19	10 U	NA	29	13982
	12/16/97	1500	1800	84	2 U	810	4 J	340	52	26	3 J	NA	5	4624
	8/12/98	1600	1800	78	3 J	940	4 J	340	49	65	3 J	NA	7	4889
	11/22/99	2200	2700	150	7 J	1900	11	610	41	220	4 U	NA	12	7851
	7/12/00	1200	2500	130	7	2200	7	980	57	600	5 U	5 U	8	7689
	10/24/00	1100	2300	120	8	2700	8	590	37	400	2 J	1 U	8	7273
	3/27/01	670	1100	56	5 U	1300	5 U	160	14	71	5 U	5 U	5 U	3371
	8/09/01	1300	2200	70	13 U	3400	13 U	110	41	29	13 U	13 U	13 U	7150
	9/20/01	2000	1300	90	10 U	2900	10 U	48	79	33	10 U	10 U	12	6462
	11/16/01	1400	1600	64	13 U	2700	13 U	140	39	24	13 U	13 U	13 U	5967
	2/06/02	1140	1310	55.7	40 U	2170	100 U	147	38.9	50.5	20 U	100 U	40 U	4912
	5/10/02	1150	1128	45.5	7.9 J	1890	7.5 J	92.5	22.3	67.2	12 U	50 U	20 U	4411
	8/29/02	1110	1160	32.9 J	40 U	2180	100 U	53.4 J	21.1	37.7	20 U	100 U	40 U	4595
	11/12/02	1240	1070	42	5.7 U	2780	1.8 U	30.5 J	3.9 U	1.6 U	71.8	1.8 U	5.3 U	5234
	2/11/03	562	787	36.3	5.5	NA	8.2	64.7	7.3	17.1	107	0.52 J	5.3	1601
	5/15/03	644	637	17.9	2.4	NA	7.8	39.9	5	24.1	50.4	0.99 J	2.1 J	1432
	8/13/03	581	542	17.9	U	NA	5.5	21.1	3.7 J	4.3 J	198	U	U	1374
	11/11/03	529	587	10.3	1.8 J	NA	3.5 J	16.5	U	U	570	U	U	1718
	2/09/04	1070	717	15.9	U	NA	U	34.2	U	5 J	743	U	U	2585
	5/28/04	870	345	18.8	4.1	NA	9.9	4.1	2.7	5.8	461	U	3.8	1725
	8/09/04	535	208	8	2.2	NA	8.6	2.3	0.56 J	2.1	311	U	1.7 J	1079
	10/27/04	816	260	14.3	4.7 J	NA	11.3	U	U	U	447	U	4.6 J	1558
	12/16/04	918	309	U	U	NA	15.5	U	U	4.3 J	665	U	U	1912
	3/17/05	293	158	5.8	2	NA	9.4	3.3	U	8.4	302	U	1.7 J	784
	6/22/05	211	126	2.9	1.4	588	6.4	3.6	U	21.5	237	U	1.1 J	1199
	9/13/05	197	121	3.3	1.3	410	6.6	1.7	U	3	162	U	1.3 J	907
	12/19/05	133	77.5	2.2 J	U	364	4.5	U	U	4	177	U	U	762
	3/13/06	100	68.3	2.8	0.64 J	344	4.8	1.1	0.35 J	7.2	178	U	0.68 J	708
	6/22/06	110	74.5	2.4	0.77 J	308	4.7	0.88 J	0.28 U	1.6	198	0.22 U	0.87 J	702
	9/06/06	58	52.5	1.7	U	226	4	0.98 J	U	1	126	U	0.46 J	471
	12/04/06	39.7	56.3	2	0.29 U	189	4.5	3.7	2.3	15.6	161	0.22 U	0.27 U	474
	3/13/07	23	42.4	2	0.29 U	132	2.7	3.3	2.2	36.6	81.2	0.22 U	0.27 U	325
	6/11/07	27.4	42.3	1.1	0.29 U	112	2.5	1.2	0.35 J	11.8	103	0.25 U	0.33 J	302
	9/04/07	19.2	48.7	1.1	0.29 U	102	2.7	0.92 J	7.4 B	8.1	97.5	0.25 U	0.21 U	288
	12/12/07	8.8	23.6	0.28 U	0.29 U	45	1.1	0.3 U	0.33 J	0.33 J	38.7	0.25 U	0.21 U	118
	3/11/08	7.6	32	0.66 J	0.29 U	62	1.9	0.3 U	0.28 U	1.4 B	53.3	0.25 U	0.21 U	159
	6/16/08	4.2	28.3	0.82 J	0.35 U	60.7	1.6	1.3	9.3	39.7	57.9	0.16 U	0.16 U	204
	9/11/08	1.5	22.7	0.73 J	0.35 U	55.5	1.2	0.89 J	0.55 J	20.2	46	0.16 U	0.16 U	149
	12/19/08	1.2	22.7	0.51 J	0.35 U	47.1	1.2	0.24 U	0.29 U	3.2	43.3	0.16 U	0.16 U	119
	2/24/09	0.22 U	27.7	0.29 U	0.35 U	32.2	1.3	0.24 U	0.29 U	1.5	51.1	0.16 U	0.16 U	114
	5/11/09	0.22 U	23.2	0.57 J	0.35 U	62.8	1.4	0.24 U	0.57 J	6.6	41.2	0.16 U	0.16 U	136
	8/11/09	0.37 U	22.1	0.46 J	0.33 U	56.5	1.3	1.3	4.8	30.6	34.1	0.23 U	0.30 U	151
	11/09/09	0.37 U	19.6	0.48 J	0.33 U	45.2	1.2	0.46 J	0.91 J	26.9	31.5	0.23 U	0.30 U	126
	2/22/10	0.37 U	23.9	0.40 U	0.33 U	44.3	1.4	0.26 U	0.27 U	9.3	33.1	0.23 U	0.30 U	112
	5/20/10	0.37 U	22.7	0.44 J	0.33 U	51.1	2.1	0.98 J	2.3	20.6	25.8	0.23 U	0.30 U	126
	8/12/10	0.37 U	16.7	0.87 JB	0.33 U	48.9	1.4	0.58 J	4.0	46.5	14.3	0.23 U	0.30 U	133
	11/12/10	0.37 U	13.7	0.69 J	0.33 U	70.0	0.96 J	0.26 U	0.6 J	9.1	16.4	0.23 U	0.30 U	111
	2/17/11	0.37 U	11.0	0.40 U	0.33 U	36.0	0.46 J	0.26 U	0.27 U	3.0	9.4	0.23 U	0.30 U	60
	6/16/11	0.37 U	16.8	0.68 J	0.18 U	58.5	1.4	0.76 J	13.8	33.5	16.3	0.21 U	0.20 U	142
	8/18/11	0.37 U	16.9	0.8 J	0.18 U	55.0	1.2	0.69 J	12.1	38.5	15.8	0.21 U	0.20 U	141
	11/03/11	0.37 U	20.2	0.56 J	0.18 U	45.0	1.6	0.54 J	2.6	20.8	19.7	0.21 U	0.20 U	111
	2/15/12	1.0 U	18.0	1.0 U	1.0 U	31.2	1.68	1.0 U	1.0 U	18.3	17.4	1.0 U	5.0 U	87
	5/16/12	1.0 U	6.28	1.0 U	1.0 U	25.6	3.20	1.0 U	1.33	7.39	1.28	1.0 U	5.0 U	45
	8/08/12	1.0 U	12.60	1.0 U	1.0 U	22.8	1.0 U	1.0 U	1.0 U	1.2	11.8	1.0 U	5.0 U	48
	11/05/12	1.0 U	8.99	1.0 U	1.0 U	15.5	1.0 U	1.0 U	1.0 U	1.0 U	7.97	1.0 U	5.0 U	32
	2/20/13	1.0 U	11.9	0.51 J	1.0 U	10.9	0.60 J	1.0 U	0.31 J	0.65 J	9.1	1.0 U	2.0 U	34
	5/15/13	1.0 U	13.3	1.0 U	1.0 U	5.3	1.10	1.0 U	1.0 U	1.6	7.9	1.0 U	2.0 U	29
	8/26/13	1.0 U	14.1	1.0 U	1.0 U	18.5	0.92 J	1.0 U	5.1	12.8	10.4	1.0 U	2.0 U	62
	11/11/13	1.0 U	7.2	1.0 U	1.0 U	39.2	0.44 J	1.0 U	1.2	39.0	10.9	1.0 U	2.0 U	98
	2/17/14	1.0 U	8.3	1.0 U	1.0 U	17.8	0.46 J	0.44 J	1.0 U	5.0	12.1	1.0 U	2.0 U	44
	5/20/14	1.0 U	10.0	1.0 U	1.0 U	19.4	0.58 J	1.4	1.1	10.2	6.2	1.0 U	2.0 U	49
	8/06/14	1.0 U	11.4	1.0 U	1.0 U	26.1	0.54 J	2.7	3.0	25.0	7.5	1.0 U	2.0 U	76
	11/17/14	1.0 U	7.6	0.56 J	1.0 U	38.8	1.0 U	2.1	0.89 J	7.3	4.9	1.0 U	2.0 U	62
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-03	10/23/96	7.3	1.4	0.2 U	0.2 U	2	0.2 U	0.2 U	0.2	0.2 U	1.3	NA	0.2 U	12
Downgradient	11/21/96	7.1	1	0.2 U	0.2 U	2	0.2 U	0.2 U	0.3	0.2 U	0.7	NA	2	13
Area	7/24/97	7	2 U	1 U	2 U	2	2 U	1 U	1 U	1 U	2 U	NA	2 U	9
	12/16/97	3 U	2 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	2 U	NA	2 U	0
	8/12/98	11	2 J	1 U	2 U	8	2 U	2 U	1 U	1 U	2 U	NA	2 U	21
	11/22/99	8	2 U	1 U	2 U	6	2 U	1 U	1 U	1 U	2 U	NA	2 U	14
	7/12/00	7	5 U	5 U	5 U	8	5 U	5 U	5 U	5 U	5 U	5 U	5 U	15
	10/25/00	5 U	5 U	5 U	5 U	6	5 U	5 U	5 U	5 U	5 U	5 U	5 U	6
	3/28/01	6	5 U	5 U	5 U	12	5 U	5 U	5 U	5 U	5 U	5 U	5 U	18
	2/07/02	4.5 J	4.2 J	2 U	2 U	9.8	5 U	5 U	1 U	1 U	2.9	5 U	2 U	21
	5/08/02	2.9 J	0.66 J	2 U	2 U	4.4 J	5 U	5 U	1 U	1 U	2.3	5 U	2 U	10
	8/29/02	4.1 J	5 U	2 U	2 U	1.9 J	5 U	5 U	1 U	1 U	1.8	5 U	2 U	8
	11/13/02	2.5 J	0.089 U	0.49 U	0.57 U	3.2 J	0.18 U	0.094 U	0.39 U	0.16 U	1.2	0.18 U	0.53 U	7
	2/12/03	3.6 J	0.089 U	0.49 U	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	2.1	0.18 U	0.53 U	6
	5/14/03	2.3	U	U	U	NA	U	U	U	U	1.4	U	U	4
	8/14/03	1.8	U	U	U	NA	U	U	U	U	1.5	U	U	3
	11/12/03	1.5	U	U	U	NA	U	U	U	U	1.5	U	U	3
	2/10/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	5/27/04	U	U	U	U	NA	U	U	U	U	1.3	U	U	1
	8/10/04	U	U	U	U	NA	U	U	U	U	2.4	U	U	2
	10/28/04	U	U	U	U	NA	U	U	U	U	1.1	U	U	1
	12/16/04	U	U	U	U	NA	U	U	U	U	1.2	U	U	1
	3/18/05	1	U	U	U	NA	U	U	U	U	U	U	U	1
	6/22/05	1.7	U	U	U	0.49 J	U	U	U	U	1.6	U	U	4
	9/14/05	1.9	U	U	U	0.89 J	U	U	U	U	1.3	U	U	4
	12/20/05	1.4	U	U	U	1.5	U	U	U	U	1.8	U	U	5
	3/14/06	1.5	1.1	U	U	1.9	U	U	0.42 J	0.55 J	1.7	U	U	7
	6/23/06	1.8	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	2	0.22 U	0.27 U	4
	9/06/06	1.9	U	U	U	U	U	U	U	U	1.5	U	U	3
	12/05/06	1.2	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.88 J	0.22 U	0.27 U	2
	3/13/07	0.95 J	0.23 U	0.33 U	0.29 U	0.62 J	0.42 U	0.28 U	0.28 U	0.29 U	0.87 J	0.22 U	0.27 U	2
	6/12/07	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
	9/04/07	0.67 U	0.2 U	0.28 U	0.29 U	0.67 J	0.32 U	0.3 U	0.35 JB	0.26 U	0.36 J	0.25 U	0.21 U	1
	12/14/07	0.98 J	0.2 U	0.28 U	0.29 U	0.75 J	0.32 U	0.3 U	0.65 J	0.26 U	0.99 J	0.25 U	0.21 U	3
	3/12/08	3.4 U	1 U	1.4 U	1.4 U	1.4 U	1.6 U	1.5 U	1.4 U	1.3 U	1.1 U	1.3 U	1.1 U	0
	6/16/08	1.2	0.16 U	0.29 U	0.35 U	1.0	0.16 U	0.24 U	1.4	0.49 J	1.1	0.16 U	0.16 U	5
	9/11/08	0.22 U	0.26 J	0.29 U	0.35 U	0.48 J	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	1
	12/19/08	0.52 J	0.24 U	0.29 U	0.35 U	0.43 J	0.16 U	0.24 U	0.29 U	0.18 U	0.65 J	0.16 U	0.16 U	2
	2/24/09	0.22 U	0.24 U	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	0
	5/11/09	0.22 U	0.24 U	0.29 U	0.35 U	0.55 J	0.16 U	0.24 U	0.29 U	0.18 U	0.74 J	0.16 U	0.16 U	1
	11/09/09	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	0
	2/22/10	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.66 J	0.23 U	0.30 U	1
	5/20/10	0.37 U	0.29 U	0.40 U	0.33 U	0.26 J	0.25 U	0.26 U	0.27 U	0.24 U	0.56 J	0.23 U	0.30 U	1
	8/12/10	0.38 J	0.29 U	0.40 U	0.33 U	0.62 J	0.25 U	0.26 U	0.27 U	0.24 U	0.57 J	0.23 U	0.30 U	2
	11/12/10	0.37 U	0.29 U	0.40 U	0.33 U	0.47 J	0.25 U	0.26 U	0.27 U	0.24 U	0.75 J	0.23 U	0.30 U	1
	2/17/11	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	0
	6/16/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.48 J	0.21 U	0.20 U	0
	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	0.44 J	0.31 U	0.24 U	0.32 U	0.21 U	0.51 J	0.21 U	0.20 U	1
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	8/08/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	2/20/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.23 J	1.0 U	2.0 U	0
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.23 J	1.0 U	2.0 U	0
	8/26/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/11/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	2/17/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	5/20/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.28 J	1.0 U	1.0 U	2.0 U	0
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	0.45 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-04	10/23/96	2.4	13.9	1.3	0.2 U	17.2	0.2 U	0.2 U	0.2 U	0.2 U	1.1	NA	0.2 U	36
Downgradient	11/21/96	3.1	13.6	1.2	0.2 U	19	0.2 U	0.2 U	0.3	0.2 U	1	NA	3	41
Area	7/24/97	3 U	10	1 U	2 U	17	2 U	1 U	1 U	1 U	2 U	NA	2 U	27
	12/16/97	3 U	7	1 U	2 U	20	2 U	1 U	1 U	1 U	2 U	NA	2 U	27
	8/12/98	3 J	7	1 J	2 U	17	2 U	1 U	1 U	1 U	2 U	NA	2 U	28
	11/22/99	4 J	5 J	1 U	2 U	11	2 U	1 U	1 U	1 U	2 U	NA	2 U	20
	7/12/00	6	8	5 U	5 U	10	5 U	5 U	5 U	5 U	5 U	5 U	5 U	24
	10/25/00	10	34	5 U	5 U	19	5 U	5 U	5 U	5 U	5 U	5 U	5 U	63
	3/28/01	9	24	5 U	5 U	31	5 U	5 U	5 U	5 U	5 U	5 U	5 U	64
	2/08/02	5 U	1.9 J	2 U	2 U	7.7	5 U	5 U	1 U	1 U	1 U	5 U	2 U	10
	5/08/02	9.4	6.6	1.3 J	2 U	9.6	5 U	5 U	1 U	1 U	2.2	5 U	2 U	29
	8/29/02	14.2	28.2	1.6 J	2 U	11.7	5 U	5 U	1 U	1 U	13	5 U	2 U	69
	11/13/02	26.4	56.9	6.2	0.57 U	32.4	0.18 U	0.094 U	0.39 U	0.52 J	7.4	0.18 U	0.53 U	130
	2/12/03	10.8	21.1	3.6	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	11.6	0.18 U	0.53 U	47
	5/14/03	21	30.6	3.4	U	NA	U	U	U	0.42 J	8.8	U	U	64
	8/14/03	17	32.2	U	U	NA	U	U	U	U	13.7	U	U	63
	11/12/03	19.9	14.1	1.1	U	NA	U	U	U	U	16.6	U	U	52
	2/10/04	11	8	U	U	NA	U	U	U	U	11.2	U	U	30
	5/27/04	21.7	35.1	2.9	U	NA	U	U	U	0.77 J	21.6	U	U	82
	8/10/04	14.4	12	U	U	NA	U	U	U	U	8.2	U	U	35
	10/28/04	11.4	10.1	U	U	NA	U	U	U	U	4.1	U	U	26
	12/17/04	10.5	8.1	U	U	NA	U	U	U	U	3.8	U	U	22
	3/18/05	9	5	U	U	NA	U	U	U	U	1.6	U	U	16
	6/21/05	14.2	11	U	U	0.99 J	U	U	U	U	3.2	U	U	29
	9/14/05	5.4	3.6	U	U	U	U	U	U	U	1.3 J	U	U	10
	12/20/05	12	10.3	U	U	0.97 J	U	U	U	U	2.3	U	U	26
	3/14/06	6.1	3.3	U	U	0.32 J	U	U	0.39 J	U	1.5	U	U	12
	6/23/06	7.1	4.9	0.33 U	0.29 U	0.37 J	0.42 U	0.28 U	0.28 U	0.29 U	1.3	0.22 U	0.27 U	14
	9/07/06	10.8	7.2	U	U	U	U	U	U	U	2.3	U	U	20
	12/05/06	7.3	4.2	0.33 U	0.29 U	0.66 J	0.42 U	0.28 U	0.28 U	0.29 U	2.2	0.22 U	0.27 U	14
	3/13/07	5	2.9	0.33 U	0.29 U	0.51 J	0.42 U	0.28 U	0.28 U	0.29 U	3.4	0.22 U	0.27 U	12
	6/12/07	7.7	9.4	0.28 U	0.29 U	1.8	0.32 U	0.3 U	0.28 U	0.26 U	2.3	0.25 U	0.21 U	21
	9/05/07	2.5	3.8	0.28 U	0.29 U	0.77 J	0.32 U	0.3 U	0.28 U	0.26 U	0.69 J	0.25 U	0.21 U	8
	12/13/07	4.7	3.8	0.28 U	0.29 U	0.62 J	0.32 U	0.3 U	0.62 J	0.26 U	0.9 J	0.25 U	0.21 U	11
	3/13/08	7	5.9	1.4 U	1.4 U	1.4 U	1.6 U	1.5 U	1.4 U	1.3 U	1.1 U	1.3 U	1.1 U	13
	6/16/08	8.9	7.4	0.29 U	0.35 U	0.26 J	0.28 J	0.24 U	0.97 J	0.2 J	1.8	0.16 U	0.16 U	20
	9/11/08	3.9	2	0.29 U	0.35 U	0.77 J	0.33 J	0.24 U	1.3	0.68 J	0.21 U	0.16 U	0.16 U	9
	12/19/08	1.6	0.96 J	0.29 U	0.35 U	0.72 J	0.16 U	0.24 U	0.29 U	0.18 U	2.3	0.16 U	0.16 U	6
	2/24/09	1.8	0.95 J	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.76 J	0.16 U	0.16 U	4
	5/11/09	3.7	1.7	0.29 U	0.35 U	0.25 U	0.33 J	0.24 U	0.29 U	0.18 U	0.95 J	0.16 U	0.16 U	7
	11/09/09	1.8	0.62 J	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.82 J	0.23 U	0.30 U	3
	2/22/10	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	1.4	0.23 U	0.30 U	1
	5/20/10	0.37 U	0.29 U	0.40 U	0.33 U	0.30 J	0.36 J	0.26 U	0.27 U	0.24 U	1.3	0.23 U	0.30 U	2
	8/12/10	0.51 J	0.37 J	0.40 U	0.33 U	0.53 J	0.34 J	0.26 U	0.27 U	0.24 U	1.1	0.23 U	0.30 U	3
	11/12/10	0.88 J	0.49 J	0.40 U	0.33 U	0.57 J	0.43 J	0.26 U	0.27 U	0.24 U	1.6	0.23 U	0.30 U	4
	2/17/11	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	1.0	0.23 U	0.30 U	1
	6/16/11	1.5	2.5	0.28 U	0.18 U	0.22 U	0.67 J	0.24 U	0.32 U	0.21 U	2.9	0.21 U	0.20 U	8
	8/18/11	0.37 U	0.74 J	0.28 U	0.18 U	0.80 J	0.78 J	0.24 U	0.32 U	0.21 U	8.9	0.21 U	0.20 U	11
	11/03/11	0.73 U	0.38 U	0.56 U	0.36 U	0.43 U	0.63 U	0.47 U	0.64 U	0.42 U	4.9	0.41 U	0.40 U	5
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.25	1.0 U	5.54	1.0 U	5.0 U	11
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	8/08/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U	5.0 U	1
	2/20/13	0.65 J	1.0 U	1.0 U	1.0 U	1.0 U	0.75 J	1.0 U	1.0 U	1.0 U	1.8	1.0 U	2.0 U	3
	5/15/13	0.63 J	0.28 J	1.0 U	1.0 U	1.0 U	0.36 J	1.0 U	1.0 U	1.0 U	2.2	1.0 U	2.0 U	3
	8/26/13	1.0 U	0.22 J	1.0 U	1.0 U	1.0 U	0.29 J	1.0 U	1.0 U	1.0 U	1.8	1.0 U	2.0 U	2
	11/11/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U	2.0 U	1
	2/19/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.3	1.0 U	2.0 U	1
	5/20/14	2.9	2.6	1.0 U	1.0 U	0.25 J	1.0 U	1.0 U	1.0 U	1.0 U	4.7	1.0 U	2.0 U	10
	8/06/14	1.0 U	0.76 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.0 U	2.0 U	2
	11/18/14	1.0 U	2.2	1.0 U	1.0 U	1.4	0.85 J	1.0 U	1.0 U	1.0 U	7.7	1.0 U	2.0 U	12
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-07D	7/11/00	5 U	140	46	5 U	37	5 U	5 U	9	14	5 U	5 U	5 U	246
MW-02 Area	10/26/00	5 U	140	41	5 U	37	5 U	5 U	5 U	10	5 U	5 U	5	233
	3/28/01	5 U	190	42	5 U	36	5 U	5 U	5 U	8	5 U	5 U	5 U	276
	8/09/01	18	380	100	5 U	140	5 U	15	9	40	5 U	5 U	5 U	702
	9/19/01	11	290	68	5 U	120	5 U	10	5 U	27	5 U	5 U	5 U	526
	11/16/01	6	210	33	5 U	71	5 U	6	5 U	16	5 U	5 U	5 U	342
	2/07/02	15.3	415	117	0.9 J	145	5 U	10	9.9	42.4	4.5	5 U	2 U	760
	5/07/02	8.7	207	68	1 J	84.5	5 U	5.5	7.9	31	3.4	5 U	2 U	417
	8/28/02	15.2	267	76.7	0.82 J	124	5 U	9	6.9	34.8	3.5	5 U	2 U	538
	11/13/02	20.7	320	99.7	0.57 U	187	0.18 U	12.8	11.7	49.1	3.7	0.18 U	0.53 U	705
	2/12/03	9.7	275	68.7	0.94 J	NA	0.18 U	8.6	9.8	42	2.8	0.18 U	0.53 U	418
	5/14/03	11.2	227	64.9	U	NA	U	12.2	7.5	41.2	2.9	U	U	367
	8/13/03	8.4	237	51.1	U	NA	U	5.9	5.4	28.4	2.4	U	U	339
	11/12/03	U	104	26.3	U	NA	U	0.64 J	3.3	13.8	1.3	U	U	149
	2/10/04	U	107	19.9	U	NA	U	U	3.3	11.1	0.9 J	U	U	142
	5/27/04	10.5	220	58.1	U	NA	U	7.1	7.6	39	6	U	U	348
	8/10/04	5.6	161	27.7	U	NA	1	3	4.1	22.3	3.9	U	U	229
	10/28/04	5.3	175	32.3	U	NA	U	3.2	3.7	21.4	2.9	U	U	244
	12/16/04	7.2	176	47.8	U	NA	U	3.4	6	31.4	7.3	U	U	279
	3/18/05	26.5	113	28.6	U	NA	1.6	77.8	11.4	96.6	40	U	U	396
	6/22/05	2.1	155	34.3	U	81.6	1.9	1.6	5.9	30.5	7.4	U	U	320
	9/13/05	2.3	145	26	U	71.2	U	0.5 J	3.7	19.4	4	U	U	272
	12/20/05	U	147	31.2	U	81.3	0.54 J	U	4.3	23.2	5	U	U	293
	3/14/06	1.2	119	U	U	56.3	U	U	3	13.6	2.5	U	U	196
	6/23/06	0.56 U	125	30.7	0.29 U	67	0.42 U	0.28 U	4.1	21.2	7.1	0.22 U	0.27 U	255
	9/07/06	2.1	162	34.5	U	87.2	0.58 J	U	4.3	21	10.1	U	U	322
	12/05/06	0.56 U	99.5	13.2	0.29 U	38.5	0.42 U	0.28 U	1.6	10.6	1.9	0.22 U	0.27 U	165
	3/13/07	0.56 U	136	24.9	0.29 U	59.4	0.42 U	0.28 U	2.7	15	3.7	0.22 U	0.27 U	242
	6/12/07	0.67 U	112	25.7	0.29 U	67.1	0.72 J	0.3 U	4	16.6	6.7	0.25 U	0.21 U	233
	9/05/07	0.67 U	119	28.1	0.29 U	66.9	0.32 U	0.3 U	4.1	16.6	7.0	0.25 U	0.21 U	242
	12/14/07	0.67 U	121	31.8	0.29 U	64.8	0.51 J	0.3 U	7.9	21.0	5.5	0.25 U	0.21 U	253
	3/12/08	0.67 U	115	19.4	0.29 U	47.7	0.33 J	0.3 U	3.5	14.3 B	3.4	0.25 U	0.21 U	204
	9/11/08	0.52 J	94.4	19.3	0.35 U	41	0.35 J	0.24 U	2.5	14.6	3.6	0.16 U	0.16 U	176
	12/19/08	0.22 U	78.1	19.1	0.35 U	37.9	0.16 U	0.24 U	1.6 B	12.3	3.3	0.16 U	0.16 U	152
	2/24/09	0.22 U	83.0	22.8	0.35 U	41.0	0.16 U	0.24 U	3.7	16.4	3.9	0.16 U	0.16 U	171
	5/11/09	0.22 U	87.0	9.5	0.35 U	29.3	0.16 U	0.31 J	1.7	6.3	1.5	0.16 U	0.16 U	136
	11/09/09	0.37 U	69.1	17.0	0.33 U	37.5	0.25 U	0.26 U	3.0	11.7	2.8	0.23 U	0.30 U	141
	8/12/10	0.37 U	105.0	25.5 B	0.33 U	48.3	0.43 J	0.26 U	4.1	18.2	3.7	0.23 U	0.30 U	205
	11/12/10	0.37 U	119.0	34.8	0.33 U	67.1	0.68 J	0.26 U	8.0	25.1	6.1	0.23 U	0.30 U	261
	2/17/11	0.37 U	100.0	25.6	0.33 U	52.8	0.25 U	0.26 U	5.8	22.2	4.3	0.23 U	0.30 U	211
	6/16/11	0.37 U	63.8	8.1	0.18 U	23.2	0.31 U	0.24 U	3.9	8.9	1.2	0.21 U	0.20 U	109
	11/03/11	0.37 U	71.8	18.9	0.18 U	39.3	0.31 U	0.24 U	4.0	17.7	3.4	0.21 U	0.20 U	155
	2/15/12	1.0 U	56.8	12.2	1.0 U	25.5	1.0 U	1.0 U	4.04	12.8	2.57	1.0 U	5.0 U	114
	5/16/12	1.0 U	41.4	2.82	1.0 U	20.6	1.0 U	1.0 U	1.0 U	10.6	1.0 U	1.0 U	5.0 U	75
	8/08/12	1.0 U	37.2	3.03	1.0 U	10.4	1.0 U	1.0 U	2.66	4.48	1.0 U	1.0 U	5.0 U	58
	2/20/13	1.0 U	41.1	5.4	1.0 U	13.9	1.0 U	0.48 J	0.59 J	6.3	0.49 J	1.0 U	2.0 U	68
	5/15/13	1.0 U	32.7	2.5	1.0 U	7.4	1.0 U	0.26 J	0.49 J	5.3	1.0 U	1.0 U	2.0 U	49
	8/26/13	1.0 U	26.7	1.8	1.0 U	4.8	1.0 U	1.0 U	0.33 J	4.7	1.0 U	1.0 U	2.0 U	38
	11/11/13	1.0 U	32.6	2.6	1.0 U	8.5	1.0 U	1.0 U	0.25 J	5.4	1.0 U	1.0 U	2.0 U	49
	2/17/14	1.0 U	29.9	2.1	1.0 U	5.9	1.0 U	1.0 U	1.0 U	4.5	1.0 U	1.0 U	2.0 U	42
	5/20/14	1.0 U	25.6	1.2	1.0 U	5.6	1.0 U	1.0 U	1.0 U	2.8	1.0 U	1.0 U	2.0 U	35
	8/06/14	1.0 U	22.2	0.5 J	1.0 U	3.8	1.0 U	1.0 U	1.0 U	1.1	1.0 U	1.0 U	2.0 U	28
	11/18/14	1.0 U	20.2	0.62 J	1.0 U	2.1	1.0 U	1.0 U	1.0 U	0.47 J	1.0 U	1.0 U	2.0 U	23
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-07S	11/22/99	170	1300	280	3 J	560	4 J	800	130	290	3 J	NA	2 J	3542
MW-02 Area	7/11/00	130	1100	200	5 U	590	5 U	730	130	340	5 U	5 U	5 U	3220
	10/26/00	140	1100	200	5 U	690	5 U	740	100	480	5 U	5 U	5	3455
	3/28/01	190	1300	190	5 U	970	5 U	920	130	360	5 U	5 U	5 U	4060
	8/09/01	170	1400	150	5 U	1100	5 U	670	89	520	5 U	5 U	5 U	4099
	9/20/01	290	1500	140	5 U	1500	5 U	670	74	500	5 U	5 U	5 U	4674
	11/16/01	180	1400	97	10 U	1200	10 U	680	52	380	10 U	10 U	10 U	3989
	2/07/02	169	1230	119	10 U	1110	2.9 J	565	60.1	265	5 U	25 U	10 U	3521
	5/13/02	154	912	88.8	4.3 J	752	3.4 J	597	46.3	223	5.8	25 U	10 U	2787
	8/28/02	130	853	66.9	10 U	795	25 U	437	24.2	294	5 U	25 U	10 U	2600
	11/13/02	130	894	94.7	2.8 U	866	0.92 U	508	27.4	331	3.8 U	0.92 U	2.7 U	2851
	2/12/03	79.4	762	75.8	3 J	NA	2.3 J	452	34.4	321	5.8	0.46 U	1.3 U	1736
	5/14/03	125	834	64.4	U	NA	3 J	440	20.1	295	13.5	2.6 J	U	1798
	8/13/03	89.2	791	64.1	U	NA	3	450	14.7	310	12.2	U	U	1734
	11/12/03	10.3	184	7.4	0.62 J	NA	U	81.1	7.5	40.7	1	U	U	333
	2/10/04	3	96.5	2.9	U	NA	U	21.9	4.3	5.4	4.7	U	U	139
	5/27/04	97.9	529	40.1	U	NA	1.8 J	345	8.1	189	76.2	U	U	1287
	8/10/04	71.2	317	20.2	1.1 J	NA	2.4 J	159	2.8	116	60.9	U	U	751
	10/28/04	73.5	304	32.6	U	NA	3.3	284	4.3	240	99.2	U	U	1041
	12/16/04	48.2	244	33.6	U	NA	3.1	172	2.7	198	71.3	U	U	773
	3/18/05	58	237	53.7	0.97 J	NA	3.1	167	24.2	193	80.4	U	U	817
	6/22/05	44.4	178	28	U	245	3.3	110	2.3	164	83.5	U	U	859
	9/14/05	27	151	22.9	0.58 J	254	2.3	66.8	0.9 J	133	54.6	U	U	713
	12/20/05	27.3	153	47.8	0.45 J	231	2.3	77.3	22.2	102	65.4	U	U	729
	3/14/06	20.5	130	46.3	U	166	1.6	58.3	21.5	72.6	53.8	U	U	571
	6/23/06	16.4	86.4	22.7	0.29 U	141	1.2	62.6	1.8	75.1	54.5	0.22 U	0.27 U	462
	9/07/06	17.5	126	48.9	U	145	1.6	79	19.7	50.6	62.6	U	U	551
	12/05/06	7.6	89.8	35.4	0.29 U	94.7	1.5	58.1	15.2	46	39.4	0.22 U	0.27 U	388
	3/13/07	6.1	95.9	44.3	0.29 U	93.5	1.1	52.9	25.6	37.9	33.8	0.22 U	0.27 U	391
	6/12/07	4.4	59.5	12.2	0.29 U	93.1	0.97 J	28.6	0.28 U	22.2	35	0.25 U	0.21 U	256
	9/05/07	0.67 U	66.3	16.2	0.29 U	94	0.89 J	28.2	0.36 J	22.1	31.8	0.25 U	0.21 U	260
	12/14/07	0.91 J	73.9	27.5	0.29 U	78.9	0.85 J	38.2	14.6	19.6	22.9	0.25 U	0.21 U	277
	3/12/08	0.88 J	100	49.6	0.29 U	70.6	1.1	59.8	36.7	22.8 B	22.1	0.25 U	0.21 U	364
	9/11/08	0.22 U	15.2	3.3	0.35 U	33.5	0.33 J	3.1	0.38 J	2.2	2.8	0.16 U	0.16 U	61
	12/19/08	0.22 U	41.2	15.6	0.35 U	53.1	0.16 U	24.0	3.4 B	13.1	13.9	0.16 U	0.16 U	164
	2/24/09	0.22 U	119.0	72.4	0.35 U	65.3	0.78 J	70.1	37.1	24.8	15.2	0.16 U	0.16 U	405
	5/11/09	0.22 U	69.9	26.0	0.35 U	73.5	0.62 J	29.4	15.2	23.9	17.7	0.16 U	0.16 U	256
	11/09/09	0.37 U	24.8	5.7	0.33 U	55.8	0.44 J	8.8	0.35 J	13.6	11.5	0.23 U	0.30 U	121
	8/12/10	0.37 U	26.4	5.7 B	0.33 U	58.6	0.71 J	7.2	0.27 U	8.9	12.7	0.23 U	0.30 U	120
	11/12/10	0.37 U	50.7	22.8	0.33 U	86.8	0.93 J	18.0	3.7	20.6	17.5	0.23 U	0.30 U	221
	2/17/11	0.37 U	113	68.9	0.33 U	54.3	0.40 J	51.2	53.3	26.5	7.5	0.23 U	0.30 U	375
	6/16/11	0.37 U	32.9	11.6	0.18 U	64.0	0.80 J	14.3	6.3	15.2	15.7	0.21 U	0.20 U	161
	11/03/11	0.37 U	32.0	12.6	0.18 U	57.9	0.46 J	10.2	4.0	17.5	10.2	0.21 U	0.20 U	145
	2/15/12	1.0 U	51.9	21.8	1.0 U	54.7	1.48	12.4	15.2	15.1	11.4	1.0 U	5.0 U	184
	5/16/12	1.0 U	31.2	8.75	1.0 U	43.8	1.31	7.44	9.06	10.6	9.56	1.0 U	5.0 U	122
	8/08/12	1.0 U	21.7	3.83	1.0 U	55.5	1.0 U	6.95	1.41	5.12	11.0	1.0 U	5.0 U	106
	2/20/13	1.0 U	77.4	43.1	1.0 U	45.3	1.0 U	23.4	31.7	13.4	7.3	1.0 U	2.0 U	242
	5/15/13	1.0 U	28.2	14.8	1.0 U	33.4	0.38 J	13.8	21.8	11.6	7.4	1.0 U	2.0 U	131
	8/26/13	1.0 U	15.5	3.4	1.0 U	33.7	0.28 J	3.9	1.1	10.2	7.9	1.0 U	2.0 U	76
	11/11/13	1.0 U	25.8	10.4	1.0 U	43.0	1.0 U	7.9	7.5	12.1	11.0	1.0 U	2.0 U	118
	2/17/14	1.0 U	85.8	55.0	1.0 U	30.7	1.0 U	29.8	57.7	24.0	9.8	1.0 U	2.0 U	293
	5/20/14	1.0 U	50.1	30.2	1.0 U	41.1	1.0 U	17.8	40.1	22.4	10.0	1.0 U	2.0 U	212
	8/06/14	1.0 U	33.2	8.1	1.0 U	46.0	1.0 U	12.4	1.0	18.1	10.2	1.0 U	2.0 U	129
	11/18/14	1.0 U	29.1	7.7	1.0 U	32.2	0.61 J	4.8	1.0	7.6	9.1	1.0 U	1.0 U	92
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-08D	7/11/00	5 U	37	7	5 U	66	5 U	5 U	140	14	5 U	6	5 U	270
MW-01 Area	10/24/00	2 U	34	5	1 U	60	1 U	4 J	79	10	1 U	2 J	2 U	194
	3/27/01	5 U	38	5 U	5 U	34	5 U	5 U	22	5 U	5 U	5 U	5 U	94
	8/08/01	5 U	41	5 U	5 U	40	5 U	5 U	21	5 U	5 U	5 U	5 U	102
	9/20/01	5 U	29	5 U	5 U	31	5 U	5 U	11	5 U	5 U	5 U	5 U	71
	11/16/01	5 U	19	5 U	5 U	16	5 U	5 U	5 U	5 U	5 U	5 U	5 U	35
	2/06/02	5 U	30.6 J	1.9	2 U	24.7	5 U	3.6 J	24.2	2.6	1 U	5 U	2 U	88
	5/10/02	5 U	42	3	2 U	41.6	1.1 J	9	56.6	8.5	1.2 U	5 U	2 U	162
	8/29/02	5 U	17.5	1.5 J	2 U	17.1	5 U	1.9 J	23	3.2	1 U	5 U	2 U	64
	11/12/02	0.65 U	25.6	2.4	0.57 U	34.8	0.18 U	7.1	44.3	7.4	0.77 U	0.18 U	0.53 U	122
	2/11/03	0.65 U	17	3.6	0.57 U	NA	0.18 U	0.094 U	9.7	3.2	0.77 U	0.18 U	0.53 U	34
	5/14/03	U	15.5	1.1	U	NA	U	0.92 J	12.4	1.7	U	U	U	32
	8/13/03	U	14.5	1.4	U	NA	U	2.6	23.5	2.8	U	U	U	45
	11/11/03	U	14.1	1.6	U	NA	U	5.1	40.8	5.4	U	U	U	67
	2/09/04	U	15.6	U	U	NA	0.75 J	U	8.3	2.9	1.2	U	U	29
	5/27/04	U	12.5	1.2	U	NA	U	U	29.2	4.2	U	U	U	47
	8/09/04	U	12.5	U	U	NA	U	2.5	40.8	5.8	U	U	U	62
	10/27/04	U	18.9	0.83 J	U	NA	U	U	31.5	9.2	U	U	U	60
	12/16/04	U	29.8	U	U	NA	U	U	7.4	7.5	U	U	U	45
	3/17/05	U	18.3	U	U	NA	U	U	9.5	2.7	28.5	U	U	59
	6/20/05	U	8.9	U	U	14.1	U	U	U	0.76 J	2.4	U	U	26
	9/12/05	U	9.6	U	U	2.7	U	U	2.1	11.1	6.6	U	U	32
	12/19/05	U	27.8	U	U	0.3 J	0.94 J	U	0.47 J	0.26 J	8.2	U	U	38
	3/13/06	0.95 J	25.3	U	U	U	0.7 J	U	U	U	U	U	U	27
	6/22/06	0.65 J	22.1	0.33 U	0.29 U	1.5	0.54 J	0.67 J	0.28 U	6.0	3.8	0.22 U	0.27 U	35
	9/06/06	U	25.3	U	U	5.7	0.72 J	1.7	6.3	11.3	7.8	U	U	59
	12/04/06	0.56 U	19.2	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	19
	3/12/07	0.56 U	18.9	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	19
	6/11/07	0.67 U	15.2	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	15
	9/04/07	0.67 U	15.9	0.28 U	0.29 U	1.2	0.32 U	0.3 U	0.28 U	0.26 U	0.71 J	0.25 U	0.21 U	18
	12/12/07	0.67 U	29.6	0.28 U	0.29 U	9.0	4.0	1.6	1.8	5.9	36.8	0.25 U	0.21 U	89
	3/12/08	0.67 U	26.4	0.28 U	0.29 U	1.5	3.1	0.55 J	0.39 J	2.5 B	1.7	0.25 U	0.21 U	36
	6/16/08	0.22 U	15.3	0.29 U	0.35 U	0.19 U	0.58 J	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	16
	9/11/08	0.22 U	12.2	0.29 U	0.35 U	0.53 J	0.67 J	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	13
	2/22/10	0.37 U	6.5	0.40 U	0.33 U	0.22 U	0.25 U	0.41 J	0.27 U	0.24 U	0.44 U	0.32 J	0.30 U	7
	5/20/10	0.37 U	10.8	0.40 U	0.33 U	17.7	0.79 J	0.26 U	17.9	5.0	0.44 U	0.23 U	0.30 U	52
	8/12/10	0.37 U	11.2	1.1 B	0.33 U	45.3	2.5	0.39 J	62.3	14.3	0.44 U	0.23 U	0.30 U	137
	11/12/10	0.37 U	14.0	0.98 J	0.33 U	73.6	3.5	0.60 J	79.1	20.9	0.44 U	0.23 U	0.30 U	193
	2/17/11	0.37 U	9.5	0.40 U	0.33 U	57.6	2.5	0.26 U	51.6	14.4	0.44 U	0.23 U	0.30 U	136
	6/16/11	0.37 U	10.5	0.69 J	0.18 U	61.3	3.5	0.24 U	45.1	14.6	0.27 U	0.21 U	0.20 U	136
	8/18/11	0.37 U	10.1	0.59 J	0.18 U	59.3	5.9	0.24 U	50.6	14.5	0.27 U	0.21 U	0.20 U	141
	11/03/11	0.37 U	8.6	0.87 J	0.18 U	65.7	3.4	0.24 U	55.4	15.7	0.27 U	0.21 U	0.20 U	150
	2/15/12	1.0 U	8.44	1.0 U	1.0 U	48.6	2.88	1.0 U	44.5	12.6	1.0 U	1.0 U	5.0 U	117
	5/16/12	1.0 U	6.75	1.0 U	1.0 U	32.5	6.25	1.0 U	44.1	9.56	1.0 U	1.0 U	5.0 U	99
	8/09/12	1.0 U	7.55	1.0 U	1.0 U	47.3	3.30	1.0 U	50.9	11.50	1.0 U	1.0 U	5.0 U	121
	11/05/12	1.0 U	6.28	1.0 U	1.0 U	37.8	2.04	1.0 U	44.9	9.71	1.0 U	1.0 U	5.0 U	101
	2/21/13	1.0 U	6.5	0.40 J	1.0 U	37.0	1.6	1.0 U	31.8	8.6	1.0 U	1.0 U	2.0 U	86
	5/15/13	1.0 U	5.4	0.32 J	1.0 U	29.4	1.5	1.0 U	34.4	9.3	1.0 U	1.0 U	2.0 U	80
	8/26/13	1.0 U	5.2	1.0 U	1.0 U	32.7	2.2	1.0 U	36.0	8.6	1.0 U	1.0 U	2.0 U	85
	11/11/13	1.0 U	5.4	1.0 U	1.0 U	37.5	1.2	1.0 U	44.8	10.1	1.0 U	1.0 U	2.0 U	99
	2/17/14	1.0 U	3.8	1.0 U	1.0 U	23.2	0.8 J	1.0 U	34.4	7.1	1.0 U	1.0 U	2.0 U	69
	5/20/14	1.0 U	3.4	1.0 U	1.0 U	29.6	1.1	1.0 U	30.6	7.7	1.0 U	1.0 U	2.0 U	72
	8/06/14	1.0 U	3.5	1.0 U	1.0 U	28.7	0.61 J	1.0 U	30.0	7.5	1.0 U	1.0 U	2.0 U	70
	11/17/14	1.0 U	3.6	1.0 U	1.0 U	28.6	0.85 J	1.0 U	32.5	7.1	1.0 U	1.0 U	2.0 U	73
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-08S	7/11/00	5 U	85	21	5 U	180	6	120	390	30	5 U	5 U	5 U	832
MW-01 Area	10/25/00	5 U	96	25	5 U	230	11	130	500	35	5 U	5 U	5 U	1027
	3/27/01	5 U	120	24	5 U	290	14	140	440	35	5 U	5 U	5 U	1063
	8/08/01	5 U	94	19	5 U	280	7	99	330	28	5 U	5 U	5 U	857
	9/20/01	5 U	81	5	5 U	210	9	24	62	10	5 U	5 U	5 U	401
	11/16/01	5 U	100	9	5 U	240	12	70	190	45	5 U	5 U	5 U	666
	2/06/02	5 U	29.7	3.4	2 U	36.9	5 U	15.5	84.6	6.9	1 U	5 U	2 U	177
	5/10/02	5 U	3.4 J	2 U	2 U	4.7 J	5 U	1.4 J	7.2	0.77 J	1.2 U	5 U	2 U	17
	8/29/02	5 U	98.9	11.2	2 U	210	8.1	69.8	247	53.1	1 U	5 U	2 U	698
	11/12/02	0.65 U	26.1	2.5	0.57 U	36.8	0.18 U	10.6	65.5	8.7	0.77 U	0.18 U	0.53 U	150
	2/11/03	0.65 U	79.9	10.6	0.57 U	NA	9.2	62.7	201	40.1	0.77 U	0.18 U	0.53 U	404
	5/14/03	U	13.6	1.6	U	NA	0.41 J	3.2	66.1	6.6	U	U	U	92
	8/13/03	U	60.7	7.6	U	NA	3.6	35.5	233	27.7	U	U	U	368
	11/11/03	U	33.5	3.7	U	NA	1.5	19.5	144	16	U	U	U	218
	2/09/04	U	79.2	9.9	U	NA	12.1	52.9	310	47.5	0.95 J	U	U	513
	5/27/04	U	71.2	8.5	U	NA	5.9	49.1	344	47.7	U	U	U	526
	8/09/04	U	76.6	7.6	U	NA	6.9	41.5	362	56.7	U	U	U	551
	10/27/04	U	91.1	4.3	U	NA	13	28.7	112	51	1.3	2.2	U	304
	12/16/04	U	64.3	4.2	U	NA	3.7	35.7	143	35.2	U	U	U	286
	3/17/05	U	63.8	6.8	U	NA	7.6	18	224	94.1	4.9	U	U	419
	6/20/05	U	43.9	2.2	U	186	5.1	14.3	182	31.5	U	U	U	465
	9/12/05	U	76.1	8.2	U	276	18.5	35.9	380	75.7	1.8	U	U	872
	12/19/05	U	57.7	5.6	U	253	8.4	28.7	349	65.1	0.7 J	U	U	768
	3/13/06	U	53.8	U	U	233	11.7	17.8	263	59	U	U	U	638
	6/22/06	1.1 U	37.9	3.4	0.59 U	179	5.9	16.2	246	50.9	0.58 U	0.43 U	0.53 U	539
	9/06/06	U	44.9	3.8	U	212	8.9	16.7	255	55.4	U	U	U	597
	12/05/06	0.56 U	48.5	6.1	0.29 U	228	15.7	16.1	202	77.9	2	0.22 U	0.27 U	596
	3/12/07	0.56 U	44.4	5.5	0.29 U	206	12.5	16.7	277	84.5	1.6	0.22 U	0.27 U	648
	6/11/07	1.3 U	34.3	3.4	0.57 U	190	11.1	10.8	239	58.8	1.5 J	0.51 U	0.42 U	549
	9/04/07	1.3 U	34.9	3.6	0.57 U	180	9.1	12.1	219 B	70.2	1.3 J	0.51 U	0.42 U	530
	12/12/07	0.67 U	36.5	3.1	0.29 U	198	8.4	13.5	237	98.4	1.4	0.54 J	0.21 U	597
	3/11/08	0.67 U	34.1	3.7	0.29 U	179	15	9.2	197	71 B	1.9	1	0.21 U	512
	6/16/08	0.22 U	28.6	2.5	0.35 U	177	10.8	9.6	281	75.6	1.7	1.5	0.16 U	588
	9/11/08	0.22 U	25.1	2.3	0.35 U	167	11.5	6.8	155	97.1	0.65 J	0.82 J	0.16 U	466
	12/19/08	0.22 U	19.3	1.9	0.35 U	133	4.6	9	182 B	64.7	0.21 U	0.64 J	0.16 U	415
	2/24/09	0.22 U	23.1	2.1	0.35 U	156	8.0	7.2	135	94.4	1.4	0.16 U	0.16 U	427
	5/11/09	0.22 U	29.7	2.5	0.35 U	193	8.5	8.2	173	104	1.6	0.42 J	0.16 U	521
	8/11/09	0.37 U	23.6	2.1	0.33 U	180	8.7	7.3	214	87.9	1.2	0.35 J	0.30 U	525
	11/09/09	0.37 U	19.1	1.6	0.33 U	141	7.3	5.1	175	79.2	0.7 J	0.23 U	0.30 U	429
	2/22/10	0.37 U	20.3	2.4	0.33 U	172	7.7	6.7	210	101	0.88 J	0.30 J	0.30 U	521
	5/20/10	0.37 U	15.5	1.6	0.33 U	144	9.2	3.5	130	69.4	1.1	0.23 J	0.30 U	375
	8/12/10	0.37 U	15.3	2.0 B	0.33 U	120	5.2	4.5	200	76.7	0.66 J	0.26 J	0.30 U	425
	11/12/10	0.37 U	20.3	2.4	0.33 U	168	6.6	5.2	184	85.4	0.99 J	0.28 J	0.30 U	473
	2/17/11	0.37 U	16.6	1.5	0.33 U	157	6.4	5.1	166	68.6	0.72 J	0.23 U	0.30 U	422
	6/16/11	0.37 U	15.2	1.7	0.18 U	144	12.2	0.24 U	118	57.2	1.8	0.21 U	0.20 U	350
	8/18/11	0.37 U	13.1	1.5	0.18 U	128	10.5	1.8	88.7	46.0	1.6	0.21 U	0.20 U	291
	11/03/11	0.37 U	11.6	1.4	0.18 U	161	13.2	1.1	55.7	44.6	1.9	0.21 U	0.20 U	291
	2/15/12	1.0 U	10.6	1.17	1.0 U	107	9.04	2.37	116	44.4	1.0 U	1.0 U	5.0 U	291
	5/16/12	1.0 U	11.4	1.0 U	1.0 U	107	5.03	3.00	190	64.0	1.0 U	1.0 U	5.0 U	380
	8/09/12	1.0 U	15.4	1.37	1.0 U	160	6.61	4.60	276	89.3	1.13	1.0 U	5.0 U	554
	11/05/12	1.0 U	15.0	1.2	1.0 U	142	8.18	3.24	247	110.0	1.21	1.0 U	5.0 U	528
	2/21/13	1.0 U	14.4	1.5	1.0 U	167	5.0	3.8	215	73.0	0.99 J	1.0 U	2.0 U	481
	5/15/13	1.0 U	13.9	1.1	1.0 U	134	9.0	2.3	162	61.2	1.4	1.1	2.0 U	386
	8/26/13	1.0 U	13.5	1.1	1.0 U	151	7.7	1.7	165	58.6	0.82 J	0.52 J	2.0 U	400
	11/11/13	1.0 U	14.1	1.1	1.0 U	178	7.0	2.6	160	74.9	0.86 J	1.0 U	2.0 U	439
	2/17/14	1.0 U	11.6	0.98 J	1.0 U	121	4.0	2.7	204	70.8	0.86 J	1.0 U	2.0 U	416
	5/20/14	1.0 U	12.1	0.86 J	1.0 U	168	7.6	2.0	199	67.0	1.2	1.0 U	2.0 U	458
	8/06/14	1.0 U	10.8	0.84 J	1.0 U	132	4.3	2.0	183	61.9	0.66 J	1.0 U	2.0 U	396
	11/17/14	1.0 U	6.4	0.73 J	1.0 U	79.3	2.0	0.74 J	57.7	75.3	0.35 J	1.0 U	2.0 U	223
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-09D	7/10/00	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	0
	10/23/00	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	0
	3/27/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	8/09/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	9/20/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	11/16/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	2/07/02	5 U	5 U	2 U	2 U	0.55 J	5 U	5 U	1 U	1 U	1 U	5 U	2 U	1
	5/10/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1.2 U	5 U	2 U	0
	8/28/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	0
	11/12/02	0.65 U	0.089 U	0.49 U	0.57 U	0.18 U	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	0
	2/11/03	0.65 U	0.089 U	0.49 U	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	0
	5/15/03	U	U	U	U	NA	U	U	0.78 J	U	U	U	U	1
	8/14/03	U	0.96 J	U	U	NA	U	U	1.7	U	U	U	U	3
	11/11/03	U	0.88 J	U	U	NA	U	U	1.6	U	U	U	U	2
	2/11/04	U	0.71 J	U	U	NA	U	U	1.2	U	U	U	U	2
	5/27/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	8/09/04	U	0.75 J	U	U	NA	U	U	1.1	U	U	U	U	2
	10/27/04	U	U	U	U	NA	U	U	0.97 J	U	U	U	U	1
	12/16/04	U	0.86 J	U	U	NA	U	U	1.8	U	U	U	U	3
	3/18/05	U	U	U	U	NA	U	U	0.62 J	U	U	U	U	1
	6/21/05	U	U	U	U	U	U	U	0.54 J	U	U	U	U	1
	9/13/05	U	0.46 J	U	U	0.49 J	U	U	0.76 J	U	U	U	U	2
	12/21/05	U	0.47 J	U	U	0.52 J	U	U	0.89 J	U	U	U	U	2
	3/15/06	U	U	U	U	0.4 J	U	U	0.79 J	U	U	U	U	1
	6/21/06	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	9/05/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	12/04/06	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	3/12/07	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	6/12/07	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.32 J	0.26 U	0.22 U	0.25 U	0.21 U	0
	9/05/07	0.67 U	0.37 J	0.28 U	0.29 U	0.65 J	0.32 U	0.3 U	1.3	0.26 U	0.22 U	0.25 U	0.21 U	2
	12/12/07	0.67 U	3.2	0.28 U	0.29 U	10.1	0.32 U	1.2	22.9	2.1	0.22 U	0.25 U	0.21 U	40
	3/11/08	0.67 U	0.5 J	0.28 U	0.29 U	1.5	0.32 U	0.3 U	5.1	0.42 JB	0.22 U	0.25 U	0.21 U	8
	6/16/08	0.22 U	1.3	0.29 U	0.35 U	3.7	0.16 U	0.24 U	10.9	0.96 J	0.21 U	0.16 U	0.16 U	17
	9/11/08	0.22 U	1.3	0.29 U	0.35 U	2.6	0.16 U	0.37 J	8.8	0.18 U	0.21 U	0.16 U	0.16 U	13
	12/19/08	0.22 U	1.3	0.29 U	0.35 U	2.8	0.16 U	0.24 U	7.9 B	0.74 J	0.21 U	0.16 U	0.16 U	13
	2/24/09	0.22 U	0.24 U	0.29 U	0.35 U	1.4	0.16 U	0.24 U	6.3	0.18 U	0.21 U	0.16 U	0.16 U	8
	5/11/09	0.22 U	0.32 J	0.29 U	0.35 U	1.0	0.16 U	0.24 U	4.0	0.32 J	0.21 U	0.16 U	0.16 U	6
	8/11/09	0.37 U	0.45 J	0.40 U	0.33 U	1.4	0.25 U	0.26 U	6.7	0.24 U	0.44 U	0.23 U	0.30 U	9
	11/09/09	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.73 J	0.24 U	0.44 U	0.23 U	0.30 U	1
	2/22/10	0.37 U	1.3	0.40 U	0.33 U	3.0	0.25 U	0.26 U	6.9	0.59 J	0.44 U	0.23 U	0.30 U	12
	5/20/10	0.37 U	0.36 J	0.40 U	0.33 U	1.2	0.25 U	0.26 U	5.0	0.32 J	0.44 U	0.23 U	0.30 U	7
	8/12/10	0.37 U	0.81 J	0.40 U	0.33 U	2.5	0.25 U	0.26 U	5.8	0.56 J	0.44 U	0.23 U	0.30 U	10
	11/12/10	0.37 U	1.6	0.40 U	0.33 U	7.6	0.25 U	0.26 U	11.6	1.6	0.44 U	0.23 U	0.30 U	22
	2/17/11	0.37 U	0.29 U	0.40 U	0.33 U	1.5	0.25 U	0.26 U	5.9	0.24 U	0.44 U	0.23 U	0.30 U	7
	6/16/11	0.37 U	0.31 J	0.28 U	0.18 U	1.3	0.31 U	0.24 U	5.4	0.21 U	0.27 U	0.21 U	0.20 U	7
	8/18/11	0.37 U	0.49 J	0.28 U	0.18 U	1.6	0.31 U	0.24 U	4.8	0.39 J	0.27 U	0.21 U	0.20 U	7
	11/03/11	0.37 U	0.46 J	0.28 U	0.18 U	0.88 J	0.31 U	0.24 U	3.9	0.21 U	0.27 U	0.21 U	0.20 U	5
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.69	1.0 U	1.0 U	1.0 U	5.0 U	6
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.84	1.0 U	1.0 U	1.0 U	5.0 U	2
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	1.57	1.0 U	1.0 U	3.45	1.0 U	1.0 U	1.0 U	5.0 U	5
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.88	1.0 U	1.0 U	1.0 U	5.0 U	2
	2/20/13	1.0 U	1.0 U	1.0 U	1.0 U	0.82 J	1.0 U	1.0 U	1.6	1.0 U	1.0 U	1.0 U	2.0 U	2
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.0 U	1.0 U	1.0 U	2.0 U	1
	8/27/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U	1.0 U	1.0 U	2.0 U	1
	11/12/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.97 J	1.0 U	1.0 U	1.0 U	2.0 U	1
	2/17/14	1.0 U	1.0 U	1.0 U	1.0 U	0.71 J	1.0 U	1.0 U	2.1	1.0 U	1.0 U	1.0 U	2.0 U	3
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.93 J	1.0 U	1.0 U	1.0 U	2.0 U	1
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.73 J	1.0 U	1.0 U	1.0 U	2.0 U	1
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	0.51 J	1.0 U	1.0 U	0.53 J	1.0 U	1.0 U	1.0 U	2.0 U	1
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-09S	7/10/00	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	0
	10/24/00	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	0
	3/27/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	8/09/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	9/20/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	11/16/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	2/06/02	5 U	2.8 J	2 U	2 U	4.7 J	5 U	5 U	0.9 J	1 U	1 U	5 U	2 U	8
	5/10/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1.2 U	5 U	2 U	0
	8/28/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	0
	11/12/02	0.65 U	0.089 U	0.49 U	0.57 U	0.18 U	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	0
	5/15/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	8/15/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	11/11/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	2/11/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	5/27/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	8/09/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	10/27/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	12/16/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	3/18/05	U	105	13.8	U	NA	U	U	3.9	7.3	9.8	U	U	140
	6/21/05	U	U	U	U	U	U	U	U	U	U	U	U	0
	9/13/05	U	U	U	U	U	U	U	0.65 J	U	U	U	U	1
	12/19/05	U	U	U	U	U	U	U	U	U	U	U	U	0
	3/15/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	6/21/06	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	9/05/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	12/04/06	0.56 U	0.23 U	0.33 U	0.23 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	3/12/07	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	6/12/07	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
	9/05/07	0.67 U	1.2	0.28 U	0.29 U	4.7	0.32 U	0.78 J	16.2	0.88 J	0.22 U	0.25 U	0.21 U	24
	12/12/07	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.8 J	0.26 U	0.22 U	0.25 U	0.21 U	1
	3/11/08	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
	6/16/08	0.22 U	0.61 J	0.29 U	0.35 U	2.1	0.16 U	0.24 U	7.9	0.43 J	0.21 U	0.16 U	0.16 U	11
	9/11/08	0.22 U	0.31 J	0.29 U	0.35 U	0.84 J	0.16 U	0.24 U	3.9	0.21 J	0.21 U	0.16 U	0.16 U	5
	12/19/08	0.22 U	0.24 U	0.29 U	0.35 U	0.32 J	0.16 U	0.24 U	0.49 JB	0.18 U	0.21 U	0.16 U	0.16 U	1
	2/24/09	0.22 U	0.24 U	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	0
	5/11/09	0.22 U	0.24 U	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.49 J	0.2 J	0.21 U	0.16 U	0.16 U	1
	8/11/09	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.61 J	0.24 U	0.44 U	0.23 U	0.30 U	1
	11/09/09	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.35 J	0.24 U	0.44 U	0.23 U	0.30 U	0
	2/22/10	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	0
	5/20/10	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	0
	8/12/10	0.37 U	0.43 J	0.40 U	0.33 U	1.9	0.25 U	0.26 U	8.4	0.69 J	0.44 U	0.23 U	0.30 U	11
	11/12/10	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	1.5	0.24 U	0.44 U	0.23 U	0.30 U	2
	2/17/11	0.37 U	0.29 U	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	0
	6/16/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
	8/18/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.58 J	0.21 U	0.27 U	0.21 U	0.20 U	1
	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.16	1.0 U	1.0 U	1.20	1.0 U	1.0 U	1.0 U	5.0 U	2
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.58	1.0 U	1.0 U	1.0 U	5.0 U	2
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	2/20/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/26/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/12/13	1.0 U	1.0 U	1.0 U	1.0 U	0.74 J	1.0 U	1.0 U	3.7	1.0 U	1.0 U	1.0 U	2.0 U	4
	2/17/14	1.0 U	1.0 U	1.0 U	1.0 U	0.70 J	1.0 U	1.0 U	2.0	0.69 J	1.0 U	1.0 U	2.0 U	3
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0	21.2	1.0 U	1.0 U	2.0 U	23
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-10D	7/11/00	5 U	55	9	5 U	20	5 U	5 U	5 U	5 U	5 U	5 U	5 U	84
Downgradient	10/25/00	5 U	180	26	5 U	65	5 U	7	7	7	5 U	5 U	5 U	292
Area	3/28/01	5	250	31	5 U	78	5 U	5 U	9	5 U	5 U	5 U	5 U	373
	8/09/01	6	230	28	5 U	90	5 U	5 U	5 U	5 U	5 U	5 U	5 U	354
	9/19/01	5 U	150	9	5 U	36	5 U	5 U	5 U	5 U	5 U	5 U	5 U	195
	11/16/01	5 U	25	6	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	31
	2/08/02	2.7 J	123	5.6	2 U	26.5	5 U	5 U	1 U	0.99 J	1.9	5 U	2 U	161
	5/13/02	5.8	162	2 U	2 U	0.89 J	5 U	5 U	1 U	1 U	70.1	5 U	2 U	239
	8/29/02	9.6	192	2 U	2 U	5 U	5 U	5 U	1 U	1 U	79.9	5 U	2 U	282
	11/13/02	8.4	188	0.49 U	0.57 U	0.18 U	0.18 U	0.094 U	0.39 U	0.16 U	63.9	0.18 U	0.53 U	260
	2/12/03	0.65 U	81.8	3.7	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	2.5	0.18 U	0.53 U	88
	5/14/03	1.9	88.9	1.2	U	NA	U	U	U	U	2.8	U	U	95
	8/13/03	6.3	188	U	U	NA	U	1.1	U	0.53 J	8.3	U	U	204
	11/12/03	U	73.3	1.7	U	NA	U	U	U	0.88 J	0.8 J	U	U	77
	2/11/04	U	55.5	1.1	U	NA	U	U	U	0.89 J	U	U	U	57
	5/27/04	U	144	2.3	U	NA	U	U	U	1.2	3.3	U	U	151
	8/10/04	U	144	U	U	NA	U	0.27 J	U	U	2.3	U	U	147
	10/28/04	U	158	U	U	NA	U	U	U	U	0.96 J	U	U	159
	12/17/04	U	122	2	U	NA	U	U	U	1.1	2.3	U	U	127
	3/18/05	3.2	125	28.5	U	NA	U	1.2	4.4	18	4.2	U	U	185
	6/21/05	U	69.4	U	U	1	U	U	U	U	8.2	U	U	79
	9/13/05	U	60.7	U	U	1.1	U	U	U	0.37 J	4	U	U	66
	12/20/05	U	50.7	U	U	U	U	U	U	U	2.3	U	U	53
	3/14/06	1.5	113	U	U	U	U	U	U	U	4.5	U	U	119
	6/23/06	6.2	116	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	3.5	0.22 U	0.27 U	126
	9/07/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	12/05/06	34.9	83.9	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	1.1	0.22 U	0.27 U	120
	3/13/07	18.6	58.9	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	78
	6/12/07	8.5	39.3	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	48
	9/06/07	5.8	24.8	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	31
	12/13/07	14.4	47.8	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.92 J	0.26 U	0.22 U	0.25 U	0.21 U	63
	3/13/08	23.8	45.6	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.87 JB	0.22 U	0.25 U	0.21 U	70
	6/16/08	10	39.1	0.29 U	0.35 U	0.29 J	0.21 J	0.24 U	0.73 J	0.2 J	0.49 J	0.16 U	0.16 U	51
	9/11/08	0.22 U	22.0	0.29 U	0.35 U	0.27 J	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	22
	12/19/08	15.7	27.7	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.35 J	0.16 U	0.16 U	44
	2/24/09	10.2	25.0	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	35
	5/11/09	8.8	26.8	0.29 U	0.35 U	0.25 U	0.16 U	0.24 U	0.29 U	0.18 U	0.21 U	0.16 U	0.16 U	36
	11/09/09	0.37 U	8.8	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	9
	2/22/10	0.37 U	15.2	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	15
	5/20/10	6.3	15.5	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	22
	8/12/10	5.9	15.5	0.40 U	0.33 U	0.33 J	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	22
	11/12/10	0.71 J	10.1	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	11
	2/17/11	0.37 U	8.0	0.40 U	0.33 U	0.22 U	0.25 U	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	8
	6/16/11	0.37 U	10.1	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	10
	8/18/11	0.37 U	8.1	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	8
	11/03/11	0.37 U	8.4	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	8
	2/15/12	1.0 U	8.01	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.60	1.0 U	1.0 U	1.0 U	5.0 U	10
	5/16/12	1.0 U	14.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.01	4.58	1.0 U	5.0 U	20
	8/08/12	1.0 U	18.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.09	1.0 U	5.0 U	22
	2/20/13	1.0 U	10.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	10
	5/15/13	0.26 J	3.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	4
	8/26/13	1.0 U	2.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	3
	11/11/13	1.0 U	2.8	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	3
	2/17/14	1.0 U	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
	5/20/14	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
	8/06/14	1.0 U	1.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
	11/18/14	1.0 U	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-10S	7/11/00	9	270	48	5 U	100	5 U	56	20	22	5 U	5 U	5 U	525
Downgradient	10/25/00	6	230	42	5 U	97	5 U	46	15	19	5 U	5 U	5 U	455
Area	3/28/01	14	350	57	5 U	140	5 U	49	18	15	5 U	5 U	5 U	643
	8/09/01	13 U	260	23	13 U	110	13 U	13 U	13 U	13 U	13 U	13 U	13 U	393
	9/19/01	21	290	26	5 U	190	5 U	20	5 U	9	5 U	5 U	5 U	556
	11/16/01	5 U	170	19	5 U	80	5 U	6	5 U	5 U	5 U	5 U	5 U	275
	2/08/02	5 U	126	6.8	2 U	24.2	5 U	3.7 J	1	2	33.1	5 U	2 U	197
	5/13/02	5 U	130	16.2	2 U	49.7	5 U	10.2	5.6	7.8	12	5 U	2 U	232
	8/29/02	5 U	88.6	1.3 J	2 U	5.3	5 U	1.4 J	0.46 J	0.82 J	27.8	5 U	2 U	126
	11/13/02	0.65 U	135	11.7	0.57 U	30.5	0.18 U	4.6 J	3.3	4.7	44	0.18 U	0.53 U	234
	2/12/03	0.65 U	149	4.4	0.57 U	NA	0.18 U	0.094 U	2.8	2.1	74.5	0.18 U	0.53 U	233
	5/14/03	U	196	23.5	U	NA	U	8.1	9	12.7	25.9	U	U	275
	8/13/03	U	142	3.6	U	NA	U	1.5	U	2	79.1	U	U	228
	11/13/03	U	128	14.2	U	NA	U	2.8	4.9	7	14.1	U	U	171
	2/10/04	U	99.6	12.7	U	NA	U	U	U	6.5	11.3	U	U	130
	5/27/04	U	180	17.1	U	NA	U	U	U	14.5	20.5	U	U	232
	8/10/04	U	137	4.1	U	NA	U	U	U	1.2	59.1	U	U	201
	10/28/04	U	164	2.4	U	NA	U	U	U	0.83 J	37.2	U	U	204
	12/17/04	U	123	10.6	U	NA	U	U	U	2.8	36.6	U	U	173
	3/18/05	U	121	U	U	NA	U	U	U	U	1.2	U	U	122
	6/21/05	U	124	14.7	U	89.6	U	U	4.7	7.4	9.9	U	U	250
	9/14/05	U	83.2	10.8	U	66.5	0.51 J	U	2.5	4.4	9.3	U	U	177
	12/20/05	U	96.2	14.1	U	86	0.58 J	U	4	7.3	3.9	U	U	212
	3/14/06	U	88.4	14	U	81	0.5 J	U	3.8	6.1	4.3	U	U	198
	6/23/06	0.56 U	70.2	10.4	0.29 U	66.9	0.55 J	0.28 U	2.4	4.5	6	0.22 U	0.27 U	161
	9/07/06	U	98.2	11.3	U	74.2	0.53 J	U	1.7	4.1	18	U	U	208
	12/05/06	0.56 U	84.7	9.6	0.29 U	60.5	0.63 J	0.28 U	0.28 U	2.9	30.4	0.22 U	0.27 U	189
	3/13/07	0.56 U	85.3	13.2	0.29 U	71	0.62 J	0.28 U	0.28 U	6.2	12.5	0.22 U	0.27 U	189
	6/12/07	0.67 U	76.4	7.1	0.29 U	46.5	0.48 J	0.3 U	3.6	3.9	24.9	0.25 U	0.21 U	163
	9/06/07	0.67 U	51.1	3.6	0.29 U	29.1	0.32 U	0.3 U	0.9 J	1.9	8.7	0.25 U	0.21 U	95
	12/13/07	0.67 U	41.5	4.8	0.29 U	34.6	0.32 U	0.3 U	1.7	4.3	3.5	0.25 U	0.21 U	90
	3/13/08	0.67 U	50.1	3.8	0.29 U	23.7	0.41 J	0.3 U	0.28 U	2 B	13.6	0.25 U	0.21 U	94
	6/16/08	0.22 U	59.5	8.3	0.35 U	51.3	0.49 J	0.24 U	3.2	6.2	8.3	0.16 U	0.16 U	137
	9/11/08	0.22 U	45.4	6.1	0.35 U	37.7	0.39 J	0.24 U	0.9 J	3.1	9	0.16 U	0.16 U	103
	12/19/08	0.22 U	31.4	4.7	0.35 U	23.6	0.16 U	0.24 U	0.7 JB	2.3	3.8	0.16 U	0.16 U	67
	2/24/09	0.22 U	27.8	3.9	0.35 U	25.0	0.16 U	0.24 U	0.29 U	3.1	5.9	0.16 U	0.16 U	66
	5/11/09	0.22 U	22.9	1.6	0.35 U	19.1	0.16 U	0.24 U	0.45 J	1.6	0.98 J	0.16 U	0.16 U	47
	11/09/09	0.37 U	46.0	6.1	0.33 U	39.2	0.32 J	0.26 U	1.6	4.0	5.6	0.23 U	0.30 U	103
	2/22/10	0.37 U	44.2	9.5	0.33 U	44.9	0.25 U	0.26 U	2.2	5.4	5.5	0.23 U	0.30 U	112
	5/20/10	0.37 U	22.1	2.8	0.33 U	22.7	0.25 U	0.26 U	1.6	2.9	0.44 U	0.23 U	0.30 U	52
	8/12/10	0.37 U	39.4	7.2 B	0.33 U	37.0	0.51 J	0.26 U	2.8	3.8	6.1	0.23 U	0.30 U	97
	11/12/10	0.37 U	33.7	6.3	0.33 U	33.1	0.49 J	0.26 U	3.3	3.9	5.0	0.23 U	0.30 U	86
	2/17/11	0.37 U	25.4	4.4	0.33 U	26.6	0.25 U	0.26 U	0.27 U	2.0	5.6	0.23 U	0.30 U	64
	6/16/11	0.37 U	21.3	3.1	0.18 U	22.6	0.31 U	0.24 U	1.0	2.2	1.7	0.21 U	0.20 U	52
	8/18/11	0.37 U	36.6	8.5	0.18 U	37.0	0.51 J	0.24 U	4.0	3.1	10.3	0.21 U	0.20 U	100
	11/03/11	0.37 U	35.8	6.4	0.18 U	31.3	0.73 J	0.24 U	3.4	2.9	17.0	0.21 U	0.20 U	98
	2/15/12	1.0 U	38.0	6.47	1.0 U	26.6	1.0 U	1.0 U	3.44	3.80	14.6	1.0 U	5.0 U	93
	5/16/12	1.0 U	14.8	1.16	1.0 U	11.2	1.0 U	1.0 U	2.38	1.61	1.0 U	1.0 U	5.0 U	31
	8/08/12	1.0 U	26.1	2.58	1.0 U	11.6	1.0 U	1.0 U	1.12	1.59	8.24	1.0 U	5.0 U	51
	2/20/13	1.0 U	28.7	4.5	1.0 U	19.5	0.46 J	1.0 U	2.4	2.4	8.2	1.0 U	2.0 U	66
	5/15/13	1.0 U	12.0	1.3	1.0 U	8.1	1.0 U	1.0 U	1.2	1.4	0.48 J	1.0 U	2.0 U	24
	8/26/13	1.0 U	24.6	3.2	1.0 U	12.9	1.0 U	1.0 U	2.8	2.4	2.6	1.0 U	2.0 U	49
	11/11/13	1.0 U	24.8	2.3	1.0 U	11.0	1.0 U	1.0 U	1.6	1.9	2.3	1.0 U	2.0 U	44
	2/17/14	1.0 U	20.6	2.8	1.0 U	9.8	1.0 U	1.0 U	1.7	2.1	2.8	1.0 U	2.0 U	40
	5/20/14	1.0 U	11.6	0.62 J	1.0 U	5.5	1.0 U	1.0 U	0.93 J	1.0	1.0 U	1.0 U	2.0 U	20
	8/06/14	1.0 U	21.0	1.5	1.0 U	7.6	1.0 U	1.0 U	1.7	1.9	1.7	1.0 U	2.0 U	35
	11/18/14	1.0 U	24.2	2.1	1.0 U	9.0	1.0 U	1.0 U	2.5	2.0	2.2	1.0 U	2.0 U	42
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-11D	7/13/00	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9	5 U	9
Downgradient	10/25/00	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
Area	3/28/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	2/07/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	0
	5/13/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1.2 U	5 U	2 U	0
	8/28/02	5 U	5 U	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	0
	11/13/02	0.65 U	0.089 U	0.49 U	0.57 U	0.18 U	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	0
	2/11/03	0.65 U	0.86 J	0.49 U	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	1
	5/15/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	8/15/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	11/13/03	U	1.1	U	U	NA	U	U	U	U	U	U	U	1
	2/11/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	5/28/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	8/10/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	10/28/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	12/16/04	U	U	U	U	NA	U	U	U	U	U	U	U	0
	3/18/05	U	1.9	U	U	NA	U	U	U	U	U	U	U	2
	6/21/05	U	U	U	U	U	U	U	U	U	U	U	U	0
	9/13/05	U	U	U	U	U	U	U	U	U	U	U	U	0
	12/21/05	U	U	U	U	U	U	U	U	U	U	U	U	0
	3/15/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	6/21/06	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	9/05/06	U	U	U	U	U	U	U	U	U	U	U	U	0
	12/05/06	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	3/13/07	0.56 U	2.8	0.33 U	0.29 U	0.4 J	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	3
	6/12/07	0.67 U	0.33 J	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
	9/05/07	0.67 U	0.34 J	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.29 J	0.26 U	0.22 U	0.25 U	0.21 U	1
	12/12/07*	13 U	4 U	5.5 U	5.7 U	5.4 U	6.3 U	6 U	5.6 U	5.1 U	4.5 U	5.1 U	4.2 U	0
	3/13/08	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

* Sample pH did not satisfy field preservation criteria. Sample diluted due to foaming.

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-11S	7/13/00	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
Downgradient	10/25/00	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
Area	3/28/01	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0
	2/07/02	5 U	0.83 J	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	1
	5/13/02	5 U	0.73 J	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1.2 U	5 U	2 U	1
	8/28/02	5 U	0.84 J	2 U	2 U	5 U	5 U	5 U	1 U	1 U	1 U	5 U	2 U	1
	11/13/02	0.65 U	3 J	1.9 J	0.57 U	1.6 J	0.18 U	0.094 U	0.39 U	1.6	0.77 U	0.18 U	0.53 U	8
	2/12/03	0.65 U	0.8 J	0.49 U	0.57 U	NA	0.18 U	0.094 U	0.39 U	0.16 U	0.77 U	0.18 U	0.53 U	1
	5/15/03	U	0.98 J	U	U	NA	U	U	U	U	U	U	U	1
	8/15/03	U	1.1	U	U	NA	U	U	U	U	U	U	U	1
	11/13/03	U	U	U	U	NA	U	U	U	U	U	U	U	0
	2/11/04	U	0.59 J	U	U	NA	U	U	U	U	U	U	U	1
	5/28/04	U	1.1	U	U	NA	U	U	U	U	U	U	U	1
	8/09/04	U	0.78 J	U	U	NA	U	U	U	U	U	U	U	1
	10/28/04	U	1.5	U	U	NA	U	U	U	U	U	U	U	2
	12/16/04	U	1.9	U	U	NA	U	U	U	U	U	U	U	2
	3/18/05	U	1.2	U	U	NA	U	U	0.62 J	U	U	U	U	2
	6/21/05	U	2	U	U	U	U	U	U	U	U	U	U	2
	9/13/05	U	1.7	U	U	U	U	U	U	U	U	U	U	2
	12/21/05	U	1.2	U	U	U	U	U	U	U	U	U	U	1
	3/15/06	U	1.5	U	U	U	U	U	U	U	U	U	U	2
	6/21/06	0.56 U	1.9	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	2
	9/05/06	U	2.8	U	U	U	U	U	U	U	U	U	U	3
	12/05/06	0.56 U	0.93 J	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	1
	3/13/07	0.56 U	0.23 U	0.33 U	0.29 U	0.18 U	0.42 U	0.28 U	0.28 U	0.29 U	0.29 U	0.22 U	0.27 U	0
	6/12/07	0.67 U	3	0.28 U	0.29 U	0.47 J	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	3
	9/05/07	0.67 U	3.2	0.28 U	0.29 U	0.38 J	0.32 U	0.3 U	0.37 J	0.26 U	0.22 U	0.25 U	0.21 U	4
	12/12/07	0.97 J	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	2.2	0.26 U	0.22 U	0.25 U	0.21 U	3
	3/13/08	0.67 U	0.2 U	0.28 U	0.29 U	0.27 U	0.32 U	0.3 U	0.28 U	0.26 U	0.22 U	0.25 U	0.21 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-12	11/23/08	0.22 U	1.2	0.29 U	0.35 U	28.5	2.6	0.24 U	0.29 U	0.18 U	2.7	0.16 U	0.16 U	35
MW-01 Area	2/22/10	1.1	2.0	0.40 U	0.33 U	13.6	5.5	0.26 U	0.27 U	0.75 J	1.2	0.23	0.30 U	24
	5/20/10	0.37 U	0.86 J	0.40 U	0.33 U	7.7	2.7	0.26 U	0.27 U	0.82 J	0.56 J	0.23 U	0.30 U	12
	8/12/10	1.4	1.3	0.40 U	0.33 U	8.7	6.4	0.26 U	0.27 U	0.33 J	0.62	0.23 U	0.30 U	19
	11/12/10	3.2	0.94 J	0.40 U	0.33 U	8.6	5.9	0.26 U	0.84 J	0.35 J	1.5	0.23 U	0.30 U	21
	2/17/11	0.37 U	0.43 J	0.40 U	0.33 U	4.0	5.0	0.26 U	0.27 U	0.24 U	0.44 U	0.23 U	0.30 U	9
	6/21/11	0.37 U	0.82 J	0.28 U	0.18 U	5.5	4.7	0.24 U	0.32 U	0.54 J	0.27 U	0.21 U	0.20 U	12
	8/18/11	0.37 U	0.5 J	0.28 U	0.18 U	3.6	3.6	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	8
	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	1.4	0.62 J	0.24 U	0.53 J	0.45 J	0.27 U	0.21 U	0.20 U	3
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	5.34	2.06	1.0 U	1.73	1.0 U	1.0 U	1.0 U	5.0 U	9
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	3.28	3.38	1.0 U	2.48	1.0 U	1.0 U	1.0 U	5.0 U	9
	8/08/12	1.0 U	1.0 U	1.0 U	1.0 U	4.23	5.8	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	10
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	3.6	4.8	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	8
	2/20/13	1.0 U	0.48 J	1.0 U	1.0 U	2.9	5.8	1.0 U	1.3	0.30 J	0.40 J	1.0 U	2.0 U	11
	5/15/13	1.0 U	0.35 J	1.0 U	1.0 U	2.0	0.76 J	1.0 U	1.7	0.62 J	0.40 J	0.82 J	2.0 U	7
	8/27/13	1.0 U	0.48 J	1.0 U	1.0 U	3.7	3.7	1.0 U	1.2	0.23 J	0.51 J	1.0 U	2.0 U	10
	11/11/13	1.0 U	1.0 U	1.0 U	1.0 U	4.9	2.6	1.0 U	11.2	1.0	0.47 J	1.0 U	2.0 U	20
	2/17/14	1.0 U	0.69 J	1.0 U	1.0 U	1.3	7.9	1.0 U	2.2	1.0 U	0.64 J	1.0 U	2.0 U	13
	5/20/14	1.0 U	0.94 J	1.0 U	1.0 U	5.5	2.0	1.0 U	7.2	3.1	1.0 U	1.0 U	2.0 U	19
	8/06/14	1.0 U	0.54 J	1.0 U	1.0 U	3.1	3.6	1.0 U	3.6	0.75 J	0.57 J	1.0 U	2.0 U	12
	11/17/14	1.0 U	0.48 J	1.0 U	1.0 U	2.4	3.3	1.0 U	5.0	0.56 J	1.0 U	1.0 U	2.0 U	12
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-13	11/23/08	0.22 U	10.1	0.94 J	0.35 U	56.5	0.82 J	5.2	199	10.8	0.21 U	4.5	0.16 U	288
Upgradient to	12/19/08	0.55 U	16.8	1.4 J	0.87 U	84.9	0.40 U	11.7	256 B	12.4	0.52 U	0.85 J	0.40 U	384
MW-01 Area	2/24/09	0.22 U	15.3	1.6	0.35 U	93.6	1.0	14.6	324	21.6	0.21 U	0.16 U	0.16 U	472
	5/11/09	0.22 U	19.2	2.0	0.35 U	127.0	1.4	11.2	292	19.0	0.21 U	0.65 J	0.16 U	472
	8/11/09	0.37 U	16.3	1.5	0.33 U	116.0	1.4	10.6	335	21.6	0.44 U	0.59 J	0.30 U	503
	11/09/09	0.37 U	13.6	1.3	0.33 U	92.8	1.3	7.8	258	19.0	0.44 U	0.5 J	0.30 U	394
	2/22/10	0.37 U	16.4	2.0	0.33 U	120.0	1.7	10.1	384	23.9	0.44 U	0.54 J	0.30 U	559
	5/20/10	0.37 U	9.4	1.1	0.33 U	73.5	1.2	7.0	274	17.3	0.44 U	0.34 J	0.30 U	384
	8/12/10	0.74 U	11.0	1.6 JB	0.67 U	81.7	1.6 J	6.1	307	17.2	0.89 U	0.47 U	0.61 U	426
	11/12/10	0.74 U	12.7	1.5 J	0.67 U	87.1	1.5 J	7.2	298	19.1	0.89 U	0.47 U	0.61 U	427
	2/17/11	0.37 U	13.1	1.4	0.33 U	105	0.89 J	7.1	291	24.1	0.44 U	0.23 U	0.30 U	443
	6/16/11	0.37 U	9.4	1.3	0.18 U	76	1.3	4.4	216	18.4	0.27 U	0.21 U	0.20 U	327
	8/18/11	0.37 U	8.8	1.4	0.18 U	81.8	1.3	4.5	220	20.5	0.27 U	0.21 U	0.20 U	338
	11/03/11	0.37 U	6.3	0.94 J	0.18 U	60.4	1.2	4.1	183	16.3	0.27 U	0.21 U	0.20 U	272
	2/15/12	1.0 U	10.5	1.10	1.0 U	84.4	1.63	5.76	372	21.5	1.0 U	1.0 U	5.0 U	497
	5/16/12	1.0 U	10.2	1.04	1.0 U	94.1	1.59	6.27	571	23.6	1.0 U	1.0 U	5.0 U	708
	8/08/12	1.0 U	11.3	1.2	1.0 U	111.0	1.0 U	7.47	472	25.2	1.0 U	1.0 U	5.0 U	628
	11/05/12	1.0 U	10.3	1.01	1.0 U	84.9	2.45	4.24	327	19.6	1.0 U	1.0 U	5.0 U	450
	2/20/13	1.0 U	10.3	0.96 J	1.0 U	91.0	0.98 J	3.7	269	21.4	1.0 U	1.0 U	2.0 U	397
	5/15/13	1.0 U	11.4	1.0	1.0 U	120.0	1.2	4.1	309 E	27.3	1.0 U	0.25 J	2.0 U	474
	8/27/13	1.0 U	9.1	1.1	1.0 U	99.8	0.52 J	4.0	218	23.9	1.0 U	0.27 J	2.0 U	357
	11/11/13	1.0 U	10	0.92 J	1.0 U	124	0.98 J	4.5	281	31.6	1.0 U	1.0 U	2.0 U	453
	2/17/14	2.0 U	6.9	2.0 U	2.0 U	71.9	2.0 U	3.1	286	19.1	2.0 U	2.0 U	4.0 U	387
	5/20/14	1.0 U	6.3	0.63 J	1.0 U	77.7	0.67 J	2.9	215	19.0	1.0 U	1.0 U	2.0 U	322
	8/06/14	1.0 U	6.8	0.58 J	1.0 U	80.2	1.1	2.4	212	19.7	1.0 U	1.0 U	2.0 U	323
	11/17/14	1.0 U	7.6	1.0 U	1.0 U	71.5	1.1	1.9	148	21.0	1.0 U	0.28 J	2.0 U	251
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-14	11/23/08	0.22 U	9.0	0.59 J	0.35 U	60	1.7	1.8	62	13.3	0.22 J	0.56 J	0.16 U	150
MW-01 Area	12/19/08	0.22 U	16.1	1.8	0.35 U	105	2.0	5.8	146 B	20.3	0.61 J	0.74 J	0.16 U	298
	2/24/09	0.22 U	17.2	1.8	0.35 U	113	1.9	6.5	184	31.3	0.21 U	0.16 U	0.16 U	356
	5/11/09	0.22 U	21.5	1.8	0.35 U	145	2.0	5.6	167	26.9	0.64 J	0.51 J	0.16 U	371
	8/11/09	0.37 U	19.8	2.0	0.33 U	145	2.6	6.5	240	38.9	0.68 J	0.35 J	0.30 U	456
	11/09/09	0.37 U	17.2	1.5	0.33 U	126	3.2	5.1	220	36.1	0.54 J	0.34 J	0.30 U	410
	2/22/10	0.37 U	19.4	2.6	0.33 U	164	2.9	5.4	263	41.4	0.76 J	0.32 J	0.30 U	500
	5/20/10	0.37 U	15.0	1.5	0.33 U	137	3.5	3.6	185	40.6	0.64 J	0.25 J	0.30 U	387
	8/12/10	0.37 U	14.3	1.9 B	0.33 U	118	3.0	3.3	205	36.3	0.73 J	0.26 J	0.30 U	383
	11/12/10	0.37 U	16.7	1.6	0.33 U	133	3.3	4.2	223	36.9	0.73 J	0.28 J	0.30 U	420
	2/17/11	0.37 U	12.3	1.2	0.33 U	110	1.8	3.3	168	27.6	0.44 U	0.23 U	0.30 U	324
	6/16/11	0.37 U	15.3	1.5	0.18 U	144	4.0	2.8	200	39.9	1.2	0.21 U	0.20 U	409
	8/18/11	0.37 U	10.8	1.6	0.18 U	123	3.5	2.1	184	36.5	0.86 J	0.21 U	0.20 U	362
	11/03/11	0.37 U	10.1	1.1	0.18 U	109	3.6	1.4	118	34.4	0.90 J	0.21 U	0.20 U	279
	2/15/12	1.0 U	9.7	1.02	1.0 U	90.2	3.58	1.3	112	25.9	1.0 U	1.0 U	5.0 U	244
	5/16/12	1.0 U	7.29	1.0 U	1.0 U	72.5	3.29	1.43	139	20.0	1.0 U	1.0 U	5.0 U	244
	8/09/12	1.0 U	8.53	1.0 U	1.0 U	90.1	1.89	1.6	75	14.4	1.0 U	1.0 U	5.0 U	192
	11/05/12	1.0 U	10.50	1.19	1.0 U	100	3.21	2.79	272	27.7	1.0 U	1.0 U	5.0 U	417
	2/20/13	1.0 U	8.3	0.77 J	1.0 U	67.8	0.68 J	1.5	72.9	12.7	0.42 J	1.0 U	2.0 U	165
	5/15/13	1.0 U	10.2	0.55 J	1.0 U	116	4.1	1.2	96.1	22.8	1.3	1.9	2.0 U	254
	8/26/13	1.0 U	11.3	0.52 J	1.0 U	119	9.4	1.9	152	33.8	1.1	0.73 J	2.0 U	330
	11/12/13	1.0 U	11.3	0.91 J	1.0 U	158	2.2	2.0	173	42.1	1.3	0.33 J	2.0 U	391
	2/17/14	1.0 U	7.6	0.69 J	1.0 U	79.1	1.0	1.5	167	26.0	0.62 J	1.0 U	2.0 U	284
	5/21/14	1.0 U	8.6	0.73 J	1.0 U	120	1.3	1.8	175	35.5	0.9 J	1.0 U	2.0 U	344
	8/06/14	1.0 U	9.2	0.82 J	1.0 U	127	1.6	1.8	188	38.0	1.0	1.0 U	2.0 U	367
	11/17/14	1.0 U	7.1	0.69 J	1.0 U	97.1	1.1	1.3	155	29.4	0.95 J	1.0 U	2.0 U	293
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-15S	6/16/11	0.37 U	0.7 J	0.28 U	0.18 U	1.8	0.31 U	0.24 U	0.63 J	0.21 U	0.27 U	0.21 U	0.20 U	3
Upgradient Area	8/18/11	0.37 U	0.19 U	0.28 U	0.18 U	0.52 J	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	1
(Driveway)	12/14/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	2/21/13	1.0 U	1.0 U	1.0 U	1.0 U	0.39 J	1.0 U	1.0 U	1.1	0.28 J	1.0 U	1.0 U	2.0 U	2
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	0.30 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/27/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/12/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-16	6/16/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
Upgradient Area	8/18/11	0.37 U	0.19 U	0.28 U	0.18 U	0.51 J	0.31 U	0.24 U	0.51 J	0.21 U	0.27 U	0.21 U	0.20 U	1
(Driveway)	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.64	1.0 U	1.0 U	1.03	1.0 U	1.0 U	1.0 U	5.0 U	3
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.69	1.0 U	1.0 U	1.92	1.0 U	1.0 U	1.0 U	5.0 U	4
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	2.49	1.0 U	1.0 U	1.75	1.0 U	1.0 U	1.0 U	5.0 U	4
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.37	1.0 U	1.0 U	1.14	1.0 U	1.0 U	1.0 U	5.0 U	3
	2/21/13	1.0 U	0.51 J	1.0 U	1.0 U	1.0	1.0 U	1.0 U	0.94 J	0.23 J	1.0 U	1.0 U	2.0 U	3
	5/15/13	1.0 U	0.35 J	1.0 U	1.0 U	1.1	0.27 J	1.0 U	0.76 J	0.22 J	1.0 U	1.0 U	2.0 U	3
	8/27/13	1.0 U	0.40 J	1.0 U	1.0 U	1.0	1.0 U	1.0 U	0.80 J	0.26 J	1.0 U	1.0 U	2.0 U	2
	11/12/13	1.0 U	1.0	1.0 U	1.0 U	2.2	1.0 U	1.0 U	1.3	1.0 U	1.0 U	1.0 U	2.0 U	5
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.38 J	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/18/14	1.0 U	0.39 J	1.0 U	1.0 U	0.85 J	1.0 U	1.0 U	0.65 J	1.0 U	1.0 U	1.0 U	2.0 U	2
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-17S	6/16/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
Upgradient Area	8/18/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
(Driveway)	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	0.52 J	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	1
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.84	1.0 U	1.0 U	1.0 U	5.0 U	2
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.07	1.0 U	1.0 U	1.0 U	5.0 U	1
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	2/21/13	1.0 U	0.36 J	1.0 U	1.0 U	1.3	1.0 U	1.0 U	0.40 J	0.26 J	1.0 U	1.0 U	2.0 U	2
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	0.26 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/27/13	1.0 U	1.0 U	1.0 U	1.0 U	0.59 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
	11/12/13	1.0 U	1.0 U	1.0 U	1.0 U	0.48 J	1.0 U	1.0 U	0.28 J	1.0 U	1.0 U	1.0 U	2.0 U	1
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	0.24 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	0.75 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-18	6/16/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
Upgradient Area	8/18/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
(Driveway)	11/03/11	0.37 U	0.19 U	0.28 U	0.18 U	0.22 U	0.31 U	0.24 U	0.32 U	0.21 U	0.27 U	0.21 U	0.20 U	0
	2/15/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	5/16/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	8/09/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	11/05/12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	0
	2/21/13	1.0 U	1.0 U	1.0 U	1.0 U	0.57 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1
	5/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/27/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/12/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	5/21/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	8/06/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
	11/18/14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	0
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-19	8/08/12	1.0 U	6.03	1.0 U	1.0 U	177	22.6	1.0 U	41.9	4.44	1.79	1.0 U	1.0 U	254
Upgradient Area	11/05/12	1.0 U	6.29	1.0 U	1.0 U	148	24.7	1.0 U	53.8	7.82	1.46	1.0 U	5.0 U	242
(Bay 1A)	2/21/13	1.0 U	6.4	0.78 J	1.0 U	175	24.2	0.34 J	19.7	6.9	1.9	1.0 U	2.0 U	235
	5/15/13	1.0 U	4.6	0.57 J	1.0 U	158	21.6	1.0 U	5.7	4.9	1.7	1.0 U	2.0 U	197
	8/27/13	1.0 U	5.3	0.71 J	1.0 U	204	25.4	1.0 U	6.5	4.8	2.6	1.0 U	2.0 U	249
	11/12/13	1.0 U	5.6	0.63 J	1.0 U	193	20.0	0.79 J	52.4	8.7	1.6	1.0 U	2.0 U	283
	2/17/14	1.0 U	5.3	0.69 J	1.0 U	174	23.7	1.0 U	22.3	7.9	2.4	1.0 U	2.0 U	236
	5/21/14	1.0 U	4.1	0.55 J	1.0 U	195	20.5	1.0 U	18.0	6.3	2.2	1.0 U	2.0 U	247
	8/06/14	1.0 U	4.8	0.61 J	1.0 U	184	21.6	1.0 U	15.0	6.8	2.2	1.0 U	2.0 U	235
	11/17/14	1.0 U	2.7	1.0 U	1.0 U	125	13.2	1.0 U	0.84 J	3.0	3.6	1.0 U	2.0 U	148
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-20	8/08/12	1.0 U	20.6	1.47	1.0 U	189	1.64	10	429	31.6	1.0 U	1.0 U	1.0 U	683
Upgradient Area	11/05/12	1.0 U	23.3	1.51	1.0 U	169	4.26	7.72	524	30.3	1.0 U	1.0 U	1.0 U	760
(Bay 1A)	2/21/13	1.0 U	28.2	1.0	1.0 U	155	2.1	4.5	275	30.7	1.0 U	0.27 J	2.0 U	497
	5/15/13	1.0 U	34.1	1.1	1.0 U	210 E	3.1	4.6	356 E	35.6	1.0 U	0.22 J	2.0 U	645
	8/27/13	1.0 U	28.8	1.1	1.0 U	186	2.2	4.1	230	33.6	1.0 U	0.33 J	2.0 U	486
	11/12/13	1.0 U	26.7	0.89 J	1.0 U	190	1.8	3.6	225	32.6	1.0 U	0.26 J	2.0 U	481
	2/19/14	1.0 U	20.8	0.69 J	1.0 U	130	1.6	3.2	262	26.7	1.0 U	1.0 U	2.0 U	445
	5/21/14	1.0 U	22.7	0.77 J	1.0 U	180	2.1	3.8	311	34.2	1.0 U	1.0 U	2.0 U	555
	8/06/14	1.0 U	27.6	0.62 J	1.0 U	183	3.1	3.3	239	35.9	1.0 U	1.0 U	2.0 U	493
	11/17/14	1.0 U	22.3	1.0 U	1.0 U	130	2.2	2.0	206	25.3	1.0 U	1.0 U	2.0 U	388
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-23	8/08/12	1.0 U	2.38	1.0 U	1.0 U	6.6	1.0 U	1.0 U	7.75	1.0 U	1.0 U	1.0 U	1.0 U	17
Upgradient Area	11/05/12	1.0 U	3.16	1.0 U	1.0 U	8.55	1.0 U	1.0 U	21.3	2.09	1.0 U	1.0 U	1.0 U	35
(Bay 1A)	2/21/13	1.0 U	3.2	0.86 J	1.0 U	8.5	0.36 J	0.48 J	2.4	0.93 J	1.0 U	1.0 U	2.0 U	17
	5/15/13	1.0 U	2.3	0.59 J	1.0 U	4.1	1.0 U	1.0 U	1.8	0.51 J	1.0 U	1.0 U	2.0 U	9
	8/27/13	1.0 U	1.8	0.54 J	1.0 U	4.3	1.0 U	0.39 J	2.7	0.59 J	1.0 U	1.0 U	2.0 U	10
	11/12/13	1.0 U	1.5	2.0	1.0 U	4.0	1.0 U	4.8	2.2	1.0 U	1.0 U	1.0 U	2.0 U	15
	2/19/14	1.0 U	2.4	0.88 J	1.0 U	5.7	1.0 U	0.89 J	5.6	0.89 J	1.0 U	1.0 U	2.0 U	16
	5/21/14	1.0 U	1.5	0.37 J	1.0 U	3.7	1.0 U	0.31 J	1.5	1.0 U	1.0 U	1.0 U	2.0 U	7
	8/06/14	1.0 U	1.6	1.0 U	1.0 U	3.2	1.0 U	1.0 U	1.7	0.35 J	1.0 U	1.0 U	2.0 U	7
	11/17/14	1.0 U	2.5	2.2	1.0 U	5.6	1.0 U	4.2 J	2.8	0.54 J	1.0 U	1.0 U	2.0 U	18
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Monitoring Well	Sample Date	Chloro-ethane	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	1,1,1-TCA	PCE	TCE	Vinyl Chloride	Chloroform	Methylene Chloride	Total VOCs
MW-24	8/08/12	1.0 U	24.7	1.33	1.0 U	183	4.66	3.52	299	60.9	1.0 U	1.0 U	1.0 U	577
Upgradient Area	11/05/12	1.0 U	29.3	1.20	1.0 U	176	7.5	2.34	276	124	1.0 U	1.0 U	1.0 U	616
(Bay 1A)	2/21/13	2.5 U	17.6	1.1 J	2.5 U	124	3.1	2.8	287	69.2	2.5 U	2.5 U	5.0 U	505
	5/15/13	1.0 U	21.0	0.76 J	1.0 U	150	6.2	1.4	152	80.1	1.0 U	8.7	2.0 U	420
	8/27/13	1.0 U	22.3	1.1	1.0 U	173	8.8	2.1	190	79.2	1.0 U	0.65 J	2.0 U	477
	11/12/13	1.0 U	7.0	0.71 J	1.0 U	60.9	2.3	1.9	183	32.0	1.0 U	0.26 J	2.0 U	288
	2/17/14	2.0 U	12.6	0.71 J	2.0 U	103	2.5	2.2	273	62.3	2.0 U	2.0 U	4.0 U	456
	5/21/14	1.0 U	12.1	0.70 J	1.0 U	119	1.9	2.6	290	72.5	1.0 U	1.0 U	2.0 U	499
	8/06/14	1.0 U	10.2	0.55 J	1.0 U	96	2.2	1.9	229	58.5	1.0 U	1.0 U	2.0 U	398
	11/17/14	1.0 U	16.0	1.0 U	1.0 U	151	3.8	2.2	314	88.3	1.0 U	0.26 J	1.0 U	576
NYSDEC Class GA Groundwater Standards		50	5	5	5	5	5	5	5	5	2	7	5	

TABLE 3 - GROUND WATER RESULTS

Westchester County Airport Hangar D1 Bay 1B

Notes:

Concentrations are in ug/L (ppb).
B = Compound found in associated field blank sample
E = Estimated concentration, high
J = Estimated concentration, low
NA = Not Analyzed
NYSDEC = New York State Department of Environmental Conservation
U = Compound undetected.
VOC = Volatile Organic Compound
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
1,2-DCA = 1,2-Dichloroethane
cis-1,2-DCE = cis-1,1-Dichloroethene
trans-1,2-DCE = trans-1,2-Dichloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
PCE = Tetrachloroethene
TCE = Trichloroethene

TABLE 4 - REMEDIAL INVESTIGATION SOIL VAPOR DATA
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-3

SOIL GAS ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	1	2	3	4	5	6	7	8	9	10	10R
Sample Date	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91
Consultant	Target	Target	Target	Target	Target	Target	Target	Target	Target	Target	Target
Sample Type	Field Control	Field Control	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Dup
1,1 Dichloroethene	ND@1	ND@1	4.9	100	114	63	334	197	111	419	387
Methylene Chloride	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1
trans-1,2-dichloroethene	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1
1,1 Dichloroethane	ND@1	ND@1	5.4	92	244	169	1130	450	292	1043	874
cis-1,2-dichloroethene	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1
Chloroform	ND@0.1	ND@0.1	ND@0.1	0.91	1	0.49	5.6	2.4	0.48	2.7	2.4
1,1,1 Trichloroethane	0.39	20	943	24540	4476	976	17830	7558	7176	16280	16060
Carbon Tetrachloride	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05
Trichloroethene	ND@0.1	0.61	0.53	7.4	9.3	10	21	11	9.9	11	11
1,1,2-trichloroethane	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1
Tetrachloroethene	ND@0.05	3.34	11	193	297	185	632	333	156	269	254

1. Results are in ug/l

TABLE 4 - REMEDIAL INVESTIGATION SOIL VAPOR DATA
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-3

SOIL GAS ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	11	12	13	14	15	16	17	18	19	20	20R	21
Sample Date	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91	1/8/91
Consultant	Target	Target	Target	Target	Target	Target	Target	Target	Target	Target	Target	Target
Sample Type	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Dup	Sample
1,1 Dichloroethene	508	1176	366	184	761	1210	1076	175	16	44	44	174
Methylene Chloride	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1
trans-1,2-dichloroethene	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1
1,1 Dichloroethane	2462	4483	1605	2435	2043	7519	2469	433	150	239	354	1347
cis-1,2-dichloroethene	70	ND@1	ND@1	453	617	104	45	254	ND@1	ND@1	61	66
Chloroform	5	14	8.6	1.5	9.5	20	13	0.95	ND@0.1	ND@0.1	ND@0.1	1.7
1,1,1 Trichloroethane	34050	50250	22320	5331	40440	62290	51450	9422	86	87	42	11210
Carbon Tetrachloride	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05	ND@0.05
Trichloroethene	57	28	20	172	181	42	39	1.8	1.9	6.4	22	53
1,1,2-trichloroethane	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1	ND@0.1
Tetrachloroethene	777	1701	745	46	1572	2282	1864	97	4.6	5.5	8.6	538

1. Results are in ug/l

TABLE 4 - REMEDIAL INVESTIGATION SOIL VAPOR DATA
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-3

SOIL GAS ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	VP-1S		VP-1D		VP-2S		VP-2D		VP-3		VP-4	
Sample Date	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97
Consultant	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD
Sample Type	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample
1,1 Dichloroethene	26	24	32	26	16	3	11	13	25	5	4	1
Methylene Chloride	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	2	1	2	1	2	1	ND@1	ND@1	ND@1	1	ND@1	ND@1
1,1 Dichloroethane	ND@1	70	ND@1	63	ND@1	79	ND@1	49	ND@1	61	ND@1	22
cis-1,2-dichloroethene	2	9	11	21	3	2	3	7	22	8	ND@1	ND@1
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1 Trichloroethane	42	22	144	19	34	16	34	13	18	14	ND@1	5
Carbon Tetrachloride	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	ND@1	8	4	9	5	3	5	10	ND@1	1	ND@1	1
1,1,2-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	2	112	12	118	3	14	3	49	ND@1	11	ND@1	7

1. Results are in ug/l

TABLE 4 - REMEDIAL INVESTIGATION SOIL VAPOR DATA
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT

TABLE 4-3

SOIL GAS ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	VP-5		VP-6		VP-6 (dup)	VP-7		VP-8		VP-9S		VP-9D	
Sample Date	7/19/97	12/17/97	7/19/97	12/17/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97
Consultant	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD	XDD
Sample Type	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample
1,1 Dichloroethene	ND@1	1	34	11	111	19	13	16	11	ND@1	1	ND@1	4
Methylene Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	ND@1	ND@1	2	1	1	ND@1	1	ND@1	1	ND@1	ND@1	ND@1	ND@1
1,1 Dichloroethane	ND@1	26	ND@1	112	111	ND@1	94	ND@1	86	ND@1	41	ND@1	54
cis-1,2-dichloroethene	ND@1	1	8	16	15	2	5	3	10	ND@1	ND@1	ND@1	2
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1 Trichloroethane	ND@1	16	871	37	36	27	21	ND@1	8	ND@1	23	ND@1	26
Carbon Tetrachloride	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	ND@1	ND@1	5	12	11	3	8	2	13	ND@1	17	ND@1	ND@1
1,1,2-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ND@1	11	7	168	145	10	75	ND@1	17	ND@1	17	ND@1	24

1. Results are in ug/l

TABLE 4 - REMEDIAL INVESTIGATION SOIL VAPOR DATA
REFERENCE: 2001 REMEDIAL INVESTIGATION REPORT
TABLE 4-3

SOIL GAS ANALYTICAL RESULTS
Hangar D, Bay 2, Westchester County Airport
White Plains, New York

Location	VP-10		VP-10 Dup	VW-1		VW-2	
Sample Date	7/19/97	12/17/97	12/17/97	7/19/97	12/17/97	7/19/97	12/17/97
Consultant	XDD	XDD	XDD	XDD	XDD	XDD	XDD
Sample Type	Sample	Sample	Dupe	Sample	Sample	Sample	Sample
1,1 Dichloroethene	ND@1	1	1	4	ND@1	11	13
Methylene Chloride	-	-	-	-	-	-	-
trans-1,2-dichloroethene	ND@1	ND@1	ND@1	ND@1	ND@1	ND@1	1
1,1 Dichloroethane	ND@1	100	13	ND@1	ND@1	ND@1	46
cis-1,2-dichloroethene	ND@1	ND@1	ND@1	ND@1	ND@1	2	7
Chloroform	-	-	-	-	-	-	-
1,1,1 Trichloroethane	ND@1	34	4	63	1	28	10
Carbon Tetrachloride	-	-	-	-	-	-	-
Trichloroethene	ND@1	1	2	3	ND@1	7	15
1,1,2-trichloroethane	-	-	-	-	-	-	-
Tetrachloroethene	ND@1	41	19	60	1	10	58

1. Results are in ug/l

TABLE 5 - SOIL CLEANUP OBJECTIVES FOR THE SITE

Criteria for On-Site Reuse of Excavated Materials or Imported Soils*

Site Management Plan
Westchester County Airport Hangar D1 Bay 1B
Westchester County, New York
Site No. 3-60-037

Type	Criteria
General Fill	Soil Cleanup Objectives (SCOs) for Commercial Site Use per 6 NYCRR Subpart 375-6
Surface Preparation	In accordance with General Fill criteria and Project Specifications

* Documentation of the fill source will be provided to the NYSDEC for approval before use on-site in accordance with DER-10 Technical Guidance for Site Investigation and Remediation Sections 5.4(e)5 - 6 and Table 5.4(e)10. All fill material brought to the Site will meet the requirements for the identified Site use as set forth in 6 NYCRR Part 375-6.7(d). Imported soil (sand, stone, and topsoil) must be free of odors and sheens. Any imported material with visually identified contamination and/or odors will be segregated and tested before being used as part of the soil cover. A “Request to Import/Reuse Fill or Soil” form is provided in Appendix C.

TABLE 6 - SOIL SAMPLING RESULTS

2008 and 2012

Westchester County Airport Hangar D1 Bay 1B

Bay 1B (November 22-23, 2008)									
Test Point Location (sample depth):	**Units**	**Unrestricted Use Criteria**	**IP-1 (6-8 ft)**	**IP-2 (7-9 ft)**	**B-3/IP-3 (7-9 ft)**	**MW-12 (6-8 ft)**	**MW-13 (7-9 ft)**	**MW-14 (7.5-8.5 ft)**	**B-6**
cis-1,2-Dichloroethene	ug/kg	250	<5.6	1.0 J	0.87 J	0.49 J	<6.2	0.97 J	Refusal, no soil recovery.
trans-1,2-Dichloroethene	ug/kg	190	<5.6	0.38 J	<4.9	<5.3	<6.2	5.9	
Tetrachloroethene	ug/kg	1,300	<5.6	<5.6	<4.9	<5.3	<6.2	1.7 J	
Trichloroethene	ug/kg	470	<5.6	<5.6	<4.9	<5.3	<6.2	<5.9	

Bay 1A (June 14-15, 2012)									
Test Point Location (sample depth):	**Units**	**Unrestricted Use Criteria**	**MW-19 (15-20 ft)**	**MW-19D (15-20 ft)**	**MW-20 (10-12.5 ft)**	**MW-21 (4.8 ft)**	**MW-22 (5.5-6.5 ft)**	**MW-23 (7-10 ft)**	**MW-24 (10-15 ft)**
cis-1,2-Dichloroethene	ug/kg	250	3.11	<1.81	<1.94	5.28	<1.72	<1.78	<1.72
trans-1,2-Dichloroethene	ug/kg	190	<1.75	<1.81	<1.94	<1.92	<1.72	<1.78	<1.72
Tetrachloroethene	ug/kg	1,300	<1.75	<1.81	<1.94	46.9	<1.72	<1.78	<1.72
Trichloroethene	ug/kg	470	<1.75	<1.81	<1.94	8.54	<1.72	<1.78	<1.72

Notes:

J = Estimated value below method detection limit.

ug/kg = micrograms per kilogram

TABLE 9 - SOIL VAPOR SAMPLING RESULTS

Westchester County Airport Hangar D1 Bay 1B

Soil Vapor Investigation Sampling Event of 12/10/13

Chemicals of Concern	Outdoor Air	Indoor Air (Ambient)				Soil Vapor		
		Office (SSV-1)	Reception (SSV-2)	Lounge (SSV-2)	Hangar (SSV-3)	SSV-1 (Office)	SSV-2 (Lounge)	SSV-3 (Hangar)
	Dec-13	Dec-13	Dec-13	Dec-13	Dec-13	Dec-13	Dec-13	Dec-13
Chloroethane	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
1,1-Dichloroethane	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	<0.81	**93.5**
1,1-Dichloroethylene	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	**19**
cis-1,2-Dichloroethylene	<0.79	<0.79	<079	<0.79	<0.79	<0.79	<0.79	**6.7**
trans-1,2-Dichloroethylene	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79	<0.79
1,1,1-Trichloroethane	<0.55	<0.55	<0.55	<0.55	<0.55	**2.7**	<0.55	**300**
Tetrachloroethylene	**2.5**	**0.32**	**0.40**	**0.58**	**0.24 J**	**5.3**	**6.7**	**47**
Trichloroethylene	<0.21	<0.21	<0.21	<0.21	<0.21	**3.7**	**1.4**	**23**
Vinyl chloride	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Soil Vapor Investigation Sampling Event of 3/17/14 and 3/26/14

Chemicals of Concern	Outdoor Air	Indoor Air (Ambient)				Soil Vapor		
		Office (SSV-1)	Reception (SSV-2)	Lounge (SSV-2)	Hangar (SSV-3)	SSV-1 (Office)	SSV-2 (Lounge)	SSV-3 (Hangar)
	Mar-14	Mar-14	Mar-14	Mar-14	Mar-14	Mar-14	Mar-14	Mar-14
Chloroethane	<0.53	<0.53	<0.53	<0.53	<0.53	<2.1	<2.1	**1.1**
1,1-Dichloroethane	<0.81	<0.81	<0.81	<0.81	<0.81	<3.2	<3.2	**44.1**
1,1-Dichloroethylene	<0.79	<0.79	<0.79	<0.79	<0.79	<3.2	<3.2	**17**
cis-1,2-Dichloroethylene	<0.79	<0.79	<0.79	<0.79	<0.79	<3.2	<3.2	**1.3**
trans-1,2-Dichloroethylene	<0.79	<0.79	<0.79	<0.79	<0.79	<3.2	<3.2	<0.79
1,1,1-Trichloroethane	<0.55	<0.55	<0.55	<0.55	**0.53**	<2.2	<2.2	**196**
Tetrachloroethylene	<0.27	**0.28**	**0.31**	<0.27	**0.68**	**1.0**	<1.1	**7.5**
Trichloroethylene	<0.21	<0.21	**0.28**	**0.21**	**1.1**	<0.86	<0.86	**3.0**
Vinyl chloride	<0.10	<0.10	<0.10	<0.10	<0.10	<0.41	<0.41	<0.10

Soil Vapor Investigation Sampling Event of 12/3/14

Chemicals of Concern	Outdoor Air	Indoor Air (Ambient)				Soil Vapor		
		Office (SSV-1)	Reception (SSV-2)	Lounge (SSV-2)	Hangar (SSV-3)	SSV-1 (Office)	SSV-2 (Lounge)	SSV-3 (Hangar)
	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14
Chloroethane	<0.53 J	<0.53	<0.53 J	<0.53	<0.53	<0.53	<0.53	**7.1**
1,1-Dichloroethane	<0.81 J	<0.81	<0.81 J	<0.81	<0.81	<0.81	**1.4**	**154**
1,1-Dichloroethylene	<0.79 J	<0.79	<0.79 J	<0.79	<0.79	<0.79	<0.79	**66.2**
cis-1,2-Dichloroethylene	<0.79 J	<0.79	<0.79 J	<0.79	<0.79	<0.79	<0.79	**3.6**
trans-1,2-Dichloroethylene	<0.79 J	<0.79	<0.79 J	<0.79	<0.79	<0.79	<0.79	<0.79
1,1,1-Trichloroethane	<0.55 J	<0.55	<0.55 J	<0.55	**0.71**	**5.3**	**6.5**	**1580**
Tetrachloroethylene	**0.56**	**1.5**	**1.2**	**1.2**	**1.6**	**10**	**361**	**142**
Trichloroethylene	<0.21 J	**0.24**	**0.21**	**0.20 J**	**0.33**	<0.21	**18**	**16**
Vinyl chloride	<0.10 J	<0.10	<0.10 J	<0.10	<0.10	<0.10	<0.10	<0.10

NOTES:

All results are in micrograms per cubic meter. **Detections are in bold type.**

Samples nominally collected over 8 hours in a 6 liter Summa canister and analyzed by EPA Method T015.

J = Estimated value below the detection limit. E = Estimated value over the detection limit.

Per the Soil Vapor/Indoor Air Matrices in the 2006 NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* , recommended actions are:

- Monitor to determine weather conditions have changed.
- Take reasonable and practical actions to identify source(s) and reduce exposures"; the concentration is likely due to sources other than soil vapor.
- Mitigate to minimize exposures.

FIGURES

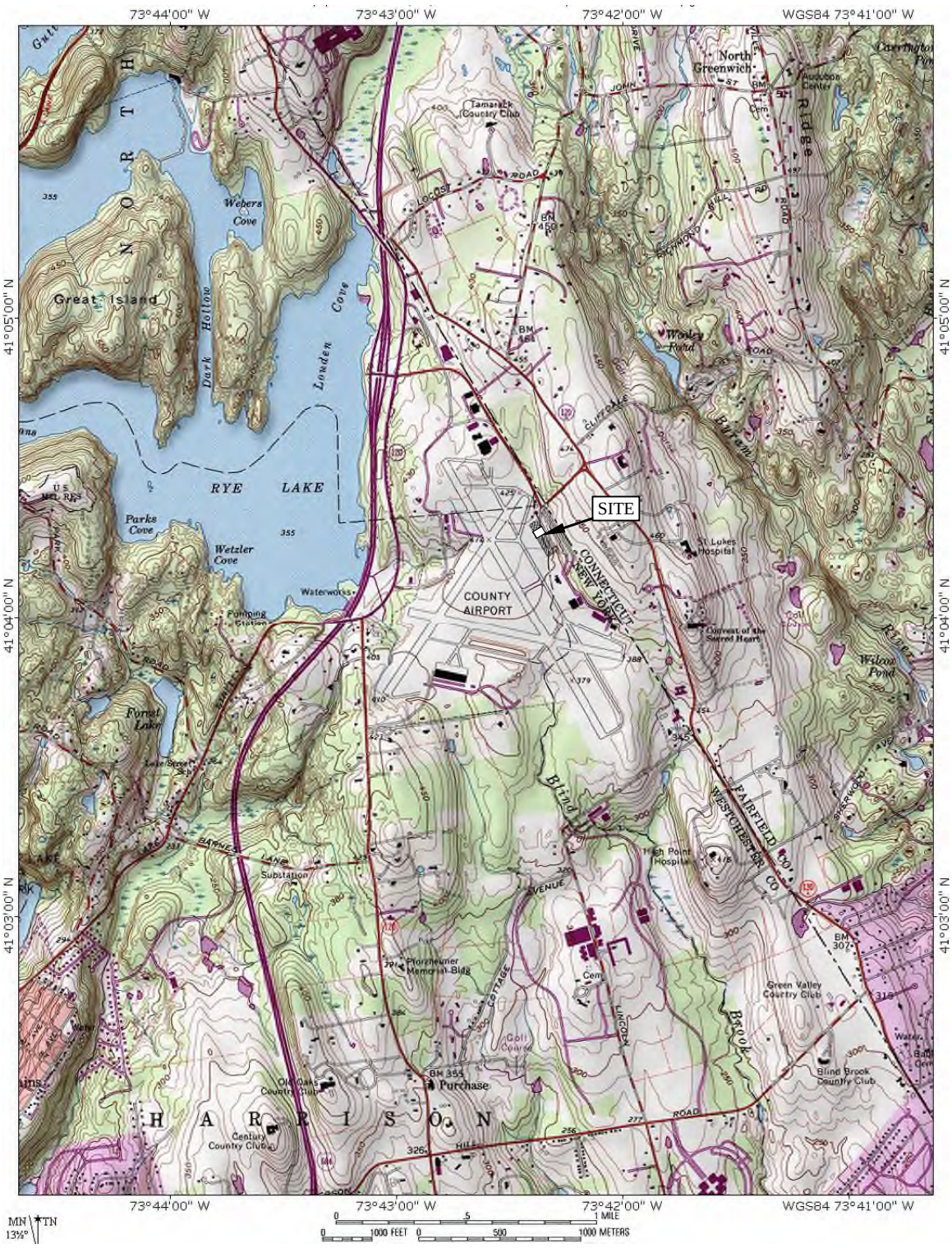
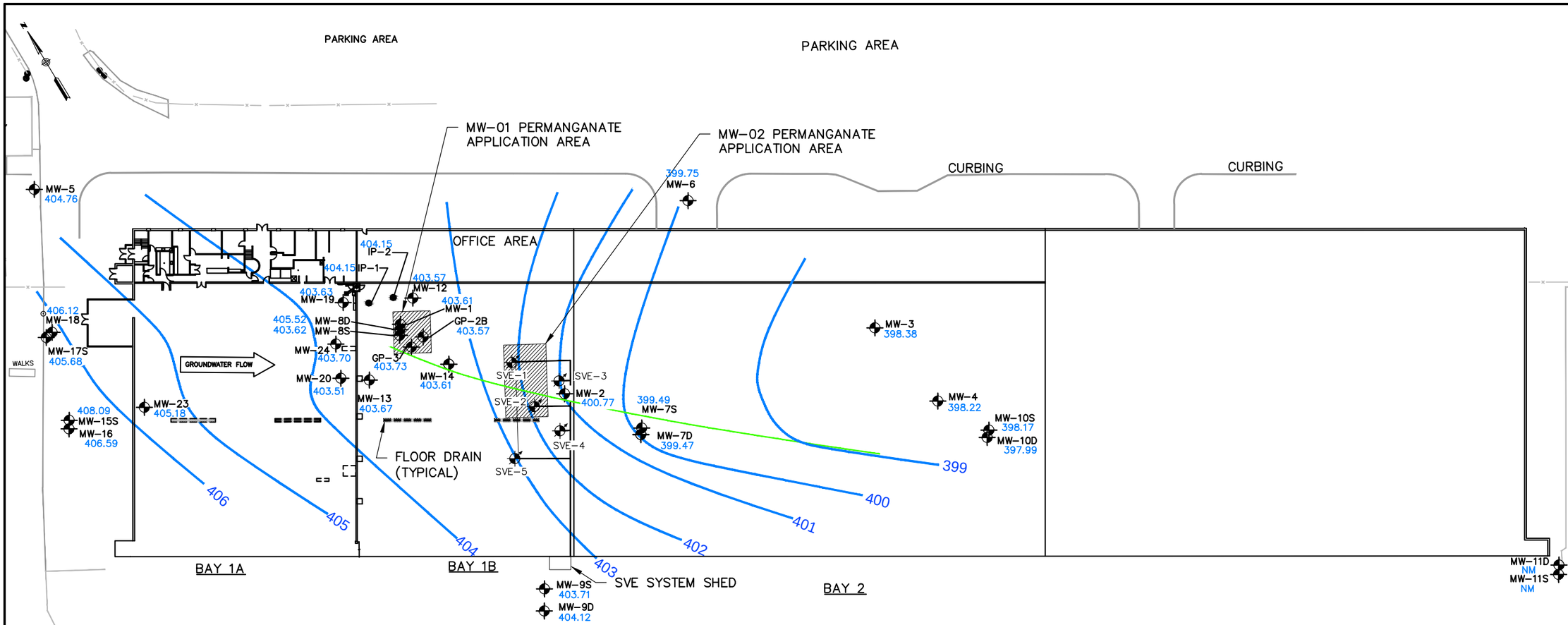


FIGURE 1
SITE LOCATION MAP

Westchester County Airport Hangar D1 Bay 1B
Site Number 360037



LEGEND:

- MW-02 — OVERBURDEN MONITORING WELL
- MW-09S — SHALLOW BEDROCK MONITORING WELL
- MW-09D — DEEP BEDROCK MONITORING WELL
- SVE-5 — SOIL VAPOR EXTRACTION (SVE) WELL
- IP 2 — INJECTION POINT
- 403 — GROUNDWATER ELEVATION
- GROUNDWATER CONTOUR, SHALLOW UNCONFINED FLOW
- NM — NOT MEASURED
- APPROXIMATE LOCATION OF BEDROCK RIDGE

MAP NOTES:

1. INFORMATION SHOWN HEREON WAS COMPILED FROM AN ACTUAL FIELD SURVEY CONDUCTED IN JUNE 15, 2011, REVISED JUNE 21, 2012.
2. NORTH ORIENTATION IS REFERENCED TO GRID NORTH AND IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE NAD 27.
3. VERTICAL DATUM ESTABLISHED FOR N.C.V.D. 1929.

60' 0 60' 120'

BAR SCALE
1" = 60'
CHECK GRAPHIC SCALE BEFORE USING

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
88.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

GROUNDWATER CONTOUR MAP NOVEMBER 2014

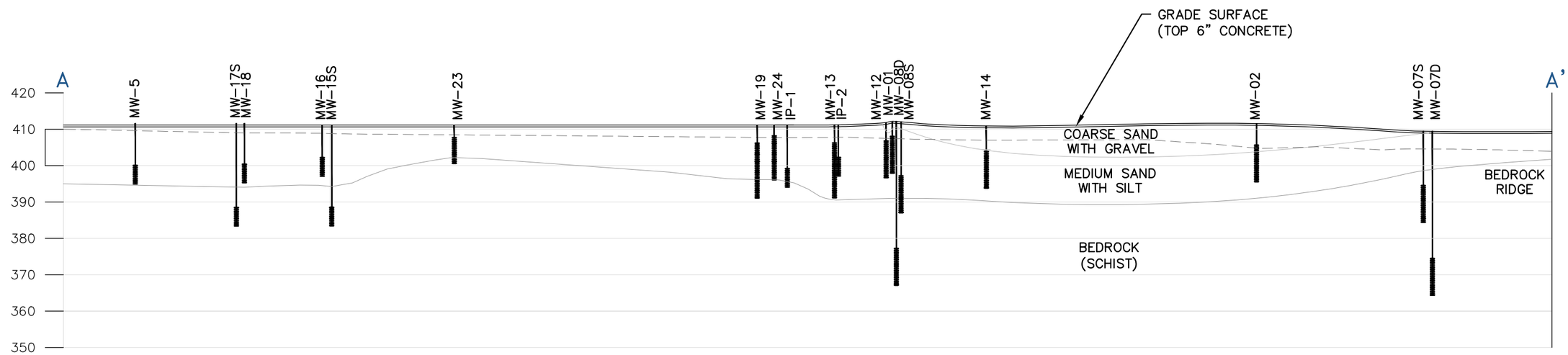
DESIGNED BY: GR
DRAWN BY: PFF
CHECKED BY: AP
206924_U2-GW-11-14.dwg

EXXONMOBIL ENVIRONMENTAL SERVICES CO.

WESTCHESTER COUNTY AIRPORT HANGAR D

JOB NO: 206924
DATE: JANUARY 2015
SCALE: AS NOTED

FIGURE 2



LEGEND:

- - - - APPROXIMATE DEPTH TO WATER

WELL SCREEN OR CASING

NOTES:

SAND, WITH SPORADIC ORGANIC SILT LENSES, IS ENCOUNTERED FROM SURFACE GRADE TO BEDROCK INTERFACE.

30' 0 30' 60'

BAR SCALE
1" = 30'
CHECK GRAPHIC SCALE BEFORE USING

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
888.265.8969 | www.woodardcurran.com

COMMITMENT & INTEGRITY DRIVE RESULTS

WOODARD & CURRAN

GEOLOGIC CROSS-SECTION A-A'

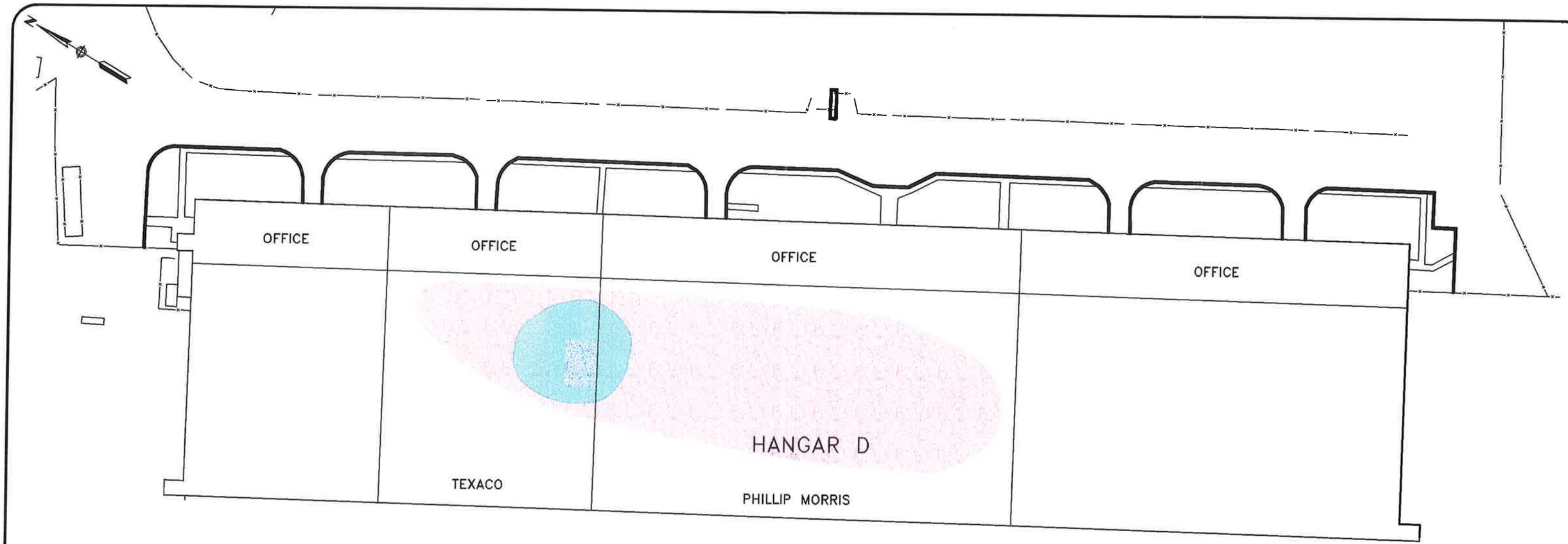
DESIGNED BY: JR
DRAWN BY: SH
CHECKED BY: AP
206924_U3 3 0609.dwg

EXXONMOBIL ENVIRONMENTAL SERVICES CO.

WESTCHESTER COUNTY AIRPORT
HANGER D

JOB NO: 206924
DATE: JUNE 2009
SCALE: AS NOTED

FIGURE 3



NOTES

1. ALL LOCATIONS & DIMENSIONS OF SITE FEATURES, PROPERTY LINES & SAMPLING LOCATIONS ARE APPROX.
2. BASE MAP PROVIDED ELECTRONICALLY FROM XDD, INC. IN FEBRUARY 2001.

LEGEND

- SOURCE AREA
- EXTENT OF SOIL IMPACTED AREA
- EXTENT OF GROUNDWATER IMPACTED AREA

SITE MANAGEMENT PLAN
FIGURE 4A

REFERENCE:

DES.BY: JWO	DR.BY: JWO	CK.BY: MED

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

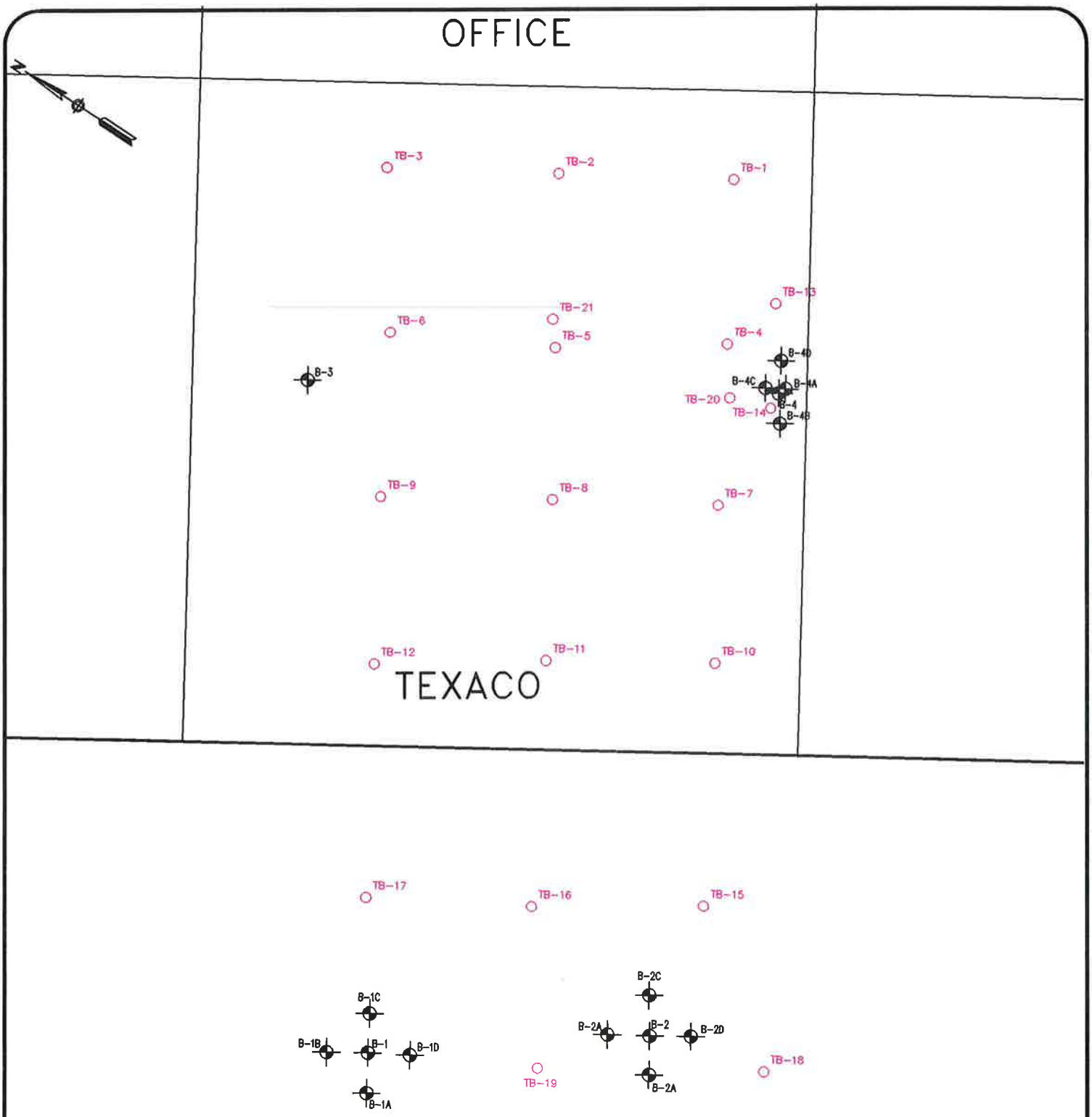
REMEDIAL INVESTIGATION REPORT

FIGURE 5-1

SITE CONCEPTUAL MODEL

SCALE: 1" = 60'	PROJECT NO: 205265	
DATE: NOVEMBER 2001	FIGURE 1	RI FIGURE 2

WOODARD & CURRAN
Engineering · Science · Operations



LEGEND

B-3 – SOIL BORING COMPLETED BY PILKO & ASSOCIATES.

TB-6 – SOIL BORINGS COMPLETED BY LBG

DES.BY: JWO	DR.BY: JWO	CK.BY: --

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

REMEDIAL INVESTIGATION REPORT

FIGURE 2-2

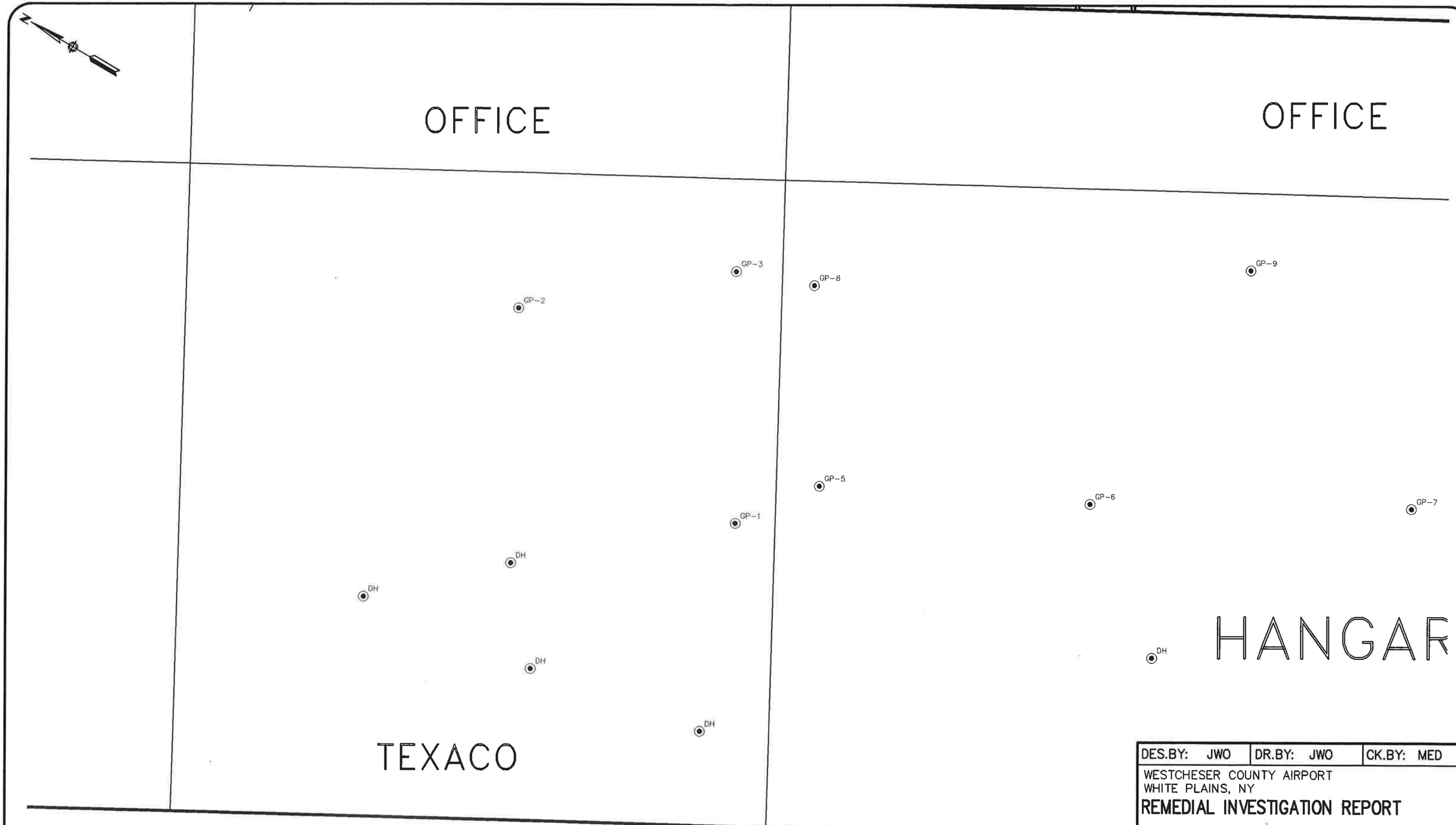
SOIL BORING LOCATIONS

SCALE: 1" = 30'	PROJECT NO: 205265	
DATE: DECEMBER 2001	FIGURE 1	RI FIGURE 2

WOODARD & CURRAN
Engineering · Science · Operations

SITE MANAGEMENT PLAN
FIGURE 4B

REFERENCE:



NOTES

1. REFER TO FIGURE 1-2 FOR ADDITIONAL NOTES AND LEGEND.

LEGEND

DH - GEOPROBE LOCATIONS INSTALLED BY MALCOLM PIRNIE. DH INDICATES DRY HOLE

SITE MANAGEMENT PLAN

FIGURE 4C **REFERENCE:**

DES.BY: JWO	DR.BY: JWO	CK.BY: MED

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

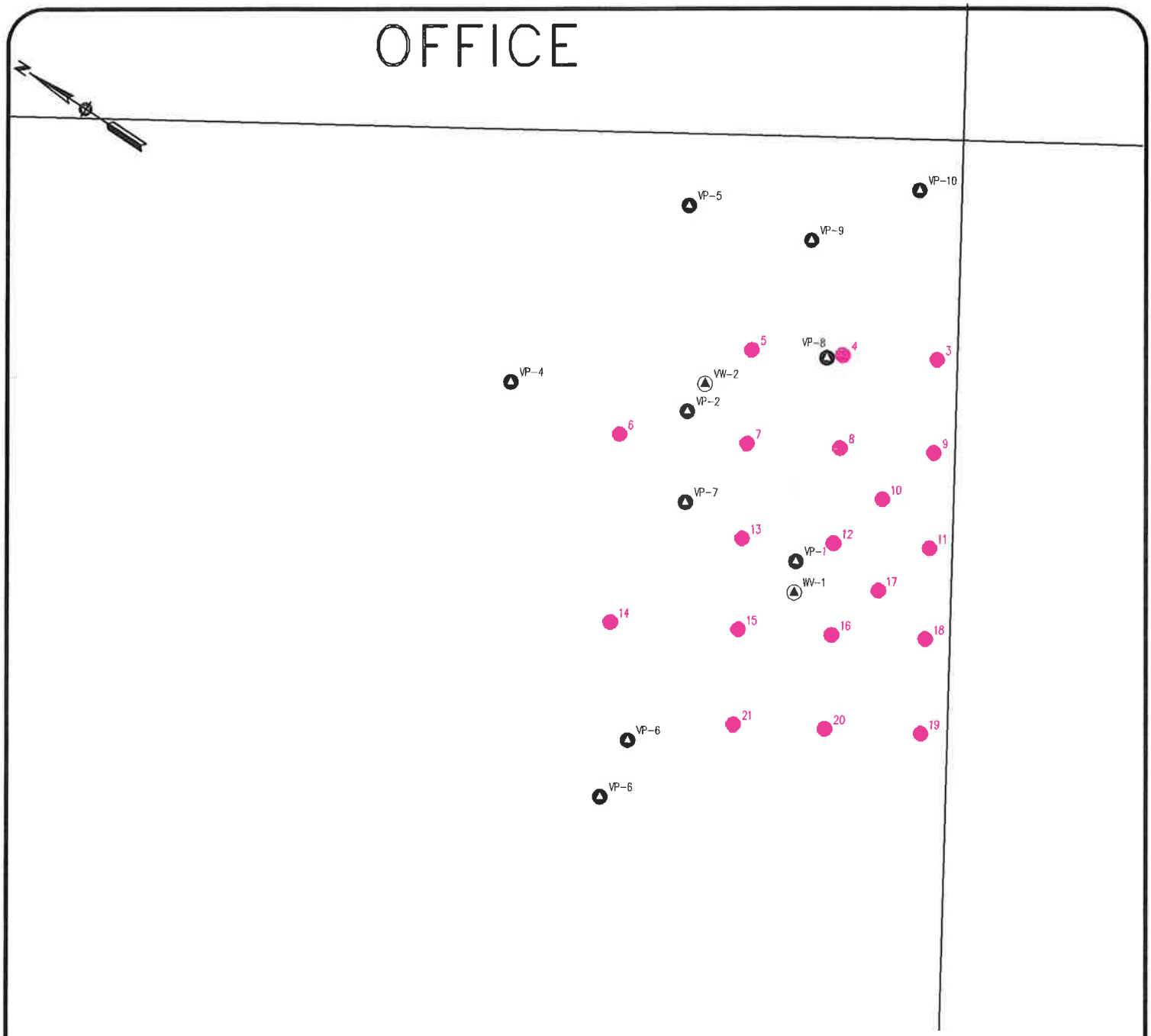
REMEDIAL INVESTIGATION REPORT

FIGURE 2-3

GEOPROBE LOCATIONS

SCALE: 1" = 20'	PROJECT NO: 205265	
DATE: DECEMBER 2001	FIGURE 1	RI FIGURE 2

WOODARD & CURRAN
Engineering · Science · Operations



TEXACO

SITE MANAGEMENT PLAN
FIGURE 4D

REFERENCE:

LEGEND

- 5 – SOIL GAS POINT SAMPLED BY TARGET ENVIRONMENTAL
- VW-2 – PERMANENT VAPOR WELL INSTALLED BY VAPEX
- VP-2 – PERMANENT VAPOR SAMPLING POINT INSTALLED BY VAPEX

DES.BY: JWO	DR.BY: JWO	CK.BY: --

WESTCHESER COUNTY AIRPORT
WHITE PLAINS, NY

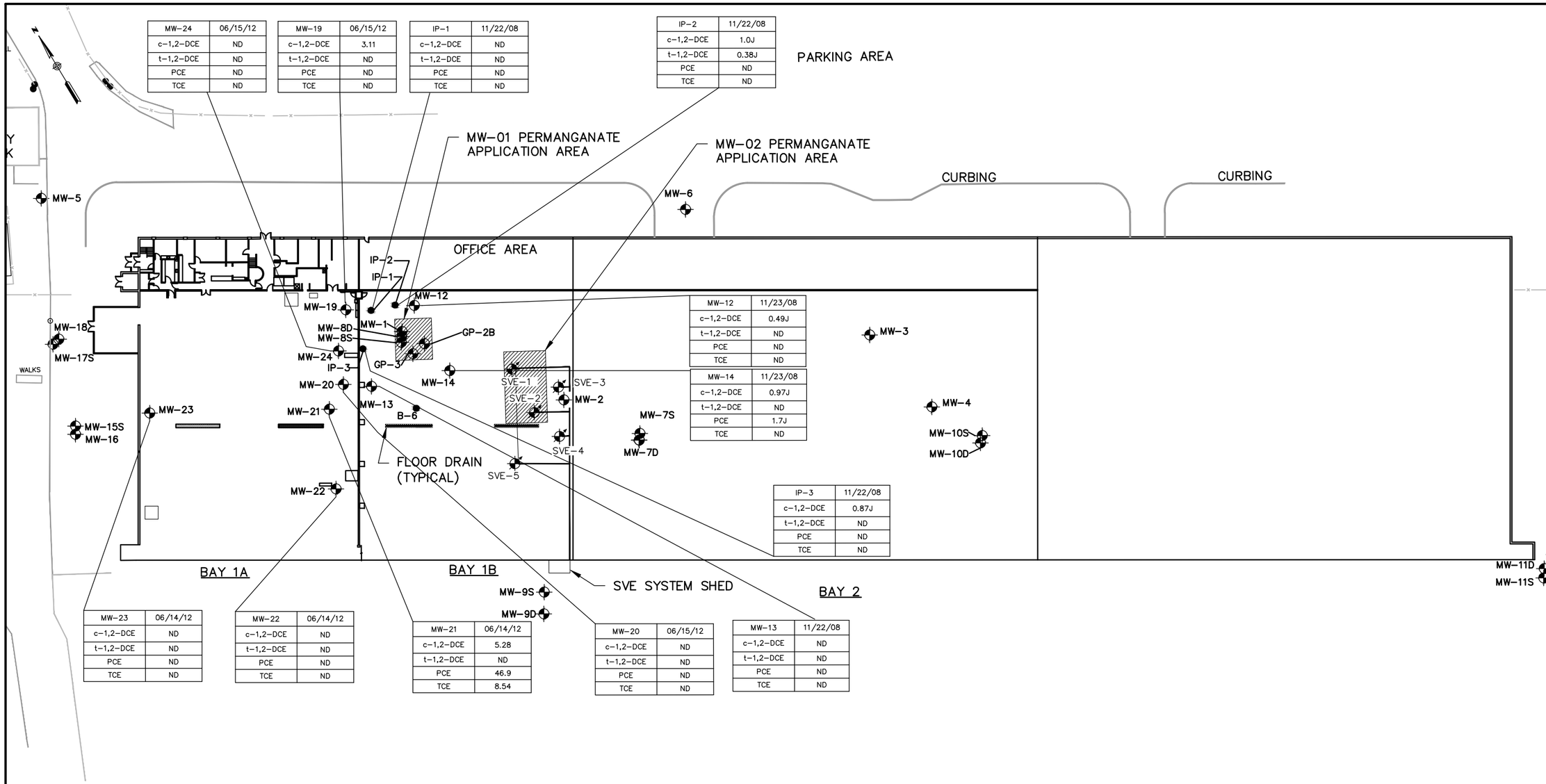
REMEDIAL INVESTIGATION REPORT

FIGURE 2-1

SOIL GAS SAMPLING LOCATION

SCALE: 1" = 20'	PROJECT NO: 205265	
DATE: DECEMBER 2001	FIGURE 1	RI FIGURE 2

WOODARD & CURRAN
Engineering · Science · Operations



MW-24	06/15/12
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-19	06/15/12
c-1,2-DCE	3.11
t-1,2-DCE	ND
PCE	ND
TCE	ND

IP-1	11/22/08
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

IP-2	11/22/08
c-1,2-DCE	1.0J
t-1,2-DCE	0.38J
PCE	ND
TCE	ND

MW-12	11/23/08
c-1,2-DCE	0.49J
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-14	11/23/08
c-1,2-DCE	0.97J
t-1,2-DCE	ND
PCE	1.7J
TCE	ND

IP-3	11/22/08
c-1,2-DCE	0.87J
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-23	06/14/12
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-22	06/14/12
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-21	06/14/12
c-1,2-DCE	5.28
t-1,2-DCE	ND
PCE	46.9
TCE	8.54

MW-20	06/15/12
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

MW-13	11/22/08
c-1,2-DCE	ND
t-1,2-DCE	ND
PCE	ND
TCE	ND

CONCENTRATIONS ARE IN ug/kg.
J = ESTIMATED CONCENTRATION
CA = CHLOROETHANE
1,1-DCA = 1,1-DICHLOROETHANE
1,1-DCE = 1,1-DICHLOROETHENE
1,2-DCA = 1,2-DICHLOROETHANE
c-1,2-DCE = cis-1,2-DICHLOROETHENE
t-1,2-DCE = trans-1,2-DICHLOROETHENE
TCA = 1,1,1-TRICHLOROETHANE
PCE = TETRACHOLORETHENE
TCE = TRICHLOROETHENE
VC = VINYL CHLORIDE
ND = UNDETECTED

LEGEND:

MW-02 OVERBURDEN MONITORING WELL
MW-09S SHALLOW BEDROCK MONITORING WELL
MW-09D DEEP BEDROCK MONITORING WELL
SVE-5 SOIL VAPOR EXTRACTION (SVE) WELL
IP 2 INJECTION POINT/BORING

MAP NOTES:

1. INFORMATION SHOWN HEREON WAS COMPILED FROM AN ACTUAL FIELD SURVEY CONDUCTED IN JUNE 15, 2011, REVISED JUNE 21, 2012.
2. NORTH ORIENTATION IS REFERENCED TO GRID NORTH AND IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE NAD 27.
3. VERTICAL DATUM ESTABLISHED FOR N.C.V.D. 1929.

60' 0 60' 120'
BAR SCALE
1" = 60'
CHECK GRAPHIC SCALE BEFORE USING

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
888.265.969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

SOIL SAMPLING RESULTS 2008 AND 2012

DESIGNED BY: AP
DRAWN BY: PF
CHECKED BY: AP
206924_U5 0912_6.dwg

EXXON MOBIL ENVIRONMENTAL SERVICES

WESTCHESTER COUNTY AIRPORT HANGAR D

JOB NO: 206924.00
DATE SEPTEMBER 2012
SCALE: AS NOTED

FIGURE 5

MW-8S	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	14.1	11.6	12.1	10.8	6.4
1,1-DCE	1.1	0.98J	0.86J	0.84J	0.73J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	178	121	168	132	79.3
t-1,2-DCE	7.0	4.0	7.6	4.3	2.0
TCA	2.6	2.7	2.0	2.0	0.74J
PCE	160	204	199	183	57.7
TCE	74.9	70.8	67.0	61.9	75.3
VC	0.86J	0.86J	1.2	0.66J	0.35J

MW-8D	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	5.4	3.8	3.4	3.5	3.6
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	37.5	23.2	29.6	28.7	28.6
t-1,2-DCE	1.2	0.8J	1.1	0.61J	0.85J
TCA	U	U	U	U	U
PCE	44.8	34.4	30.6	30.0	32.5
TCE	10.1	7.1	7.7	7.5	7.1
VC	U	U	U	U	U

MW-01	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	6.4	7.5	8.4	8.6	8.6
1,1-DCE	U	U	U	U	055.J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	69.1	71.1	107.0	89.2	94.7
t-1,2-DCE	11.3	10.1	10.7	11.4	8.9
TCA	U	U	U	U	U
PCE	1.4	3.8	2.2	U	0.51J
TCE	9.4	15.6	17.0	11.7	5.7
VC	8.1	8.7	8.9	13.1	8.6

MW-12	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	U	0.69J	0.94J	0.54J	0.48J
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	4.9	1.3	5.5	3.1	2.4
t-1,2-DCE	2.6	7.9	2.0	3.6	3.3
TCA	U	U	U	U	U
PCE	11.2	2.2	7.2	3.6	5.0
TCE	1.0	U	3.1	0.75J	0.56J
VC	0.47J	0.64J	U	0.57J	U

MW-20	11/12/13	02/17/14	5/21/14	8/7/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	26.7	20.8	22.7	27.6	22.3
1,1-DCE	0.89J	0.69J	0.77J	0.62J	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	190	130	180	183	130
t-1,2-DCE	1.8	1.6	2.1	3.1	2.2
TCA	3.6	3.2	3.8	3.3	2.0
PCE	225	262	311	239	206
TCE	32.6	26.7	34.2	35.9	25.3
VC	U	U	U	U	U

MW-24	11/12/13	02/17/14	5/21/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	7.0	12.6	12.1	10.2	16.0
1,1-DCE	0.71J	0.71J	0.7J	0.55J	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	60.9	103	119	96	151
t-1,2-DCE	2.3	2.5	1.9	2.2	3.8
TCA	1.9	2.2	2.6	1.9	2.2
PCE	183	273	290	229	314
TCE	32.0	62.3	72.5	58.5	88.3
VC	U	U	U	U	U

MW-19	11/12/13	02/17/14	5/21/14	8/7/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	5.6	5.3	4.1	4.8	2.7
1,1-DCE	0.63J	0.69J	0.55J	0.61J	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	193	174	195	184	125
t-1,2-DCE	20.0	23.7	20.5	21.6	13.2
TCA	0.79J	U	U	U	U
PCE	52.4	22.3	18.0	15.0	0.84J
TCE	8.7	7.9	6.3	6.8	3.0
VC	1.6	2.4	2.2	2.2	3.6

GP-02B	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	11.1	12.1	11.0	13.1	12.7
1,1-DCE	U	0.45J	U	U	0.59J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	63.9	63.5	83.8	101	91.9
t-1,2-DCE	6.4	6.5	5.9	6.3	5.8
TCA	U	U	U	U	U
PCE	5.2	1.7	3.4	1.8	2.4
TCE	11.3	24.2	23.2	25.0	24.2
VC	5.6	8.5	7.3	9.0	9.8

MW-02	11/11/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	7.2	8.3	10.0	11.4	7.6
1,1-DCE	U	U	U	U	0.56J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	39.2	17.8	19.4	26.1	38.8
t-1,2-DCE	0.44J	0.46J	0.58J	0.54J	U
TCA	U	0.44J	1.4	2.7	2.1
PCE	1.2	U	1.1	3.0	089J
TCE	39.0	5.0	10.2	25.0	7.3
VC	10.9	12.1	6.2	7.5	4.9

MW-03	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	U	U	U	U	U
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	U	U	U	U	0.45J
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	U	U	U	U	U
TCE	U	U	U	0.28J	U
VC	U	U	U	U	U

MW-14	11/12/13	2/17/14	5/21/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	11.3	7.6	8.6	9.2	7.1
1,1-DCE	0.91J	0.69J	0.73J	0.82J	0.69J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	158	79.1	120	127	97.1
t-1,2-DCE	2.2	1.0	1.3	1.6	1.1
TCA	2.0	1.5	1.8	1.8	1.3
PCE	173	167	175	188	155
TCE	42.1	26.0	35.5	38.0	29.4
VC	1.3	0.62J	0.9J	1.0	0.95J

MW-04	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	2.9	U	U
1,1-DCA	U	U	2.6	0.76J	2.2
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	U	U	0.25J	U	1.4
t-1,2-DCE	U	U	U	U	0.85J
TCA	U	U	U	U	U
PCE	U	U	U	U	U
TCE	U	U	U	U	U
VC	1.0	1.3	4.7	1.4	7.7

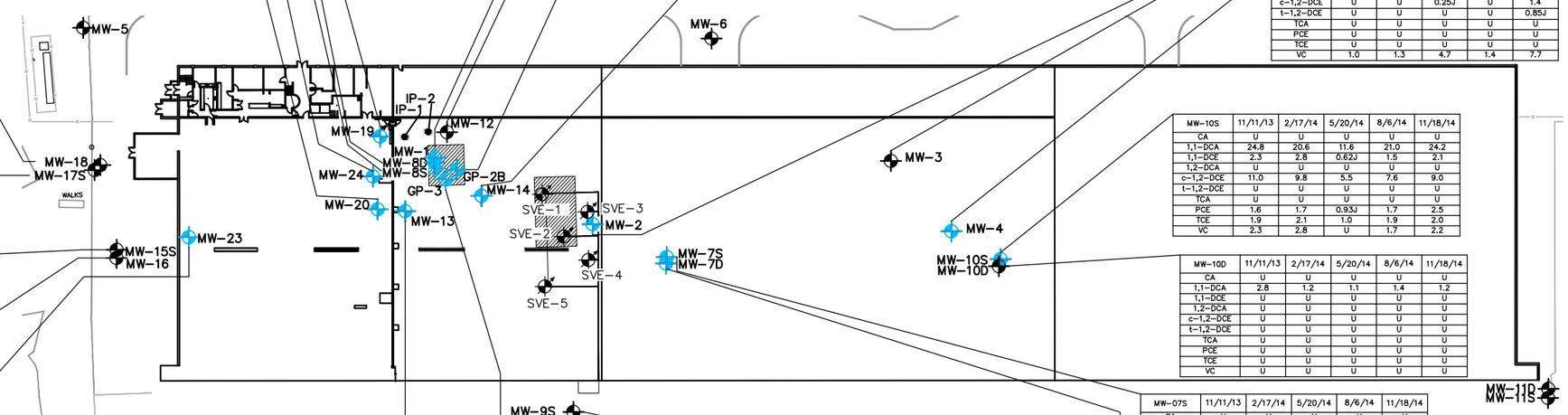
MW-18	11/12/13	2/17/14	5/21/14	8/7/14	11/18/14
CA	U	NS	U	U	U
1,1-DCA	U	NS	U	U	U
1,1-DCE	U	NS	U	U	U
1,2-DCA	U	NS	U	U	U
c-1,2-DCE	U	NS	U	U	U
t-1,2-DCE	U	NS	U	U	U
TCA	U	NS	U	U	U
PCE	U	NS	U	U	U
TCE	U	NS	U	U	U
VC	U	NS	U	U	U

MW-17S	11/12/13	02/17/14	5/21/14	8/7/14	11/18/14
CA	U	NS	U	U	U
1,1-DCA	U	NS	U	U	U
1,1-DCE	U	NS	U	U	U
1,2-DCA	U	NS	U	U	U
c-1,2-DCE	0.48J	NS	0.24J	U	0.75J
t-1,2-DCE	U	NS	U	U	U
TCA	U	NS	U	U	U
PCE	0.28J	NS	U	U	U
TCE	U	NS	U	U	U
VC	U	NS	U	U	U

MW-15S	11/12/13	02/17/14	5/21/14	8/7/14	11/18/14
CA	U	NS	U	U	U
1,1-DCA	U	NS	U	U	U
1,1-DCE	U	NS	U	U	U
1,2-DCA	U	NS	U	U	U
c-1,2-DCE	U	NS	U	U	U
t-1,2-DCE	U	NS	U	U	U
TCA	U	NS	U	U	U
PCE	U	NS	U	U	U
TCE	U	NS	U	U	U
VC	U	NS	U	U	U

MW-16	11/12/13	02/17/14	5/21/14	8/7/14	11/18/14
CA	U	NS	U	U	U
1,1-DCA	1.0	NS	U	U	0.39J
1,1-DCE	U	NS	U	U	U
1,2-DCA	U	NS	U	U	U
c-1,2-DCE	2.2	NS	U	U	0.85J
t-1,2-DCE	U	NS	U	U	U
TCA	U	NS	U	U	U
PCE	1.3	NS	U	0.38J	0.65J
TCE	U	NS	U	U	U
VC	U	NS	U	U	U

MW-23	11/12/13	02/17/14	5/21/14	8/7/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	1.5	2.4	1.5	1.6	2.5
1,1-DCE	2.0	0.88J	0.37J	U	2.2
1,2-DCA	U	U	U	U	U
c-1,2-DCE	4.0	5.7	3.7	3.2	5.6
t-1,2-DCE	U	U	U	U	U
TCA	4.8	0.89J	0.31J	U	4.2
PCE	2.2	5.6	1.5	1.7	2.8
TCE	U	0.89J	U	0.35J	0.54J
VC	U	U	U	U	U



MW-10S	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	24.8	20.6	11.6	21.0	24.2
1,1-DCE	2.3	2.8	0.62J	1.5	2.1
1,2-DCA	U	U	U	U	U
c-1,2-DCE	11.0	9.8	5.5	7.6	9.0
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	1.6	1.7	0.93J	1.7	2.5
TCE	1.9	2.1	1.0	1.9	2.0
VC	2.3	2.8	U	1.7	2.2

MW-10D	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	2.8	1.2	1.1	1.4	1.2
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	U	U	U	U	U
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	U	U	U	U	U
TCE	U	U	U	U	U
VC	U	U	U	U	U

MW-07S	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	25.8	85.8	50.1	33.2	29.1
1,1-DCE	10.4	55.0	30.2	8.1	7.7
1,2-DCA	U	U	U	U	U
c-1,2-DCE	43.0	30.7	41.1	46.0	32.2
t-1,2-DCE	U	U	U	U	0.61J
TCA	7.9	29.8	17.8	12.4	4.8
PCE	7.5	57.7	40.1	1.0	1.0
TCE	12.1	24.0	22.4	18.1	7.6
VC	11.0	9.8	10.0	10.2	9.1

MW-07D	11/11/13	2/17/14	5/20/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	32.6	29.9	25.6	22.2	20.2
1,1-DCE	2.6	2.1	1.2	0.50J	0.62J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	8.5	5.9	5.6	3.8	2.1
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	0.25J	U	U	U	U
TCE	5.4	4.5	2.8	1.1	0.47J
VC	U	U	U	U	U

MW-09S	11/12/13	2/17/14	5/21/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	U	U	U	U	U
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	0.74J	0.7J	U	U	U
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	3.7	2.0	2.0	U	U
TCE	U	0.69J	21.2	U	U
VC	U	U	U	U	U

MW-09D	11/12/13	2/17/14	5/21/14	8/6/14	11/18/14
CA	U	U	U	U	U
1,1-DCA	U	U	U	U	U
1,1-DCE	U	U	U	U	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	U	0.71J	U	U	0.51J
t-1,2-DCE	U	U	U	U	U
TCA	U	U	U	U	U
PCE	0.97J	2.1	0.93J	0.73J	0.53J
TCE	U	U	U	U	U
VC	U	U	U	U	U

MW-13	11/11/13	2/17/14	5/20/14	8/7/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	10	6.9	6.3	6.8	7.6
1,1-DCE	0.92J	U	0.63J	0.58J	U
1,2-DCA	U	U	U	U	U
c-1,2-DCE	124	71.9	77.7	80.2	71.5
t-1,2-DCE	0.98J	U	0.67J	1.1	1.1
TCA	4.5	3.1	2.9	2.4	1.9
PCE	281	286	215	212	148
TCE	31.6	19.1	19.0	19.7	21.0
VC	U	U	U	U	U

GP-03	11/12/13	2/17/14	5/20/14	8/6/14	11/17/14
CA	U	U	U	U	U
1,1-DCA	16.0	13.4	12.3	13.5	12.0
1,1-DCE	1.0	0.88J	0.77J	0.92J	0.65J
1,2-DCA	U	U	U	U	U
c-1,2-DCE	162	113	133	135	113
t-1,2-DCE	5.5	4.6	4.0	4.3	3.8
TCA	1.3	1.0	1.5	1.3	0.39J
PCE	133	109	138	138	38.5
TCE	93.3	76.5	75.5	82.7	44.6
VC	12.2	14.8	8.1	12.6	14.7

CONCENTRATIONS ARE IN ug/L (ppb).
BLUE HIGHLIGHTED WELLS EXCEED ONE OR MORE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) CLASS GA GROUNDWATER STANDARDS.
a = DILUTED DUE TO HIGH CONCENTRATION OF NON-TARGET COMPOUND
B = COMPOUND FOUND IN FIELD BLANK SAMPLE
J = ESTIMATED CONCENTRATION, LOW
E = ESTIMATED CONCENTRATION, HIGH
CA = CHLOROETHANE
1,1-DCA = 1,1-DICHLOROETHANE
1,1-DCE = 1,1-DICHLOROETHENE
1,2-DCA = 1,2-DICHLOROETHANE
c-1,2-DCE = cis-1,2-DICHLOROETHENE
t-1,2-DCE = trans-1,2-DICHLOROETHENE
TCA = 1,1,1-TRICHLOROETHANE
PCE = TETRACHOLORETHENE
TCE = TRICHLOROETHENE
VC = VINYL CHLORIDE
U = UNDETECTED
NS = NOT SAMPLED, WELL OBSTRUCTED.

MAP NOTES:

1. INFORMATION SHOWN HEREON WAS COMPILED FROM AN ACTUAL FIELD SURVEY CONDUCTED IN JUNE 15, 2011, REVISED JUNE 21, 2012.
2. NORTH ORIENTATION IS REFERENCED TO GRID NORTH AND IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE NAD 27.
3. VERTICAL DATUM ESTABLISHED FOR N.C.V.D. 1929.

LEGEND:

MW-02 MONITORING WELL
SVE-5 SOIL VAPOR EXTRACTION (SVE) WELL
IP 2 INJECTION POINT

80' 0 80' 160'
BAR SCALE
1" = 80'
CHECK GRAPHIC SCALE BEFORE USING

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
88.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

BASELINE POST – REMEDIATION GROUNDWATER QUALITY NOVEMBER 2014

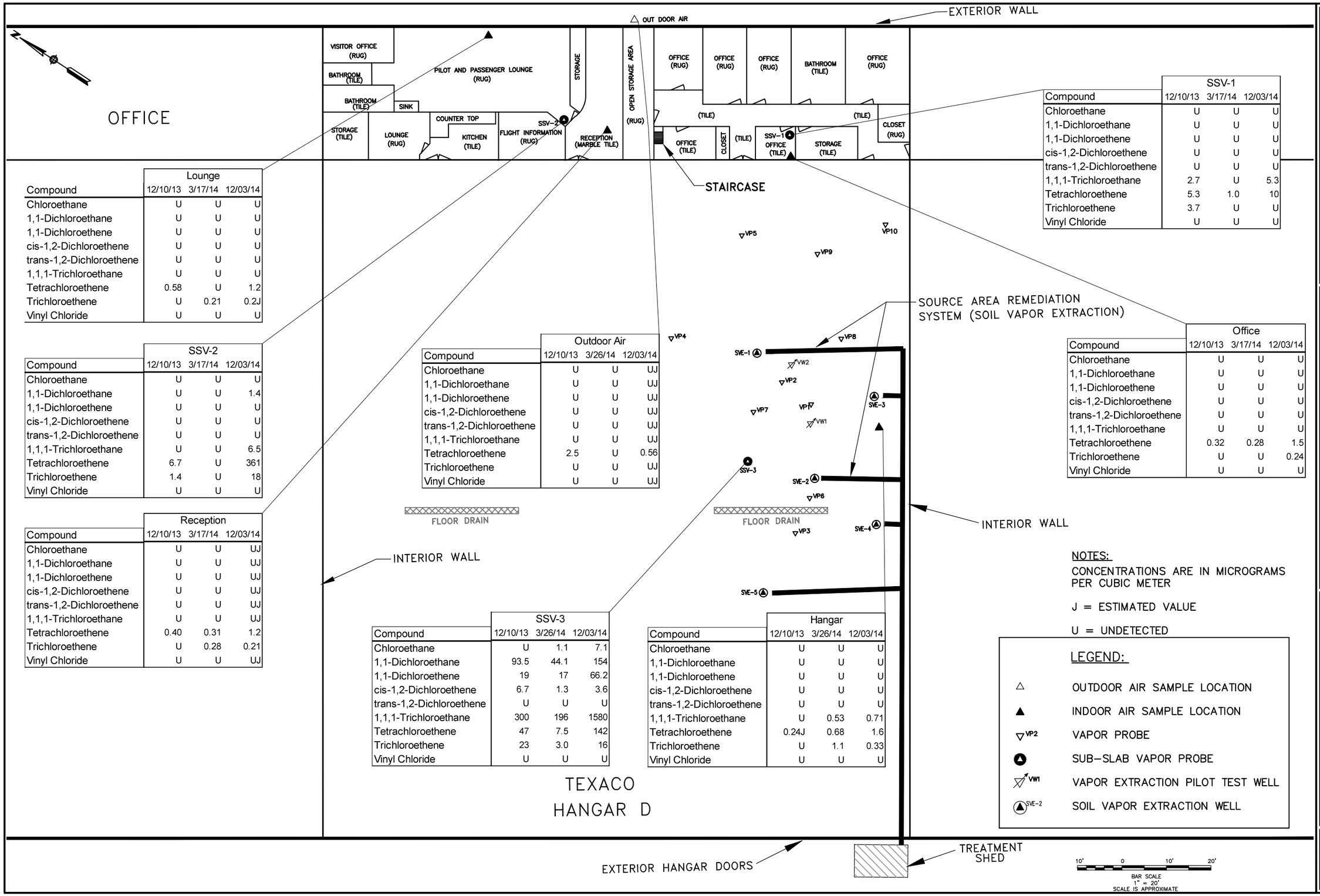
DESIGNED BY: GR
DRAWN BY: PFF
CHECKED BY: AP
206924_U6 CHEM 11-14.DWG

EXXONMOBIL ENVIRONMENTAL SERVICES CO.

WESTCHESTER COUNTY AIRPORT HANGAR D

JOB NO: 206924
DATE: JANUARY 2015
SCALE: AS NOTED

FIGURE 6



Compound	Lounge 12/10/13	3/17/14	12/03/14
Chloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	U	U	U
Tetrachloroethene	0.58	U	1.2
Trichloroethene	U	0.21	0.2J
Vinyl Chloride	U	U	U

Compound	SSV-2 12/10/13	3/17/14	12/03/14
Chloroethane	U	U	U
1,1-Dichloroethane	U	U	1.4
1,1-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	U	U	6.5
Tetrachloroethene	6.7	U	361
Trichloroethene	1.4	U	18
Vinyl Chloride	U	U	U

Compound	Reception 12/10/13	3/17/14	12/03/14
Chloroethane	U	U	UJ
1,1-Dichloroethane	U	U	UJ
1,1-Dichloroethene	U	U	UJ
cis-1,2-Dichloroethene	U	U	UJ
trans-1,2-Dichloroethene	U	U	UJ
1,1,1-Trichloroethane	U	U	UJ
Tetrachloroethene	0.40	0.31	1.2
Trichloroethene	U	0.28	0.21
Vinyl Chloride	U	U	UJ

Compound	Outdoor Air 12/10/13	3/26/14	12/03/14
Chloroethane	U	U	UJ
1,1-Dichloroethane	U	U	UJ
1,1-Dichloroethene	U	U	UJ
cis-1,2-Dichloroethene	U	U	UJ
trans-1,2-Dichloroethene	U	U	UJ
1,1,1-Trichloroethane	U	U	UJ
Tetrachloroethene	2.5	U	0.56
Trichloroethene	U	U	UJ
Vinyl Chloride	U	U	UJ

Compound	SSV-3 12/10/13	3/26/14	12/03/14
Chloroethane	U	1.1	7.1
1,1-Dichloroethane	93.5	44.1	154
1,1-Dichloroethene	19	17	66.2
cis-1,2-Dichloroethene	6.7	1.3	3.6
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	300	196	1580
Tetrachloroethene	47	7.5	142
Trichloroethene	23	3.0	16
Vinyl Chloride	U	U	U

Compound	Hangar 12/10/13	3/26/14	12/03/14
Chloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	U	0.53	0.71
Tetrachloroethene	0.24J	0.68	1.6
Trichloroethene	U	1.1	0.33
Vinyl Chloride	U	U	U

Compound	SSV-1 12/10/13	3/17/14	12/03/14
Chloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	2.7	U	5.3
Tetrachloroethene	5.3	1.0	10
Trichloroethene	3.7	U	U
Vinyl Chloride	U	U	U

Compound	Office 12/10/13	3/17/14	12/03/14
Chloroethane	U	U	U
1,1-Dichloroethane	U	U	U
1,1-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
trans-1,2-Dichloroethene	U	U	U
1,1,1-Trichloroethane	U	U	U
Tetrachloroethene	0.32	0.28	1.5
Trichloroethene	U	U	0.24
Vinyl Chloride	U	U	U

NOTES:

CONCENTRATIONS ARE IN MICROGRAMS PER CUBIC METER

J = ESTIMATED VALUE

U = UNDETECTED

LEGEND:

- △ OUTDOOR AIR SAMPLE LOCATION
- ▲ INDOOR AIR SAMPLE LOCATION
- ▽VP2 VAPOR PROBE
- SUB-SLAB VAPOR PROBE
- VW1 VAPOR EXTRACTION PILOT TEST WELL
- SVE-2 SOIL VAPOR EXTRACTION WELL

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

AREA OF SOIL VAPOR INTRUSION CONCERN

DESIGNED BY: AP
DRAWN BY: SH/PFF
CHECKED BY: AP
206924_U7 SITE Nov-2014.dwg

WESTCHESTER COUNTY AIRPORT
HANGAR D

SOIL VAPOR SAMPLING LOCATIONS

JOB NO: 206824
DATE: JANUARY 2015
SCALE: AS NOTED

FIGURE 7

APPENDIX A – SITE DOCUMENTS
(PENDING)

APPENDIX B – SVE SYSTEM DESIGN DRAWINGS

SOIL VAPOR EXTRACTION SYSTEM
EQUIPMENT BUILDING
BASIS OF DESIGN REPORT

HANGER D, BAY 2
WESTCHESTER COUNTY AIRPORT
WHITE PLAINS, NEW YORK

August 2003 by Woodard & Curran of Cheshire, CT

Prepared for:
Mr. Steven Trifiletti
ExxonMobil Refining and Supply Company
464 Doughty Boulevard
Inwood, NY 11696

INTRODUCTION

Woodard & Curran, Inc. (W&C) has prepared the following design and installation parameters for the Soil Vapor Extraction (SVE) System Equipment building. The shed is being relocated from its current position within the hangar to accommodate concerns presented by the current occupant of the hangar, Jet Equity, LLC. These parameters are based upon conversations and meetings with Jet Equity and discussions with Westchester County Airport personnel and will serve as the basis for reconstruction of the existing SVE System Equipment building outside of the hangar.

DESIGN PARAMETERS

Building:

- The SVE system equipment building is a pre-built, wood-framed and insulated with acoustical foam. Building dimensions are 8' by 12' with a gabled roof.

- The shed floor is made of 2 x 6 floor joists, overlaid with 3/4" plywood. Sidewalls and trusses are of 2 x 4 construction spaced 24" on center. Exterior consists of 5/8" T1-11 siding covered with two coats of all-weather stain.

- The roof trusses are overlaid by 7/16" roof decking, roofing paper and 250 weight asphalt shingles.

- Access to the shed will be via 5' wide by 6' high double swing wooden doors. The doors will be secured with a padlock and a copy of the key will be provided to airport maintenance personnel upon request.

- The shed is to be located on the concrete slab-on-grade foundation, which will be located adjacent to the Hangar building as shown on the attached site plan (Figure 1). We have also included the Piping and Instrumentation Diagram and Legend initially submitted as part of the Remedial Design Report for your information (P-01 and P-02).

- If required, a building permit will be filed with the Town of Rye Brook. Zoning approval and planning approval are assumed not to be required.

- Signage will be provided for the shed indicating "Authorized Personnel Only" and "Hearing Protection Required Inside of Shed". In addition, emergency contact information will be posted on the exterior of the shed.

- Concrete filled traffic bollards will be provided on the outside corners of the building to protect the building from traffic damage.

Site Work and Utilities:

- The building will be placed on a 10 ft. x 14 ft. concrete slab on grade supported, as necessary, by concrete block footings to offset the slope of the existing grade in the proposed area of the SVE equipment shed location, as shown on Figure 1.

- Site work will maintain local area positive drainage. (Anticipated truing and leveling of asphalt, separate drainage piping and structures are not anticipated).

Specialty:

- A stack will be routed from the equipment shed up the exterior of the existing hangar building wall. The stack will extend 2 ft. above the top of the existing hangar roof. The stack will be attached to the hangar building wall via clamps secured to the hangar building's structural columns.

- Piping from the extraction wells is currently installed beneath the hangar slab and extends to the wall of the hangar. System process piping will be routed along a pipe chase currently existing on the hangar wall to the equipment shed.

- The piping will go through the portion of the hangar wall above the hangar doors. This portion of the wall is constructed of transite paneling which contains asbestos. Therefore, the work will be completed by a certified asbestos contractor and in accordance with applicable state and federal regulations.

HVAC:

- The building will have an exhaust fan with louvers and thermostat and louvered wall vents for natural ventilation.

- Electric heat will be provided to maintain 50 deg F throughout the shed. An automatic thermostat will be provided.

Electrical:

- The equipment shed will be a non-classified area; all electrical equipment and fittings will be rated for General Purpose (GP). All enclosures in this area will be NEMA 4.

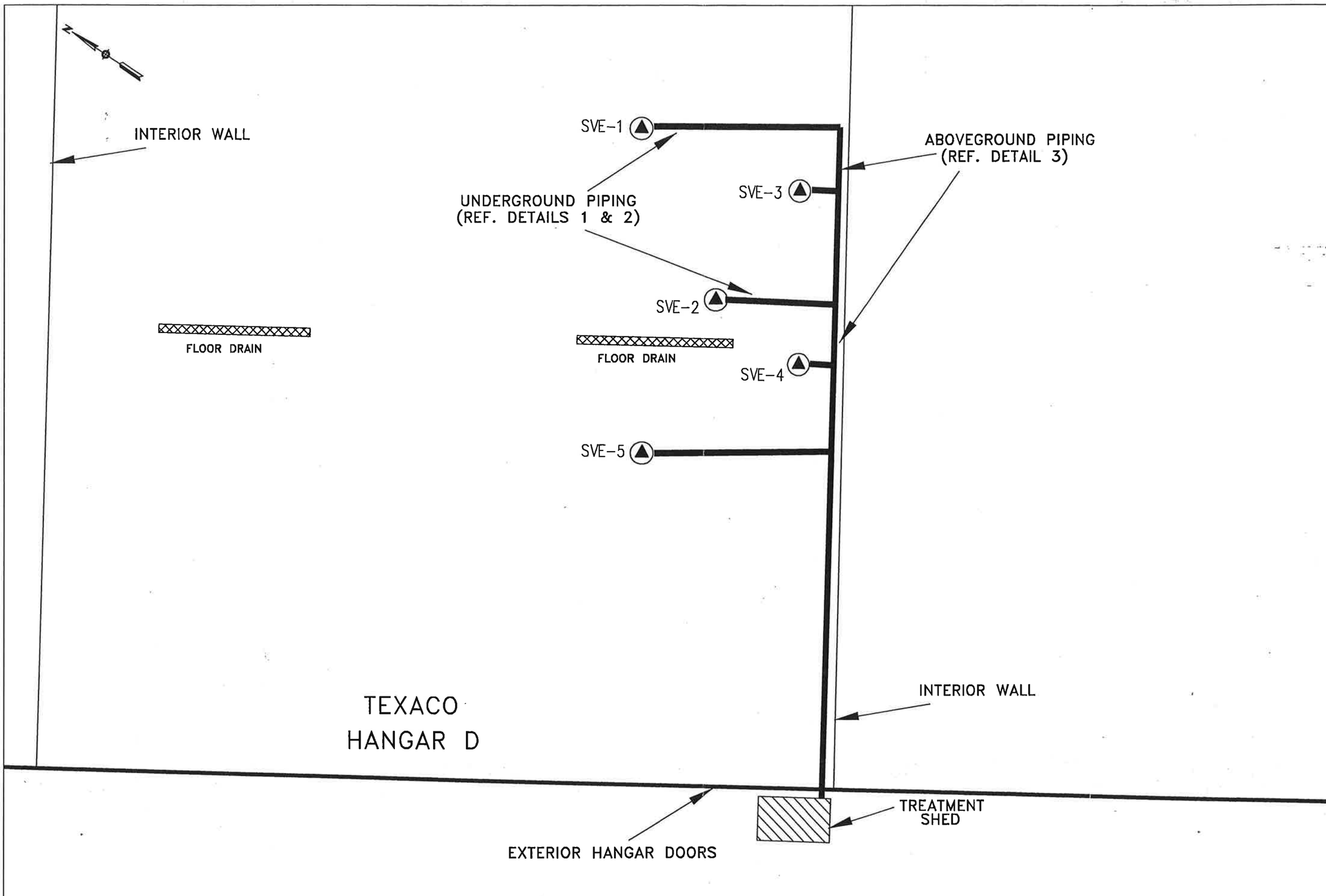
- Electrical fixtures in the equipment shed will include:

  - 1 GP circuit breaker panel;
  - 1 GP heater;
  - 1 GP louvered exhaust fan;
  - 1 GP thermostat;
  - 1 GP light with switch;
  - 1 GP GFCI (ground fault circuit interrupter), convenience receptacle; and
  - controls and electrical hardware necessary to operate the SVE system.

- Power for the system will be provided from an adjacent panel located inside the hanger.
- Electrical power will be routed overhead from the Hangar building to the equipment shed. A separate electrical meter will be provided which will allow Jet Equity to be reimbursed for the cost of operating the system.
- Electrical fixtures outside the shed will include:
    - 1 GP exterior light, activated automatically; and
    - 1 GP, all-weather electrical disconnect.
- Phone service will be provided to the shed to allow remote notification to W&C personnel of any system errors.

FIRE DETECTION:

- A smoke detector will be provided equipment shed. The detector will alarm locally.
- One, Type ABC, 20-pound fire extinguisher will be mounted in the equipment shed.



WOODARD & CURRAN
Engineering · Science · Operations

PROPOSED SOIL VAPOR
EXTRACTION SYSTEM LAYOUT

DESIGNED BY:
DRAWN BY: EVR
CHECKED BY:
FILE: C1-ASB.DWG

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR
EXTRACTION SYSTEM

JOB NO: 206565
DATE: 7/12/02
SCALE: 1" = 15'

C-01

FUNCTIONAL DESCRIPTION OF INSTRUMENT IDENTIFICATION

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS	ANALOG	ALARM		
B	BURNER FLAME		USERS CHOICE	USERS CHOICE	USERS CHOICE
C	CHLORINE			CONTROL	
D	USERS CHOICE	DIFFERENTIAL OR DIGITAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING (DIMENSIONAL)		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY	MOTOR			MIDDLE OR INTERMEDIATE
N	USERS CHOICE		USERS CHOICE	USERS CHOICE	RUN
O	USERS CHOICE	OPERATED	ORIFICE (RESTRICTION)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY	REGULATE	RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	RUN			RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

THE FOLLOWING DESIGNATIONS ARE USED TO BETTER IDENTIFY AN INSTRUMENT FUNCTION

I/P	–	CURRENT TO PNEUMATIC CONVERTER
E/I	–	VOLTAGE TO CURRENT CONVERTER
Σ	–	ADD OR TOTALIZE
√	–	SQUARE ROOT
X	–	MULTIPLY
÷	–	DIVIDE
>	–	HIGH SELECT
MV	–	MEASURED VARIABLE
<	–	LOW SELECT
S.P.	–	SET POINT
∫	–	INTEGRATE
f(x)	–	CHARACTERISTIC
P	–	PROPORTIONAL CONTROL MODE
D	–	DERIVATIVE
I	–	INTEGRAL CONTROL MODE
pH	–	HYDROGEN ION CONCENTRATION

HAND SWITCH POSITION SYMBOLS

(UNLABELLED SWITCHES ARE TO BE ON-OFF)

A	AUTOMATIC	L	LOCAL
C	CLOSE	M	MANUAL
H	HAND	O	OPEN OR OFF
J	JOG	R	REMOTE

LINE SYMBOLS

- FLEXIBLE PVC HOSE
- ELECTRIC INSTRUMENT LINE (ANALOG)
- ELECTRICAL SIGNAL (DISCRETE)
- HYDRAULIC CONTROL LINE
- PNEUMATIC SIGNAL
- PROCESS FLOW – MINOR
- PROCESS FLOW – MAJOR
- SOFTWARE OR DATA LINK
- MECHANICAL LINK
- CAPILLARY TUBE
- OPTICAL SIGNAL
- MAGNETIC SIGNAL
- UNDEFINED SIGNAL
- TELEPHONE LINE

TYPICAL SYMBOLS

- FLOATING MIXER
- FLOATING DECANTER
- PROGRESSIVE CAVITY PUMP
- CENTRIFUGAL PUMP
- GEAR PUMP
- DIAPHRAGM PUMP
- METERING PUMP
- SUBMERSIBLE PUMP
- EXHAUST FAN
- ROTARY COMPRESSOR
- BLOWER
- INLET AIR FILTER
- INLET/OUTLET AIR SILENCER
- AGITATOR
- BACK FLOW PREVENTER
- GAS INJECTOR
- MOTOR
- MAGNETIC FLOWMETER
- ROTAMETER
- PROPELLER FLOWMETER
- VENTURI FLOWMETER
- FLOW TOTALIZER
- ULTRASONIC LEVEL ELEMENT
- MERCURY FLOAT SWITCH
- SQUARE-D LEVEL SWITCH
- 1/2"-SWR-PRP — PIPE DIAMETER, PIPE MATERIAL, FLUID CARRIED
- FROM – TO ARROW
- PLUG VALVE
- BUTTERFLY VALVE
- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- 3-WAY VALVE
- NEEDLE VALVE
- PINCH VALVE
- DIAPHRAGM VALVE
- PRESSURE REGULATING VALVE
- RELIEF VALVE
- COMBINATION AIR RELEASE VALVE AND AIR/VACUUM VALVE
- COMBINATION SAFETY RELIEF, BACKPRESSURE, ANTI-SIPHON VALVE
- INLINE PRESSURE REDUCING VALVE
- CHECK VALVE
- MOTORIZED VALVE
- FAIL CLOSED VALVE
- FAIL OPEN VALVE
- FAIL LOCKED VALVE (POSITION DOES NOT CHANGE)
- SLIDE GATE VALVE
- NORMALLY CLOSED VALVE
- SOLENOID ACTUATOR
- MODULATING ACTUATOR
- REDUCER
- PIPE CAP
- UNION
- QUICK DISCONNECT COUPLING
- HB — HOSE BIBB CONNECTION
- PT — PITOT TUBE CONNECTION
- MP — MONITORING PORT
- FLEXIBLE CONNECTION
- DRESSER COUPLING
- Y-STRAINER
- FLANGE
- TRAP
- LUBRICATOR (OILER)
- INLINE AIR FILTER
- PULSATION DAMPENER
- PRESSURE INDICATOR WITH DIAPHRAGM
- FLOW CALIBRATION STANDPIPE
- COMPRESSED AIR LINE PRESSURE
- EQUIPMENT TAG

TYPICAL INSTRUMENT SYMBOLS

- PI 500 — FUNCTIONAL IDENTIFICATION (SEE LEGEND TABLE); LOOP IDENTIFICATION NUMBER
- PI 500 — FIELD MOUNTED
- PI 500 — AUXILIARY LOCATION
- PI 500 — FRONT PANEL MOUNTED
- PI 500 — REAR PANEL MOUNTED
- STATUS INDICATION
- INCLUDED WITH PURCHASED EQUIPMENT
- COMPUTER CONTROL SYSTEM CONFIGURABLE FUNCTION (DISPLAYED ON CRT)
- COMPUTER CONTROL SYSTEM CONFIGURABLE FUNCTION (NOT DISPLAYED ON CRT)
- PROGRAMMABLE LOGIC CONTROLLER I/O
- PROGRAMMABLE LOGIC CONTROL, PRIMARY LOCATION
- PROGRAMMABLE LOGIC CONTROL, FIELD MOUNTED
- X — UNDEFINED INTERLOCK LOGIC

TYPICAL PIPE, VALVES AND EQUIPMENT ABBREVIATIONS

FLUID DESIGNATION

AI – INSTRUMENT AIR
APL – PLANT AIR
CAL – ALUM
COHC – CAUSTIC, 50%
CPL – POLYMER
DE – EQUIPMENT DRAIN
DTO – TANK OVERFLOW
E – EFFLUENT
EF – EFFLUENT, FILTER
EP – EFFLUENT, PRIMARY
F – FILTRATE
SG – SOIL GAS
SGC – SOIL GAS CONDENSATE
SLO – OILY WASTE
SL – SLUDGE
V – VENT
WD – DECANT WATER
WG – GROUNDWATER
WPL – PLANT WATER
WWP – PROCESS WASTEWATER
WST – STORMWATER

PIPE MATERIAL

ADI – LINED DUCTILE IRON
CPVC – CHLORINATED POLYVINYLCHLORIDE
CS – CARBON STEEL
CU – COPPER
DI – DUCTILE IRON
FRP – FIBERGLASS REINFORCED PLASTIC
HDPE – HIGH DENSITY POLYETHYLENE
PE – POLYETHYLENE
PVC – POLYVINYLCHLORIDE
SS – STAINLESS STEEL – 304L
TT – TYGON (PLASTIC) TUBING

GENERAL ABBREVIATIONS

AIR – AMBIENT AIR
ACFM – ACTUAL CUBIC FEET PER MINUTE
AFF – ABOVE FINISHED FLOOR
BF – BLIND FLANGE
ECC – ECCENTRIC
EL – ELEVATION
FF – FINISHED FLOOR
FLG – FLANGE
FL – FLOOR
FOB – FLAT ON BOTTOM
FOT – FLAT ON TOP
GPD – GALLONS PER DAY
GPH – GALLONS PER HOUR
GPM – GALLONS PER MINUTE
HWL – HIGH WATER LEVEL
ICFM – INLET CUBIC FEET PER MINUTE
INV – INVERT
LWL – LOW WATER LEVEL
MGD – MILLION GALLONS PER DAY
Mg/L – MILLIGRAMS PER LITER
MHW – MEAN HIGH WATER
MLW – MEAN LOW WATER
MSL – MEAN SEA LEVEL
OC – ON CENTER
PPD – POUNDS PER DAY
PSIA – POUNDS PER SQUARE INCH ABSOLUTE
PSIG – GAUGE POUNDS PER SQUARE INCH
RED. – REDUCER
SCFM – CUBIC FEET PER MINUTE – STD COND.
SP – SET POINT (TYPICAL)
TDH – TOTAL DYNAMIC HEAD
TOS – TOP OF STRUCTURE
TYP – TYPICAL
VTA – VENT TO ATMOSPHERE
WS – WATER SURFACE
mA – MILLI AMP
S/S/LO – START, STOP, LOCKOUT
H/O/A – HAND, OFF, AUTO

EQUIPMENT DESIGNATIONS

AC – AIR COMPRESSOR
B – BLOWER
BS – BAR SCREEN
E – GENERAL EQUIPMENT
F – FILTER
FP – FILTER PRESS
GC – GRIT CHANNEL
MX – MIXER
P – PUMP
PS – PUMP STATION
S – SUMP
T – TANK
G – GRINDER
MCP – MAIN CONTROL PANEL
MS – MOISTURE SEPARATOR
CP – CONTROL PANEL
GAC – GRANULAR ACTIVATED CARBON UNIT
PPIS – POTASSIUM PERMANGANATE IMPREGNATED SILICA UNIT

VALVE TAG SYMBOL

VALVE — SPECIFICATION & REFERENCE No. — SYSTEM NUMBER — SEQUENCE No.

VALVE TYPE

1	GATE	6	CHECK
2	BALL	7	ANGLE
3	BUTTERFLY	8	PINCH OR DIAPHRAGM
4	PLUG	9	3-WAY OR 4-WAY
5	GLOBE	0	SPECIAL

STATE OF NEW YORK
ANNE E. PROCTOR
070766
LICENSED PROFESSIONAL ENGINEER

WOODARD & CURRAN
Engineering · Science · Operations

THIS DOCUMENT IS THE PROPERTY OF WOODARD & CURRAN INC. AND ITS CLIENT. REPRODUCTION OR MODIFICATION WITHOUT WRITTEN PERMISSION IS PROHIBITED.

REV	DESCRIPTION	DATE

DESIGNED BY: EVR
DRAWN BY:
CHECKED BY:
FILE: GRANGE.dwg

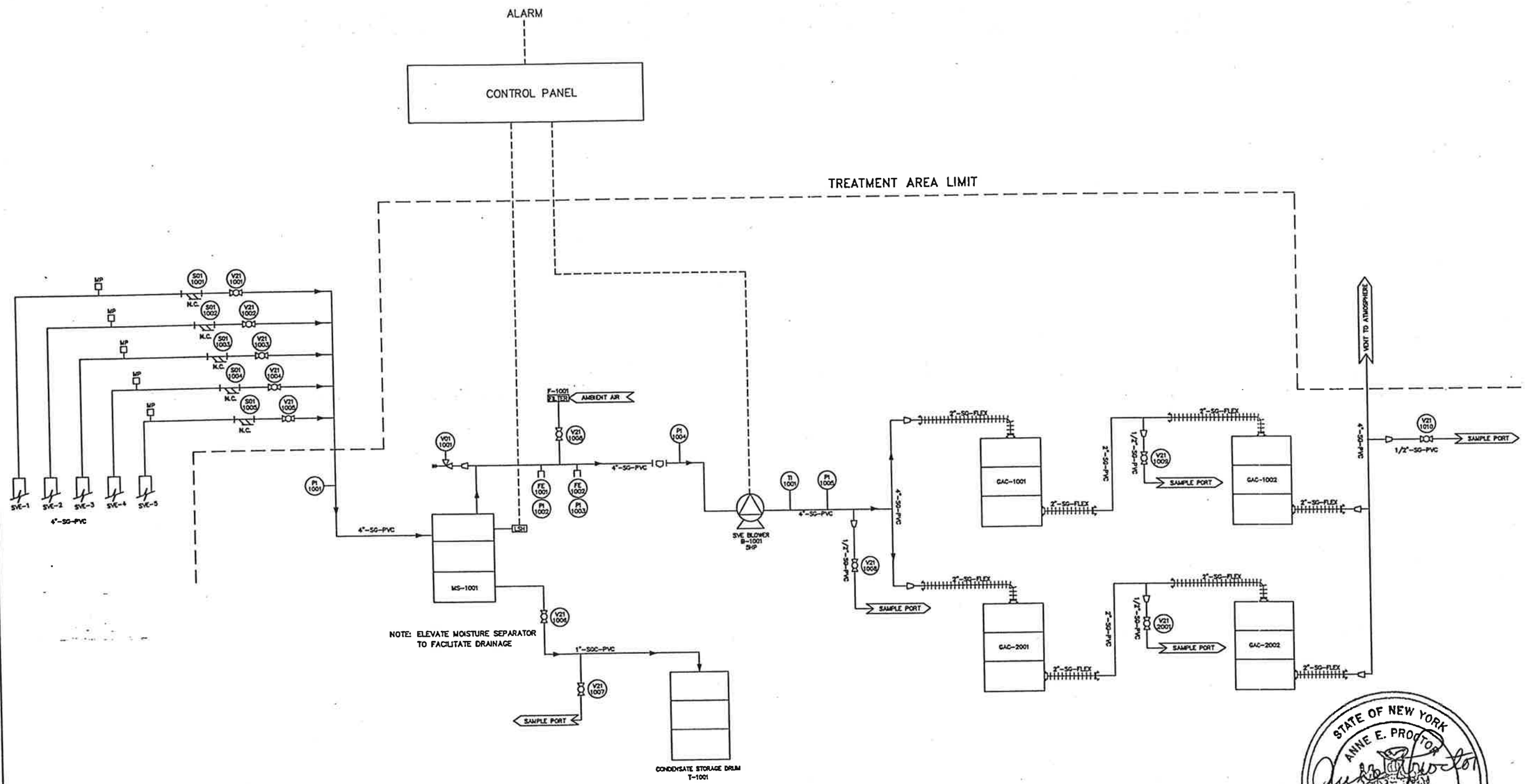
PIPING & INSTRUMENTATION LEGEND

WESTCHESTER COUNTY AIRPORT HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO.: 206565
DATE: 7/12/02
SCALE:
SHEET: OF

P-01



STATE OF NEW YORK
ANNE E. PROCTOR
070706
LICENSED PROFESSIONAL ENGINEER

WOODARD & CURRAN
Engineering · Science · Operations

PIPING AND INSTRUMENTATION DIAGRAM

DESIGNED BY:
DRAWN BY: EVR
CHECKED BY:
FILE: P2-ASB.dwg

WESTCHESTER COUNTY AIRPORT
HANGAR D

PROPOSED SOIL VAPOR EXTRACTION SYSTEM

JOB NO: 206565
DATE: 7/12/02
SCALE: NOT TO SCALE

P-02

APPENDIX C – EXCAVATION WORK PLAN

C-1 NOTIFICATION

At least 60 days prior to the start of any activity that is anticipated to encounter remaining contamination, the Site owner or their representative will notify the Department. Currently, this notification will be made to:

Chief, Site Control Section
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 11th Floor

and

Mr. Matthew Hubicki or current NYSDEC Project Manager
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 11th Floor

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in Appendix D of this document,

- Identification of disposal facilities for potential waste streams, and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

C-2 SOIL SCREENING METHODS

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

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

C-3 STOCKPILE METHODS

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

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

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

C-4 MATERIALS EXCAVATION AND LOAD OUT

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

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

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

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

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete.

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

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

C-5 MATERIALS TRANSPORT OFF-SITE

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

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

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Truck transport routes and times will be in accordance with requirements of the airport authority, Westchester County, and localities through which the route traverses. All trucks loaded with Site materials will exit the vicinity of the Site using only these

approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

C-6 MATERIALS DISPOSAL OFF-SITE

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

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

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does

not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-7 MATERIALS REUSE ON-SITE

Chemical criteria for on-site reuse of material must be approved by NYSDEC and are listed in Table 5. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

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

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed at an approved facility and in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, but will be managed off-site.

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

C-9 COVER SYSTEM RESTORATION

Surface cover shall be restored in-kind in a manner that matches conditions prior to disturbance or as specified in contract documents for the work.

C-10 BACKFILL FROM OFF-SITE SOURCES

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

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 5. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site. A "Request to Import/Reuse Fill or Soil" form is provided at the end of this EWP.

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

C-11 STORMWATER POLLUTION PREVENTION

For larger excavations exceeding 1 acre, procedures for stormwater pollution prevention will be submitted and approved prior to work commencing. The Stormwater Pollution Prevention Plan will conform to the requirements of NYSDEC Division of Water guidelines and NYS regulations.

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

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

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

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

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

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

C-12 CONTINGENCY PLAN

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

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

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC’s Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Reports prepared pursuant to Section 5 of the SMP.

C-13 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be conducted during soil excavation, test pitting, break-up of concrete, or other activity that can generate airborne contaminant or nuisance releases in accordance with the NYSDOH Generic CAMP (in Appendix D) or as required and approved by the NYSDEC and NYSDOH in a task-specific CAMP for the planned activity. Whether using a generic or site-specific plan, the CAMP requires, at a minimum, real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) from a work area when Site activities are in progress that could generate airborne contaminants to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities), and to mitigate the spread of contamination off-site by air. Air monitoring for VOCs and particulates should be conducted upwind and downwind at the work area perimeter, and as required in the work area to protect workers directly involved with the subject work activities. The CAMP will identify action levels for all monitored parameters and mitigation measures, up to and including stoppage of work, upon an action level exceedance.

A figure showing the location of air sampling stations based on generally prevailing wind conditions will be provided by the Qualified Professional for the work to the NYSDEC for approval. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will be developed by the Qualified Professional for the work subject to the approval of the NYSDEC. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the

project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

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

C-15 DUST CONTROL PLAN

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

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

- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-16 OTHER NUISANCES

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

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 80 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

APPENDIX D – HEALTH AND SAFETY PLAN
AND
COMMUNITY AIR MONITORING PLAN

GROUNDWATER & ENVIRONMENTAL SERVICES, INC.

SITE-SPECIFIC HEALTH AND SAFETY PLAN
FOR

Hanger D (Fmr. Mobil Hanger)
Westchester County Airport
240 Airport Road
White Plains, NY

EMERGENCY PHONE NUMBERS

Local Police 911

Local Fire 911

Local Rescue 911

Local Hospital Name, Number & Address
White Plains Hospital
41 East Post Road
White Plains, NY 10601
Telephone: 914-681-0600

Directions to Hospital (map attached)
Please see attached directions and map.

National Response Center (NRC): 1-800-424-8802
The NRC should be contacted in the event of a significant chemical release. Once notified, the NRC will activate a federal response to the spill. *Please confirm with the client and project manager to determine if the spill should be reported.*

Poison Control Center: 1-800-222-1222
The Poison Control Center should be contacted in the event of accidental poisoning. They will provide information on immediate treatment for the poisoning.

Nearest Telephone: Office: 1-866-839-5195 (GES-LHV) Cell: GES Personnel

Groundwater & Environmental Services, Inc.

GES Personnel
Site Supervisor

GES Personnel
Cell Phone:

Thomas M. Baylis
Vice President of Corporate Health and Safety

610-587-1124
Cell Phone:

Client Representative

Leon D. Paredes | Telephone Number | 718-404-0674

State Agency Representative

NYSDEC (Central Office) | Telephone Number | (518) 402-9662

DO NOT TRANSPORT SERIOUSLY INJURED
CALL LOCAL RESCUE

Westchester County Airport Hangar D Site Contacts

Leon D. Paredes
ExxonMobil Environmental Services Company
US North – Project Manager
38 Varick Street
Brooklyn, New York 11222
C: 281-627-5579 O: 718-404-0674 F: 718-404-0681
Email: leon.d.paredes@exxonmobil.com

Anne Proctor
Woodard & Curran
1520 Highland Avenue
Cheshire, CT 06410

Phone: (203) 271-0379
Cell: (203) 379-7688
Fax: (203) 271-7952
aproctor@woodardcurran.com

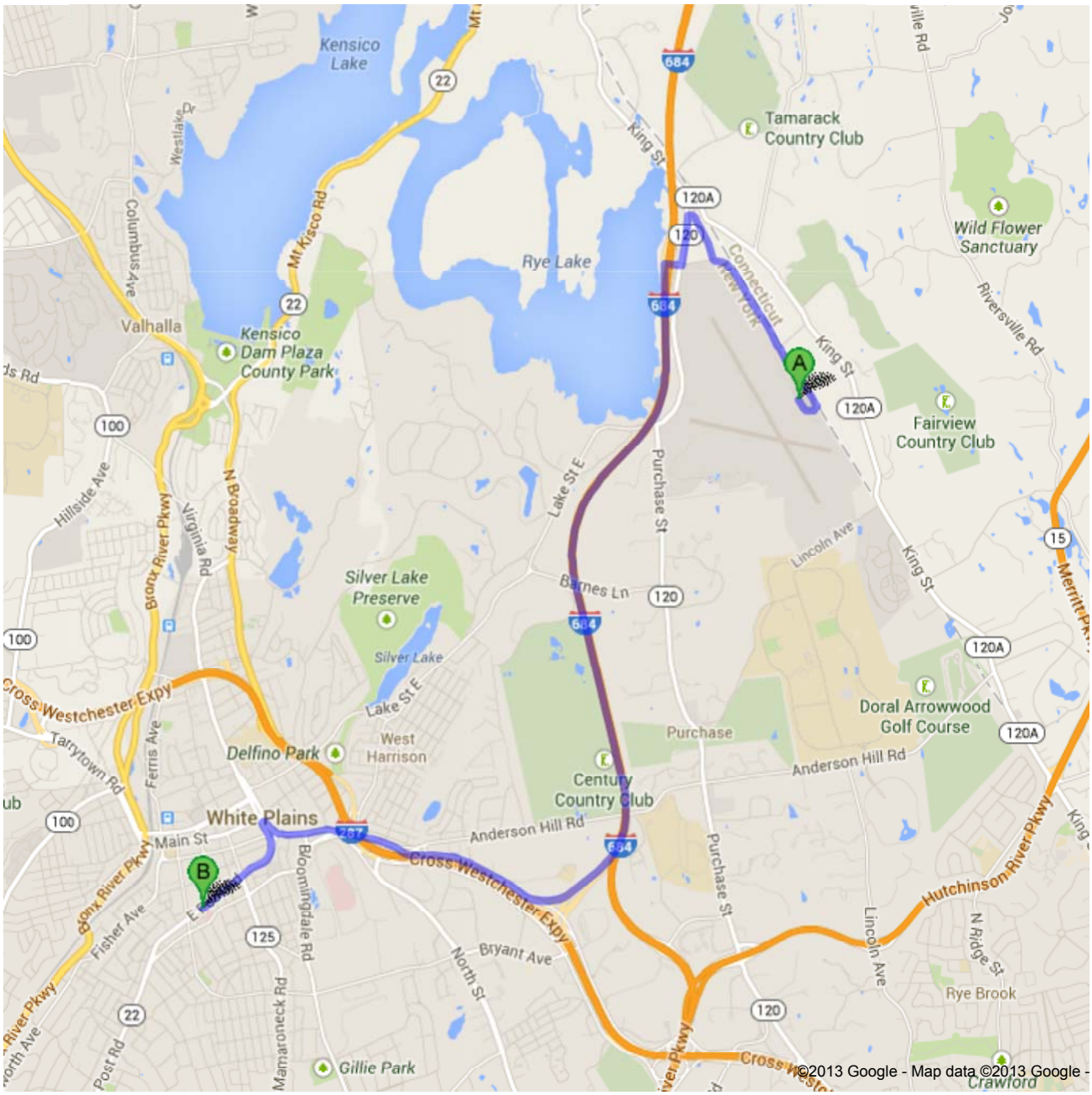
Landmark Aviation
176 Airport Road
Hangar D1
Westchester County Airport
White Plains, NY 10604

Phone: (914) 761-3000

- Frank Ciezadlo (General Manager)
  Cell: (773) 329-1816
  fciezaldo@landmarkaviation.com
- Eric Faulkner (Director of FBO Operations)
  Phone: (914) 761-3201 Ext. 127
  Cell: (917) 327-0766
- Gonzalo Montoya (Hangar D1 Bay 2 and Hangar D3 Supervisor)
  Phone: (914) 761-3201

HOSPITAL ROUTE MAPS

Directions to 41 E Post Rd, White Plains, NY 10601
8.5 mi – about **17 mins**



Westchester County Airport
240 Westchester Airport County Rd #202, White Plains, NY 10604

	1. Head **southeast** on **Airport Rd/Westchester Airport County Rd** toward **Hangar Rd** Continue to follow Airport Rd About 1 min	go 0.5 mi total 0.5 mi
	2. At the traffic circle, continue straight to stay on **Airport Rd** About 2 mins	go 0.7 mi total 1.2 mi
	3. Continue onto **New King Ct** About 46 secs	go 0.3 mi total 1.5 mi
	4. Turn left onto **NY-120 S/Purchase St** About 2 mins	go 0.3 mi total 1.8 mi
	5. Take the 1st right onto **Airport Rd**	go 0.1 mi total 1.9 mi
	6. Turn left onto the **Interstate 684 S** ramp to **Interstate 287**	go 0.3 mi total 2.2 mi
	7. Merge onto **I-684 S** About 3 mins	go 3.3 mi total 5.5 mi
	8. Take the **Interstate 287 W** exit toward **White Plains**	go 0.4 mi total 5.9 mi
	9. Follow signs for **Westchester Ave** and merge onto **Westchester Ave**	go 0.4 mi total 6.3 mi
	10. Keep right to stay on **Westchester Ave**	go 0.4 mi total 6.7 mi
	11. Slight left to stay on **Westchester Ave** About 3 mins	go 1.0 mi total 7.8 mi
	12. Turn left onto **S Broadway** About 1 min	go 0.2 mi total 8.0 mi
	13. Continue onto **E Post Rd** Destination will be on the left About 2 mins	go 0.5 mi total 8.5 mi

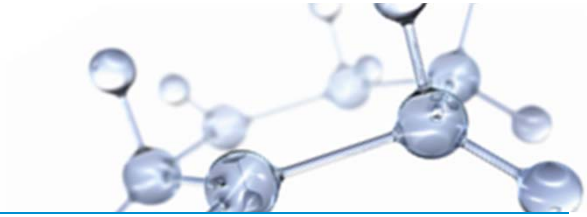
41 E Post Rd, White Plains, NY 10601

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2013 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

Core Safety Expectations



- Always follow Fall Protection standards when working at elevated heights
- Always follow Written Permit procedures regarding:
  - Confined space (e.g., entry only with a valid work permit)
  - Hot Work (e.g., starting only after a valid work permit is issued)
  - Excavation or sub-surface work (e.g., starting only after a valid work permit is issued)
  - Gas Testing where required (e.g., starting work only after testing is completed)
- Always follow Lock Out/Tag Out (LOTO) procedures/permit
- Always follow Defeat of Critical Device procedures (MOC)
- Always follow the written PPE requirements for the work being performed

ExxonMobil
Taking on the world's toughest energy challenges.™

GES TAILGATE SAFETY MEETING CHECKSHEET

Complete the following check sheet to better conduct an effective tailgate safety meeting
(Length of meeting 30 minutes, depending on time on site & scope of work)

- **Introductions:**
  - ✓ How is everyone feeling today?
  - ✓ If working with new subcontractors, multiple subcontractors, or personnel that haven't worked together before, have everyone introduce themselves and their role.
  - ✓ Review OSHA, LPS, and API credentials.
  - ✓ Review that everyone is responsible for their own safety, and to look out for everyone else on site.

- **Stop Work Reminder For All Present**
  - ✓ ALL on-site personnel have the ***AUTHORITY, OBLIGATION and RESPONSIBILITY*** to stop the job at any time if they observe unsafe acts, situations or conditions!
  - ✓ Please report all Losses, Near Losses, injuries, and any other abnormal situations to the GES Site Supervisor immediately.

- **HASP and Emergency Information**
  - ✓ Hospital location: (We do NOT transport seriously injured personnel). Call 911
  - ✓ First aid kit, eye wash, fire extinguisher, fuel service emergency stop, and HASP locations
  - ✓ Review of First Aid/CPR trained site personnel
  - ✓ Review "emergency stop work" signal, establish safe muster point, smoking and break location(s)
  - ✓ Discuss what type of site activities could trigger a "stop work" alert (injury, fuel delivery, unexpected 3rd party site intrusion, weather, etc.)
  - ✓ Decontamination procedures
  - ✓ Emergency procedures

- **Discuss Scope Of Work For The Day**
  - ✓ What do we expect to accomplish today?
  - ✓ Review the anticipated schedule, but emphasize the need to work safe. <u>Safe operations cannot be replaced by "need for speed"</u>

- **JSA Discussion Regarding The Day's Tasks**
  - ✓ Focus on Making every JSA Site Specific
    - ▪ If working with subcontractors, empower them with the JSA review of the tasks they will be performing
    - ▪ Challenge them as a "job expert" to share experiences
  - ✓ "What conditions and challenges exist on <u>this site today</u> that are not accounted for in our JSAs?"
  - ✓ Review and complete checklists and permits
  - ✓ If necessary, insure appropriate spotters, and establish communications between spotters and equipment operators

- **Equipment/Machinery/PPE Check**
  - ✓ Gas, grease and oil checked
  - ✓ Safety devices checked and in working order
  - ✓ Required and recommended Personal Protective Equipment (PPE) on site and in good condition (per JSA).
  - ✓ Proper signage (Fence, traffic, drums, samples…)

- **SPSA/Hazard Communication**
  - ✓ Ask all site personnel to communicate a SPSA they performed since coming on site (you 1st, and then go around to every individual on site.)
  - ✓ Emphasize that SPSAs and Hazard Recognitions should be performed and shared constantly throughout the day, not just at Tailgate Safety Meetings and "Take 2 at 2 meetings"!
  - ✓ Encourage and empower all site personnel to communicate SPSAs out loud as they are performing them to share experiences and increase site awareness
  - ✓ Reminder - YOU are not only responsible for their own safety, but to look out for everyone else on site.
  - ✓ Finally – Stress the need and benefit of SPSAs. They are the most powerful tool in our toolbox.
  - ✓ SPSAs – "Every Task, Every Job, Every Day"

TABLE OF CONTENTS

Section **Page No.**

EMERGENCY PHONE NUMBERS ..... Cover Page

1.0 INTRODUCTION 1
1.1 APPROVALS 1
1.2 SITE BACKGROUND 1
1.3 SCOPE OF WORK 1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES 2

3.0 OSHA TRAINING REQUIREMENTS 2
3.1 GENERAL TRAINING REQUIREMENTS 2
3.2 PRE-ENTRY MEETING 2
3.3 FIRST AID/CPR TRAINING 3

4.0 MEDICAL SURVEILLANCE REQUIREMENTS 3
4.1 GENERAL MEDICAL SURVEILLANCE REQUIREMENTS 3
4.2 DRUG AND ALCOHOL COMPLIANCE 3
4.3 ACCIDENT / INCIDENT MEDICAL SURVEILLANCE 3

5.0 HAZARD ASSESSMENT 4
5.1 CHEMICAL HAZARDS 4
5.2 PHYSICAL HAZARDS 5
5.3 RADIOLOGICAL HAZARDS 9

6.0 SITE CONTROL MEASURES 9
6.1 SITE ZONES 9
6.2 COMMUNICATIONS 10

7.0 PERSONAL PROTECTIVE EQUIPMENT 11
7.1 GENERAL 11
7.2 LEVEL D PROTECTION 11
7.3 MODIFIED LEVEL C PROTECTION 11
7.4 LEVEL C PROTECTION 11
7.5 LEVEL A AND B PROTECTION 12

8.0 DECONTAMINATION 12

8.1 GENERAL 12

9.0 EMERGENCY ACTION PLAN 13
9.1 PERSONAL INJURY WITHIN THE EXCLUSION ZONE 13
9.2 PERSONAL INJURY WITHIN THE DECONTAMINATION ZONE 14
9.3 PERSONAL INJURY WITHIN THE SUPPORT ZONE 14
9.4 FIRE/EXPLOSION 15
9.5 PERSONAL PROTECTION EQUIPMENT FAILURE 15
9.6 EQUIPMENT FAILURE 16

10.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES 16
10.1 WORK PERMITS 16
10.2 GENERAL SITE RULES 16
10.3 ADDITIONAL STANDARD OPERATORING SAFETY PROCEDURES 18

EXPOSURE MONITORING PROGRAM 21
REAL-TIME MONITORING 21
ACTION LEVELS 21

FIGURES

Figure 1 Route to Local Hospital Map

LIST OF ATTACHMENTS

Attachment A Site Maps

Attachment B Exposure Monitoring Program for the Contaminants of Concern

Attachment C Material Safety Data Sheets

Attachment D Job Safety Analysis Sheets and Daily Site Safety Checklists

Attachment E Pre-entry Meeting Notes

Attachment F Sign-off Sheet

Attachment G Incident/Injury Case Management

Attachment H Site Specific Decontamination Plan

1.0 INTRODUCTION

1.1 APPROVALS

Prepared By: Mark Lancaster - LHSO (Employee - title) Date: 2-26-2014

Reviewed by: Michael DeGloria - PM (Employee - Project Manager) Date: _____

Approved By: Mark Lancaster - LHSO (Employee - Local Health and Safety Officer) Date: 2-26-2014

1.2 SITE BACKGROUND

Project Name: Hanger D - Fmr. Mobil Hanger

Site Address: Westchester County Airport, 240 Airport Road, White Plains, NY

Nearest Intersection: Airport Road & King Street

Township/Municipality: White Plains

County: Westchester

Additional Site Information: _____

1.3 SCOPE OF WORK

Task 1 - General Site Activities

Task 2 - Site Visit

Task 3 - O&M Activities

Task 4 - GW Sampling Activities

Task 5 - _____

Task 6 - _____

Task 7 - _____

Task 8 - _____

Task 9 - _____

Task 10 - _____

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Responsibility	Name	Task Description
Project Manager	Michael DeGloria	Oversee and coordinate all budget and technical aspects for the project
Local Health & Safety Officer	Mark Lancaster	Coordinate all health and safety operations for the project site
Site Supervisor	GES Personnel	Oversee and coordinate all health and safety aspects from the project site

3.0 OSHA TRAINING REQUIREMENTS

3.1 GENERAL TRAINING REQUIREMENTS

All personnel performing activities covered by this plan must be trained in accordance with the requirements of 29 CFR 1910.120(e). The Project Manager will verify and document that all GES personnel meet the applicable training requirements prior to the start of site work, including:

- OSHA 1910.120 initial 40-hour training
- OSHA annual eight-hour refresher training within the last year
- OSHA eight-hour supervisory training for on-site managers and supervisors and GES requirements
- At least one GES employee will have American Red Cross (or equivalent) first aid and CPR training, and will be present on-site at all times

Documentation for training certification will be maintained by the Local HSO.

Subcontractors chosen to perform well drilling, excavation, materials disposal, utility installation in trenches, and any other site activities where the potential exists for contact with contaminants must provide written documentation of HAZWOPER training, for each of his employees who will be involved in activities at this site, before the start of work.

3.2 PRE-ENTRY MEETING

A Pre-entry meeting reviewing the Site Specific Health and Safety Plan for all proposed work location personnel shall be held and documented in this HASP and in the site log.

This meeting shall be prior to the commencement of any on-site work activities. A site-specific briefing is provided to all site visitors who enter this site beyond the site entry point. For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

3.3 FIRST AID/CPR TRAINING

At least one member of the GES staff assigned to the project will have American Red Cross (or equivalent) First Aid and cardiopulmonary resuscitation (CPR) training. At least one trained individual will be present on-site at all times. The Local HSO will maintain all training documentation.

4.0 MEDICAL SURVEILLANCE REQUIREMENTS

4.1 GENERAL MEDICAL SURVEILLANCE REQUIREMENTS

All personnel performing activities requiring the use of an air-purifying respirator covered by this plan must be active participants in an ongoing medical monitoring program in accordance with the requirements of 29 CFR 1910.120(f). Subcontractors chosen to perform selected site activities must provide written documentation of such, for each employee who will be involved in activities at this site, before the start of work.

4.2 DRUG AND ALCOHOL COMPLIANCE

All personnel performing activities covered by this plan must have had a negative drug and alcohol screen performed within the last 12 months.

4.3 ACCIDENT / INCIDENT MEDICAL SURVEILLANCE

As a follow-up to a work-related injury, all employees are entitled and encouraged to seek medical attention. All accidents and potential exposures must be reported **immediately** to the Local HSO, who will coordinate with CHSSE to arrange for appropriate medical attention. Depending on the type of incident, it may be critical to perform tests within 24 to 48 hours. *Failure to report an injury or incident immediately will result in disciplinary action*. The *GES Incident/Injury Case Management Procedure* can be found in **Attachment G**.

Events surrounding near-miss accidents/injuries will be recorded in the daily log and documented in accordance with the GES Incident Reporting Procedures.

5.0 HAZARD ASSESSMENT

Job Safety Analyses (JSAs) are required for all appropriate site activities. Each JSA must identify and quantify the health and safety hazards associated with each task and site operation, and to evaluate risks to workers. Using this information, appropriate control methods are selected to mitigate or (preferably) eliminate the identified risks.

5.1 CHEMICAL HAZARDS

5.1.1 Contaminant Characterization and Potential Routes of Exposure

The main routes of exposure for field personnel include:

- Inhalation of contaminant vapors;
- Inhalation of contaminated particulate matter;
- Ingestion of contaminated material; or
- Dermal absorption of contaminated material.
- Injection of contaminated material

Site personnel can reduce their exposure potential by:

- Using the proper PPE;
- Practicing contamination avoidance;
- Following proper decontamination procedures; and
- Observing good personnel hygiene.

5.1.2 General Chemical Data

In order to protect site personnel from the hazards associated with site contaminants of concern found during projects at GES Sites, an Exposure Monitoring Program will be implemented to control potential chemical exposures. **Attachment B** contains this program along with data tables on the contaminants of concern. These tables provide information on each contaminant's characteristics, such as routes of exposure, health hazards, ionization potentials, exposure limits, etc. All hazardous chemicals brought on-site by GES personnel or its subcontractors will be managed in accordance with 29 CFR 1910.1200 and the GES Hazard Communication Program. This will include: proper labeling, an inventory list of all hazardous materials brought onsite, and a copy of each chemical's Material Safety Data Sheet (MSDS) will be maintained on-site. **Attachment C** contains MSDSs of hazardous substances generally used by GES personnel.

5.2 PHYSICAL HAZARDS

A variety of physical hazards may be present, but these hazards are similar to those associated with any field project.

5.2.1 Slips/Trips/Falls/Cuts

* Utilize proper housekeeping practices, such as removal of debris and tools from the work area to keep the area clear of trip hazards.
* Use caution tape or barricade fencing where warranted to keep unauthorized personnel from entering the work area.
* Replace manhole covers securely to prevent tripping and vehicle accidents.
* Use hose cutters when cutting piping.
* Walkways and work spaces will be kept clear of cords, hoses, pipes, etc. that cause trip hazards.
* If trip hazards cannot be removed from the work area, they shall be taped down and cones shall be placed to identify the hazard.

5.2.2 Excessive Noise

* Use hearing protection during loud mechanical operations such as drilling, Geoprobing and excavating operations, inside a remedial shed when equipment is operating loudly or in other high decibel situations in accordance with the *GES Hearing Protection Policy*.

5.2.3 Airborne Particulate (ears, eyes, nose, mouth, inhalation)

* Eye protection is to be worn at all times on site.
* Respiratory protection is to be worn when site activities cause excessive particulates, such as performing carbon change-outs.

5.2.4 On-site Traffic

* Safety vest shall be worn and safety cones placed around the worksite as specified in the GES *Traffic Control Procedures*.
* Use caution tape or barricade fencing where warranted to keep unauthorized personnel from entering the work area.

5.2.5 Ladder Safety

* Ladders must be inspected prior to use. Any damaged ladder will be discarded immediately.
* Painted ladders are forbidden.
* Never stand on the top step of the ladder.
* Extension ladders must extend 36" beyond work area.

* Pitch ladders at a 4:1 ratio.
* Extension and straight ladders must be tied off.
* Fall protection must be worn when working at heights six (6) feet or more above ground.

5.2.6 Air Compressor

* Eye protection is to be worn at all times on site.
* Hot steam will burn skin upon contact.
* Use proper pressure relief valves before performing O&M on an air compressor.

5.2.7 Electrical

* Inspect all electrical equipment and extension cords prior to use.
* All electrical circuits and equipment must be grounded in accordance with the NEC regulations.
* Spark producing equipment is not to be used in operating remedial system sheds.
* Lockout/Tagout procedures will be in effect if equipment is to be repaired. Refer to the GES *Lockout Tagout Procedures* for full details.
* Use three-pronged plugs and heavy-duty extension cords.
* A GFCI is required when using an extension cord.
* Workers must not have wet hands or be standing in water while plugging/unplugging energized equipment.
* **Plugs and receptacles will be kept out of water (unless they are approved for submersion).**

5.2.8 Power Tools

* Equipment will be inspected for defects prior to use.
* Eye protection is to be worn at all times on site.
* Employees using tools that may subject their hands to an injury, such as cuts, abrasions, punctures, or burns will wear protective gloves.
* Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools.
* A GFCI will be used with all power tool operations.
* Shielding or guarding will be in effect if applicable.

5.2.9 Back Strain

* Utilize proper lifting procedures when loading and unloading heavy equipment.
* Bend down at the knees rather than bending the back.
* Use a mechanical lifting device or a lifting aid such as hand carts, drum dollies or lift gates when lifting heavy objects.

5.2.10 Site Security

* Do not permit anyone who is not properly trained and outfitted with the appropriate PPE to enter the Exclusion or Contamination Reduction Zones (this includes GES personnel, clients, etc.)
* Use caution tape or barricade fencing where warranted to keep unauthorized personnel from entering the work area.
* On sites where it is believed that security is an issue, two employees will be used for all field work. The "buddy-system" will be in place and the two employees will be in constant communication and within each others line of sight. There will be a cellular phone available to call 911 if a violent condition presents itself.
* When acts of violence occur or when an employee(s) feels that they are being placed in a threatening position they must immediately leave the site.
* All potential acts of violence or threats by non-GES personnel must be immediately reported to the Site Operations Manager and the Local Health and Safety Officer. The situation will be discussed to determine future action on the site in question.
* If any GES employee notices suspicious persons or activities in a GES office or in the vicinity of a work area, he or she should immediately report the observation to his or her supervisor or Site Operations Manager.

5.2.11 Biological Hazards (insects, snakes, poisonous plants and animals)

* Do not touch or contact poisonous plants, such as poison ivy/poison oak.
* If available, apply an over-the-counter barrier cream, such as Ivy Block® to prevent contact with plant oils.
* Wash hands and arms immediately with soap and water if skin contacts the plants.
* Wear long pants with socks pulled over legs to prevent skin contact with plants and insects.
* Inspect yourself carefully for insects or ticks after being outdoors.
* Spray any wasp/hornet nests with an insect repellant from a safe distance recommended by the product's manufacturer.
* **Do not antagonize snakes or wild animals.**

5.2.12 Heat Stress

* Know and recognize the signs and symptoms of heat-related illnesses, as follows:
  Heat cramps
  Heat exhaustion:
    Cool, moist, pale, or flushed skin
    Headache
    Nausea

Dizziness, weakness and exhaustion

Heat stroke:

Red, hot, dry, skin
Changes in consciousness
Rapid, weak pulse
Rapid, shallow breathing

* Adjust work schedules to provide time intervals for intake of juices, juice products and water in an area free from contamination.

5.2.13 Cold Stress

* Know and recognize the signs and symptoms of cold-related illnesses, as follows:

Frostbite:

Lack of feeling in the affected area
Skin that appears waxy, is cold to the touch or is discolored (flushed, white, yellow or blue)

Hypothermia:

Shivering
Numbness
Glassy stare
Apathy
Loss of consciousness

* Have appropriate clothing available and dress in layers to protect against cold weather.
* Adjust work schedules to provide sufficient rest periods in a heated area for warming up during operations conducted in cold weather.

5.2.14 Confined Space (CS) Entry

* Confined Space Entry is prohibited unless authorized by the project manager or local health and safety officer.
* The *GES Confined Space Entry Requirements* must be followed, including but not limited to air monitoring, presence of attendant and permit completion.

5.2.15 Fall Hazards

* OSHA-approved man-lifts and ladders will be used for access to elevated locations.
* Employees must wear a safety belt with a lanyard attached to the boom or basket when working from a man-lift.
* If the elevated location is inaccessible by a man-lift, CHSSE shall be contacted to determine the appropriate fall protection.
* Complete details are found in the *GES Fall Protection* Program.

5.2.16 Hot Work

* A hot work permit will be completed prior to the start of the work.
* The Site Supervisor will conduct a safety briefing on hot work rules and procedures, and all hot work participants will sign the permit.
* Hot work will not be performed if there is a possibility of an explosive atmosphere or an oxygen-enriched atmosphere.
* The Site Supervisor will designate a person for fire watch duty, who will have access to a properly rated fire extinguisher and will remain on-duty for one-half hour after the hot work is complete.
* All hot work equipment will be inspected daily, prior to use. If the equipment is found to be defective, it will be removed from the site, or tagged with a "Do Not Use" sign until it is repaired.
* All welding and cutting personnel will be trained in the safe operation of their equipment.
* Refer to the GES *Hot Work Requirement Policy* for complete details.

5.3 RADIOLOGICAL HAZARDS

If site-specific potential radiological information becomes available, the hazards will be addressed in an addendum to the HASP. Ionizing Radiation action levels can be found in **Attachment B, Table 2.**

6.0 SITE CONTROL MEASURES

6.1 SITE ZONES

A controlled work area should be established in the immediate vicinity of the site activities covered by this plan. Only those persons who can comply with the requirements of this plan should be allowed into this area during any work activities, which may result in exposure to the hazards associated with the specific task being performed. The work site should be marked off with at least the following items from the GES Traffic Control Procedures: Four (4) traffic cones with flags reaching 70 inches in combined height, caution tape, two (2) work area signs or barricades at the site entrances and a flashing amber light on the company vehicle.

When activities involve invasive activities on sites in which the Project Manager, Local HSO or the CHS have determined the area to be highly-contaminated, a three-zone system will be used to control the potential spread of contamination.

These zones are characterized by the presence or absence of chemical and biological hazards and the activities contained within them.

Zone boundaries should be clearly marked at all times and the flow of personnel among the zones must be controlled. The site should be monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings must also be changed and workers immediately notified of the change.
For the purpose of this plan, the following definition of terms is provided:

Exclusion Zone - The immediate area of the work activity to be performed or an area fully enclosing the hazards present. Personnel and equipment will enter and exit the Exclusion Zone from the designated access points in the Contamination Reduction Zone (CRZ).

Contamination Reduction Zone - The transition area between the contaminated and uncontaminated area. Based on monitoring results, the CRZ boundaries may be adjusted to ensure that the Support Zone remains uncontaminated. Workers and equipment exit the Exclusion Zone through the designated access point(s) into the CRZ. Workers and equipment are then decontaminated in the CRZ, according to the procedures specified in the Decontamination section of this HASP. Workers and equipment then exit the CRZ into the Support Zone through the designated access points.

If necessary, emergency decontamination procedures are implemented. Emergency decontamination procedures are described in **Section 9.2** of this HASP and in **Attachment H** (if necessary).

Support Zone - The Support Zone is the clean area of the site, beyond the outer boundary of the CRZ. There should be no contamination in this zone. Administrative, clerical, and other support functions are based in the Support Zone.

Air and surface monitoring are conducted in the Support Zone as needed to ensure that it remains uncontaminated. If contamination is detected, zone boundaries are adjusted until corrective action is taken and monitoring results indicate that this zone is again uncontaminated.

6.2 COMMUNICATIONS

Emergency numbers are listed on the cover of this HASP. Work will not be conducted on-site without access to a telephone, site personnel will be informed of its location. If a telephone is not available on site, a cell phone will be made available for emergency use.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 GENERAL

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices, and PPE are used to protect employees.

The level of protection worn by site personnel will be enforced by the Site Supervisor. Levels of protection may be upgraded or downgraded at the discretion of the Local HSO, or CHS, based on real-time air monitoring data and prior site experience. Any changes in the level of protection will be documented. Levels of protection less than those designated in this HASP must first be approved by the Corporate HSSE Department.

7.2 LEVEL D PROTECTION

Level D PPE provides minimal protection against chemical hazards. A respirator is not required. Level D PPE includes:

- Cotton coveralls or long pants and a shirt with sleeves
- Reflective safety vest or hi-visibility shirt.
- Safety glasses
- Steel-toe/steel-shank work boots
- Work gloves
- Hearing protection (as required by task)
- Hard Hat (as required by task)
- Chemical resistant gloves (as required by task)

7.3 MODIFIED LEVEL C PROTECTION

Modified Level C PPE includes the items listed in Section 7.2 above, and the following items:

- Full-face APR or Half-face APR respirator equipped with the appropriate chemical cartridges

7.4 LEVEL C PROTECTION

Level C PPE provides a higher level of respiratory and skin protection against chemical hazards than Level D. Level C PPE includes the items listed in Section 7.2 above, and the following items:

- Poly-coated Tyvek (yellow) or Saranex® (shiny white)
- Steel-toe/steel-shank work boots and chemical resistant over-boots, or chemical resistant steel-toe/steel shank boots
- Chemical resistant inner gloves
- Chemical resistant outer gloves
- Seal arm, leg, and zipper joints with tape, as required
- Half-face or full-face, air-purifying respirator equipped with appropriate cartridges

7.5 LEVEL A AND B PROTECTION

Level A PPE should be worn when the highest level of respiratory and skin protection is needed, or if the contaminants of concern are unknown. Level B PPE should be worn when the highest level of respiratory protection is required, but a lesser level of skin protection is needed. The tasks covered under this HASP do not require the use of Level A or B PPE.

Separate Health and Safety Plans will be developed for Level A/Level B investigations and for Emergency Responses, which may involve the use of Level A and/or Level B health and safety measures.

8.0 DECONTAMINATION

8.1 GENERAL

At a minimum, the procedures outlined below shall be followed for decontamination:

- Remove gross contamination from tools, respirator, monitoring equipment, boots, etc., prior to leaving the "exclusion zone", using paper towels, handi-wipes, etc.
- Completely decontaminate soiled equipment in the Contamination Reduction Zone using detergent and water and dispose of all cleaning materials as follows.

    1. Due to the small quantity of waste generated during decontamination, it is allowable in most states to dispose of lightly contaminated materials in the site dumpster. It is important, however, to ensure that there is no chance of vapor generation or fluid leaking from the dumpster. At no time are materials containing free product to be disposed of in this manner. In this case, arrangements must be made for use of labeled drums and proper disposal.

2. All decontamination materials including protective sheeting, rags, sorbents, disposable personal protective equipment, and decontamination fluids should be carefully screened with a Photo-ionization Detector (PID) prior to disposal to determine relative levels of contamination.

3. Lightly contaminated decontamination fluids should either be treated via the site treatment system prior to discharge or disposed of via the sanitary sewer system. Highly contaminated decontamination fluids must be stored in labeled drums and proper disposal arrangements must be made.

Note: All Federal, State, County and/or City requirements regarding disposal must be complied with. Below - document specific requirements.

- Dispose of contaminated gloves, Tyvek suits, used cartridges, paper towels, etc., by placing in a plastic bag and discarding in accordance with applicable standards.
- Wash hands and face thoroughly with soap and water before lunch or coffee breaks, and as soon as practical after finishing work for the day.
- Particular care should be taken to protect any skin injuries. If open wounds exist on hands or forearms, handling chemicals should be restricted or eliminated.
- Shower as soon as possible.
- A site-specific decontamination plan (if required) is located in **Attachment H**.

9.0 EMERGENCY ACTION PLAN

9.1 PERSONAL INJURY WITHIN THE EXCLUSION ZONE

Site operations shall be temporarily halted and all site personnel shall assemble in the Contamination Reduction Zone. The Site Supervisor shall evaluate the nature of the injury and, if indicated by the hazards present on site, the injured person shall be decontaminated to the extent possible prior to movement to the Support Zone.

Contact shall be made for an ambulance and with the designated medical facility (if required). An individual certified in Standard First Aid and Adult CPR may choose to initiate the appropriate first aid. No persons shall reenter the Exclusion Zone until:

a. The conditions resulting in the emergency have been corrected;
b The hazards have been reassessed;
c The Site Safety Plan has been reviewed; and
d. Site personnel have been briefed on any changes in the Site Safety Plan.

9.2 PERSONAL INJURY WITHIN THE DECONTAMINATION ZONE

The Site Supervisor shall evaluate the nature of the injury and, if indicated by the hazards present on site, the injured person shall be decontaminated to the extent possible prior to movement to the Support Zone.

Contact shall be made for an ambulance and with the designated medical facility (if required). An individual certified in Standard First Aid and Adult CPR may choose to initiate the appropriate first aid.

If the injury increases risk to other site workers, all site personnel shall move to the Contamination Reduction Zone and site activities will stop until the risks can be assessed and either removed or minimized.

9.3 PERSONAL INJURY WITHIN THE SUPPORT ZONE

The Site Supervisor will assess the nature of the injury and determine if the cause of injury or loss of the injured person will affect continuation of site operations. If the injury will not affect the safety or performance of other site workers, operations may continue, with the person certified in first aid initiating the appropriate first aid and necessary follow up as stated above.

If the injury increases risk to other site workers, all site personnel shall move to the Contamination Reduction Zone and site activities will stop until the risks can be assessed and either removed or minimized.

9.4 FIRE/EXPLOSION

If a fire is observed in the incipient phase (i.e., when it begins) and if the site personnel witnessing the fire feel secure in attempting to control the fire, the individual can attempt to extinguish the fire by using the onsite fire extinguisher. The fire extinguisher should be a 10 or 20 pound (lb) dry chemical, Class A, B, and C extinguisher and is adequate for paper and wood based products (A), flammable and combustible liquids (B), and electrical (C) type fires.

If there is no fire extinguisher available or if site personnel do not feel secure in attempting to extinguish the fire, site personnel shall perform the following:

- Secure the site, if possible.
- Evacuate the area using the nearest safe pathway from the area.
- Proceed to the nearest phone and call 911 and provide the emergency operator all required information. This will activate the emergency response system.

If more than one individual is on the site team, the individual activating the evacuation plan shall verbally communicate to the other site personnel that there is an emergency condition and that they should evacuate from the work area. If contact cannot be made verbally with the other site personnel, any of the following systems can be used as long as the system is audible above background noise. The system can be the site vehicle horn, a whistle, an air horn, or other acceptable device. The system used for initiating an evacuation from the site shall be discussed during the tailgate meeting with the other site personnel prior to beginning the workday. The system that is decided upon shall be documented in the site logbook.

If an explosion or other unsafe condition occurs that the site supervisor had determined will place the other site personnel at risk, then the evacuation system described above should be activated immediately.

9.5 PERSONAL PROTECTIVE EQUIPMENT FAILURE

If any site worker experiences a failure or alteration of protective equipment that affects the protection factor that person and his/her buddy, if applicable,

shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

9.6 EQUIPMENT FAILURE

If any other equipment on site fails to operate properly, the Site Supervisor shall be notified and then determine the effect of this failure on continuing operations. If the failure will affect the safety of personnel, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions are taken.

10.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

10.1 WORK PERMITS

Work permits will be required for Confined Space Entry, and Hot Work. These permits must be obtained from the Local Health and Safety Officer prior to site work.

10.2 GENERAL SITE RULES

The following general site rules apply to all personnel while on the site:

- Before daily site operations begin, the daily site safety checklist will be completed, the subcontractor's training documentation will be reviewed (as required by section 3 of this plan), and a pre-entry briefing will be held to review the site's health and safety plan concerns and emergency procedures. This meeting will be registered in this Health and Safety Plan. Attendance will be documented.

- One site worker will be assigned to keep the daily log for all health and safety-specific site activities, unless otherwise specified.

- All personnel will wear steel-toe safety boots. Hard hats will be worn when working near heavy equipment (drill rigs, excavating equipment, etc.), when individuals are working overhead, when required in the Job Safety Analysis (JSA), or when required by the client.

- Eye protection and high visibility clothing/reflective safety vests will be

worn at all times while on site.

- Possession of alcohol or illegal substances on the job site or consumption during hours of site operations is strictly prohibited.

- Food and/or beverages are not permitted in the site's Exclusion or Contamination Reduction Zones. Food and/or beverages will be permitted in the Support Zone, if proper decontamination procedures are being followed.

- Smoking is not permitted on site. Chewing tobacco, snuff, application of cosmetics and/or lip balm is not permitted in the site's Exclusion or Contamination Reduction Zones.

- A change in level of protection will be based on air monitoring equipment readings taken in the breathing zone.

- Field personnel will use air monitoring equipment and not their nose to determine site contamination (i.e., sniffing sampled soils or water in jars, confined spaces, open bore holes or trenches, etc.). Odors detected during the course of standard operating procedures, however, should be noted in the daily log.

- Field personnel should not stand with their head directly over a well when it is being opened.

- First Aid Kit(s) and Fire Extinguisher(s) will be available in all company vehicles and/or within 50 feet of the working area.

Note: Hot work activities require that a person onsite shall act as a fire watch with a Class A, B, C dry chemical extinguisher within 10 feet of the activity, and all necessary work requirements are satisfied.

Any revisions to the final Site-Specific Health and Safety Plan must be reviewed by the Project/Case Manager and approved by the Local Health and Safety Officer or a Principal Hydrogeologist, at a minimum.

10.3 ADDITIONAL STANDARD OPERATING SAFETY PROCEDURES

See Attachments.

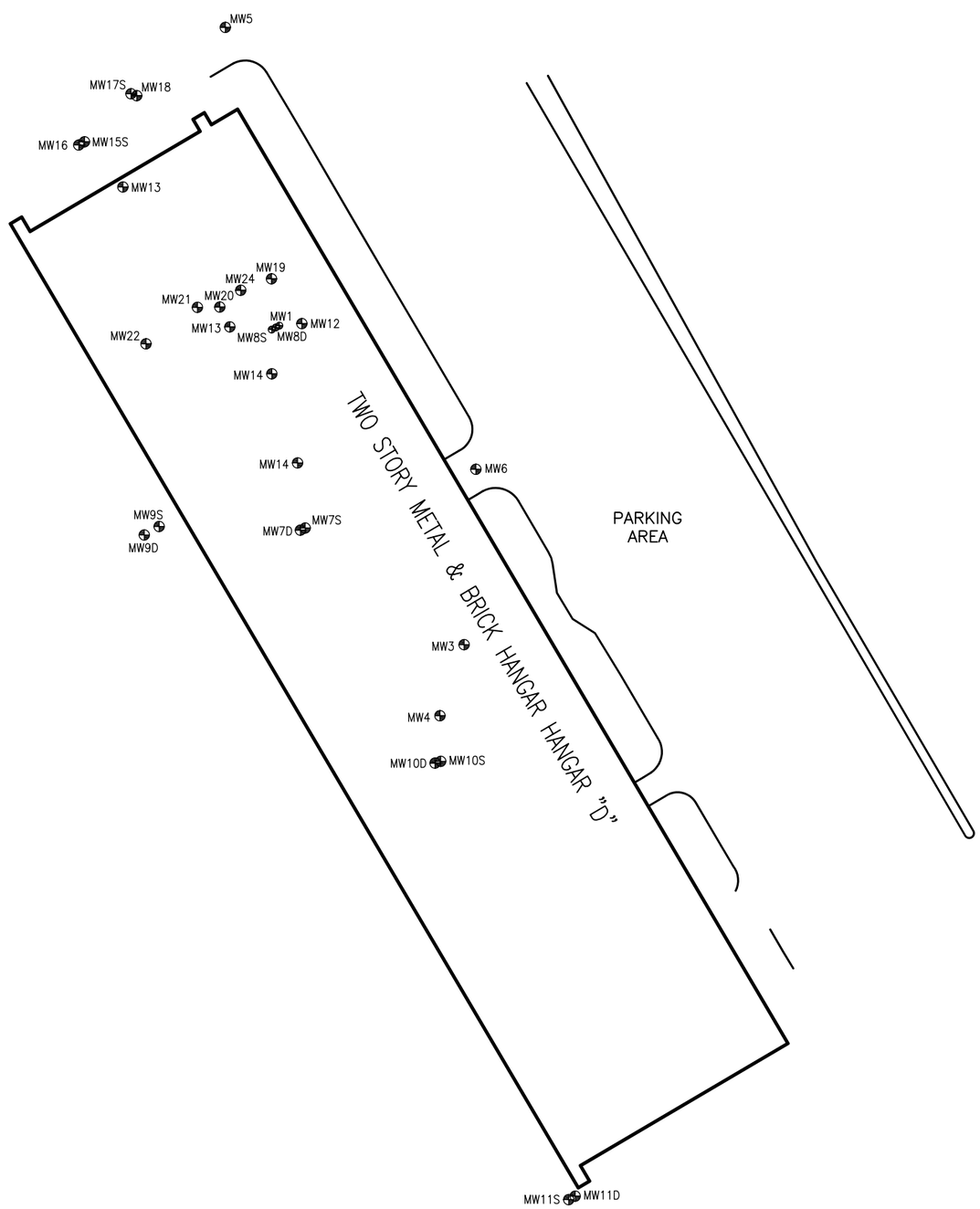
See JSA

ATTACHMENT A

SITE MAPS

ATTACHMENT B

EXPOSURE MONITORING PROGRAM
FOR THE CONTAMINANTS OF CONCERN



LEGEND

MONITORING WELL

DRAFTED BY: B.C.S. (N.J.)	SITE MAP
CHECKED BY:	WESTCHESTER AIRPORT HANGAR "D" 240 AIRPORT ROAD WHITE PLAINS, NEW YORK
REVIEWED BY:	
NORTH	Groundwater & Environmental Services, Inc. 70 JON BARRETT ROAD, SUITE B, PATTERSON, NY 12563
	SCALE IN FEET: 0 APPROXIMATE 100 / DATE: 6-26-12 / FIGURE:

M:\Graphics\1100-Patterson-LHV\Misc\Westchester County Airport\Westchester County Airport Hanger D\Westchester County Airport Hanger D SM.dwg, B-100, bsilvestri

EXPOSURE MONITORING PROGRAM

REAL-TIME MONITORING

Photo-ionization Detector (PID): Real-time monitoring for volatile organic compounds (VOCs) will be conducted using a photo-ionization detector (PID). The PID will be used to monitor employee breathing zones during all invasive activities. **Table 1** lists PID action levels and response requirements

Combustible Gas Indicator/Oxygen Level Meter: Real-time monitoring for combustible gases and oxygen levels will be conducted using a Combustible Gas Indicator (CGI)/Oxygen Level Meter. The CGI will test for the presence of combustible gases by continuously monitoring the lower explosive limit (LEL) of organic vapors. The CGI will be used to monitor the LEL prior to, and during, Confined Space (CS) entries and during work near an excavation in contaminated soil. The Oxygen Level Meter will detect an oxygen-deficient or oxygen-enriched atmosphere, and will be used prior to, and during, all CS entry activities. If ionizing radiation is suspected at a site, a Geiger counter will be used to measure exposure under guidance of a Health Physicist. **Table 2** lists CGI, Oxygen Level Meter, and ionizing radiation action levels and response requirements.

Depending on the Contaminants of Concern, other forms of real-time monitoring equipment may be required to quantify chemical hazards and protect workers from exposure. These may include, but are not limited to bio-aerosol monitors, detector tubes, dust monitors, etc.

- Calibration of Real-Time Monitoring Equipment: Monitoring and calibration protocols will be performed in accordance with the manufacturer's guidelines. Calibration will be performed, at a minimum, prior to each day's use.

- Calibration logs will be maintained by the Local HSO.

ACTION LEVELS

Tables 1 and 2 list the action levels and response requirements for a PID and CGI/Oxygen Level Meter. Changing levels of protection, upgrading respiratory protection, or changing work practices is based on maintaining the upper limit of the action level for approximately 10 minutes sustained in the breathing zone (i.e., a non-transient reading) or at the discretion of the Site Supervisor. If changes in protection levels are required, the Site Supervisor will first notify the Local HSO or the CHS to determine if administrative or engineering controls can be implemented to mitigate or eliminate the hazard.

Table 1 provides action levels that must be complied with when petroleum products such as gasoline are the known site contaminants. If the site contains other potential site contaminants, appropriate action levels must be determined based on established chemical exposure limits and monitoring instrument response factors.

TABLE 1 OVM ACTION LEVELS	
Meter Response (Breathing Zone)	**Action Required**
PID response <5 units above background	No respiratory protection required (i.e., Level D)
PID response >5 units above background (Bkgd) and < 50 units above Bkgd.	Stop work. Investigate the cause of elevated VOC measurements. Contact the Project Manager or office and determine if administrative or engineering controls can be implemented to mitigate or eliminate the elevated readings. If not medically qualified to wear respiratory protection, leave work zone. If the elevated readings cannot be reduced below 5 units above background or eliminated, and if medically qualified, fit tested and trained to wear respiratory protection, then upgrade to Modified Level C, half-face respiratory protection.
PID response >50 units and < 250 units above Bkgd.	Stop work. Investigate the cause of elevated VOC measurements. Contact the Project Manager or office and determine if administrative or engineering controls can be implemented to mitigate or eliminate the elevated readings. If not medically qualified to wear respiratory protection, leave work zone. If the elevated readings cannot be reduced below 5 units above background or eliminated, and if medically qualified, fit tested and trained to wear respiratory protection, then upgrade to Modified Level C, full-face respiratory protection.
PID response > 250 above Bkgd.	Retreat from site*

*Note 1: If a retreat becomes necessary, the Local HSO, CHSSE or Regional Engineering will be consulted in regard to adding mechanical ventilation or possible changes in work practices. Work will not resume until appropriate corrective measures are implemented.

*Note 2: Because direct reading instruments cannot indicate or are not compound specific, concentrations shown on the instruments shall be related to units above background and not parts per million (ppm).

TABLE 2 CGI/O2/RADIATION LEVEL ACTION LEVELS	
Meter Response	Action
CGI response < 10 % LEL	Continue normal operations.
CGI response > 10 % and <20 % LEL	Eliminate all sources of ignition from the work area; implement continuous monitoring. However if work is being done in a confined space, retreat from work area.*
CGI response > 20 % LEL	Discontinue operations; allow to vent; retreat from work area.*
Oxygen level < 19.5%	Retreat from work area.*
Oxygen level > 23.5%	Retreat from work area.*
3X background to <2 mR/hr	Radiation above background levels (normally 0.01-0.02 mR/hr) signifies possible source(s) radiation present. Continue investigation with caution. Perform thorough monitoring. **Consult with a health physicist**.
>2mR/hr	Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of a health physicist

*Note 1: If a retreat becomes necessary, the Local HSO, CHSSE or Regional Engineering will be consulted in regard to adding mechanical ventilation or possible changes in work practices. Work will not resume until appropriate corrective measures are implemented.

TABLE 3 RETAIL PETROLEUM MATERIALS OF CONCERN					
Contaminant	**OSHA TWA (ppm)**	**ACGIH TLV (ppm)**	**Hazards**	**Entry Routes**	**IP**
Benzene	1	10	1,2,4,5,6,9	Inh, Abs, Ing, Con	9.24
Xylene	100	100	1,2,3,4,5,6,7,10	Inh, Abs, Ing, Con	8.56
Ethylbenzene	100	100	1,2,3,10	Inh, Ing, Con	8.76
Toluene	200	50	1,2,3,4,5,7,10	Inh, Abs, Ing, Con	8.82

TWA = Time Weighted Average in parts per million (ppm)
C = Ceiling
IP = Ionization Potential

1 = irritant to skin
2 = irritant to eyes
3 = irritant to respiratory system
4 = may cause headache
5 = may cause dizziness, lightheadedness
6 = may cause nausea and vomiting
7 = may cause liver and kidney damage
8 = irritant to GI tract
9 = carcinogen/possible carcinogen
10 = may cause damage to CNS

TABLE 4 *INORGANIC GASES AND VAPORS OF CONCERN					
Contaminant	**OSHA TWA (ppm)**	**ACGIH TLV (ppm)**	**Hazards**	**Entry Routes**	**IP**

TWA = Time Weighted Average in parts per million (ppm)
C = Ceiling
IP = Ionization Potential

1 = irritant to skin
2 = irritant to eyes
3 = irritant to respiratory system
4 = may cause headache
5 = may cause dizziness, lightheadedness
6 = may cause nausea and vomiting
7 = may cause liver and kidney damage
8 = irritant to GI tract
9 = carcinogen/possible carcinogen
10 = may cause damage to CNS

*Notes: Consult standard reference manuals for air concentration/toxicity data. Action level depends on PEL/REL/TLV.
These Action Levels, if not defined by regulation, is some percent (usually 50%) of the applicable PEL/REL/TLV. That number must also be adjusted to account for instrument response factors.

ATTACHMENT C

SITE MATERIAL SAFETY DATA SHEETS (MSDS)

Please See JSA Binder for All Common MSDSs

ATTACHMENT D

JOB SAFETY ANALYSIS SHEETS AND DAILY SITE SAFETY CHECKLISTS

Please see JSA Binder for JSAs

GES DAILY SITE SAFETY CHECKLIST

Site Name: _____
Address: _____
_____
_____

Individual's Name: _____ Date: _____

Task and date of entry: _____ _____
_____ _____
_____ _____
_____ _____
_____

This checklist is to be completed on a daily basis. The date should be noted in the space provided. The employee completing the checklist should verify that each item is correct and initial in the last space provided.

Date:

1. Proper training certificates have been obtained from all onsite personnel.
2. The site-specific HASP has been reviewed and signed by GES employees and GES-hired subcontractors.
3. The daily site-safety meeting has been conducted.
4. Applicable JSAs are onsite, reviewed by staff to ensure all tasks/jobs are covered, and site specific JSA modifications occur when needed.
5. Fire extinguishers are available for use and are fully charged.
6. A fully-stocked first aid kit & eye wash bottle is readily available.
7. Any potential tripping hazards have been removed from site.
8. All vessels containing flammable or corrosive material are properly labeled.
9. Proper personal protective equipment is being used for present conditions.
10. Equipment onsite is checked and in safe working order.
11. Safety cones and flags or barricades have been utilized to mark out work area along with all required signage (No Smoking, No Trespassing, Work Area...).
12. No person onsite has the appearance of being under the influence of motor skill altering substances.
13. All workers onsite are clothed in an appropriate manner (highly visible clothing, no tank tops, muscle shirts or shorts).
14. Electrical power-operated tools shall be properly grounded and used with a Ground-Fault Circuit Interrupter (GFCI).
15. All required permits (GES and/or client) are completed by an authorized individual.
16. When working alone, has a phone call been placed to the PM to discuss site conditions, review the Scope of Work, LPS requirements, and coordinate communications for the day? Note: The frequency/ amount of additional calls from the field should be established during the PM's discussion with the individual. A call must always occur prior to leaving the site.
17. Prior to leaving the site for the day, the GES site supervisor has conducted a meeting with onsite staff to review worker conditions (possible injuries), JSA revisions, discuss possible Near Losses/ Losses, and activities scheduled for the next day.
18. All health and safety concerns have been communicated to the Local Health and Safety Officer and Project Manager

I verify and initial that the above information is correct by initialing in the boxes to the right:

GES DAILY SITE SAFETY CHECKLIST

Site Name: _____
Address: _____
_____
_____

Individual's Name: _____ Date: _____

Task and date of entry: _____ _____
_____ _____
_____ _____
_____ _____
_____

This checklist is to be completed on a daily basis. The date should be noted in the space provided. The employee completing the checklist should verify that each item is correct and initial in the last space provided.

Date:

1. Proper training certificates have been obtained from all onsite personnel.
2. The site-specific HASP has been reviewed and signed by GES employees and GES-hired subcontractors.
3. The daily site-safety meeting has been conducted.
4. Applicable JSAs are onsite, reviewed by staff to ensure all tasks/jobs are covered, and site specific JSA modifications occur when needed.
5. Fire extinguishers are available for use and are fully charged.
6. A fully-stocked first aid kit & eye wash bottle is readily available.
7. Any potential tripping hazards have been removed from site.
8. All vessels containing flammable or corrosive material are properly labeled.
9. Proper personal protective equipment is being used for present conditions.
10. Equipment onsite is checked and in safe working order.
11. Safety cones and flags or barricades have been utilized to mark out work area along with all required signage (No Smoking, No Trespassing, Work Area...).
12. No person onsite has the appearance of being under the influence of motor skill altering substances.
13. All workers onsite are clothed in an appropriate manner (highly visible clothing, no tank tops, muscle shirts or shorts).
14. Electrical power-operated tools shall be properly grounded and used with a Ground-Fault Circuit Interrupter (GFCI).
15. All required permits (GES and/or client) are completed by an authorized individual.
16. When working alone, has a phone call been placed to the PM to discuss site conditions, review the Scope of Work, LPS requirements, and coordinate communications for the day? Note: The frequency/ amount of additional calls from the field should be established during the PM's discussion with the individual. A call must always occur prior to leaving the site.
17. Prior to leaving the site for the day, the GES site supervisor has conducted a meeting with onsite staff to review worker conditions (possible injuries), JSA revisions, discuss possible Near Losses/ Losses, and activities scheduled for the next day.
18. All health and safety concerns have been communicated to the Local Health and Safety Officer and Project Manager

I verify and initial that the above information is correct by initialing in the boxes to the right:

ATTACHMENT E

PRE-ENTRY MEETING NOTES

PRE-ENTRY MEETING NOTES/ATTENDANCE (Include date, length of meeting, names of personnel in attendance, topics of discussion, comments and concerns, etc.)

PRE-ENTRY MEETING NOTES/ATTENDANCE (Include date, length of meeting, names of personnel in attendance, topics of discussion, comments and concerns, etc.)

ATTACHMENT F

SIGN OFF SHEET

SITE SAFETY AND HEALTH PLAN COMPLIANCE AGREEMENT

All project personnel, including visitors, must follow the requirements of this Site Safety Plan. In order to document individual agreement with this requirement, all personnel must complete this "Site Safety and Health Plan Compliance Agreement." These agreements will be kept in this Site Safety Plan and will become part of the permanent project record upon completion of site activities.

By signing below, I have read the Site Health and Safety Plan (HASP), or I have been verbally advised of its contents. I understand, and I agree to comply with all of its provisions. I understand that I could be prohibited from working on the project, and I may be subject to disciplinary actions for violating any of the health and safety requirements specified in the HASP.

NAME	SIGNATURE	DATE	(TIME IN/OUT)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			

SITE SAFETY AND HEALTH PLAN COMPLIANCE AGREEMENT

All project personnel, including visitors, must follow the requirements of this Site Safety Plan. In order to document individual agreement with this requirement, all personnel must complete this "Site Safety and Health Plan Compliance Agreement." These agreements will be kept in this Site Safety Plan and will become part of the permanent project record upon completion of site activities.

By signing below, I have read the Site Health and Safety Plan (HASP), or I have been verbally advised of its contents. I understand, and I agree to comply with all of its provisions. I understand that I could be prohibited from working on the project, and I may be subject to disciplinary actions for violating any of the health and safety requirements specified in the HASP.

NAME	SIGNATURE	DATE	(TIME IN/OUT)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			

ATTACHMENT G

INCIDENT/INJURY CASE MANAGEMENT

GES Project Injury Case Management Approach

1. **If an injury occurs onsite to a GES or subcontractor employee, the injury must be immediately reported to the GES oversight person.**
2. **GES oversight person or another individual who is certified in CPR/FA will evaluate the injured person's (IPs) condition**

3. DOES THE INJURY REQUIRE EMERGENCY CARE?

Yes

1. *Call 911*

2. Provide emergency care/support until Emergency Management Services (EMS) arrives.

3. Following 911 call, notify:

a) Project Manager/LHSO - names (Office: phone number ; Cell Phone: (phone number) and/or (name or number of Site Operations Manager) & if subcontractor notify subcontractor manager (as applicable)

b) Project Manager or Ops Manager to notify Tom Baylis (Corporate HSSE) - Cell phone: 610-587-1124

c) Tom Baylis notifies client Program Manager - Cell Phone: (phone number)

d) Program Manager or office Project Manager will notify client, if required.

4. Project staff or management accompany IP to emergency room

5. Ensure that the individual receives the necessary support and immediate care

6. CHSSE will notify Workcare, Inc. regarding IPs condition and to obtain injury case management support.

7. Begin incident investigation per LPS guidance

8. GES PM will initiate and complete any client required form

No

Can the injury be treated with *only* basic first aid?

Yes - Provide Basic First Aid

Provide Notification according to items outlined in Item# 3 a, b, c, and d, and follow up Incident Investigation process per LPS Guidance

Can the injury be treated with *only* basic first aid?

No - Provide Basic First Aid, Support and THEN...

1) Provide Notification according to items outlined in Item# 3 a, b, c, and d, and follow up Incident Investigation process per LPS Guidance

2) GES PM with CHSSE support will schedule appointment at GES contracted Occupational Clinic (or for subcontractor injury, a subcontractor chosen Occupational clinic).

3) Corporate HSSE will notify Workcare, regarding IPs condition and obtain injury case management support and to facilitate the appropriate/suitable treatment and care.

4) IP will be accompanied to the Occupational Clinic by LHSO or other appropriate management staff and the required treatment provided.

ALL accidents, injuries, property damages, or releases (Loss or Near Loss) shall be reported to GES' on-site supervisor *ASAP but no later than the end of the shift.*

Injury Case Management is a collaborative process which:

- Helps ensure prompt, adequate, and appropriate medical care is provided
- Assesses, plans, implements, coordinates, monitors, and evaluates options
- Can minimize the impact of an impairment (resulting from potentially work-related injury or illness)
- Preserves as much as practicable the individual's functional capacity.

Medical injuries or emergencies within each field location will be managed by the following method:

- If an injury or medical condition occurs that cannot be treated by providing basic first aid to the individual, the GES PM and Site Operations Manager are notified by the GES Oversight person.
- Onsite, individuals who are certified in cardiopulmonary resuscitation (CPR)/First Aid will be requested to respond to the individual's location.
- Following this evaluation the GES VP, HSSE and client program manager, must be contacted regarding the individual's condition and injury management approach onsite and offsite.

Following an assessment of the individual's condition, if responding GES personnel feel that outside medical response personnel (emergency care) are necessary:

- The 911 emergency response system will be activated, if necessary.
- Provide the 911 emergency operator all of the information that is requested.
- The injured individual (GES or subcontractor employee) will be accompanied by other GES staff (i.e., PM, LHSO, Site Supervisor) so that desired injury management information will be communicated to the attending physician.

If an individual requires medical treatment *beyond basic first aid*, but the initial assessment determines that the individual does not require emergency care, then:

- The PM, Site Operations Manager, and CHSSE will be contacted PRIOR to leaving the site.
- The individual will be scheduled for an appointment at the occupational clinic near each office.
- If the injured individual is a subcontractor, then the individual will be directed to visit an occupational clinic established by the subcontracting company.
- If there is no clinic established, the individual will be scheduled at a GES clinic.

The individual will be accompanied to their examination by the GES LHSO or other GES or subcontractor management staff. Desired injury management information will be communicated to the attending physician that will include but not be limited to:

- Any required or alternative medication (over the counter medication)
- Any workplace restrictions versus lost time are discussed with the attending physician.
- The GES VP, HSSE will also contact the attending physician regarding the examination, diagnosis and the GES injury management approach.

ATTACHMENT H

SITE-SPECIFIC DECONTAMINATION PLAN

DECONTAMINATION PLAN

1. Personnel Decontamination

   Section 7 lists the specific levels of protection required. Consistent with the levels of protection required, step by step procedures for personnel decontamination for each Level of Protection are attached.

2. Levels of Protection Required for Decontamination Personnel

   The levels of protection required for personnel assisting with decontamination will be:
   ☐ Level B ☐ Level C ☐ Level D

   Modifications include:

3. Disposition of Decontamination Wastes

   (Provide a description of daily, weekly, and end of project waste disposition including identification of storage area, hauler, and final disposal site if applicable.)

4. Equipment Decontamination

   A procedure for decontamination steps required for non-sampling equipment and heavy machinery follows:

5. Sampling Equipment Decontamination

   Sampling equipment will be decontaminated in accordance with the following procedure:

LEVEL C DECONTAMINATION PROCEDURES (if required)

[Check indicated Functions or add steps as necessary]:

STEP	FUNCTION	DESCRIPTION OF PROCESS, SOLUTION AND CONTAINER
☐	Segregated equipment drop	_____
☐	Boot cover and glove wash	_____
☐	Boot cover and glove rinse	_____
☐	Tape removal - outer glove/boot	_____
☐	Boot cover removal	_____
☐	Outer glove removal	_____

----------HOT-LINE----------

☐	Suit/safety boot wash	_____
☐	Suit/boot/glove rinse	_____
☐	Safety boot removal	_____
☐	Suit Removal	_____
☐	Inner glove wash	_____
☐	Inner glove rinse	_____
☐	Face piece removal	_____
☐	Inner glove removal	_____
☐	Inner clothing removal	_____

----------CRC/SAFE ZONE BOUNDARY----------

☐	Field wash	_____
☐	Redress	_____

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

APPENDIX E – MONITORING WELL BORING AND CONSTRUCTION LOGS

Injection Well Log

Groundwater & Environmental Services, Inc.

ID NO. **IP-1**

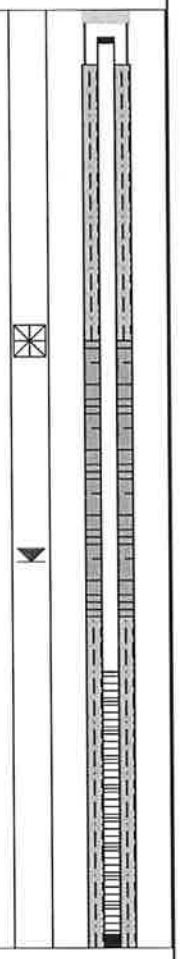
Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #:
Address: **184 Airport Rd, White Plains, NY**	GES Job #: **1101379**	Regulatory Case Mgr: **M. Tipple**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **John Simms**	Date Drilled: **November 22, 2008**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **Zebra**	Completion Date: **November 22, 2008**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **Charlie**	Drilling Method: **HSA**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **GeoProbe 6620DT**	Sampling Method: **Macro Core**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **6 fbg**
Surface Elevation: **NA**	Borehole Diameter: **7 in.**	Type of Seal: **Cetco Granular**
Total Depth: **17 fbg**	Well Diameter: **2 in.**	Top of Sand: **11 fbg**
Refusal Depth: **NA**	Riser Length: **11 ft**	Sand Type: **#2**
Initial Depth to Water: **10 fbg**	Screen Slot Size: **10**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **5 ft**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm)	Blow Counts	SAMPLE LITHOLOGY	Comments
0	0-2 fbg	24 in.	0.0 ppm		SM: Light brown, moist, fine to medium SAND with little silt and trace gravel.	Hand-cleared boring to 4.3 fbg.
	2-4 fbg	24 in.	0.0 ppm		SM: Yellow-orange, moist, fine to medium SAND with some silt and trace gravel.	
5	4-6 fbg	24 in.	0.4 ppm		SM: Olive-grey, moist, fine to medium SAND with some silt and trace gravel.	
	6-8 fbg	24 in.	0.6 ppm		SM: Olive-grey, moist, fine to medium SAND with some silt and trace gravel and clay.	
	8-10 fbg	24 in.	0.3 ppm		SM: Wet, fine SAND and silt with trace clay and gravel.	
10	10-12 fbg	24 in.	0.3 ppm		SM: Olive-grey, saturated, fine to medium SAND and silt with trace clay and gravel.	
	12-14 fbg	24 in.	0.6 ppm		SM: Olive-grey, saturated, fine SAND and silt with trace clay and gravel.	
15					No recovery.	
					End of Boring.	

Well Completion Detail



Proportions Used:

Trace =	< 10%
Little =	< 30%
Some =	< 50%
and =	@ 50%

Notes:

NA = not available; fbg. = feet below grade

in. = inches; ft.= feet; ppm.= parts per million

Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

0 - 4 = Very Loose
5 - 9 = Loose
10 - 29 = Medium Dense
30 - 49 = Dense
50 + = Very Dense

Symbols:

Apparent Water Level

Lab Sample Location

Injection Well Log

Groundwater & Environmental Services, Inc.

ID NO. **IP-2**

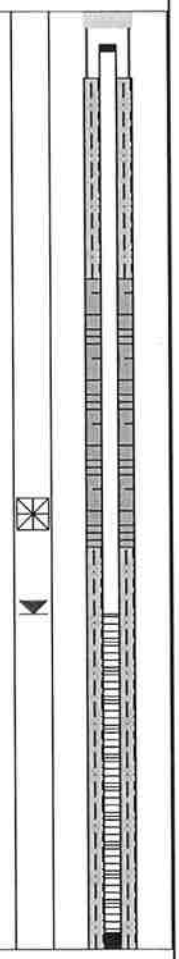
Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #:
Address: **184 Airport Rd, White Plains, NY**	GES Job #: **1101379**	Regulatory Case Mgr: **M. Tipple**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **John Simms**	Date Drilled: **November 22, 2008**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **Zebra**	Completion Date: **November 22, 2008**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **Charlie**	Drilling Method: **HSA**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **GeoProbe 6620DT**	Sampling Method: **Macro Core**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **4 fbg**
Surface Elevation: **NA**	Borehole Diameter: **7 in.**	Type of Seal: **Cetco Granular**
Total Depth: **14 fbg**	Well Diameter: **2 in.**	Top of Sand: **8 fbg**
Refusal Depth: **NA**	Riser Length: **8.5 ft**	Sand Type: **#2**
Initial Depth to Water: **9 fbg**	Screen Slot Size: **10**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **5 ft**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm)	Blow Counts	SAMPLE LITHOLOGY	Comments
0	0-5 fbg	NA	NA		No recovery.	Hand-cleared boring to 3.3 fbg.
5	5-7 fbg	24 in.	0.0 ppm		SM: Olive-grey, moist, fine SAND with some silt and trace gravel and clay.	
	7-9 fbg	24 in.	0.3 ppm		SM: Olive-grey, wet, fine SAND and silt with trace gravel and clay.	
10	9-11 fbg	24 in.	0.3 ppm		SM: Olive-grey, saturated, fine SAND and silt with trace gravel and clay.	
	11-13 fbg	24 in.	0.4 ppm		SM: Olive-grey, saturated, fine SAND and silt with trace clay.	
					No recovery.	
					End of Boring.	

Well Completion Detail



Proportions Used:

Trace = < 10%
Little = < 30%
Some = < 50%
and = @ 50%

Notes:

NA = not available; fbg = feet below grade
in. = inches; ft. = feet; ppm = parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

0 - 4 = Very Loose
5 - 9 = Loose
10 - 29 = Medium Dense
30 - 49 = Dense
50 + = Very Dense

Symbols:

Apparent Water Level
Lab Sample Location

MALCOLM PIRNIE

BORING MW-1

PROJECT: Former Mobil Oil

PROJECT NO: 1030065

DATE: 10/8/96

LOCATION: Westchester Cty. Airport

ELEVATION:

DATUM:

SAMPLE no.	depth	recovery	blows per 6"	DEPTH	STRATA	SAMPLE DESCRIPTION	WELL CONST.	REMARKS
S-1	0-2	10%	11 / 50/0"			(cement 0-6")		
S-2	2-4	40%	15 / 35 / 50/0"		SP	Cf lt. brn SAND, tr. gravel, boulder @ 1.5', rock flour (schist)		
S-3	4-6	60%	11 / 14 / 9 / 7	5				
S-4	6-8	60%	5 / 3 / 3 / 6					
S-5	8-10	40%	7 / 5 / 4 / 3	10	SM	f grn/gry SAND, some silt, tr. clay, tr. f. gravel		▽ @ 10'
S-6	10-12	80%	6 / 4 / 3 / 2					
S-7	12-14	60%	5 / 6 / 5 / 4					
				15		Rock @ 14' EOB @ 14'		
				20				
				25				
				30				
				35				
				40				

NOTES: Sample S-7 selected for geotech. analysis

SHEET 1 OF 1

ADVANCED DRILLING, INC.	PROJECT: Westchester County Airport	CLIENT: Malcolm Pirnie, Inc.	PROJECT NO.: ADV-327	HOLE NUMBER: MW-1

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Westchester Airport	Westchester	New York		-

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPTH
10-8-96	10-8-96	Scott Alberalla	J 1320	8.25	14 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
		Hollow Stem Augers	Split Spoon	10 Feet

PROTECTIVE CASING	NOTES
FLUSH	

Soil Boring Cross-Reference *MW-1*

Town and City _____

County and State *Westchester, New York*

Installation Date (s) *10-8-96*

Drilling Method *Hollow Stem Augers*

Driller *Scott Alberalla*

Drilling Fluid *None*

Static water level after drilling *ft.*

Well developed for _____ hours at _____ gpm

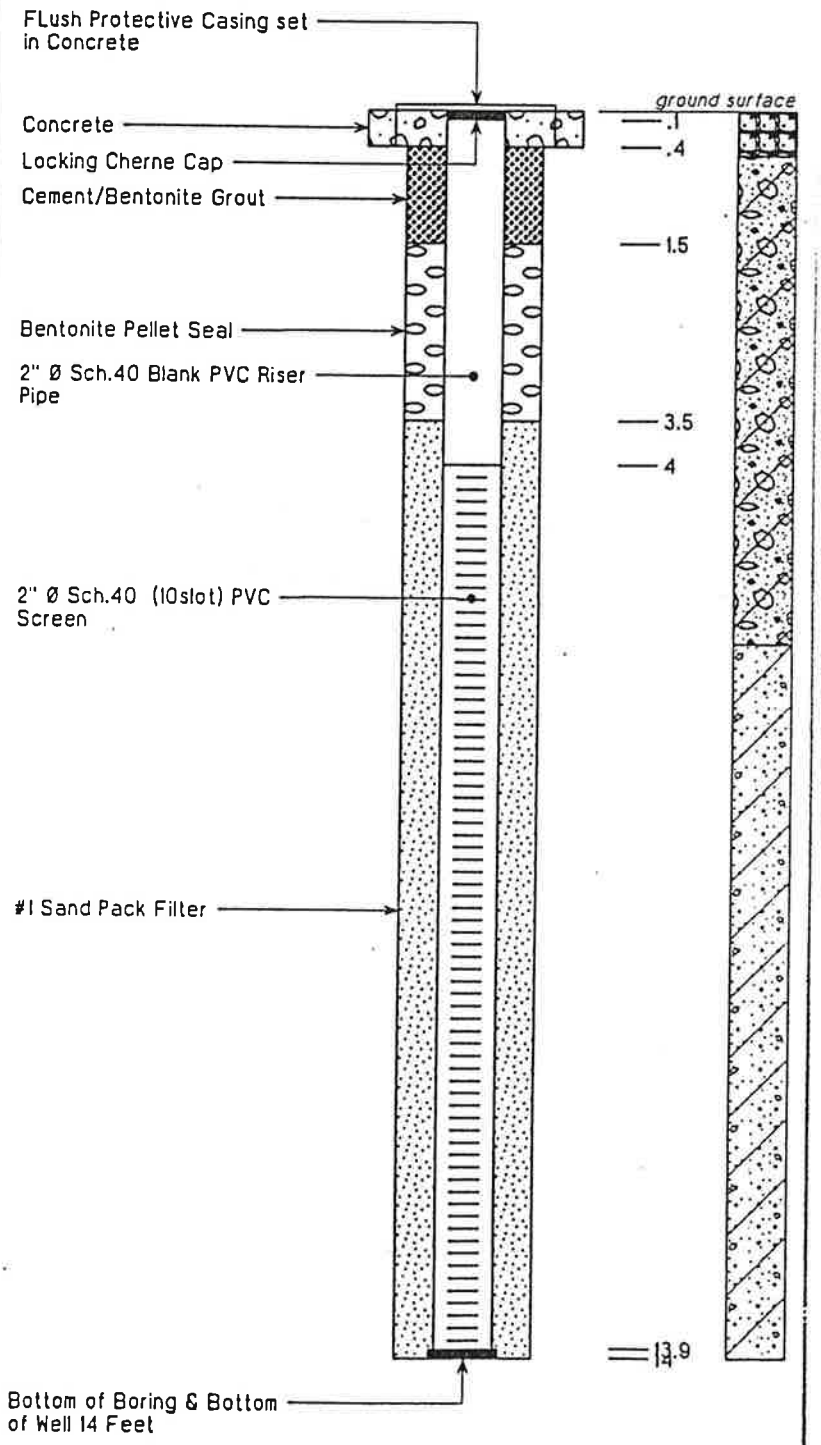
Method of development _____

Well Purpose *Monitoring*

Remarks _____

Prepared By *Scott*

Date Prepared *10/14/96*



MALCOLM PIRNIE

BORING MW-2

PROJECT: Former Mobil Oil

PROJECT NO: 10300165

DATE: 10/8/96

LOCATION: Westchester Cty. Airport

ELEVATION:

DATUM:

SAMPLE no.	depth	recovery	blows per 6"	DEPTH	STRATA	SAMPLE DESCRIPTION	WELL CONST.	REMARKS
S-1	0-2	30%	X 6 / 7 6			(cement 0-6")		
S-2	2-4	10%	7 7 / 4 4			cf brn SAND, tr. silt, tr. f gravel, tr. mica fragments		
S-3	4-6	30%	3 1 / 2 2	5	SP			
S-4	6-8	60%	4 6 / 8 13					
S-5	8-10	50%	5 6 / 4 3	10		mf grn/gry SAND, some silt, tr. clay		▽ @ 10'
S-6	10-12	50%	4 3 / 3 2		SM			
S-7	12-14	40%	1 2 / 1 1					
S-8	14-16	100%	4 2 / 1 3	15				
S-9	16-18	0%	50/0"			Rock @ 16' EOB @ 16'		
				20				
				25				
				30				
				35				
				40				

NOTES: Sample S-4 selected for VOC Analysis. Sample S-8 selected for geotech analysis

ADVANCED DRILLING, INC.	PROJECT: Westchester County Airport	CLIENT: Malcolm Pirnie, Inc.	PROJECT NO.: ADV-327	HOLE NUMBER: MW-2

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Westchester Airport	Westchester	New York		-

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPTH
10-8-96	10-8-96	Scott Alberalla	J 1320	8.25	16 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
		Hollow Stem Augers	Split Spoon	10 Feet

PROTECTIVE CASING	NOTES
FLUSH	

Soil Boring Cross-Reference *MW-2*

Town and City _____

County and State *Westchester, New York*

Installation Date (s) *10-8-96*

Drilling Method *Hollow Stem Augers*

Driller *Scott Alberalla*

Drilling Fluid *None*

Static water level after drilling *ft.*

Well developed for _____ hours at _____ gpm

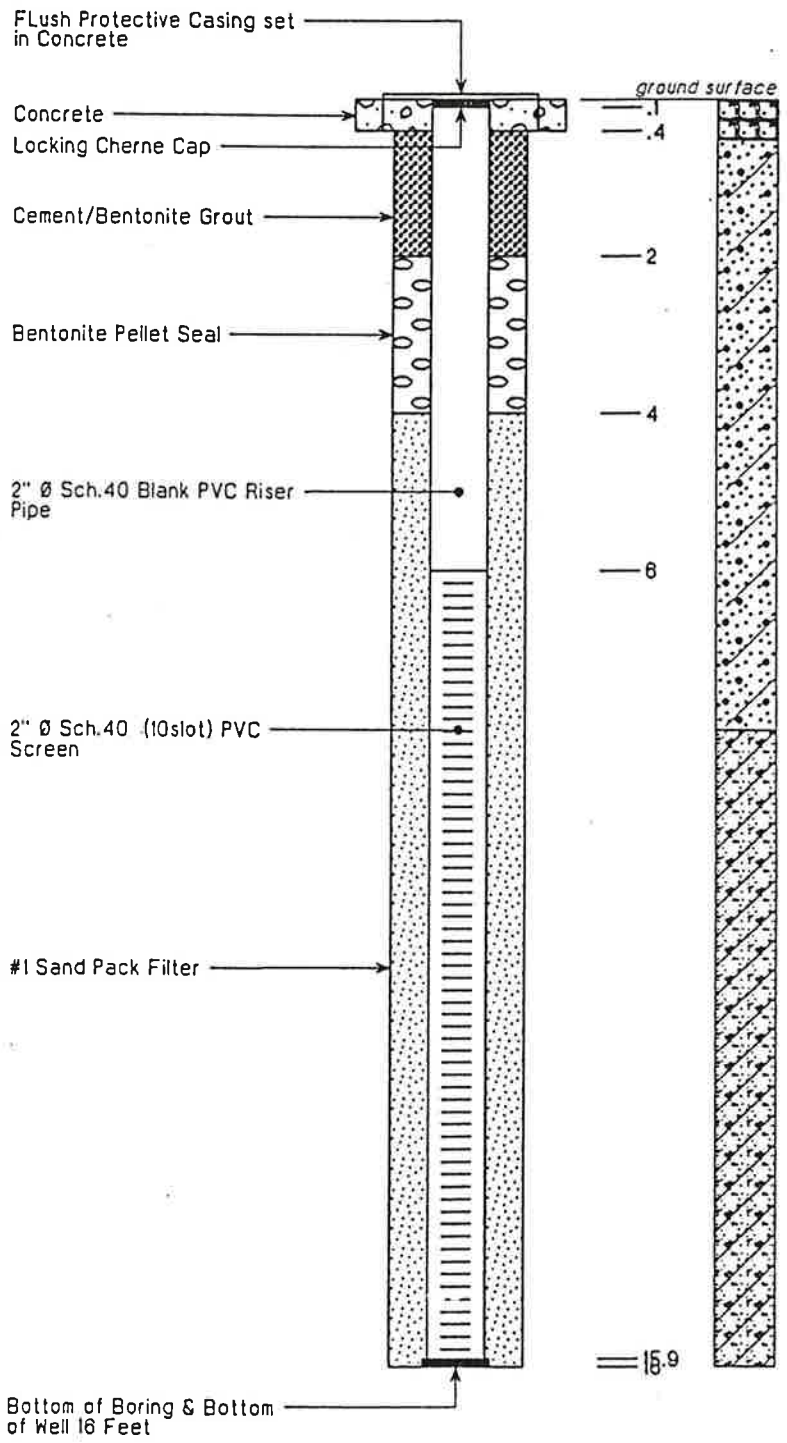
Method of development _____

Well Purpose *Monitoring*

Remarks _____

Prepared By *Scott*

Date Prepared *10/14/96*



MALCOLM PIRNIE

BORING MW-3

PROJECT: Former Mob.l Oil

PROJECT NO: 1030065

DATE: 10/7/96

LOCATION: Westchester Cty Airport

ELEVATION:

DATUM:

SAMPLE no.	depth	recovery	blows per 6"	DEPTH	STRATA	SAMPLE DESCRIPTION	WELL CONST.	REMARKS
S-1	0-2	100%	X 22			(cement 0-6")		
			49 | 17					
S-2	2-4	100%	13 | 21					
			30 | 17			cf gry/brn SAND, some pebbles, tr. silt		
S-3	4-6	80%	12 | 18	5	SP			
			34 | 12					
S-4	6-8	80%	15 | 18					
			11 | 18					
S-5	8-10	40%	5 | 3					
			3 | 2	10		mf gry/grn SAND, some silt, tr. clay, tr. f gravel		▽ @ 12'
S-6	10-12	40%	2 | 3					
			2 | 1					
S-7	12-14	10%	4 | 2		SM			
			2 | 2					
S-8	14-16	50%	1 | 1	15				
			2 | 1					
S-9	16-18	40%	3 | 3					
			3 | 4					
				20		Rock @ 18' EOB @ 18'		
				25				
				30				
				35				
				40				

NOTES: Sample S-9 selected for geotech. analysis

SHEET OF

ADVANCED DRILLING, INC.	PROJECT: Westchester County Airport	CLIENT: Malcolm Pirnie, Inc.	PROJECT NO.: ADV-327	HOLE NUMBER: MW-3

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Westchester Airport	Westchester	New York		

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPTH
10-7-96	10-7-96	Scott Alberalla	J 1320	8.25	18 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
		Hollow Stem Augers	Split Spoon	12 Feet

PROTECTIVE CASING	NOTES
FLUSH	

Soil Boring Cross-Reference *MW-3*

Town and City _____

County and State *Westchester, New York*

Installation Date (s) *10-8-96*

Drilling Method *Hollow Stem Augers*

Driller *Scott Alberalla*

Drilling Fluid *None*

Static water level after drilling *ft.*

Well developed for _____ hours at _____ gpm

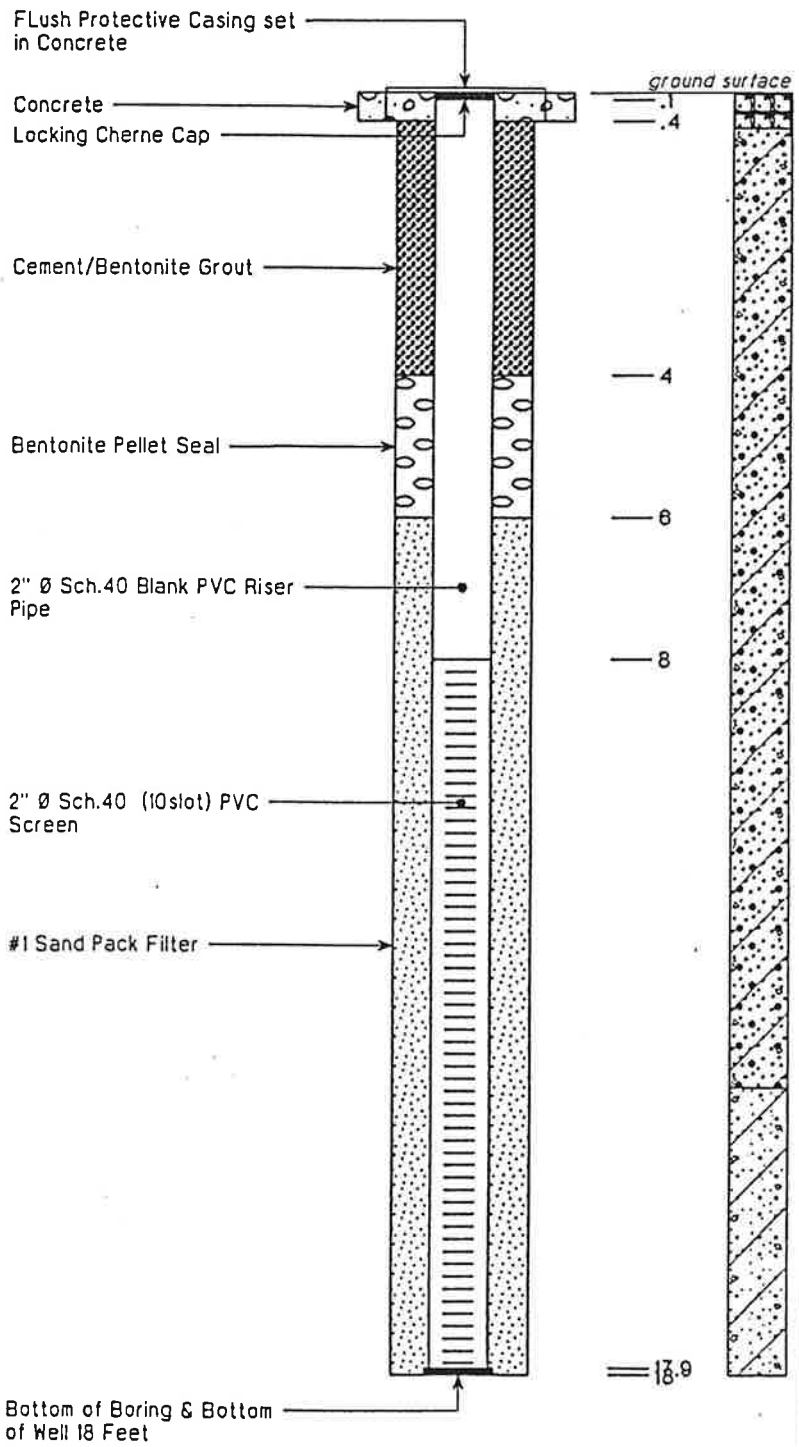
Method of development _____

Well Purpose *Monitoring*

Remarks _____

Prepared By *Scott*

Date Prepared *10/14/96*



MALCOLM PIRNIE

BORING MW-4

PROJECT: Former Mobil Oil

PROJECT NO: 1030065

DATE: 10/7/96

LOCATION: Westchester Cty Airport

ELEVATION:

DATUM:

SAMPLE no.	depth	recovery	blows per 6"	DEPTH	STRATA	SAMPLE DESCRIPTION	WELL CONST.	REMARKS
						(Cement 0-10")		
S-1	1-3	60%	4 6					
			7 5			cf gry/grn SAND, tr. gravel, tr. pebbles		
S-2	3-5	40%	3 3		SP			
			9 5	5				
S-3	5-7	40%	6 4					
			4 3					
S-4	7-9	60%	6 8					
			12 10					
S-5	9-11	50%	8 3	10		mf gry/grn SAND, some silt, tr. clay		▽ @ 11'
			5 4					
S-6	11-13	40%	4 4		SM			
			10 6					
S-7	13-15	50%	1 1					
			3 2	15				
S-8	15-17	60%	14 3					
			2 4					
				20		Rock @ 18' EOB @ 18'		
				25				
				30				
				35				
				40				

NOTES: Sample S-8 selected for geotech. analysis

SHEET 1 OF 1

ADVANCED DRILLING, INC.	PROJECT: Westchester County Airport	CLIENT: Malcolm Pirnie, Inc.	PROJECT NO.: ADV-327	HOLE NUMBE: MW-4

MUNICIPALITY	COUNTY	STATE	COORDINATES	WELL PERMIT NO.
Westchester Airport	Westchester	New York		-

START DATE	COMPLETION DATE	DRILLER	DRILLER LICENSE NO.	BORING DIA.	TOTAL DEPT
10-7-96	10-7-96	Scott Alberalla	J 1320	8.25	18 Ft.

LOT	BLOCK	DRILLING METHOD	SAMPLE TYPE	DEPTH OF GROUNDWATER
		Hollow Stem Augers	Split Spoon	11 Feet

PROTECTIVE CASING	NOTES
FLUSH	

Soil Boring Cross-Reference *MW-4*

Town and City

County and State *Westchester, New York*

Installation Date (s) *10-8-96*

Drilling Method *Hollow Stem Augers*

Driller *Scott Alberalla*

Drilling Fluid *None*

Static water level after drilling *ft.*

Well developed for _____ hours at _____ gpm

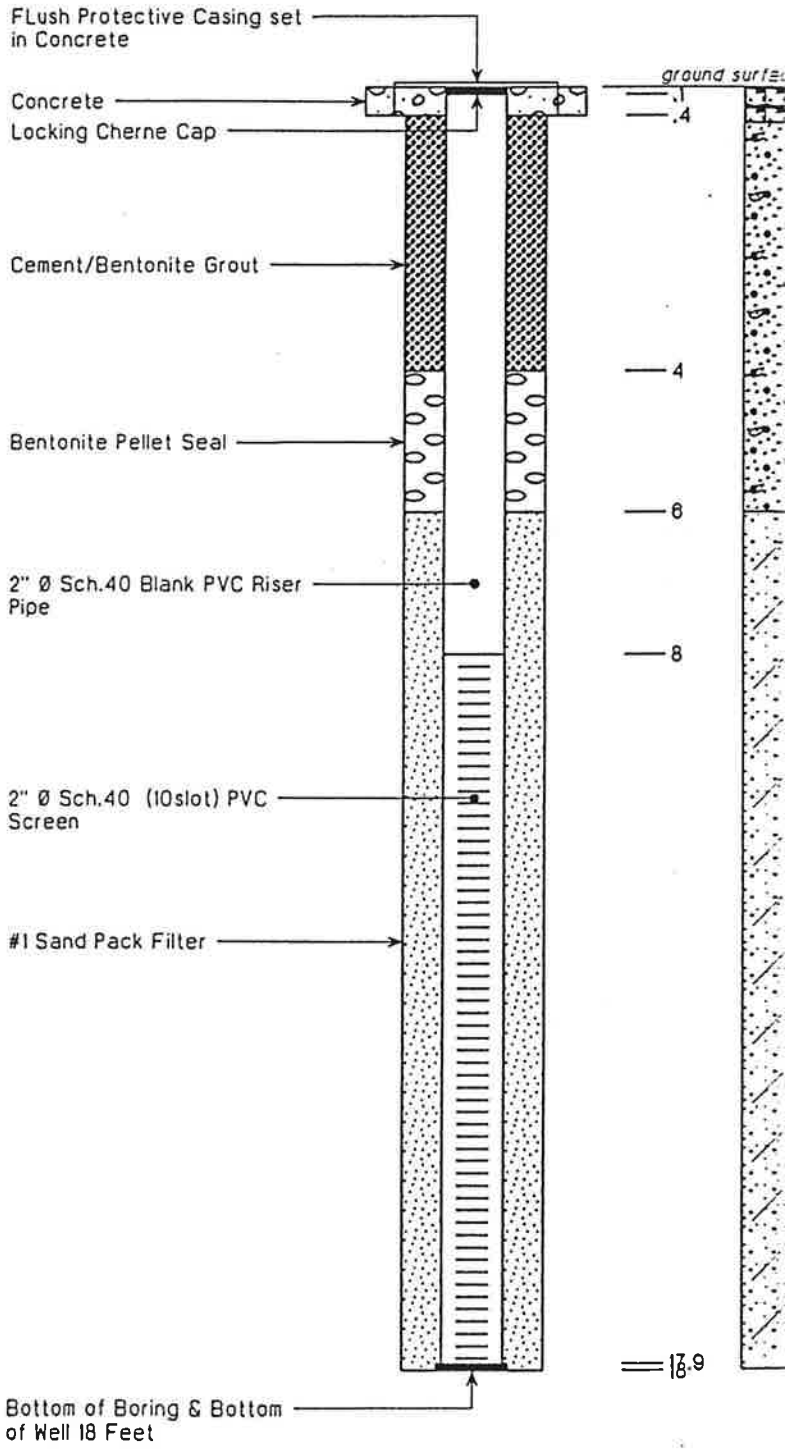
Method of development

Well Purpose *Monitoring*

Remarks

Prepared By *Scott*

Date Prepared *10/14/96*



CLIENT: XDD

PROJECT NAME: Westchester County Airport

LOCATION: Westchester, NY

DRILLER: T. Roe

INSPECTOR: S. McGee

DATE START: 11/7/99

DATE FINISH: 11/7/99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	SA	SS	
SIZE I.D.	4"	3"	
HAMMER WT.		140	
HAMMER FALL		30"	

BORING No. SB-01

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	6"-2'6"	7	8	10	8	18"		5" Concrete - Dark Brown Fine-Med. Sand, Little Crs. Sand, Gravel, Silt (4.0)		
S2	2'6"-4'6"	7	8	13	13	20"		Gray Brown Fine Sand, Little Silt, Trace of Crs. Sand, Gravel (5.5)		
S3	4'6"-6'6"	12	14	27	24	22"		Light Brown Fine Sand and Gravel, Little Med.-Crs. Sand, Trace of Silt (6.6)		
S4	6'7"-8'7"	17	18	24	18	20"		Gray Brown Fine Sand, Little Silt, Gravel, Trace of Med.-Crs. Sand (10.0)		
S5	8'6"-10'6"	16	11	8	6	14"		Gray Fine Sand, Some Silt, Little Clay, Trace of Med.-Crs. Sand, Gravel, Organics (15.5)		
S6	10'6"-12'6"	5	6	5	6	14"		Possible Highly Weathered Schist (16.5)		
S7	12'6"-14'6"	4	4	6	5	10"		End of Boring @ 16'6" Water @ 12' +/-		
S8	14'6"-16'6"	15	26	39	100					

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS: *1 DOT Soil*
2 DOT Drillig Fluid
1 DOT for Future Development

CLIENT: XDD

PROJECT NAME: Westchester County Airport

LOCATION: Westchester, NY

DRILLER: T. Roe

INSPECTOR: S. McGee

DATE START: 11/8/99

DATE FINISH: 11/9/99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	SA	SS	
SIZE I.D.	4"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

BORING No. MW-5

SHEET 1 OF 1

ARCHITECT/ ENGINEER

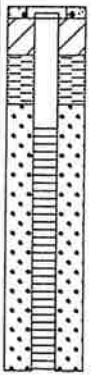
FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	3'-5'	3	3	4	4	18"		Gray Brown Fine Sand, Some Silt, Little Med.-Crs. Sand, Trace of Gravel, Occasional Cobbles		1 - 6" Roadway Box
S2	5'-7'	5	3	2	4	18"		6.0 Gray Silt and Fine Sand, Little Med.-Crs. Sand, Trace of Roots, Gravel		5' of 2" PVC Riser; 2' Bentonite Chip Seal
S3	10'-12'	1	1	1	1	18"		15.0 End of Boring @ 15' Water @ 7'4" +/-		10' of .010 Slot, 2" PVC Screen; NJ #2 Sand; Bottom of Well @ 15'



NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *1 DOT for Well Development Water*

CLIENT: XDD

PROJECT NAME: Westchester County Airport

LOCATION: Westchester, NY

DRILLER: T. Roe

INSPECTOR: S. McGee

DATE START: 11/8/99

DATE FINISH: 11/8/99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

BORING No. MW-6

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

	Casing	Sampler	Core Barrel
TYPE	SA	SS	
SIZE I.D.	4"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								6" Dark Brown Topsoil - Brown Fine Sand, Little Med.-Crs. Sand, Gravel, Trace of Silt, Occasional Cobbles, Boulder (3.0)		1 - 6" Roadway Box; 15' of 2" PVC Riser
S1	3'-5'	17	15	17	17	16"				
S2	5'-7'	5	5	4	4	12"		Brown Fine-Crs. Sand, Little Gravel, Trace of Silt (13.0)		12'6" Bentonite Seal
S3	10'-12'	2	3	2	2	10"				
S4	15'-17'	2	3	2	5	24"		Gray Fine Sand, Some Silt, Little Clay, Trace of Med.-Crs. Sand (15.0)		
								Brown Silt, Some Clay, Fine Sand, Trace of Med.-Crs. Sand, Roots (19.5)		5' of .010 Slot, 2" PVC Screen
								Probable Weathered Rock (20.0)		NJ #2 Sand
								End of Boring @ 20' Water @ 12' +/-		Bottom of Well @ 20'

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS: *I DOT for Soil*

CLIENT: XDD

PROJECT NAME: Westchester County Airport

LOCATION: Westchester, NY

DRILLER: T. Roe

INSPECTOR: S. McGee

DATE START: 11/7/99

DATE FINISH: 11/9/99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ2
SIZE I.D.	4"/3"	1-3/8"	2"
HAMMER WT.	300/Spin	140	
HAMMER FALL	24"	30"	

BORING No. MW-7

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								8" Concrete - Brown Gray Fine Sand, Some Silt, Little Gravel, Med.-Crs. Sand, Occasional Cobble		1 - 6" Roadway Box 15' of 2" PVC Riser
S1	5'-7'	5	5	8	6	4"		6.0 Gray Silt, Little Clay, Fine Sand, Trace of Wood Fragments		
S2	10'-12'	26	16	10	8	1"		12.0		
S3	12'6"-13'	100/ 6"				5"		Weathered Rock, Pounded 4" Casing to 13', Spun 3" Casint to 14'9" and Grouted in Place		
R1	15'-20'		CORED			39"	3-1/2 2-1/2 3 2-1/2 3-1/2	15.0 Run #1 - Cored Weathered, Fractured Gray Brown Schist from 15'-20' - Recovery 39"		10' of .010 Slot, 2" PVC Screen Top 5' - Field Slot Bottom 5'
R2	20'-25'		CORED			60"	4 5 5 5 5	20.0 Run #2 - Cored Slightly Fractured Dark Gray Gneiss from 20'-25' - Recovery 60" 25.0		NJ #2 Sand
								End of Boring @ 25' Water @ 13' +/-		Bottom of Well @ 25'

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS:

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: S. Maggie

DATE START: 5-25-00

DATE FINISH: 5-31-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

BORING No. MW-7D

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								9" Concrete		
S1	1'-3'	17	25	18	20	10"		Dark Gray Fine - Medium Sand, Some Silt, Little Fine - Coarse Gravel, Trace of Clay		
S2	3'-5'	9	5	6	5	18"				
S3	5'-7'	3	3	3	4	22"				
S4	7'-9'	4	4	4	4	22"				
S5	9'-11'	2	4	13	15	18"				
S6	11'-11'6"	90				6"		11 Top of Weathered Rock		
								15 HW Rollerbit to 25'		
R1	25'-30'	CORED				55"	8 5 5 4	25 Run #1, Cored Gray Mica Schist, Rec. 55"		
R2	30'-35'	CORED				55"	5 5 5 6 5	30 Run #2, Cored Gray Mica Schist, Rec. 55"		
R3	35'-40'	CORED				58"	6 6 6 6 5	35 Run #3, Cored Gray Mica Schist, Rec. 58"		
R4	40'-45'	CORED				58"	5 6 6 7 7 7	40 Run #4, Cored Gray Mica Schist, Rec. 60"		
								45 End of Boring @ 45' Water @ 11'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS: *Grouted 35' NW pipe in place, remainder is open core.*
Installed 8" Roadway Box

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: S.Maggie/L.Buttermor

DATE START: 5-23-00

DATE FINISH: 5-23-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NQ
SIZE I.D.	3"	1-3/8"	2"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

BORING No. MW-8D

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								6" Concrete 12" Thin Wall Gravel Silt 1.5		
S1	5'-5'3"	100/				3"		Brown Fine - Coarse Sand, Some Fine - Coarse Gravel, Silt		
R1	6'-10'	3"	CORED			14"		6 Run #1, Cored Boulders, Rec. 14"		
S2	10'-12'	2	2	1	4	10"		10 Gray Silt and Fine - Medium Sand, Little Fine Gravel		
S3	12'-13'	12	100			6"		13 Top of Weathered Rock @ 13'		
R2	15'-20'		CORED			38"	8 5 5 4	15 Run #2, Cored Gray Mica Schist, Rec. 38"		
R3	20'-25'		CORED			46"	5 5 4 4 5	20 Run #3, Cored Gray Mica Schist, Rec. 46"		
R4	25'-30'		CORED			50"	6 5 4 4 5	25 Run #4, Cored Gray Mica Schist, Rec. 50"		
R5	30'-35'		CORED			49"	5 5 5 5 5	30 Run #5, Cored Gray Mica Schist, Rec. 49"		
R6	35'-40'		CORED			45"	5 5 5 4 5	35 Run #6, Cored Gray Mica Schist, Rec. 45"		
R7	40'-45'		CORED			43"	5 5 6 7 7 8	40 Run #7, Cored Gray Mica Schist, Rec. 43" 45		
								End of Boring @ 45' Water @ 9'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS: *Grouted 35' of NW Casing in place*
One 8" Road Way Box Installed

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: L. Buttermore

DATE START: 5-30-00

DATE FINISH: 5-31-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	NW		
SIZE I.D.	3"		
HAMMER WT.	300		
HAMMER FALL	24"		

BORING No. MW-8S

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								Grouted in 15' of 3" Casing No Samples Required Material Same as MW-8D		
								15 Top of Rock @ 15' Rollerbitted to 25' Rock hole remains open		
								25 End of Boring @ 25' Water @ 10'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *Installed 8" Roadway Box*

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: T. Carpenter/St. John

INSPECTOR: L. Buttermore

DATE START: 5-16-00

DATE FINISH: 5-22-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2-1/8"
HAMMER WT.	300/SPIN	140	
HAMMER FALL	24"	30"	

BORING No. MW-9D

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	1'-3'	5	15	63	121	12"		Concrete (8)		
								Brown Fine - Medium Sand and Gravel (3.5)		
R1	3'6"-8'6"	CORED				60"	6 6 7 7	Run #1, Cored Gray Brown Mica Schist, Rec. 60" (8.5)		
R2	8'6"-13'6"	CORED				35"	8 6 7 7 5	Run #2, Cored Gray Brown Fractured Mica Schist, Rec. 35" (13.5)		
R3	13'6"-18'6"	CORED				60"	5 6 6 7 7	Run #3, Cored Gray Brown Mica Schist, Rec. 60" (18.5)		
R4	18'6"-23'6"	CORED				57"	8 4 4 6 5	Run #4, Cored Gray Mica Schist, Rec. 57" (23.5)		
R5	23'6"-28'6"	CORED				60"	6 7 8 6 6 6	Run #5, Cored Gray Mica Schist, Rec. 60" (28.5)		
								Rollerbit to 30' (30)		
R6	30'-35'	CORED				60"	5 4 4 4	Run #6, Cored Gray Mica Schist, Rec. 60" (35)		
R7	35'-40'	CORED				60"	4 4 4 4 5 5	Run #7, Cored Gray Mica Schist, Rec. 60" (40)		
								End of Boring @ 40' Water @ 9'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *Set Casing @ 30', Grout in Place*
No PVC Set in hole
One 8" Roadway Box Installed

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: T. Carpenter

INSPECTOR: L. Buttermore

DATE START: 5-16-00

DATE FINISH: 5-17-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2-1/8"
HAMMER WT.	SPIN	140	
HAMMER FALL		30"	

BORING No. MW-9S

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	1'-3'	4	8	15	10	14"		Concrete (8)		
S2	3'-5'	23	38	25	27	15"		Brown Fine - Medium Sand and Silt, Some Gravel (3)		
S3	5'-6'6"	47	68	123		11"		Decomposed Mica Schist (7.5)		
R1	7'6"-12'6"	CORED						Run #1, Cored Gray Mica Schist (12.5)		
R2	12'6"-17'6"	CORED				60"		Run #2, Cored Gray Brown Mica Schist, Rec. 60" (17.5)		
R3	17'6"-20'	CORED				30"		Run #3, Cored Gray Brown Mica Schist, Rec. 30" (20)		
								End of Boring @ 20' Water @ 9' +/-		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *Set Casing @ 7'6"*
and Grouted in Place
One 8" Roadway Box Installed

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: T. Carpenter/ St. John

INSPECTOR: L. Buttermore

DATE START: 5-18-00

DATE FINISH: 5-24-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW		NQ
SIZE I.D.	4"/3"		2-1/8"
HAMMER WT.	300/SPIN		
HAMMER FALL	24"		

BORING No. MW-10D

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								Soil Same as MW-10S		
								25		
R1	25'-30'	CORED				39"	5 5 6 6	Run #1, Cored Gray Mica Schist, Rec. 39"		
								30		
R2	30'-35'	CORED				34"	5 6 8 8 8 9	Run #2, Cored Gray Mica Schist, Rec. 34" (Barrel Plugging up)		
								35		
								HW Rollerbitted to 45' without coring		
								Grouted 45' of NW Casing in		
								45		
R3	45'-50'	CORED				60"	6 5 6 6	Run #3, Cored Gray Schist, Rec. 60"		
								50		
R4	50'-55'	CORED				60"	6 6 6 6 5 5	Run #4, Cored Gray Schist, Rec. 60"		
								55		
								End of Boring @ 55' Water @ 15'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *45' of 3" Casing in hole, Bottom Open*
Installed 1, 8" Roadway Box

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: T. Carpenter

INSPECTOR: L. Buttermore

DATE START: 5-17-00

DATE FINISH: 5-23-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

BORING No. MW-10S

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								Concrete (5)		
S1	1'-3'	16	21	28	17	8"		Brown Fine - Medium Sand and Silt, Some Gravel (5)		
S2	3'-5'	19	23	36	31	24"		Brown Silt, Some Fine - Medium Sand, Trace of Clay		
S3	5'-7'	9	8	7	8	14"				
S4	7'-9'	6	8	8	9	4"				
S5	9'-11'	8	7	7	8	10"				
S6	11'-13'	6	6	4	4	0"				
S7	13'-15'	7	10	10	11	6"				
S8	15'-17'	3	3	4	5	12"				
S9	17'-19'	4	4	4	6	5"				
S10	19'-21'	4	6	7	12	4"				
S11	21'-23'	10	17	16	17	18"				
S12	23'-25'	13	16	28	31	22"				
S13	25'-25'9"	49	120/ 3"			9"		Decomposed Rock (25)		
R1	27'-32'		CORED			48"	6 6 7 7	Run #1, Cored Gray Mica Schist, Rec. 48" (27)		
R2	32'-37'		CORED			60"	6 6 5 5 6 6	Run #2, Cored Gray Mica Schist, Rec. 60" (32)		
								End of Boring @ 37' (37)		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *Set Casing @ 27', Grout in Place*
Installed 10'of 2" Screen, 27'of 2" Riser,
One 8" Roadway Box Installed

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: L. Buttermore

DATE START: 6-1-00

DATE FINISH: 6-5-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

BORING No. MW-11D

SHEET 1 OF 2

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	0'-2'	10	20	18	11	10"		4" Asphalt		
S2	2'-4'	10	11	9	8	12"		Gray Fine - Medium Sand, Some Fine - Coarse Gravel, Silt		
S3	4'-6'	4	4	3	4	14"				
S4	6'-8'	5	6	8	9	10"		7		
S5	8'-10'	8	10	10	13	12"		Gray Fine Sand and Silt, Little Fine - Coarse Gravel		
S6	10'-12'	6	5	6	6	14"				
S7	12'-14'	6	7	7	8	8"				
S8	14'-16'	7	8	9	9	18"				
S9	16'-18'	8	10	14	15	12"				
S10	19'-20'6"	16	24	80		8"		20		
R1	20'-25'		CORED			18"	8 7 4 3 3	Run #1, Cored Boulders, Rec. 18"		
								25 Brown Weathered Rock, Rollerbitted to 30'		
R2	30'-35'		CORED			52"	6 6 5 6	30 Run #2, Cored Gray Mica Schist, Rec. 52"		
R3	35'-40'		CORED			42"	6 6 6 7 7	35 Run #3, Cored Gray Mica Schist, Rec. 42"		
R4	40'-45'		CORED			47"	6 6 6 5 5	40 Run #4, Cored Gray Mica Schist, Rec. 47"		
R5	45'-50'		CORED			56"	5 6 5 5 6	45 Run #5, Cored Gray Mica Schist, Rec. 56"		
R6	50'-55'		CORED			44"	6 6 6 6 6	50 Run #6, Cored Gray Mica Schist, Rec. 44"		
R7	55'-60'		CORED			60"	6 6 6 6	55 Run #7, Cored Gray Mica Schist, Rec. 60"		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS: *No PVC inst., 1 8" RW Box, Total DOT Drums: 16*
Grouted in 50' NW Casing

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: L. Buttermore

DATE START: 6-1-00

DATE FINISH: 6-5-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	HW/NW	SS	NQ
SIZE I.D.	4"/3"	1-3/8"	2"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

BORING No. MW-11D

SHEET 2 OF 2

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
							6 6	60 End of Boring @ 60' Water @ 22'		

CLIENT: XDD

PROJECT NAME: WESTCHESTER COUNTY AIRPORT

LOCATION: WESTCHESTER, NY

DRILLER: M. St. John

INSPECTOR: L. Buttermore

DATE START: 6-2-00

DATE FINISH: 6-6-00

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

	Casing	Sampler	Core Barrel
TYPE	NW		
SIZE I.D.	3"		
HAMMER WT.	300		
HAMMER FALL	24"		

BORING No. MW-11S

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. XDDWESTC

SURFACE ELEV.

LINE & STATION

OFFSET

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
								4" Asphalt No Samples Required, material same as MW-11D		
R1	30'-35'	CORED				55"		30 Run #1, Cored Gray Mica Schist, Rec. 55"		
R2	35'-40'	CORED				60"		35 Run #2, Cored Gray Mica Schist, Rec. 60" 40		
								End of Boring @ 40' Water @ 21'		

NOTES: 1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of ground-water may occur due to factors other than those present at the time measurements were made.

REMARKS: *Grouted in 30' NW Casing, 1 RW Box, No PVC*

Monitoring Well Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-12**

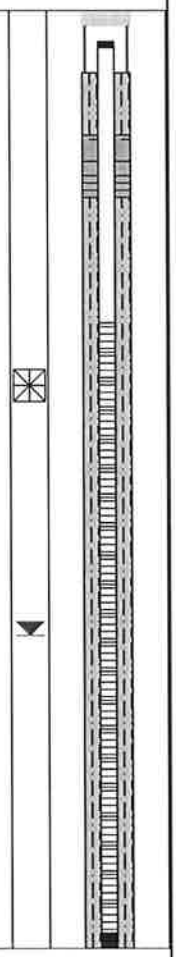
Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #:
Address: **184 Airport Rd, White Plains, NY**	GES Job #: **1101379**	Regulatory Case Mgr: **M. Tipple**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **John Simms**	Date Drilled: **November 22, 2008**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **Zebra**	Completion Date: **November 22, 2008**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **Charlie**	Drilling Method: **HSA**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **GeoProbe 6620DT**	Sampling Method: **Macro Core**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **2 fbg**
Surface Elevation: **NA**	Borehole Diameter: **7 in.**	Type of Seal: **Cetco Granular**
Total Depth: **15 fbg**	Well Diameter: **2 in.**	Top of Sand: **3 fbg**
Refusal Depth: **NA**	Riser Length: **4.5 ft**	Sand Type: **#2**
Initial Depth to Water: **10 fbg**	Screen Slot Size: **10**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **10 ft**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm)	Blow Counts	SAMPLE LITHOLOGY	Comments
0	0-2 fbg	24 in.	0.0 ppm		SM: Brown, moist, fine to medium SAND with trace gravel.	Hand-cleared boring to 4.6 fbg.
	2-4 fbg	24 in.	0.0 ppm		SM: Yellow-orange, moist fine to medium SAND with some silt and trace gravel.	
5	4-6 fbg	24 in.	0.6 ppm		SM: Olive-grey, moist, fine to medium SAND with some silt and trace gravel.	
	6-8 fbg	24 in.	0.6 ppm		SM: Moist to wet, fine to medium SAND with some silt and trace gravel.	
	8-10 fbg	24 in.	0.3 ppm		SM: Olive-grey, wet, fine to medium SAND with some silt and trace gravel.	
10	10-12 fbg	24 in.	0.3 ppm		SM: Olive-grey, saturated, fine to medium SAND with some silt and trace gravel.	
					No recovery.	
15					End of Boring.	

Well Completion Detail



Proportions Used:
Trace = < 10%
Little = < 30%
Some = < 50%
and = @ 50%

Notes:
NA = not available; fbg. = feet below grade
in. = inches; ft. = feet; ppm. = parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:
0 - 4 = Very Loose
5 - 9 = Loose
10 - 29 = Medium Dense
30 - 49 = Dense
50 + = Very Dense

Symbols:
Apparent Water Level
Lab Sample Location

Monitoring Well Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-13**

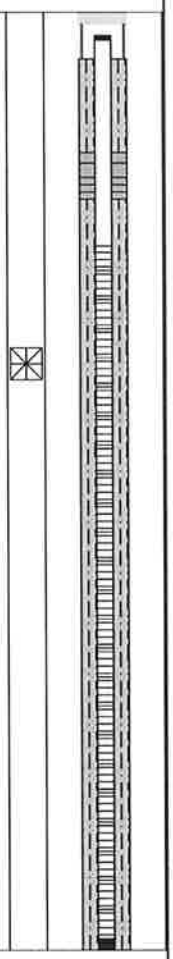
Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #:
Address: **184 Airport Rd, White Plains, NY**	GES Job #: **1101379**	Regulatory Case Mgr: **M. Tipple**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **John Simms**	Date Drilled: **November 22, 2008**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **Zebra**	Completion Date: **November 22, 2008**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **Charlie**	Drilling Method: **HSA**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **GeoProbe 6620DT**	Sampling Method: **Macro Core**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **3 fbg**
Surface Elevation: **NA**	Borehole Diameter: **7 in.**	Type of Seal: **Cetco Granular**
Total Depth: **20 fbg**	Well Diameter: **2 in.**	Top of Sand: **4 fbg**
Refusal Depth: **NA**	Riser Length: **4.5 ft**	Sand Type: **#2**
Initial Depth to Water: **NA**	Screen Slot Size: **10**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **15 ft**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm)	Blow Counts	SAMPLE LITHOLOGY	Comments
0	0-5 fbg	NA	NA		No recovery.	Hand-cleared boring to 4 fbg.
5	5-7 fbg	24 in.	0.0 ppm		SM: Olive-grey, fine to medium SAND with some silt and trace gravel.	
	7-9 fbg	24 in.	0.5 ppm		SM: Moist, fine SAND and silt with trace gravel and clay.	
10					No recovery.	
15						
20					End of Boring.	

Well Completion Detail



Proportions Used:

Trace = < 10%
Little = < 30%
Some = < 50%
and = @ 50%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft. = feet; ppm. = parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

0 - 4 = Very Loose
5 - 9 = Loose
10 - 29 = Medium Dense
30 - 49 = Dense
50 + = Very Dense

Symbols:

Apparent Water Level
Lab Sample Location

Monitoring Well Log

Groundwater & Environmental Services, Inc.

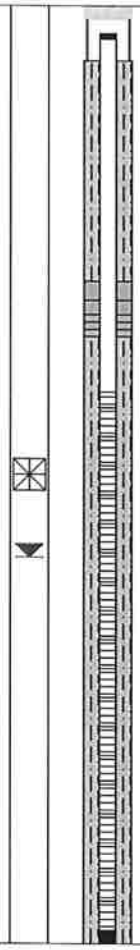
ID NO. **MW-14**

Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #:
Address: **184 Airport Rd, White Plains, NY**	GES Job #: **1101379**	Regulatory Case Mgr: **M. Tipple**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **John Simms**	Date Drilled: **November 23, 2008**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **Zebra**	Completion Date: **November 23, 2008**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **Charlie**	Drilling Method: **HSA**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **GeoProbe 6620DT**	Sampling Method: **Macro Core**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **5 fbg**
Surface Elevation: **NA**	Borehole Diameter: **7 in.**	Type of Seal: **Cetco Granular**
Total Depth: **17 fbg**	Well Diameter: **2 in.**	Top of Sand: **6 fbg**
Refusal Depth: **NA**	Riser Length: **6.5 ft**	Sand Type: **#2**
Initial Depth to Water: **10 fbg**	Screen Slot Size: **10**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **10 ft**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm)	Blow Counts	SAMPLE LITHOLOGY	Comments
0	0-8 fbg	NA	NA		No recovery.	Hand-cleared boring to 6.6 fbg.
5					SM: Olive-grey, saturated, fine to medium SAND and silt with trace gravel and clay.	
	8-10 fbg	24 in.	0.3 ppm			
10	10-12 fbg	24 in.	0.4 ppm		SM: Olive-grey, saturated, fine SAND and silt with trace gravel and clay.	
	12-13 fbg	12 in.	0.3 ppm			
					No recovery.	
15					End of Boring.	



Proportions Used:

Trace =	< 10%
Little =	< 30%
Some =	< 50%
and =	@ 50%

Notes:

NA = not available; fbg. = feet below grade

in. = inches; ft. = feet; ppm. = parts per million

Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

0 - 4 = Very Loose
5 - 9 = Loose
10 - 29 = Medium Dense
30 - 49 = Dense
50 + = Very Dense

Symbols:

Apparent Water Level

Lab Sample Location

Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

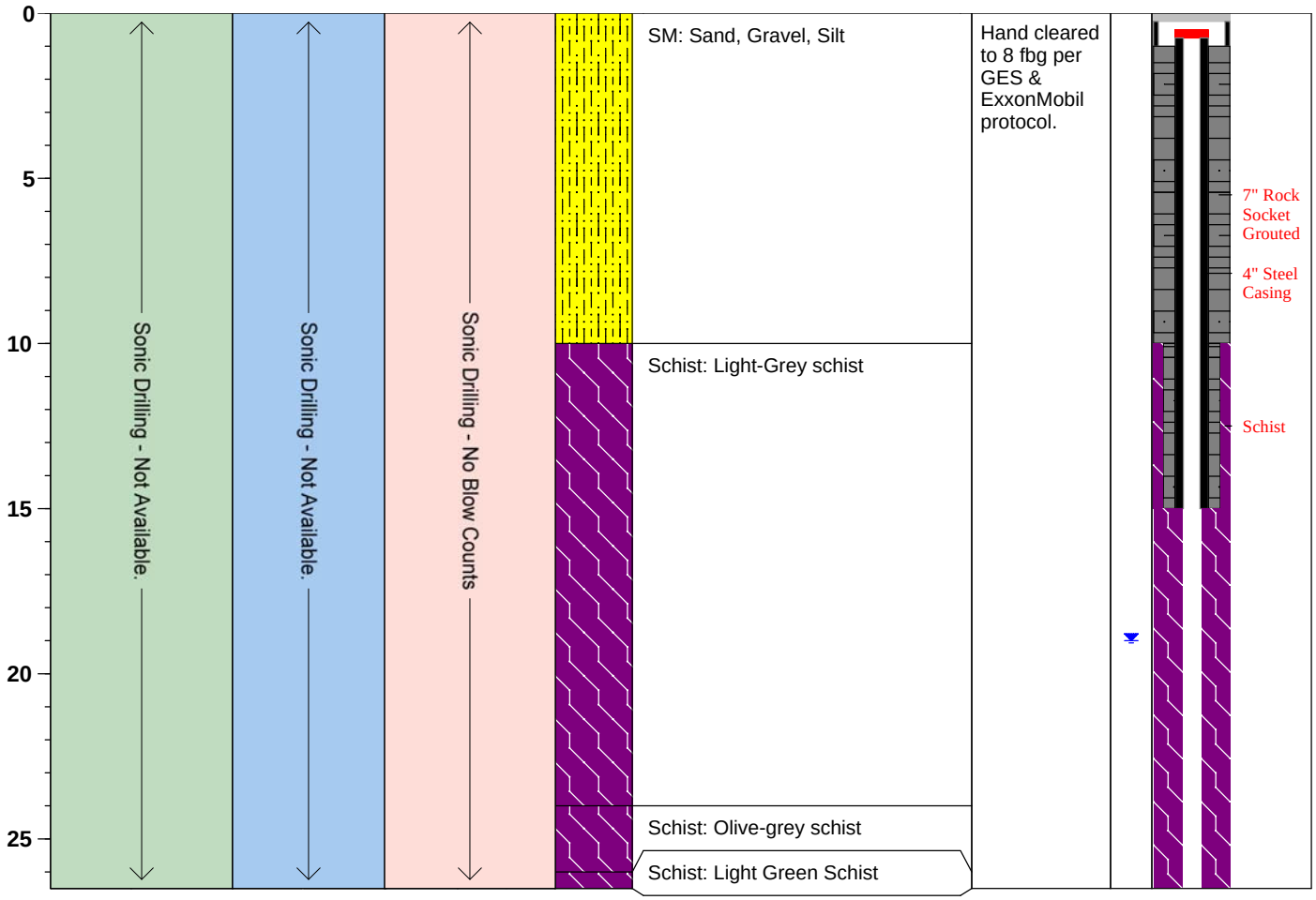
ID NO. **MW-15S**

Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **NA**
Address: **184 Airport Rd., White Plains, NY**	GES Job #: **1101984**	Regulatory Case Mgr: **M. Tipple**
County: **Weschester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **J. Simms**	Date Drilled: **6/9/11 - 6/15/11**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **ADT**	Completion Date: **6/10/11**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **T. Sheerin**	Drilling Method: **Sonic Drilling**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Sonic Rig**	Sampling Method: **NA**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **NA**
Surface Elevation: **411.99**	Borehole Diameter: **3 in.**	Type of Seal: **NA**
Total Depth: **26.5 ft.**	Well Diameter: **NA**	Top of Sand: **NA**
Refusal Depth: **NA**	Riser Length: **NA**	Sand Type: **NA**
Initial Depth to Water: **19 ft.**	Screen Slot Size: **NA**	Well Material Type: **NA**
Static Depth to Water: **NA**	Screen Length: **NA**	Top of Grout: **0 fbg**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 1 100	Blow Counts 1 50	Geologic Description	Comments	Well Completion Detail



Proportions Used:	Notes:	Blow Count Pentration Resistance:		Symbols:
Trace = <5%	NA = not available; fbg. = feet below grade	Consistency (M&C)	Density (G&S)	Apparent Water Level
Few = 5-10%	in. = inches; ft.= feet; ppm= parts per million	<2 = Very Soft	0-4 = Very Loose	Lab Sample Location
Little = 10-20%	Soil Lithologies based on field observations only.	2-4 = Soft	4-10 = Loose	
Some = 20-30%		4-8 = Medium	10-30 = Medium	
Adjective = 30-40%		8-15 = Stiff	30-50 = Dense	
And = >40%		15-30 = Very Stiff	>50 = Very Dense	
		>30 = Hard		

Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO.**MW-16**

Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **NA**
Address: **184 Airport Rd., White Plains, NY**	GES Job #: **1101984**	Regulatory Case Mgr: **M. Tipple**
County: **Weschester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**

Logged By: **J. Simms**	Date Drilled: **6/9/11 - 6/15/11**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **ADT**	Completion Date: **6/9/11**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **T. Sheerin**	Drilling Method: **Sonic Drilling**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Sonic Rig**	Sampling Method: **NA**	Field Screening: **PID 10.6 eV Lamp (ppm)**

Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **NA**
Surface Elevation: **411.69**	Borehole Diameter: **5.25 in.**	Type of Seal: **NA**
Total Depth: **12 ft.**	Well Diameter: **2 in.**	Top of Sand: **1 fbg**
Refusal Depth: **NA**	Riser Length: **1.5**	Sand Type: **#2 Silica Sand**
Initial Depth to Water: **2.67**	Screen Slot Size: **0.020 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **10**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 1 100	Blow Counts 1 50	Geologic Description	Comments	Well Completion Detail
0	Sonic Drilling - Not Available			Sonic Drilling - No Blow Counts	Gravel and Sand: Sand and Gravel, Some silt	Hand cleared to 8 fbg per GES & ExxonMobil protocol.	Manway; Well Pad; Well Cap; Sch. 40 Riser; 0.02 in. Screen
5							
10					Schist: Weathered Schist		

Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

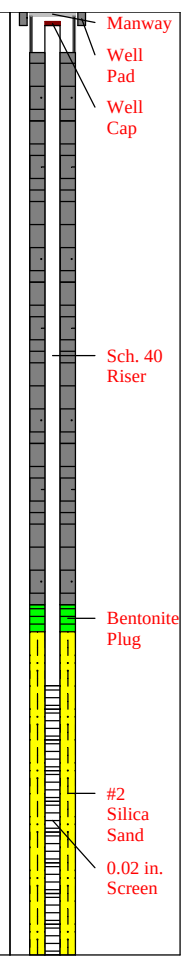
Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO.**MW-17S**

Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **NA**
Address: **184 Airport Rd., White Plains, NY**	GES Job #: **1101984**	Regulatory Case Mgr: **M. Tipple**
County: **Weschester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/9/11 - 6/15/11**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **ADT**	Completion Date: **6/9/11**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **T. Sheerin**	Drilling Method: **Sonic Drilling**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Sonic Rig**	Sampling Method: **NA**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **21 fbg**
Surface Elevation: **411.39**	Borehole Diameter: **5.25 in.**	Type of Seal: **Bentonite Plug**
Total Depth: **35 ft.**	Well Diameter: **2 in.**	Top of Sand: **23 fbg**
Refusal Depth: **NA**	Riser Length: **25 ft.**	Sand Type: **#2 Silica Sand**
Initial Depth to Water: **3.58**	Screen Slot Size: **0.020 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **10 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 1 100	Blow Counts 1 50	Geologic Description	Comments	Well Completion Detail
0	Sonic Drilling - Not Available		Sonic Drilling - Not Available	Sonic Drilling - No Blow Counts	SM: Sand, Gravel, and Silts	Hand cleared to 8 fbg per GES & ExxonMobil protocol.	Manway; Well Pad; Well Cap
10					Schist: Weathered Schist		Sch. 40 Riser
15					Schist: Weathered Schist		
20							Bentonite Plug
25							#2 Silica Sand
30							0.02 in. Screen
35					Schist: Weathered Schist		



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

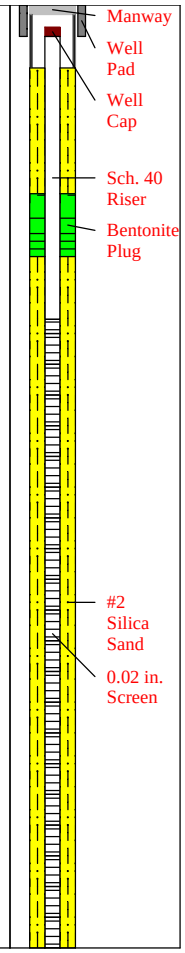
Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO.**MW-18**

Project: **Hangar D, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **NA**
Address: **184 Airport Rd., White Plains, NY**	GES Job #: **1101984**	Regulatory Case Mgr: **M. Tipple**
County: **Weschester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/9/11 - 6/15/11**	Split Spoon/Acetate Sleeve Diameter: **NA**
Drilling Company: **ADT**	Completion Date: **6/9/11**	Split Spoon/Acetate Sleeve Length: **NA**
Drill Operator: **T. Sheerin**	Drilling Method: **Sonic Drilling**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Sonic Rig**	Sampling Method: **NA**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **NA**	Longitude: **NA**	Top of Bentonite Seal: **3 fbg**
Surface Elevation: **411.81**	Borehole Diameter: **5.25 in.**	Type of Seal: **Bentonite Plug**
Total Depth: **15 ft.**	Well Diameter: **2 in.**	Top of Sand: **4 fbg**
Refusal Depth: **NA**	Riser Length: **5 ft.**	Sand Type: **#2 Silica Sand**
Initial Depth to Water: **3.21**	Screen Slot Size: **0.020 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **NA**	Screen Length: **10 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 1 100	Blow Counts 1 50	Geologic Description	Comments	Well Completion Detail
0	Sonic Drilling - Not Available		Sonic Drilling - Not Available	Sonic Drilling - No Blow Counts	No Samples Collected	Hand cleared to 8 fbg per GES & ExxonMobil protocol.	Manway; Well Pad; Well Cap; Sch. 40 Riser; Bentonite Plug; #2 Silica Sand; 0.02 in. Screen
5							
10							
15							



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-19**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **2 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/15/12**	Split Spoon/Acetate Sleeve Length: **5 ft.**
Drill Operator: **M. Schneck**	Drilling Method: **Hollow Stem Auger/Direct Push**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Geoprobe Model #7822DT**	Sampling Method: **Macro-core**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'18.169"**	Longitude: **W 73º42'24.601"**	Top of Bentonite Seal: **1.5 fbg**
Surface Elevation: **412.58**	Borehole Diameter: **9 in.**	Type of Seal: **Bentonite, Cetco Medium**
Total Depth: **20 ft.**	Well Diameter: **2 in.**	Top of Sand: **2.5 fbg**
Refusal Depth: **20.7 ft.**	Riser Length: **4.5 ft.**	Sand Type: **Filpro #00 & #2 Sand**
Initial Depth to Water: **8.5 fbg**	Screen Slot Size: **0.010 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **7.67 fbg**	Screen Length: **15 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0						Hand cleared to 4.5 fbg.	Manway; Well Pad; Well Cap; Bentonite Seal; Sch. 40 Riser; #00 Transition Sand
	2-2.5		2.9	No Blow Counts	SW: Loose, fine to medium, brown sand, some gravel, and trace silt.		
	4-4.5		2.0		SW: Compact, fine to medium, gray sand, some gravel, and trace silt.		
5	5-10		3.1		SW: Compact, fine to medium, gray sand, some gravel, trace silt, and moist.		
10	10-15		2.6		SW: Loose, fine to medium, gray sand, some gravel, trace silt, and wet.		#2 Sand; 0.01 in. Screen
15	15-20		4.6		SCHIST: Weathered mica schist; saturated.	Laboratory sample collected between 15 and 20 fbg.	
20							

Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

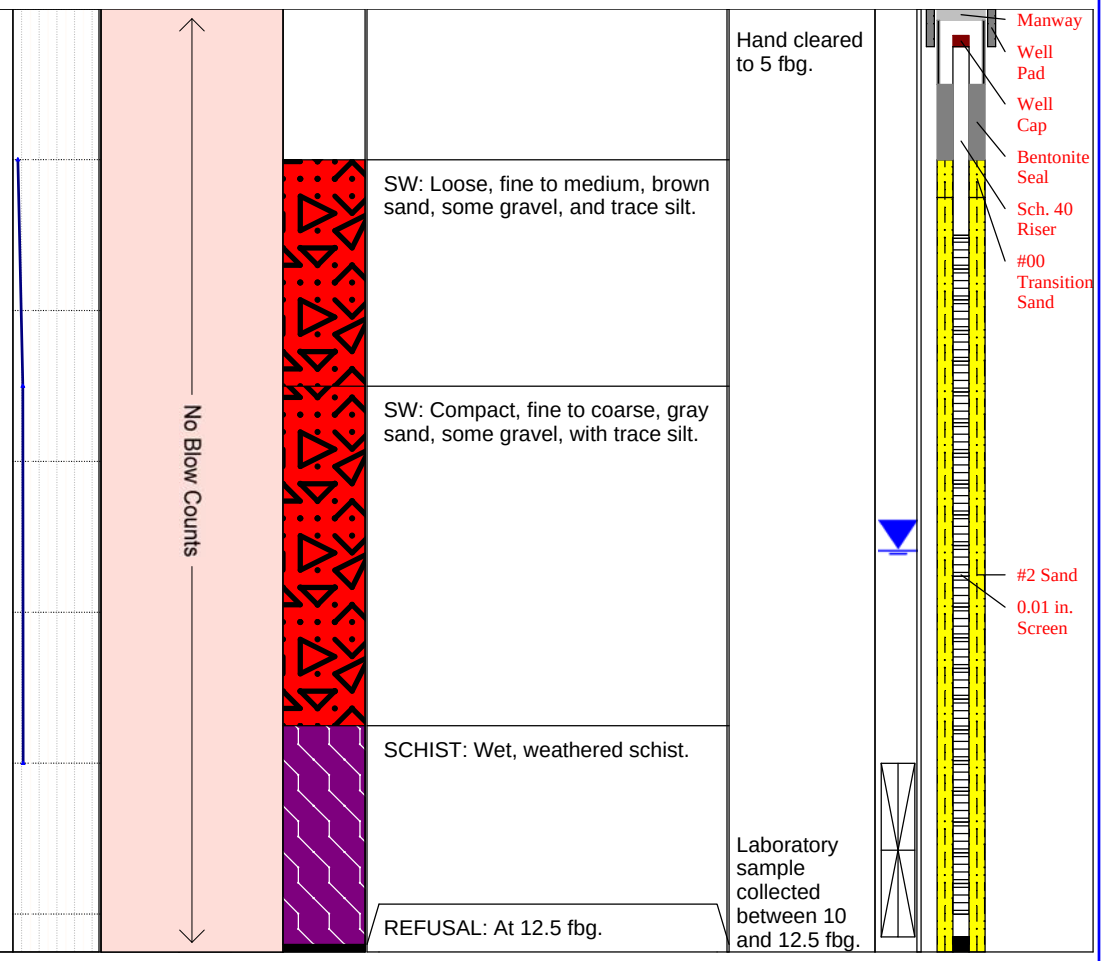
Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-20**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **2 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/15/12**	Split Spoon/Acetate Sleeve Length: **5 ft.**
Drill Operator: **M. Schneck**	Drilling Method: **Hollow Stem Auger/Direct Push**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Geoprobe Model #7822DT**	Sampling Method: **Macro-core**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'17.971"**	Longitude: **W 73º42'25.091"**	Top of Bentonite Seal: **1 fbg**
Surface Elevation: **412.13**	Borehole Diameter: **9 in.**	Type of Seal: **Bentonite, Cetco Medium**
Total Depth: **12 ft.**	Well Diameter: **2 in.**	Top of Sand: **2 fbg**
Refusal Depth: **12.5 ft.**	Riser Length: **2.5 ft.**	Sand Type: **Filpro #00 & #2 Sand**
Initial Depth to Water: **9.00 fbg**	Screen Slot Size: **0.010 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **7.00 fbg**	Screen Length: **9 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0						Hand cleared to 5 fbg.	Manway; Well Pad; Well Cap; Bentonite Seal; Sch. 40 Riser; #00 Transition Sand
	2-2.5		2.8	No Blow Counts	SW: Loose, fine to medium, brown sand, some gravel, and trace silt.		
5	5-10		5.6		SW: Compact, fine to coarse, gray sand, some gravel, with trace silt.		#2 Sand; 0.01 in. Screen
10	10-12.5		5.8		SCHIST: Wet, weathered schist.	Laboratory sample collected between 10 and 12.5 fbg.	
					REFUSAL: At 12.5 fbg.		



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

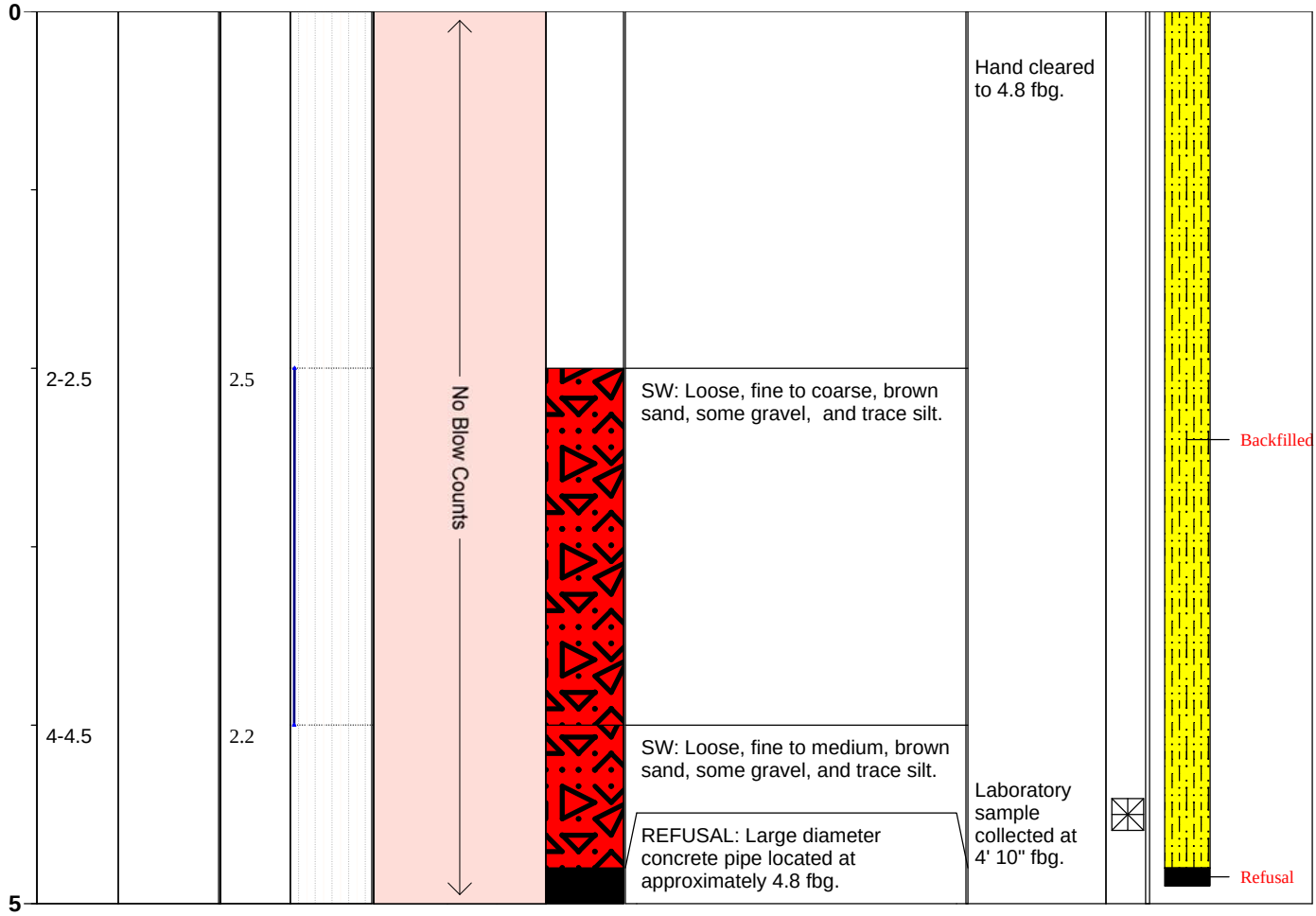
Soil Boring Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-21**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **3 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/14/12**	Split Spoon/Acetate Sleeve Length: **6 in.**
Drill Operator: **M. Schneck**	Drilling Method: **Hand-held Bucket Auger**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **NA**	Sampling Method: **Bucket Auger**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'17.969"**	Longitude: **W 73º42'25.302"**	Top of Bentonite Seal: **NA**
Surface Elevation: **412.02**	Borehole Diameter: **9 in.**	Type of Seal: **Concrete**
Total Depth: **NA**	Well Diameter: **NA**	Top of Sand: **NA**
Refusal Depth: **10 ft.**	Riser Length: **NA**	Sand Type: **NA**
Initial Depth to Water: **NA**	Screen Slot Size: **NA**	Well Material Type: **NA**
Static Depth to Water: **NA**	Screen Length: **NA**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0				No Blow Counts		Hand cleared to 4.8 fbg.	
2-2.5		2.5			SW: Loose, fine to coarse, brown sand, some gravel, and trace silt.		Backfilled
4-4.5		2.2			SW: Loose, fine to medium, brown sand, some gravel, and trace silt.	Laboratory sample collected at 4' 10" fbg.	
5					REFUSAL: Large diameter concrete pipe located at approximately 4.8 fbg.		Refusal



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

MW-21 p. 1 of 1

Soil Boring Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-22**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **2 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/14/12**	Split Spoon/Acetate Sleeve Length: **5 ft.**
Drill Operator: **M. Schneck**	Drilling Method: **Direct Push**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Geoprobe Model #7822DT**	Sampling Method: **Macro-core**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'17.712"**	Longitude: **W 73º42'25.789"**	Top of Bentonite Seal: **NA**
Surface Elevation: **412.34**	Borehole Diameter: **4 in.**	Type of Seal: **Concrete**
Total Depth: **NA**	Well Diameter: **NA**	Top of Sand: **NA**
Refusal Depth: **6.5 ft.**	Riser Length: **NA**	Sand Type: **NA**
Initial Depth to Water: **NA**	Screen Slot Size: **NA**	Well Material Type: **NA**
Static Depth to Water: **NA**	Screen Length: **NA**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0				No Blow Counts		Hand cleared to 6.5 fbg.	
	2-2.5		3.3		SW: Compact, fine to medium, olive gray sand, some gravel, and trace silt.		Backfilled
	4-4.5		4.7		SW: Loose, fine to medium, brown sand, some gravel, and trace silt.		
5	5.5-6.5		4.6		SCHIST: Weathered mica schist interlayered with dolomitic marble.	Laboratory sample collected between 5.5 to 6.5 fbg.	

Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

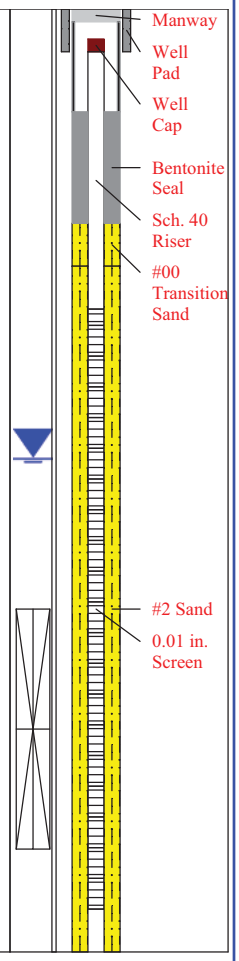
Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-23**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **2 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/14/12**	Split Spoon/Acetate Sleeve Length: **5 ft.**
Drill Operator: **M. Schneck**	Drilling Method: **Hollow Stem Auger/Direct Push**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Geoprobe Model #7822DT**	Sampling Method: **Macro-core**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'18.833"**	Longitude: **W 73º42'25.997"**	Top of Bentonite Seal: **1.5 fbg**
Surface Elevation: **411.92**	Borehole Diameter: **9 in.**	Type of Seal: **Bentonite, Cetco Medium**
Total Depth: **10 ft.**	Well Diameter: **2 in.**	Top of Sand: **2.5 fbg**
Refusal Depth: **10.5 ft.**	Riser Length: **3 ft.**	Sand Type: **Filpro #00 & #2 Sand**
Initial Depth to Water: **7.5 fbg**	Screen Slot Size: **0.010 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **5.09 fbg**	Screen Length: **7 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0						Hand cleared to 8 fbg.	Manway; Well Pad; Well Cap
	2-2.5		3.2	No Blow Counts	SW: Loose, fine to medium, brown sand, some gravel, and trace silt.		Bentonite Seal; Sch. 40 Riser; #00 Transition Sand
	4-4.5		3.1				
5							
	6-6.5		2.7				
	7-10		3.3			Laboratory sample collected between 7 and 10 fbg.	#2 Sand; 0.01 in. Screen
					SCHIST: Weathered mica schist.		
10							



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

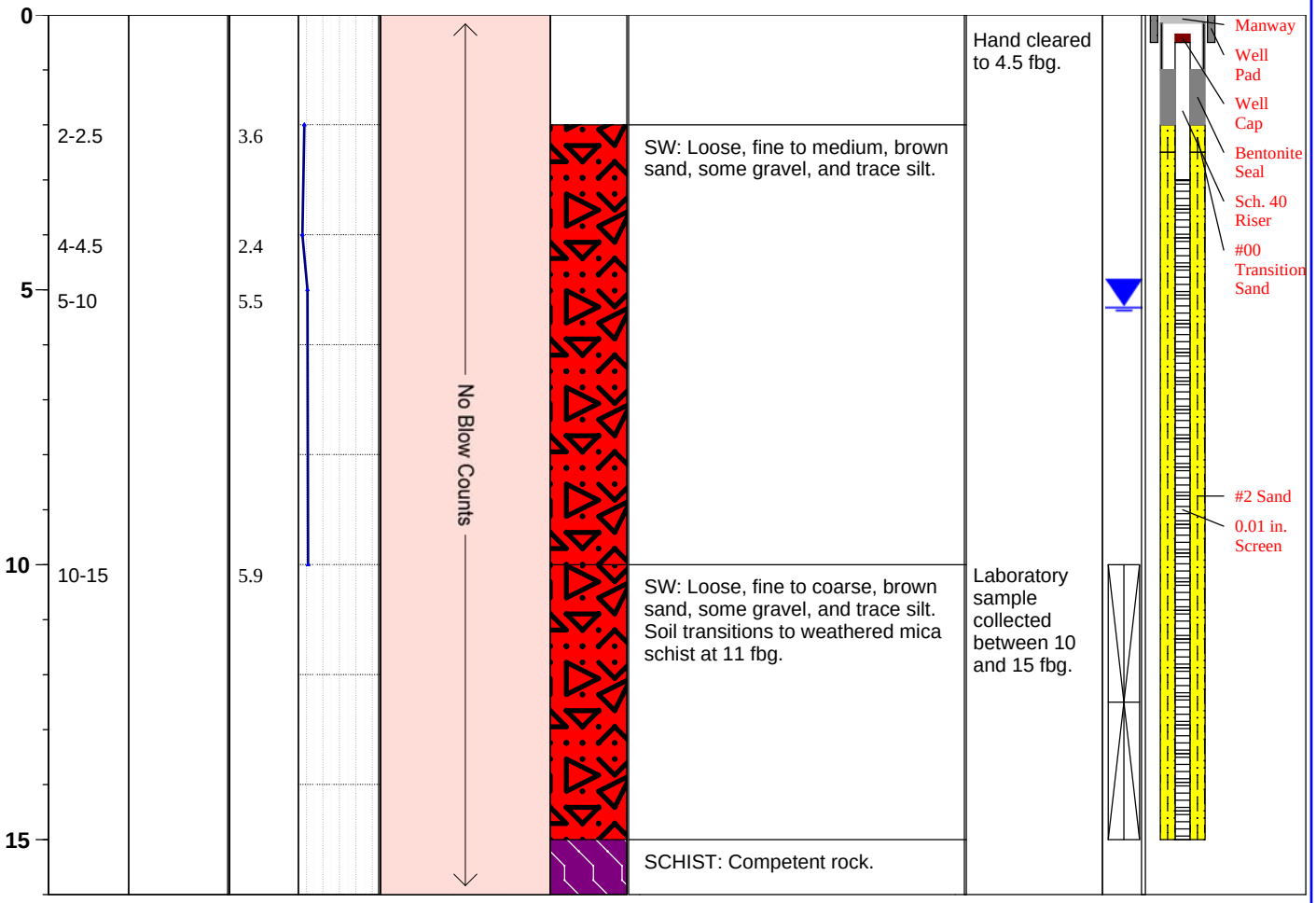
Monitoring Well Completion Log

Groundwater & Environmental Services, Inc.

ID NO. **MW-24**

Project: **D1, Bay 1A, Westchester Co. Airport**	Client: **EMES**	Regulatory Case #: **360037**
Address: **176 Airport Rd., Harrison, NY**	GES Job #: **1192290**	Regulatory Case Mgr: **M. Hubicki**
County: **Westchester**	GES Project Mgr: **M. DeGloria**	Permit #: **NA**
Logged By: **J. Simms**	Date Drilled: **6/11/12-6/15/12**	Split Spoon/Acetate Sleeve Diameter: **2 in.**
Drilling Company: **Longshore Environmental**	Completion Date: **6/15/12**	Split Spoon/Acetate Sleeve Length: **5 ft.**
Drill Operator: **M. Schneck**	Drilling Method: **Direct Push**	Soil Classification System: **USCS/Burmister**
Drill Rig Type: **Geoprobe Model #7822DT**	Sampling Method: **Macro-core**	Field Screening: **PID 10.6 eV Lamp (ppm)**
Lattitude: **N 41º04'18.089"**	Longitude: **W 73º42'24.892"**	Top of Bentonite Seal: **1.0 fbg**
Surface Elevation: **412.37**	Borehole Diameter: **4 in.**	Type of Seal: **Bentonite, Cetco Medium**
Total Depth: **16 ft.**	Well Diameter: **2 in.**	Top of Sand: **2.0 fbg**
Refusal Depth: **16 ft.**	Riser Length: **2.5 ft.**	Sand Type: **Filpro #00 & #2 Sand**
Initial Depth to Water: **8 fbg**	Screen Slot Size: **0.010 in.**	Well Material Type: **Schedule 40 PVC**
Static Depth to Water: **7.25 fbg**	Screen Length: **12 ft.**	Top of Grout: **NA**

Depth (feet)	Sample Interval (feet)	Recovery (inches)	Field Screen (ppm) 0 50	Blow Counts 1 100	Geologic Description	Comments	Well Completion Detail
0						Hand cleared to 4.5 fbg.	Manway, Well Pad, Well Cap, Bentonite Seal, Sch. 40 Riser, #00 Transition Sand
	2-2.5		3.6	No Blow Counts	SW: Loose, fine to medium, brown sand, some gravel, and trace silt.		
	4-4.5		2.4				
5	5-10		5.5				
10	10-15		5.9		SW: Loose, fine to coarse, brown sand, some gravel, and trace silt. Soil transitions to weathered mica schist at 11 fbg.	Laboratory sample collected between 10 and 15 fbg.	#2 Sand, 0.01 in. Screen
15					SCHIST: Competent rock.		



Proportions Used:

Trace = <5%
Few = 5-10%
Little = 10-20%
Some = 20-30%
Adjective = 30-40%
And = >40%

Notes:

NA = not available; fbg. = feet below grade
in. = inches; ft.= feet; ppm= parts per million
Soil Lithologies based on field observations only.

Blow Count Pentration Resistance:

Consistency (M&C)		Density (G&S)	
<2 =	Very Soft	0-4 =	Very Loose
2-4 =	Soft	4-10 =	Loose
4-8 =	Medium	10-30 =	Medium
8-15 =	Stiff	30-50 =	Dense
15-30 =	Very Stiff	>50 =	Very Dense
>30 =	Hard		

Symbols:

Apparent Water Level
Lab Sample Location

APPENDIX F – SAMPLING AND INSPECTION FORMS

Quarterly Ground Water Gauging Sheet
Westchester County Airport, Hangar D

Well ID	Well Diameter (inches)	Approximate DTW (ft)	Approximate DTB (ft)	Approximate DTP (ft)	COMMENTS
MW-01	2		13.30		
MW-02	2		15.92		
MW-03	2		17.37		
MW-04	2		17.50		
MW-05	2		14.40		
MW-06	2		19.54		
MW-7S	2		24.60		
MW-7D	3		45.30		
MW-8S	3		24.90		
MW-8D	3		46.40		
MW-9S	2		19.80		
MW-9D	3		39.70		
MW-10S	2		36.87		
MW-10D	3		49.65		
MW-11S	3		39.55		Destroyed
MW-11D	3		56.50		Destroyed
GP-3	1		12.75		
GP-2B	1		13.70		
MW-12	2		14.77		
MW-13	2		19.95		
MW-14	2		17.66		
IP-1	2		15.50		
IP-2	2		15.52		
MW-15S	4		26.40		
MW-16	2		11.80		
MW-17S	2		31.60		
MW-18	2		15.00		
MW-19	2		19.75		
MW-20	2		12.05		
MW-23	2		10.55		
MW-24	2		14.85		

Well Sampling Data Form

Westchester County Airport, Hangar D

Well ID: _____ **Date:** _____

DTW: _____ **Intake (Depth of Pump):** _____

DTB: _____ **Total Volume Purged:** _____

Purge Start: _____

Pump Settings: CPM: _____ **PSI:** _____ **Discharge Rate:** _____

Time	**DTW** (ft bls) [0.3 ft*]	**FR** (ml/min) [<500 ml/min]	**T** (^{o}C) [3%]	**Sp. Cond.** (mS/cm) [3%]	**DO** (mg/L) [10%]	**pH** (SU) [+/- 0.1 units]	**ORP** (mV) [+/- 10 mV]	**Turb** (NTU) [10%]	**Volume Purged** (gallons)

Purge Water Description: _____

_____

_____

Purge End: _____

Depth to Bottom (after purging): _____ **Depth to Product (after purging):** _____

Final Pump Settings: CPM: _____ **psi:** _____ **Discharge Rate:** _____

Sample Time: _____ **Sample Time on Bottles:** _____

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

APPENDIX G – QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

HANGAR D1 BAY 1B
WESTCHESTER COUNTY AIRPORT

WOODARD & CURRAN
Engineering • Science • Operations

Updated October 2014

TABLE OF CONTENTS

1. INTRODUCTION 1

1.1 PROJECT DESCRIPTION 1
1.2 SITE DESCRIPTION 1
1.3 PROJECT OBJECTIVES 2
1.4 DATA GATHERING OBJECTIVES 2
1.4.1 Investigation Synopsis 2
1.4.2 Physical Characterization Activities 2
1.5 PROJECT SCHEDULE 2
1.6 CHEMICAL PARAMETERS TO BE MEASURED 2

2. PROJECT ORGANIZATION 3

2.1 NYSDEC PROJECT MANAGER 3
2.2 CLIENT PROJECT MANAGER 3
2.3 CONSULTANT PROJECT MANAGER 3
2.4 FIELD LEAD PROJECT MANAGER 4
2.5 FIELD LEAD SITE MANAGER/SUPERVISOR 4
2.6 PROJECT QUALITY ASSURANCE OFFICER 4
2.7 HEALTH AND SAFETY OFFICER 4
2.8 ANALYTICAL LABORATORY SUBCONTRACTOR 4

3. QUALITY ASSURANCE OBJECTIVES AND CRITERIA 5

3.1 OVERALL PROJECT OBJECTIVES 5
3.2 DATA QUALITY OBJECTIVES (DQOS) 6

4. SAMPLING PROCEDURES 8

4.1 MEDIA SAMPLING 8
4.1.1 Review of Sampling Procedures 8
4.1.2 Field Equipment 8
4.1.3 Sample Containers 9
4.1.4 Laboratory Scheduling 9
4.1.5 Health and Safety 9
4.2 FIELD SAMPLING PROTOCOLS 9
4.2.1 Soil Sampling Procedures (if required) 10
4.2.2 Groundwater Gauging and Sampling 11
4.2.3 Soil Vapor, Indoor or Outdoor Air Sampling Procedure 14
4.2.4 Waste Disposal Sampling 16
4.2.5 Equipment Decontamination 16
4.2.6 Blank Samples 17
4.2.7 Documentation 17

5. SAMPLE CUSTODY 19

5.1 FIELD CUSTODY PROCEDURES 19
5.1.1 Sample Identification 19
5.2 LABORATORY CHAIN-OF-CUSTODY 20
5.3 LABORATORY SAMPLE TRACKING AND MANAGEMENT 20

6. CALIBRATION PROCEDURES AND FREQUENCY 22
6.1 LABORATORY CALIBRATION 22
6.2 FIELD CALIBRATION 22
7. ANALYTICAL PROCEDURES 23
7.1 LABORATORY ANALYSES 23
7.2 METHOD SELECTION 23
8. DATA REDUCTION AND REPORTING 24
8.1 DATA REDUCTION 24
8.1.1 Field Data Collection and Reduction 24
8.1.2 Laboratory Data Collection and Reduction 24
8.2 IDENTIFICATION AND TREATMENT OF OUTLIERS 25
8.2.1 Identification of Outliers 25
8.2.2 Treatment of Outliers 26
8.3 DATA REDUCTION, REPORTING, AND REPORT STORAGE 26
8.3.1 Data Reduction 26
8.3.2 Data Reporting 27
8.3.3 Data Validation 27
8.3.4 Environmental Data Submission 28
8.3.5 Report Storage 28
9. INTERNAL QUALITY CONTROL CHECKS 29
9.1 FIELD QUALITY CONTROL CHECKS 29
9.1.1 Blanks 29
9.1.2 Duplicates 29
9.2 LABORATORY QUALITY CONTROL 30
10. PERFORMANCE AND SYSTEM AUDITS 31
10.1 PERFORMANCE AUDITS 31
10.2 SYSTEM AUDITS 31
10.3 ON-SITE INSPECTIONS 31
11. CORRECTIVE ACTION 32
11.1 LABORATORY CORRECTIVE ACTION 32
11.2 CONSULTANT CORRECTIVE ACTION 32

TABLES

Table 1: Recommended Containers, Preservation, Storage, and Holding Times

FIGURES

Figure 1: Site Location Map
Figure 2: Site Boundaries and Groundwater Contour Map (August 2014)
Figure 3: Project Organization Chart and Resume Summaries

APPENDICES

Appendix A: DQO Summary Forms
Appendix B: Laboratory Quality Assurance Plan
Appendix C: Sampling Visit Procedures

1. INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been updated on behalf of ExxonMobil Oil Corporation (ExxonMobil) in conjunction with the Site Management Plan (SMP) for Hangar D1 Bay 1B at the Westchester County Airport located in Harrison, New York (the "Site", refer to Figures 1 and 2 in the SMP and included herein). This QAPP has been prepared in accordance with the general guidelines and requirements of the New York State Department of Environmental Conservation (NYSDEC). The QAPP focuses on specific QA/QC activities, policies, applicable organization, objectives, and functional activities that are designed to achieve data quality objectives for this specific project. The QAPP contains detailed procedures and references to approved documents to be utilized during all field investigation and analytical laboratory activities relating to the Site.

1.1 PROJECT DESCRIPTION

This site-specific QAPP describes the Quality Assurance (QA) Program and Quality Control (QC) procedures employed to ensure the integrity, validity and usability of the analytical results. The analytical procedures utilized to support this project will include sample analysis using NYSDEC Analytical Services Protocol (ASP), United States Environmental Protection Agency (EPA) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Third Edition", as well as the American Public Health Association (APHA) publication "Standard Methods for the Examination of Water and Wastewater, 22nd Edition". Selected groundwater samples will be analyzed for volatile organic compounds (VOCs), pH, specific conductance, temperature and other in-situ water quality analysis. Selected soil vapor and air samples will be analyzed for VOCs. The work is being completed to confirm post-remediation conditions at the Site for residual concentrations of chlorinated solvents in soil vapor and groundwater. Remediation consisted of a soil vapor extraction system for unsaturated zone soils, and the injection of oxidants for the vadose zone.

1.2 SITE DESCRIPTION

The Westchester County Airport is located in the Town of Harrison, Westchester County, New York. The northeast boundary of the airport is adjacent to Fairfield County, Connecticut. Undeveloped woodlands are located north, south and east of the airport. Rye Lake is located west of the airport.

The airport began operations in 1952. Hangar D was also constructed in 1952. During the first 30 years of operation, the airport hangers were managed by Gulf Oil under a long term lease with Westchester County. Hangar D1 Bay 1B was used by Mobil from 1982 until 1990 as a base for corporate flight operations which included routine aircraft maintenance, technician labs, an electronic lab, and a small paint booth used only for touch-up painting. On-site facilities also included administration offices, a pilot's briefing room, conference room and an executive lounge.

The Site is serviced by municipal water and sewer. Although no drinking water wells are located on the Site, or within the boundaries of the airport, Rye Lake, also known as Kenisco Reservoir, is located approximately 3,500 feet to the west and cross-gradient of the Site. Additionally, residential properties located approximately ¾ of a mile to the south and hydrogeologically downgradient of the Site utilize private drinking water wells installed into bedrock. The nearest residential property to the Site is approximately ½ mile to the east and cross-gradient from the Site.

1.3 PROJECT OBJECTIVES

The purpose of the SMP is to provide guidance for Site monitoring following the completion of remedial actions at the Site in accordance with the Record of Decision (ROD).

The SMP outlines the data to be collected following remediation to confirm the effectiveness of the remedy to reduce or mitigate contamination at the Site. The data to be collected will be retained in accordance with the field techniques for sample collection and handling, as outlined in this QAPP.

A fully state-certified and National Environmental Laboratory Accreditation Conference (NELAC) laboratory will perform the analytical work. The laboratory will provide analytical results including QA/QC sample results and electronic data deliverables (EDD).

1.4 DATA GATHERING OBJECTIVES

Definitions of specific work activities and their objectives are derived from the data quality objectives (DQOs), which are reflected in the overall project approach. The DQOs can be found in Appendix A.

1.4.1 Investigation Synopsis

The investigation designed for the Site addressed the presence or absence of organic constituents, as necessary, in soils, soil vapor, and groundwater. The work activities planned as part of the monitoring program are detailed in the SMP or task-specific work plan.

1.4.2 Physical Characterization Activities

The data collection requirements are discussed in the SMP or task-specific work plan. The base tasks required to collect the respective samples are detailed in this QAPP.

1.5 PROJECT SCHEDULE

The project schedule is outlined in Table 8 in the SMP or the task-specific work plan.

1.6 CHEMICAL PARAMETERS TO BE MEASURED

Chemical parameters to be measured include primarily (Project Compound List – PCL)

- Volatile organic compounds (VOCs),
- pH
- Specific Conductance
- Groundwater Temperature
- ORP
- Dissolved Oxygen

The analytical data package will include all associated QC data and backup, as required. Additional task-specific sampling and laboratory analysis will be provided in the task-specific work plans. Table 1 and Appendix A summarize sample matrices and laboratory analytical methods to be utilized.

2. PROJECT ORGANIZATION

This section describes the project team that has been assembled to complete the remedial program. In addition, the responsibilities of key project personnel have also been outlined. Please note that multiple project team positions may be assigned to a single project team member. For example, the on-site health and safety officer may also be the field supervisor. The following is a listing of selected/key project positions:

- NYSDEC Project Manager;
- Client Project Manager;
- Consultant Project Manager;
- Field Lead Project Manager;
- Field Lead Site Manager/Supervisor;
- Project Quality Assurance Officer;
- Health and Safety Officer; and
- Analytical Laboratory Subcontractor.

The following is a brief description of selected/key project personnel and their roles within the investigation program. A project organization chart is included as Figure 3.

2.1 NYSDEC PROJECT MANAGER

The NYSDEC Project Manager (NYSDEC PM) will interface directly with the Client Project Manager or the Consultant Project Manager as the Client Project Manager directs. The NYSDEC PM will be the central point of contact for interagency and other regulatory bodies that have an interest in this project. The NYSDEC PM will also monitor the progress of the project, and ensure that it is being implemented to the NYSDEC's satisfaction. All report comments, NYSDEC correspondence, and requests from any regulatory agency will be funneled through the NYSDEC point-of-contact.

2.2 CLIENT PROJECT MANAGER

The Client Project Manager (Client or ExxonMobil PM) will interface directly with the consultant to ensure that the overall program is being implemented in accordance with all regulatory agency requirements. The ExxonMobil PM is also responsible for the timely submittal of reports and other project documentation to NYSDEC.

2.3 CONSULTANT PROJECT MANAGER

The Consultant Project Manager (Consultant PM) is responsible for the overall technical aspects of the program implementation. The Consultant PM will provide overall guidance to the Field Lead PM to ensure that all tasks are scoped in accordance with the objectives, procedures, and project schedule established in the SMP or task-specific work plan. In addition, the Consultant PM will serve as a primary point of contact for the ExxonMobil PM, maintain the project files, and disseminate project data and results for analysis.

2.4 FIELD LEAD PROJECT MANAGER

The Field Lead Project Manager (Field Lead PM) is responsible for the logistical aspects of the program implementation. The Field Lead PM will provide overall guidance to the field staff to ensure that all tasks are completed in accordance with the objectives, procedures, and project schedule established in the SMP or task-specific work plan. In addition, the Field Lead PM will review and assess the performance of the project staff and subcontractors and serve as a primary point of contact for the ExxonMobil PM.

2.5 FIELD LEAD SITE MANAGER/SUPERVISOR

The Field Lead Site Manager/Supervisor (Field Lead SM/S) is responsible for the coordination and day-to-day operations of the personnel assigned to the field team. The Field Lead SM/S will ensure that all specified procedures are used, supervise on-site Field Lead/Consultant/Subcontractor personnel, and serve as the on-site Health and Safety Officer. The Field Lead SM/S will provide technical work scope implementation consultation to both the field team and the Field Lead PM and reports directly to the Field Lead PM.

2.6 PROJECT QUALITY ASSURANCE OFFICER

The Quality Assurance Officer (QAO) provides in-house consultant review of field methods/procedures and laboratory data, but is not involved with the day-to-day execution of the work scopes. The QAO's responsibility (or his/her designee's) is to review field and lab data for compliance with QAPP requirements. The QAO or designee will review the field notes and sample collection techniques, and interact with the laboratory regarding issues specifically germane to laboratory data generation tasks. The QAO duties for this project are shared by the Consultant and Field Lead PMs, who report directly to the ExxonMobil PM.

2.7 HEALTH AND SAFETY OFFICER

The Health and Safety Officer (HSO) is responsible for providing hazard communication information, oversight of training employees (as directed by the ExxonMobil PM) in safe operating procedures, and advising the ExxonMobil PM on any matters which involve the health and safety of personnel completing the field work. The HSO will be consulted prior to any changes made in the project-specific Health and Safety Plan (HASP). The HSO duties will be conducted or assigned by the Field Lead PM.

2.8 ANALYTICAL LABORATORY SUBCONTRACTOR

The analytical laboratory will be responsible for the chemical characterization of all samples collected for fixed base analysis (versus field analyzed samples). The designated laboratory will be a contractor able to complete the prescribed analyses in accordance with EPA SW-846, third edition requirements. Further, the laboratory will maintain an internal QA/QC and data validation program in accordance with all applicable certifications. The laboratory selected for the program is Accutest Laboratories (Accutest), located in Dayton, NJ. The specific documentation from the Laboratory is included in Appendix B.

3. QUALITY ASSURANCE OBJECTIVES AND CRITERIA

It is expected that by the design of separate data quality requirements for field sampling and laboratory analysis, clear distinctions between any problems found in the system can be isolated with respect to the cause. The data quality requirements are also designed to provide an indication of the variability inherent to the overall system. The quality control samples, field sampling protocols, and project-specific standard operating procedures (SOP's) are utilized to identify and to address the variability in the total system, as necessary.

3.1 OVERALL PROJECT OBJECTIVES

The work planned for the Site will address the concentrations of chlorinated solvents related to remediation of the Site. The assessment and analytical strategies have been selected to achieve the project goals of the Site. The seven steps included in EPA's DQO Process Guideline Document (EPA QA/G-4) were implemented in developing the DQO's for this project. The seven steps include the following:

1. Statement of the Problem.
2. Identification of the Decision.
3. Identification of the Inputs to the Decision.
4. Definition of the Boundaries of the Study.
5. Development of a Decision Rule.
6. Specification of Tolerable Limits on Decision Errors.
7. Optimization of the Design for obtaining Data.

To achieve the overall objectives, specific data quality requirements will need to be met. The DQOs outlined below and summarized in the DQO Summary Forms (Appendix A) represent quantitative and qualitative statements specifying the quality of the environmental data required to support the decision making process for this project. The DQOs define the acceptable limits for individual activities or for overall sequences of processes when the individual activities cannot be isolated. The indicators of data quality can be determined through evaluation of a number of key parameters. Precision, accuracy, representativeness, completeness and comparability, more commonly known as PARCC parameters, are utilized to determine data quality. The general definitions of the data quality indicators used in the subsequent sections are defined below.

Precision - Precision is the degree of agreement between a set of measurements, irrespective of the true value. Precision or reproducibility is determined through the evaluation of duplicate or replicate samples. The relative percent difference (RPD) of the two sample results is calculated and evaluated in relation to acceptable limits for the analytical method and sample matrix.

Accuracy - Accuracy is a measure of bias, or the difference between a measurement and an accepted or true value. This difference can be expressed as a percent of the true value and/or % Recovery A central goal of the accuracy objective is to identify, evaluate, and limit systematic and random errors in the measurement system.

Representativeness - Representativeness expresses the degree to which data accurately and precisely represents the characteristic of the environmental area from which it was obtained. Multiple random measurements or sampling rounds improves the accuracy of a determination when random errors are

involved. In this way, the effects of random error are minimized. Systematic errors affect the representativeness as well and are covered by the accuracy DQOs. The precision of random samplings is the primary measure to be used to monitor the effects of the various factors, such as medium homogeneity, which affect representativeness.

Completeness - Completeness is the ratio of the amount of valid data obtained from a measurement system compared to the amount expected under ideal conditions. The amount of data expected from a measurement system is by design a sufficient amount to achieve the overall project objectives. A sufficient amount of data of known quality must be generated to properly assess the study area and to substantiate further decision making.

Comparability - Comparability expresses the confidence with which one data set can be compared with another data set from a different phase or from a different program. Comparability involves a review of a composite of the parameters generated above as well as review of design factors such as sampling and analytical protocols. Inter-laboratory evaluations can play a role in the evaluation of analytical comparability.

3.2 DATA QUALITY OBJECTIVES (DQOS)

The general quality goal for the field investigation is to maximize the confidence in the data set generated in terms of each of the data quality indicators. DQO Summary Forms are included in Appendix A.

The limits to be used for evaluation of accuracy and precision of the data generated will include the laboratory limits as well as those found in the appropriate EPA Method. The data will be qualified for outliers using qualifiers as stated in the laboratory's QA documentation. Please refer to Section 8.3 of this document, entitled "Identification and Treatment of Outliers".

Precision Precision is a measure of the variability or random error in measurements of the same sample. Precision is typically evaluated by the calculation of the relative percent difference (RPD) in the concentration between duplicate samples. The overall precision is a mixture of sampling and laboratory variability. Laboratory duplicates and field duplicates are both used to evaluate precision. The laboratory duplicate RPDs provide an indication of analytical laboratory precision, while field duplicated RPDs provide an indication of overall laboratory and field precision.

The data quality objective for the field is to achieve a precision on field duplicates equal to or better than the laboratory duplicate data objectives. Frequency limits for laboratory precision are included in the associated analytical methods. Field duplicate samples are generally collected at a frequency of one per twenty samples collected per matrix.

In general, the associated project samples are not qualified based upon the field duplicate analysis. However, this information is used in conjunction with the remaining quality control information generated to evaluate the sampling and analytical program. Laboratory precision will be evaluated using Matrix Spikes and Matrix Spike Duplicates.

Accuracy Accuracy for a particular analysis is measured by assessing percent recovery of a "known" compound, which is added to or "spiked" into the project and quality control samples. All spiking solutions and standards used will be EPA standard reference materials. The objective for total accuracy is to meet the laboratory accuracy limits for the target compound list as published in the

appropriate method.

The accuracy limits and frequency for analysis are included in the associated analytical methods. Laboratory accuracy will be qualified in accordance with EPA guidelines. The following quality control areas generate accuracy information:

- System Monitoring (Surrogate Compound) Recovery;
- Matrix Spike and Matrix Spike Duplicates; and
- Matrix Spike Blanks and Laboratory Control Samples.

If needed, soil analytical results will be compared to field screening results, if available, and observations made during the time of sample collection to assess the precision of volatile analyses reported in subsequent laboratory data packages.

Representativeness The field objectives for representativeness are to: a) minimize the effects of bias resulting from loss and contamination during sampling and handling; and b) to assess and minimize the effects of factors, such as medium heterogeneity, which leads to imprecision.

To monitor the potential for field or cross contamination, equipment blanks will be collected for batches of sampling equipment. Rinsate blanks will be collected and will be applicable to all samples collected, or by the use of the sampling equipment decontaminated on that particular date. Sampling protocols, preservation and sample handling procedures as described in Section 4.0, will be instituted to enhance representativeness for the project. If analytical results of sampling events warrant, the rinsate blank samples will be analyzed to assess the representativeness of the sampling event.

The representativeness will be assured by the fulfillment of the DQOs for accuracy and precision and will be evaluated by means of the laboratory and field duplicate samples which are hypothetically identical samples.

Completeness The field objective for completeness is 90%. Every effort will be made to obtain valid samples for every sampling point in the plan. However, due to complications in homogeneity and possible matrix interference, some difficulty is expected in generating data from samples that require all of the DQOs. Therefore, the laboratory minimum objective for completeness will be 80%. Sufficient duplicates and backup samples will be collected to assure a high return of valid data for the project samples.

Comparability The field objective for comparability is to: a) provide samples collected by standardized protocols, and, b) to collect sufficient information concerning geological and physical characteristics of the sampling sites to allow determination of the physical comparability so that the new data can be compared with descriptions of historic records. The data collection personnel will use standardized methods of field analysis, sample collection, holding times, and preservation. In addition, field conditions will be considered prior to sampling to attain a high degree of data comparability. The attainment of the DQOs for accuracy and precision, representativeness, and completeness will also contribute to the comparability of the data collected.

4. SAMPLING PROCEDURES

4.1 MEDIA SAMPLING

This section specifies sampling equipment, sampling methods, and analytical procedures that will be used for the field activities at the Site. Inspection and calibration procedures have been established to ensure that all equipment is in proper working order prior to going into the field. Decontamination procedures are also detailed. Prior to sampling, the following steps must be taken by the persons responsible for the collection of the various media samples retained for both investigations.

1. Thoroughly review the SMP or task-specific work plan, appropriate Standard Operating Procedures, sampling procedures and required analyses.
2. Assemble and inspect all field equipment necessary for sample collection, verify that the equipment is clean and in proper working order. Note and replace any items that are in short supply or that are showing indications of wear. Calibrate all equipment to manufacturer's specifications.
3. Procure all sampling containers. Examine containers to ensure that their integrity is not compromised. Contact the laboratory if any problems are found.
4. Confirm sample delivery date and method of shipment with the laboratory.
5. Review the site-specific HASP.

4.1.1 Review of Sampling Procedures

Field personnel involved in the sample collection process will be thoroughly familiar with the procedures outlined in the SMP and any task-specific work plans. Field personnel will review the procedures outlined in this QAPP and any questions will be addressed before going to the Site.

4.1.2 Field Equipment

Field equipment is to be maintained through the use of a tracking system. When damaged equipment in need of repair is returned to the equipment warehouse or vendor, it will be appropriately flagged for the required maintenance to be performed. This process assures only operable and properly maintained equipment enters the field. Routine daily maintenance procedures conducted in the field will include:

1. Removal of dirt and debris from exposed surfaces of sampling equipment and measurement systems;
2. Storage of equipment away from the elements;
3. Daily inspections of sampling equipment and measurement systems for possible problems (e.g., cracked or clogged lines, weak batteries);
4. Check instrument calibration; and
5. Charging any battery packs when equipment is not in use.

Spare replacement parts stored in the field to minimize downtime include:

1. Appropriately sized batteries;
2. Locks;
2. Extra sample containers and preservatives;

3. Extra sample coolers, packing materials, and sample locations stakes;
4. Additional supply of health and safety equipment (i.e., respirator cartridges, boots, gloves, Tyvek, etc.); and
5. Additional equipment as necessary for the field task.

Field equipment necessary to complete the sampling program is summarized in Section 6.2 and listed in Appendix C. This list will be reviewed before going to the Site to ensure that all of the necessary equipment is available and in good working order. Any additions or changes to this list shall be made before going to the Site.

4.1.3 Sample Containers

Sample containers used will not distort, rupture, leak, adsorb, or react with constituents of the samples. The containers will have adequate wall thickness to withstand handling, sample collection, and transportation to the laboratory. Containers will be large enough to contain the optimum sample volume. All sample containers will be pre-cleaned, pre-preserved, and supplied by the contract laboratory. The sample container size, type, and preservative necessary for sampling visits are listed in Table 1.

4.1.4 Laboratory Scheduling

The laboratory selected to analyze samples will be notified as to the types of analysis to be run, number of samples per analyses, sampling date, and expected arrival date at the laboratory. This information will be utilized by the laboratory for scheduling purposes to insure that all samples are analyzed in accordance with current SW-846 and APHA Standard Method for Examination of Water and Wastewater procedures.

4.1.5 Health and Safety

A site-specific HASP has been developed for this Site in accordance with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation, 29 CFR 1910.120 and additional requirements by ExxonMobil for this Site. All field personnel involved with the field programs will be thoroughly familiar with the HASP. Field personnel will sign off on the document acknowledging that they have read and understand its contents.

All personnel working at this Site will have a minimum of 40 hours of initial hazardous waste activity instruction and an annual 8 hours of refresher training, as well as a minimum of three days of field experience under the direct supervision of an experienced person. On-site managers and supervisors directly responsible for the employees engaged in the sampling activities will also receive an additional 8 hours of supervisory training. These training requirements comply with the OSHA HAZWOPER regulation.

4.2 FIELD SAMPLING PROTOCOLS

This section details procedures which will be followed to collect representative media samples from the proposed locations. A summary of the post-remediation sampling planned for each media is provided in the SMP and any task-specific work plans.

4.2.1 Soil Sampling Procedures (if required)

Subsurface soil samples will be collected using either direct push technology (Geoprobe®) or conventional drilling methods. For conventional drilling, a pre-cleaned 2-inch diameter by 24-inch long standard split spoon will be driven by a standard 140 pound hammer through 4.25-inch inside diameter by 6.5-inch outside diameter hollow stem augers. Also, a standard 'Shelby Tube" may also be used in lieu of the split spoon. For Geoprobe® soil sampling, a pre-cleaned 2.125-inch drive probe (36 or 48 inches long) will be driven using the Geoprobe® drive assembly. The tool string (sampler and outer casing) is driven one sampling interval (36 to 48-inches) to collect the soil sample. A 1.125-inch diameter soil sample is extracted with the inner-rod and liner.

At each boring location, samples will be collected continuously from the ground surface to the base of the boring. Each sample will be screened with a PID and the reading will be recorded on a log. The sample depth(s) designated by the task-specific work plan being implemented, will be retained for the respective analysis.

The work steps listed below will be followed during the soil sample collection process:

1. Check the calibration of the photoionization detector (PID) with 10.2 eV lamp or equivalent daily. If the calibration is incorrect, re-calibrate the instrument according to manufacturer's specifications.
2. The Geoprobe® soil sampling core barrel will be fitted with either an acrylic, or Teflon liner or PVC sampling core tube. A new liner /core tube will be fitted in the soil sampling device after each sample interval.
3. Collect core samples at the intervals specified in the work scope. Put on new disposable latex sampling gloves and open the split spoon. For a Geoprobe® sample cut open the acrylic or Teflon™ or PVC liner. Quickly log the soil characterization information. Using a clean spatula, vertically slice the soil, separating portions for field screening and lab analysis from the same vertical interval. Upon retrieval of the soil sampling device, appropriate containers will be filled immediately, and in accordance with requirements as noted Table 1. In addition, the field screening container will be filled and set aside. Please note that soil samples collected for VOCs will not be composited, sieved or homogenized prior to sample containerization. All samples will then be placed on ice in a staging cooler, pending the selection of samples for laboratory analysis. The field screening container will be screened using the PID as described in Step 4. Samples selected for laboratory analysis will be shipped to the laboratory within 24 hours of collection via an overnight carrier. The detailed procedure for sample handling and Chain-of-Custody (COC) procedures is described in Section 5.0.
4. Samples to be used for the field screening sampling container, place a piece of clean aluminum foil over the mouth of the jar before putting on the lid and place the sample in a warm area to enhance volatilization. Wait approximately ten (10) to fifteen (15) minutes and screen the sample with the PID. Log the results in the field log.
5. Affix a label and custody seal to the retained containers and place the samples in the insulated cooler. Discard unneeded samples with drill spoils**,** which will be stored near the boring location, and covered with plastic pending receipt of the sample data.

6. Label the sample containers with a self-adhesive label and waterproof ink and seal the containers with custody seals. Labels will include the following information:

   a. Sample identification number,
   b. Job name and identification number,
   c. Date and time of sample collection,
   d. Type of analysis requested, and
   e. Name of sampler.

7. Complete soil boring log.

8. Decontaminate all non-disposable sampling equipment as detailed in Section 4.2.5. Locations for duplicate samples will be based on field observations (i.e., intervals with high PID readings and/or adequate sample volume). At duplicate locations, the emphasis will be placed on VOC portions. The remaining recovered sample will be divided among the other parameters.

9. Repeat steps 1-8 for all of the boring locations and collect the appropriate blanks and duplicate samples as discussed in Sections 4.2.6 and 9.0.

10. Fill out the COC form and reference the preservation techniques in the remarks section.

11. Store the collected samples obtained during the sampling activities together under refrigeration and in an area known to be free of contamination.

12. Enter into the field log book, at a minimum, the information requested in Section 4.2.7.

13. Ship the iced sample set via overnight carrier within 24 hours of collection, maintaining COC as described in Section 5.0. Each cooler shall contain a temperature blank, which the laboratory will use to verify that the samples are chilled to 4 C.

4.2.2 Groundwater Gauging and Sampling

4.2.2.1 Groundwater Gauging

Prior to purging and sampling, all Site monitoring wells will be gauged using a water level indicator probe (or equivalent) to determine depth to water and depth to bottom of the monitoring well within 0.01 ft based on the surveyed top of casing elevation. The following work steps will be followed during the well gauging:

1. Remove the monitoring well cover from the well utilizing the proper lifting equipment and techniques**,** record pertinent observations.

2. Monitor vapor conditions for the well interior with a PID with a 10.2 eV lamp and an oxygen/lower explosive limit (O_2/LEL) meter. The PID and the O_2/LEL meter will be calibrated according to the manufacturers' specifications, prior to each days sampling event.

3. Using a water level indicator probe instrument capable of measuring to 0.01 foot the depth to water. Use the top of the monitoring well casing or sampling point as the reference point and record in the field log book. Care should be taken to minimize disturbance to the water column and to any particulates adhering to the sides or at the bottom of the well. Therefore, to avoid disturbing any accumulated sediment and to

prevent mixing of stagnant water with water in the screened interval, the total depth to bottom should be measured well in advance (1-2 weeks) of the gauging, purging and sampling event. Obtain depth to bottom of well information and calculate the standing water volume as: depth of water column x cross-sectional area of the well.

4. Record all monitoring and observation data in the field log book. Check results for consistency with previously measured values before proceeding.

4.2.2.2 Groundwater Sampling

A groundwater sampling program will be conducted to procure and analyze samples from monitoring wells, and from Geoprobe boreholes from depth-discrete horizons within the various aquifers. Boreholes or monitoring wells will be purged and sampled by the low-flow purging and sampling methods described in this section. These methods are adapted from EPA *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (January 2010).

For the low flow purging and sampling, adjustable rate, positive displacement pumps (e.g., low flow rate submersible centrifugal or bladder pumps of stainless steel or Teflon construction are recommended). The pump should be easily adjustable and capable of operating reliably at lower flow rates within the well or at the surface.

Tubing used in purging and sampling each well must be dedicated to the individual well. Once properly located (in well or at the surface with a drop tube), avoid moving the pump or tubing in the well. The same tubing should be used for purging and sampling. Teflon or Teflon-lined polyethylene tubing must be used for collecting samples for organic analysis. For samples collected for inorganic analyses, Teflon or Teflon lined polyethylene, PVC, Tygon or polyethylene tubing may be used. The tubing length should be minimized.

Groundwater samples will be collected from the sampling points in the order of least contamination to the most contamination to limit cross-contamination.

Samples will be collected in containers pre-preserved at the laboratory, if a chemical preservative is required. The containers will be pre-preserved according to guidelines listed in Table 1. All samples will be iced and/or refrigerated, in addition to required chemical preservation, from the time of collection to shipment to the laboratory. The following general work steps will be followed during the procurement of the groundwater samples:

1. Attach and secure the polyethylene tubing to the pump. As the pump (or tubing) is slowly lowered into the well, secure the safety drop cable, tubing and/or electrical lines to each other using nylon stay-ties, if applicable.
2. The pump, tubing and/or electrical lines should be lowered slowly into the well to a depth corresponding to the center of the saturated screened section of the well, or at a location determined to either be a preferential flow path or zone of contamination. The pump/tube intake should be kept above the bottom of the well to prevent any mobilization of sediment present in the bottom of the well. If possible, the pump/tubing should be placed in the well 12 to (preferably) 48 hours prior to purging/sampling to minimize the effects of turbidity and mixing in the well due to the introduction of the pump/tubing.

3. Start pumping water from the well at a rate of 100 to 400 milliliters per minute (mL/min) if possible. Avoid surging. Watch for air bubbles displaced from the discharge tube to evaluate progress of steady pumping until water arrives at the surface. The pumping rate should cause little or no water level drawdown (<0.2 ft) and the water level should stabilize. Water level measurements should be made during purging. Precautions should be made to avoid pump suction loss or air entrainment. If needed, pumping rates should be reduced to the minimum capabilities of the pump to avoid pumping the well dry and ensure stabilization of indicator parameters. If the recharge rate of the well is very low, purging should be interrupted so as not to cause the drawdown to advance below the pump intake, but the operator should try to maintain a steady flow rate to the extent possible. In these low-yielding wells, where 100 mL/min exceeds the entrance rate of groundwater into the well, it is important to avoid dewatering the well screen interval. In these cases, the pump should remain in place and the water level should be allowed to recover repeatedly until there is sufficient volume in the well to allow sample collection.

4. While purging the sampling point or well, monitoring of in-line (via a flow-through cell apparatus) water quality indicator parameters should include turbidity, specific conductance, pH, dissolved oxygen (DO-appropriately qualified in the field notes) and redox potential (eH). These measurements must be collected every three (3) to five (5) minutes until all of the parameters have stabilized. Stabilization is achieved when three (3) successive readings are within $\pm$0.1 for pH, $\pm$3% for conductivity, $\pm$10mv for Eh and $\pm$10% for turbidity. The minimum parameters that can be used to determine stabilization during purging in this procedure are pH, specific conductivity. Turbidity and DO are typically the last parameters to stabilize. If the parameters have stabilized, but the turbidity is not in the range of 5-10 NTU then follow step 5; else go to step 6.

5. If the turbidity measurements do not approach the range of natural groundwater (10 NTU), both filtered and unfiltered samples may be collected for analysis, as applicable. Filtered samples are to be collected with an in-line filter. A high capacity, in-line 0.45 micron particulate filter must be pre-rinsed according to the manufacturer's recommendations, or with approximately one (1) liter of groundwater following purging and prior to sampling. After the sample is filtered, it must be preserved immediately (see Step #6).

6. Once stabilization has been reached and documented, sample points for appropriate analytical parameters. The sampling containers for VOCs will contain a sufficient volume of preservative prior to sampling. Each sample container will be filled by allowing the pump discharge water to flow gently down the inside of the container (with minimal turbulence). During sampling the pre-preserved sample container will be kept upright to prevent loss of preservative. Carefully, but quickly place the cap on the containers and tighten the cap securely. Check volatile vials to ensure no air bubbles are present.

7. Obtain duplicate and blank samples at the frequency discussed in Sections 4.2.6 and 9.0.

8. Label the sample containers using self-adhesive labels and waterproof ink and seal containers with custody seals. Labels will include the following information:

   a. Sample identification number;
   b. Job name and identification number;

c. Date and time of sample collection;
d. Type of analysis requested; and
e. Name of sampler.

9. Fill out COC form and reference the preservation technique in the remarks section. Note any deviations from prescribed procedures on the form, or other conditions which could affect analytical results.

10. Check to make sure the vial and bottle caps are tight and place on ice immediately.

11. Store the collected samples together with any blank samples collected for that sampling event. The sample set and blanks must be stored together, on ice, in an area known to be free of contamination.

12. Ship the sample set, on ice, via overnight courier within 24-hours of collection.

    NOTE: It is preferred that water samples be shipped the same day as the samples were collected. If a delay is envisioned, the field supervisor must notify the laboratory contact and the Field Lead PM. Proper chain of custody procedures should be followed as described in Section 5.0. Each cooler shall contain a temperature blank which the laboratory will use to verify that the samples are chilled to 4° C.

13. After sample collection, the tubing from the pump should be properly discarded or dedicated to the well for re-sampling by placing the tube inside the well.

14. Measure and record well total depth. Enter in the field log book per Section 4.2.7.

15. Repeat steps 1 through 14 for each monitoring point sampled.

4.2.3 Soil Vapor, Indoor or Outdoor Air Sampling Procedure

The procedure for collecting soil vapor samples is:

1. Prior to sample collection, at a minimum, three (3) sampling train volumes of soil vapor will be purged prior to sample collection using the portable pump at a rate of approximately 100 mL/min. During purging, elapsed time and purge flow rate will be recorded in the field log book.

2. Temperature, barometric pressure, weather conditions, and depth to groundwater (measured in nearby monitoring wells, if available) will also be recorded in the field log book.

3. Periodic total VOC readings of the purged soil vapor will be measured in the field using a PID. The periodic PID readings will be obtained from the effluent side of the vacuum pump and recorded in the field log book.

4. Tracer gas (helium) will be used as a QA/QC measure to verify the integrity of the sub slab vapor point. The atmosphere in the immediate vicinity of the area where the vapor point tubing intersects the slab will be enriched with the tracer gas and a vapor sample will be collected from the sub-slab for the presence of high concentrations (>10%) of the tracer gas. A plastic container will be placed over the tubing and will be used to keep the tracer gas in contact with the tubing during the testing. A portable monitoring device (detection limits in the low ppm range) will be used to field screen sub-slab vapor for the tracer gas prior to and

after sampling for the compounds of concern. If concentrations (>10%) of tracer gas are observed in a sample, then the vapor point seal will be enhanced to reduce the infiltration of air.

5. Following purging and verification of the integrity of the sub slab vapor point, a sample of vapor will be collected using a dedicated 6-liter SUMMA canister. The canister vacuum will be used to "pull" the soil vapor sample into the canister. The vacuum pump assembly will be disconnected from the dedicated tubing and the canister will be connected in its place for sample collection.

6. To collect the sample:

   a. Note canister and flow controller serial number on chain of custody.

   b. Properly site the canister and verify the vacuum (–30 inches Hg or 0 mm Hg) with a vacuum gauge.

   c. Attach the flow controller device (with filter in line), open the canister bellows valve and note the start time. Start co-located canisters at the same time if possible. Immediately check the flow rate and adjust to set point, if necessary. Note the initial flow rate.

   d. When sample collection is complete, note the final flow rate. Close canister bellows valve and note the final time.

   e. Detach the flow controller and check the remaining vacuum with the gauge. Vacuum and flow rate should be observed at the end of the event. Ambient pressure (0 psig or 760 mm Hg) indicates an excessively high flow rate set point or a leak. This observation compromises the time - integrated aspect of the sample.

7. After collection of the sample, cap tubing and replace flush-mount cover.

8. In addition to the field log book per Section 4.2.7, the field sampling team will maintain a log sheet for each sample summarizing the following:
   a. Sample identification (location);
   b. Date and time of sample collection;
   c. Identity of samplers;
   d. Sampling methods and devices;
   e. Purge volumes;
   f. Volume of soil vapor extracted;
   g. Vacuum before and after samples were collected; and
   h. Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone

9. Fill out COC form. Note any deviation from prescribed procedures on the form, or other conditions which could affect the analytical results.

10. Store the collected samples in an area known to be free of contamination.

11. Ship the sample set via overnight courier within 24-hours of collection, maintaining custody as described in Section 5.0.

12. Decontaminate all non-disposable sampling equipment as detailed in Section 4.2.5

13. Repeat steps 1 through 12 for each soil vapor sample collected. Repeat steps 6 and 8-12 for each ambient (indoor or outdoor) air sample collected.

4.2.4 Waste Disposal Sampling

Wastes, including soil and liquid, resulting from field investigation activities may require sampling for characterization to facilitate proper disposal. Accumulated soils and liquid wastes will be sampled by collecting grab samples using hand sampling equipment. Any required waste disposal with be done in accordance with regulatory requirements and any additional requirements by ExxonMobil. Refer to Section 4.2.5 for decontamination procedures.

4.2.5 Equipment Decontamination

Soil Sampling Equipment Decontamination:

Before sampling activities begin, a decontamination area will be established. All decontaminated equipment will be kept in this area on clean plastic. The following decontamination procedures will be followed for cleaning the probe drive sampler (Geoprobe®), the split spoons (conventional drilling), the sediment sampler, and any other hand tools utilized between sampling intervals and locations:

1. Wash and scrub with low phosphate detergent (Liqui-Nox or equivalent);
2. Tap water rinse;
3. Rinse with methanol;
4. Thoroughly rinse with deionized water; and
5. Air dry.

NOTE: All deionized water used will be demonstrated analyte-free in accordance with applicable QA/QC protocol.

The following decontamination procedures will be followed for steam-cleaning all down-hole drilling and sampling between boring locations:

1. Steam clean the interior of a large cow trough or plastic lined decontamination pad and pump off the excess water into the proper storage containers. Follow this procedure for the decontamination of the augers in the pre-determined decontamination area;
2. Place the augers/drilling tools in the cow trough and steam clean with a low-phosphate soap (Liqui-Nox or equivalent) and water solution followed by a de-ionized water rinse; and
3. Let equipment air dry.

Groundwater and Soil Vapor Sampling Equipment Decontamination:

The following procedures shall be used for decontamination of sampling pumps, purge pumps, flow-through cells and bailers (if used):

1. Wash and scrub with low phosphate detergent;
2. Tap water rinse;

3. Rinse with methanol;
4. Thoroughly rinse with deionized water; and
5. Air dry.

NOTE: Field instrumentation will follow the decontamination procedure described above unless manufacturer's operation instructions explain otherwise. All deionized water used will be demonstrated analyte-free in accordance with applicable QA/QC protocol.

Disposable sampling equipment (e.g. latex gloves, disposable bailers) will be collected in plastic bags. Bags will be placed in a designated storage area.

4.2.6 Blank Samples

Blank samples will be collected as a means to assess field QC. Blanks will be clearly labeled and distinguishable to the laboratory to the extent possible. Deionized water used for blank preparation will be demonstrated analyte-free in accordance with applicable QA/QC protocol. Blanks will be collected at the frequency specified in Section 9.0 in sample containers and pre-preserved in accordance with routine procedures as specified in Table 1. All blank samples shall be given an arbitrary identification number which must be logged in the field log book.

4.2.7 Documentation

Field personnel will log all field measurements, observations, and field instrument calibrations in bound, waterproof field log books. Log book entries will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities. Because the log book will be used to write reports, it will contain only facts and observations. Language will be objective, factual, and free of personal feelings or other terminology that may prove inappropriate. Each individual making an entry into the field log book will date and sign their entry. It is anticipated that the data reduction for this investigation will be minimal and will consist primarily of tabulating analytical results. Entries in the field log book will include the following:

- Date and time of entry;
- Weather;
- Purpose of sampling;
- Name and address of field contact;
- All personnel on-site on that date;
- Description of sample (note if sample is replicate, blank, composite or grab);
- Sample date, time and source of sample containers;
- Sampling location (and map referenced);
- Screening concentrations and depth of sample;
- Number and size of samples taken;
- Description of sample point;
- Collector's sample ID number(s);
- Field observations;
- Any field measurements;
- Sampling point purging information (volume purged, temperature, pH and conductivity, depth to water);

- The method of sample shipment with air bill number, name of overnight courier and laboratory receiving the samples;
- All samples shipped on the COC;
- Calibration of all instruments (pH pens, conductivity meters, PID, turbidity meters, etc.);
- A description of any circumstances or observations that might affect analytical results; and
- A description of any deviations from the normal or written sampling procedures.

Because sampling situations vary, notes will be as descriptive and inclusive as possible. If anyone other than the persons to whom the field log book was assigned makes an entry, they will date and sign that entry.

5. SAMPLE CUSTODY

A sample is the physical evidence collected from a site or the environment. An important part of the investigation is the control and tracking of the evidence collected. The primary objectives of sample custody procedures are to create accurately written records that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. Sample custody for samples collected during this investigation will be maintained by the Field Lead SM/S or other field personnel collecting the samples. The field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory.

5.1 FIELD CUSTODY PROCEDURES

All necessary sample containers will be shipped by the laboratory to the Field Lead SM/S. Sample containers needed for a specific sampling task will then be relinquished by the Field Lead SM/S to the sampling team after the Field Lead SM/S (or his/her designee) has checked the integrity of the containers and assured that the proper containers have been assigned to the task conducted.

Immediately after the sample collection, each sample container will be sealed with an individual custody seal. The samples will then be placed into an insulated cooler for shipment to the laboratory. Field COC records will be completed at the time of the sample collection and will accompany the sample cooler placed inside the cooler in a zip-lock baggy. The samples will be properly relinquished on the field COC record by each sampling team. Each cooler with soil or groundwater samples will contain sufficient ice to insure proper temperature is maintained, samples will be packed in a manner to prevent damage to containers, and a temperature blank will be included in each cooler shipped to the laboratory. The Field Lead SM/S or designee will initial and place a custody seal on each sample cooler. All coolers will be relinquished to an overnight courier. The name of the overnight courier will be written on the COC, along with the air bill number.

5.1.1 Sample Identification

Each separate sample will be identified using a sample label. The sampler will complete all information, using a waterproof pen, and should include:

1. The sample ID number will be the number assigned to the particular sampling station, including the depth of sampling, if relevant.

   Example: MW-01
   Matrix: Water
   Depth: Not Applicable

2. The analysis required will be indicated for each sample.

   Example: EPA Method 8260

3. Date taken will be the date the sample was collected, using the format: MM-DD-YYYY.

   Example: 01-01-2014

4. Time will be the time the sample was collected, using military time or denotation of AM or PM.

Example: 15:30 or 3:30PM

5. The sampler's name will be printed on the label.

6. Other information relevant to the sample.

Prior to going to the field, this identification procedure will be further refined if necessary, to facilitate accurate and simple sample identification.

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing by the field personnel collecting samples.

All samples analyzed by the laboratory are considered to be of an evidentiary nature. The possession of samples must be traceable from the time samples are collected in the field until the analysis is completed and the data are entered as evidence. The tracing of the samples is accomplished by "chain-of custody" procedures as follows:

1. A COC record will be completed for each set of samples.

2. Samples will not leave custody of the field investigator until relinquished to another party.

   Custody is defined as:

   A. In the actual physical possession of the samples by the field personnel.
   B. In the field personnel's view after being in physical possession.
   C. In a locked area after being in physical possession.
   D. In a designated, locked storage area.

5.2 LABORATORY CHAIN-OF-CUSTODY

Upon arrival at the laboratory, the Sample Custodian at the laboratory must maintain possession of the COC samples and all records documenting that possession. Upon receipt of samples, the sample custodian removes the COC from the sealed cooler and must sign the shipping report accompanying each sample and record the date and time. Samples as received are verified to match those listed on the COC, and the custody seals inspected. A copy of this record becomes part of the report file. The custodian must sign the COC "Received By" laboratory space. The samples are then secured under lock and key in refrigerated storage.

5.3 LABORATORY SAMPLE TRACKING AND MANAGEMENT

The laboratory will maintain sample information records in a LIMS (Laboratory Information Management System) computer system. The sample receipt and data entry activity (called "login") is reflected in a daily report, which is immediately entered into the master log book. The chronological file contains all samples.

Each laboratory manager gets a report of pertinent analyses not yet completed including the daily update from the login activity. The tracking continues until the LIMS registers the completion of the report and invoice mailing.

6. CALIBRATION PROCEDURES AND FREQUENCY

6.1 LABORATORY CALIBRATION

The confirmation calibration frequency required by the laboratory methods is dependent on the outcome of daily calibration checks made with QC standards. Reference materials have required minimum purity, and are certified. Spiked reference samples (spiked into reagent water) are introduced into the analytical system to determine recovery and to further validate calibration at a frequency dependent on the matrix spike performance. All calibrations and frequency are detailed in the individual methods and will be followed for all analytical work completed for this project.

6.2 FIELD CALIBRATION

Field analytical equipment will be calibrated prior to each day's use, and a calibration check will be completed at the end of each field day (refer to Appendix C). Additional calibration may be performed as required to verify proper operation of all equipment. The calibration procedures for all equipment will conform to manufacturer's operation instructions and procedures will be used to calibrate the equipment to within the allowable tolerances established by the manufacturer. If calibration acceptance criteria cannot be met, corrective actions will be implemented. Corrective actions will be the responsibility of field personnel and/or the equipment provider, and will include troubleshooting the problem according to the manufacturer's operating manual and/or instrument replacement. Records of instrument calibration will be maintained by field personnel and copies of instrument manuals will be available on-site to field personnel.

Field instruments requiring calibration that are anticipated to be used during this project includes interface probes or water level indicators, PIDs, multi-meter water quality instruments, and air monitoring meters, and calibration should follow the manufacturer's operation manuals. Additional field equipment that may be required during the course of the project will be presented in task-specific work plans. Daily field calibration procedures will, at a minimum, include the following:

1. Equipment shall undergo daily preventive maintenance per Section 4.1.2.

2. Daily calibration records shall include:

    A. calibrator's name
    B. standards used and source
    C. date/time of calibration
    D. corrective actions taken (if any)
    E. instrument name/model
    F. temperature/barometric pressure/humidity conditions (if known).

3. All standards used shall be checked monthly to determine stability and operating condition, and a record kept of these inspections.

4. All personnel performing instrument calibrations shall be trained in its operation and calibrating procedures.

7. ANALYTICAL PROCEDURES

7.1 LABORATORY ANALYSES

The methods and technical information indicated in this QAPP are derived from the following referenced manuals:

1. United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Third Edition, Update III, and all subsequent editions, updates, and revisions.

2. American Public Health Association. Standard Methods for the Examination of Water and Wastewater, 22th Edition, and all subsequent editions.

The laboratory is under obligation to perform analytical cleanups when matrix interferences are present to achieve the required detection limits. Re-extraction, re-sonification or re-steam distillation is warranted along with cleanup to provide the best prepared sample possible.

Analyte detection limits are provided in Appendix B. Low level detection limits will be utilized whenever possible for all analyses. However, if samples are heavily impacted with matrix interferences, then the low level detection limits may not be achievable. The affected samples will be diluted and re-analyzed. Medium level detection limits will be utilized, if warranted.

The laboratory is expected to perform all analyses to provide the best possible representation of the sampling point. The laboratory will document any analytical problems encountered during the course of analysis and report the problems and corrective actions in the Case Narrative of the individual data packages.

The methods described above will be used by the designated laboratory to analyze all samples, where possible. All laboratory reporting will utilize standardized forms for reporting results.

7.2 METHOD SELECTION

The methods specified for this project include the compounds for TCL volatile organics. All methods are selected to obtain the most accurate representation of the sampling point possible. Method detection limit selection is based on the real assessment and analytical characterization data quality objectives. A comprehensive deliverables package will be generated to ensure that sufficient QC data and documentation is available. The methods selected specify the frequency and acceptance criteria for all associated QC samples.

QC samples include one method blank, matrix spike, and matrix spike duplicate every twenty samples or one per analytical batch, whichever occurs most frequently. Surrogate spikes are compounds that are added to every sample, method, field or trip blank, matrix spike and matrix spike duplicate sample. Surrogate recoveries are monitored to indicate the necessity for re-analysis based upon very low or very high recovery.

8. DATA REDUCTION AND REPORTING

Internal data validation practices will be followed to insure that new data is not altered and that an audit trail is developed for data that will be reduced. Data validation practices occur in the laboratory, by specialty subcontractors, and at the Consultant's offices.

8.1 DATA REDUCTION

8.1.1 Field Data Collection and Reduction

Field personnel will log all field measurements, observations, and field instrument calibrations in bound, field log books. Log book entries will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities. Because the field log book will be used to write reports, it will contain only facts and observations. Language will be objective, factual, and free of personal feelings or other terminology that may prove inappropriate. Each individual making an entry into the field log book will date and sign their entry.

8.1.2 Laboratory Data Collection and Reduction

The data reduction scheme used in the laboratory form each of the measurement parameters, including the formulas used for calculating concentration for water will be that stated in the standard operating procedure (SOP) for the analytical method used. All analyses will utilize a bound notebook into which will be recorded the following items, at a minimum:

a. analyst;
b. date;
c. sample number (lab #); and
d. analysis set-up conditions, e.g. dilutions, auto-sampler position number, or other instrument specifics not covered by an SOP.

For instrumental analyses, this analysis notebook will be instrument-specific and referred to as an instrument log. For other types of analyses, this analysis log book will also contain all raw data collected by the analyst. All analyses will involve electronic data handling, resulting in values bearing the conventional units used by the laboratory, and already corrected for dilutions. The analyst will need to round the answers appropriately and sometimes sum the columns of data.

Raw data output will be recorded in hardcopy with sample identification, date and dilutions. Subsequent data reduction will involve the use of a fully-documented calibration curve, as indicated in the specific method SOP. For extractable organics, sample volume, and amount of injection enter into the calculation. In this case the electronic data handling system will report in-solution concentration, and the analyst will apply the corresponding correction using the sample volume recorded on the extractions lab bench sheet and the injection volume recorded in the analysis log book. The resulting run factor and how it is derived will be transcribed onto the in-process data form.

For all analyses, the data will not be blank-corrected and will be flagged with a 'B' qualifier if blanks do not meet acceptability criteria. Additionally, any result that is less than ten times the value of the blank for common laboratory contaminants (2-butanone, methylene chloride and acetone, only) will be

considered questionable. All other compounds are considered questionable if the result is less than five (5) times the value of the blank.

Chemists and technicians will be responsible for the measurement/analysis of any specific parameter, and for any calculations associated with the determination of parameter concentrations. All calculations are listed in the reference method. The chemists and their supervisors will be responsible for reviewing all results, applying calculation checks on a minimum of 10% of the results on each report. These individuals will be responsible for determining whether or not the results are acceptable, though the ultimate authority to determine acceptability will be the laboratory's director of QA. The laboratory section manager will be responsible for the final review of all data and for proofing of reports prior to submittal of the reports to the Consultant PM.

Final reports will be typed from the in-process report forms approved by the supervisor after the review of all supporting data. The data output will be stored in a single secure location indexed by project number for at least five years.

The data will be cross-checked for correctness for reported values, detection limits, percent moisture and dilution factors (if applicable), after data has been reduced and transcribed into the final reporting format. The procedure to be used in the final cross-check of the data in the final report format will be as follows;

1. obtain the laboratory data or field notebooks and final reports
2. compare the sample numbers and description
3. compare the sample date and time (if provided), and
4. compare all positive results with those reported in the laboratory report.

8.2 IDENTIFICATION AND TREATMENT OF OUTLIERS

Outliers are unusually large or unusually small values in a population of observations. Outliers may be the result of a variety of circumstances, including any of the following:

1. errors in recording of data;
2. calculation errors;
3. analytical errors;
4. inaccurate reading of meters
5. faulty or defective instruments
6. actual values due to comparatively unique conditions;
7. sample identification incorrectly transcribed in the field or lab;
8. sampling artifacts; or
9. sample integrity problems.

8.2.1 Identification of Outliers

Procedures for the identification of outliers will be followed at both the analytical stage and at the ensuing data reduction stage.

Outliers in laboratory data can arise from errors in analysis or from site-specific conditions that are out of control of the laboratory. Errors in the laboratory are most often detected in the data review and validation process. It is necessary to eliminate outliers from QC data because of the skewing effect which

can destroy the effectiveness of the QC data. Extreme values will not be automatically eliminated as outliers. Those data will be evaluated as part of the data set.

Outliers will be identified at the data reduction stage by the Consultant PM. When any particular value is suspected to be an outlier, the following steps will be taken:

1. Other data from the same sample will be checked to see if they are also anomalous.
2. The Field Lead PM will talk to any individuals involved in generating the anomalous value. This will include questioning the field crew and the analyst.
3. If samplers demonstrate standard competency in the sampling procedure used at the time the sample with the anomalous value was obtained, the sampling error will be dismissed as a possible cause of the outlier.
4. The analyst will be asked to examine his/her notes and calculations and, if possible, to rerun the sample, for the specific parameter in question.
5. The following procedure will be used to identify and handle extreme values and outliers identified in the data collected during the investigations. After the samples have been analyzed and verified according to the QA/QC requirements, a statistical program will be employed to evaluate the significance of the data. This data will be compiled into two subsets: one representing total VOCs and one representing inorganic parameters. After the data have been segregated, the data will be reviewed for the presence of outliers and if necessary a statistical test will be conducted to evaluate the appropriate statistical distribution (e.g., the Shapiro-Wilk's or the Lilliefore's goodness-of-fit test). The distribution will be used to decide on the appropriate method to assess extreme values or outliers. Most likely, Rosner's test for outliers will be used to conduct the outlier assessment.
6. Based on the results from the outlier study, a map will be generated locating the potential "hot spots" and be used to evaluate the need for supplemental data to delineate "hot spots".

8.2.2 Treatment of Outliers

Rejection of any suspect data or outliers will only be done by the Consultant and ExxonMobil PMs. The data will be rejected as an unacceptable outlier by the PMs if:

1. A problem with equipment or an incorrect procedure during the sampling stage is identified.
2. The rerun of the analyst generates a value that significantly differs from the value being examined.

8.3 DATA REDUCTION, REPORTING, AND REPORT STORAGE

8.3.1 Data Reduction

Analytical data will be generated from direct-reading instruments, reporting integrators or data management computer software. The automated outputs will include identifications of compounds,

concentrations and retention times. Outputs will be in graphic form (chromatograms), spectra, recorder charts, and in printer tabular form. The outputs will be in a standard format specified for each analysis and monitored for consistency. For direct reading instruments, the analyst will be required to record all results into a bound lab notebook.

Auxiliary data produced for internal records, which will not normally be reported to customers as part of the analytical data, may include the following: Laboratory worksheets, laboratory notebooks, sample tracking system forms, instrument logs, standard records, maintenance records, calibration records, and associated QC records. These sources will be available, however, for inspection during audits to determine the validity of data.

8.3.2 Data Reporting

In addition to analytical data, the laboratory will report matrix spike, matrix duplicate, surrogate recoveries and method blanks, as applicable. This data package will be presented as an appendix to any project report.

8.3.3 Data Validation

Data validation consists of a methodical screening and checking of batch specific quality control data, as well as raw data review to verify and substantiate the qualitative and quantitative results reported on the sample data sheets and quality control summary sheets. Once the review is completed, the analytical results generated are qualified based upon the quality control deviations noted during the validation review process.

Analytical data subject to validation will be evaluated in accordance with project specific requirements, as defined by the performance criteria discussed in this QAPP. Hardcopy and/or PDF copies of the analytical data package will be submitted to the external Data Validator to review, and will include the reported sample results and batch specific quality control data, including raw data back up to substantiate the reported values and verify that proper method specific quality control was performed. In addition, calibration information will be included to ensure acceptable instrument performance.

As applicable, data validation will include a review of the following items

- Holding Times
- Surrogate Recovery
- Matrix Spike (MS) and Matrix Spike Duplicates (MSD)
- Laboratory Control Samples (LCS) and Laboratory Control Sample Duplicates (LCSD)
- Laboratory Fortified Blanks (LFB)
- Trip, Equipment, Field and Method Blanks
- Initial (ICV) and Continuing Calibration Verification (CCV)
- Field Duplicate Samples
- Compound Identification
- Compound Quantitation and Reported Detection Limits
- Sample Result Verification (verify in raw data)

Based on validation results, qualifiers will be added to reported analyte concentrations to indicate uncertainty or potential bias or interferences. Specific data qualifiers which will be applied to sample concentrations include the following:

U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.

J - The analyte was detected but the associated reported concentration is approximate and is considered estimated.

R - The reported analyte concentration is rejected due to serious deficiencies with associated quality control results. The presence or absence of the analyte cannot be confirmed.

UJ - The analyte was analyzed for, but was not detected. However, due to quality control results that did not meet acceptance criteria, the quantitation limit is uncertain and may not accurately represent the actual limit.

Data Validation Reports will present the results of the data validation processes. Reports will be completed on 10% of samples collected during the post-remediation monitoring period as outlined in Table 8 in the SMP, or otherwise specified in task-specific work plans, by an in-house or outside Data Validator following receipt of the analytical data packages, and will include a discussion of the data's compliance with measurement performance criteria and a summary of resulting data qualifiers and/or edits in accordance with NYSDEC Data Usability Summary Reports (DUSRs).

8.3.4 Environmental Data Submission

NYSDEC has implemented an Environmental Information Management System (EIMS) using the database software application EQuIS from EarthSoft Inc. Laboratory and related sample data must be submitted electronically in a standardized electronic data deliverable (EDD) format meeting the guidelines specified by NYSDEC. Data providers are responsible for submitting a complete data package to the Consultant PM, who must ensure the supporting tables (such as sample location coordinates) are submitted and complete.

8.3.5 Report Storage

All final customer report folders will be filed in a secure area in the laboratory documentation office. QC sample reports are maintained in separate files. All data, chromatograms, calculations, and reports will be stored for in the Consultant's offices or ExxonMobil archives.

9. INTERNAL QUALITY CONTROL CHECKS

The intent of the internal QC program is to detect potential problems at the source and if necessary, trace the sample analytical pathways to identify potential locations for the introduction of contamination. The QC data generated in the field will be used to monitor sampling technique reproducibility and cleanliness. QC data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness, but accuracy in samples submitted for analysis.

9.1 FIELD QUALITY CONTROL CHECKS

The field QC checks monitor the data quality as it is affected by field procedures and conditions to the degree feasible as discussed in Section 4.0. The degree of effort (number of check samples per total samples taken) is stated in this section for each category. The acceptability criteria were outlined in Section 4.0. All field QC samples are submitted blind to the laboratory.

9.1.1 Blanks

Trip Blank – Trip blanks consist of reagent water prepared by the laboratory, sealed in the proper sampling container, and supplied by the laboratory within one week of the scheduled sampling date. A trip blank will be placed in a sample cooler prior to sample collection, and will be handled as other samples except that it is not opened. This sample focuses on external sources of contamination and sampling container quality and cleanliness. For each shipment to the laboratory, one trip blank will be submitted. The trip blank is never opened in the field and is only analyzed for volatile organics. Trip blanks will be included as part of each sampling event and will be analyzed on an as needed basis.

Rinsate (or Equipment) Blank – Rinsate blanks may be collected for each type of equipment used each day a decontamination event is carried out. The rinsate blank is collected by pouring de-ionized water over decontaminated/pre-cleaned sampling equipment to determine the possibility of cross contamination. Rinsate blanks will be collected during sampling events and will be analyzed on an as needed basis.

Field Blank – Some of the required blanks may also consist of routine field blanks which are collected by pouring the de-ionized water directly from the source into the pre-cleaned sample container.

Temperature Blank – As needed, each cooler of samples shipped to the analytical laboratory shall contain a temperature blank which the laboratory will use to verify that the samples are chilled to 4° C. A temperature blank will be placed in a sample cooler along with the Site samples, and will remain unopened until returned to the laboratory.

9.1.2 Duplicates

Blind field duplicates (as opposed to duplicate containers full of sample intended as backup) are sequential or collocated grab samples collected to monitor overall precision as detailed in Section 3.0. One duplicate will be collected and submitted per twenty (20) samples or one (1) per sampling event, whichever is greater.

9.2 LABORATORY QUALITY CONTROL

All analytical procedures and QA/QC protocols will be followed as per EPA methods and/or the Laboratory QA Plan. The QC criteria are summarized in each approved analytical method.

10. PERFORMANCE AND SYSTEM AUDITS

10.1 PERFORMANCE AUDITS

Laboratory QC audits are to be carried out by the laboratory QA staff at least annually for each laboratory department. Results of QC audits will be reviewed by the laboratory QA officer and will be reported as part of the QA reports to laboratory management.

Laboratory QC audits are to be carried out by the laboratory QA staff on a routine basis for each method. Blind audit samples will be utilized. Results of blind audit sample analyses will be reviewed by the laboratory QA officer and will be reported as part of the QA reports to laboratory management.

10.2 SYSTEM AUDITS

The Consultant PM, Field Lead PM, or the project QAO will conduct spot audits of field QC procedures based on the historic body of data or as deemed necessary.

10.3 ON-SITE INSPECTIONS

The laboratory will participate in the NYSDOH Environmental Laboratory Accreditation Program (ELAP) and be regularly inspected to document compliance with the various certification programs in which the laboratory participates. The laboratory will maintain the proper certifications for all sub-categories of solid and hazardous waste.

11. CORRECTIVE ACTION

11.1 LABORATORY CORRECTIVE ACTION

The QC samples are designed to imitate samples and indicate possible sources of error or laboratory contamination. Any corrective actions taken by the laboratory will be documented and initialed. The Laboratory Manager will provide documentation as to what, if any, corrective actions (i.e., re-analysis) were initiated during this study and report them to the Consultant PM.

If any laboratory data fail to meet the precision and accuracy criteria objectives described in the analytical methods, the laboratory group manager will be notified and will be required to make any necessary systematic changes and then re-analyze the samples in question. If the samples in questions cannot be re-analyzed for some reason, the Consultant and ExxonMobil PMs will decide whether or not the suspect data will be used, or if re-sampling is necessary.

The laboratory must take corrective action if any of the blank QC data generated during the laboratory analysis is outside criteria. By comparison of blank results, contamination may be attributed to either laboratory or field sampling techniques.

Corrective action for out-of-control calibrations is to re-calibrate the instrument and reanalyze the samples. A sequence is specified in the procedure to be used to analyze the sample when problems in analyses are encountered. The laboratory will be expected to follow this procedure exactly and document the problems encountered and corrective action taken in a case narrative enclosed with each deliverables package. Corrective action is described in the appropriate methods.

11.2 CONSULTANT CORRECTIVE ACTION

Field QA activities will be reported to the Field Lead PM. Problems encountered during the study affecting QA will be reported on a Corrective Action Form or other convention. If systematic changes cannot be achieved to produce data that meet precision and accuracy objectives, the Consultant PM will be notified. The Consultant and ExxonMobil PMs will decide whether or not the suspect data will be used, or if re-sampling is necessary.

The Consultant and Field Lead PMs will be responsible for initiating the corrective actions and for insuring that the actions are taken in a timely manner, and also that the desired results are produced. All corrective actions taken will be reported to the ExxonMobil PM and appropriate regulatory agencies in the final report.

TABLE 1

RECOMMENDED CONTAINERS, PRESERVATION, STORAGE, AND HOLDING TIMES

Parameter	Analysis Method	Matrix	Sample Container[1]	Volume	Number of Containers	Preservation	Holding Time[4] (From Collection)
For Soil Samples							
Volatiles	EPA 8260	Soil	G(b) TefCap	4 oz Jar	1	Cool 4° C	14 days
For Groundwater and QA/QC Samples[3]							
Volatiles	EPA 8260/5030	Water	G(b) TefSep	40 ml[2]	3 minimum	Cool 4° C HCl pH < 2	14 days
For Soil Vapor and Ambient (Indoor/Outdoor) Air Samples							
Volatiles	EPA Method TO-15 Compendium List	Air	Summa Canister	6 L	1	None	14 days

Notes:

1. G(b) = glass (oven dry); TefSep = Teflon Septum; TefCap = Teflon Cap; HCl = Hydrochloric Acid. All containers will be obtained from the NYSDEC/NYSDOH-approved laboratory, pre-cleaned and pre-preserved.
2. Fill vials completely to avoid volatile loss. Remove any air bubbles. The sample will be poured into the pre-preserved container to be analyzed for volatiles. Care will be taken to not spill the sample with preservative out of the sample container.
3. Laboratory deionized water will be utilized for all method blanks, trip blanks, field blanks and equipment blanks. The laboratory will utilize laboratory grade reagents for all analyses
4. Holding time and preservation requirements are located within SW-846 protocols. Analysis is to be performed from time of collection. Samples are to be delivered to the laboratory the day after sample collection, unless otherwise pre-approved.

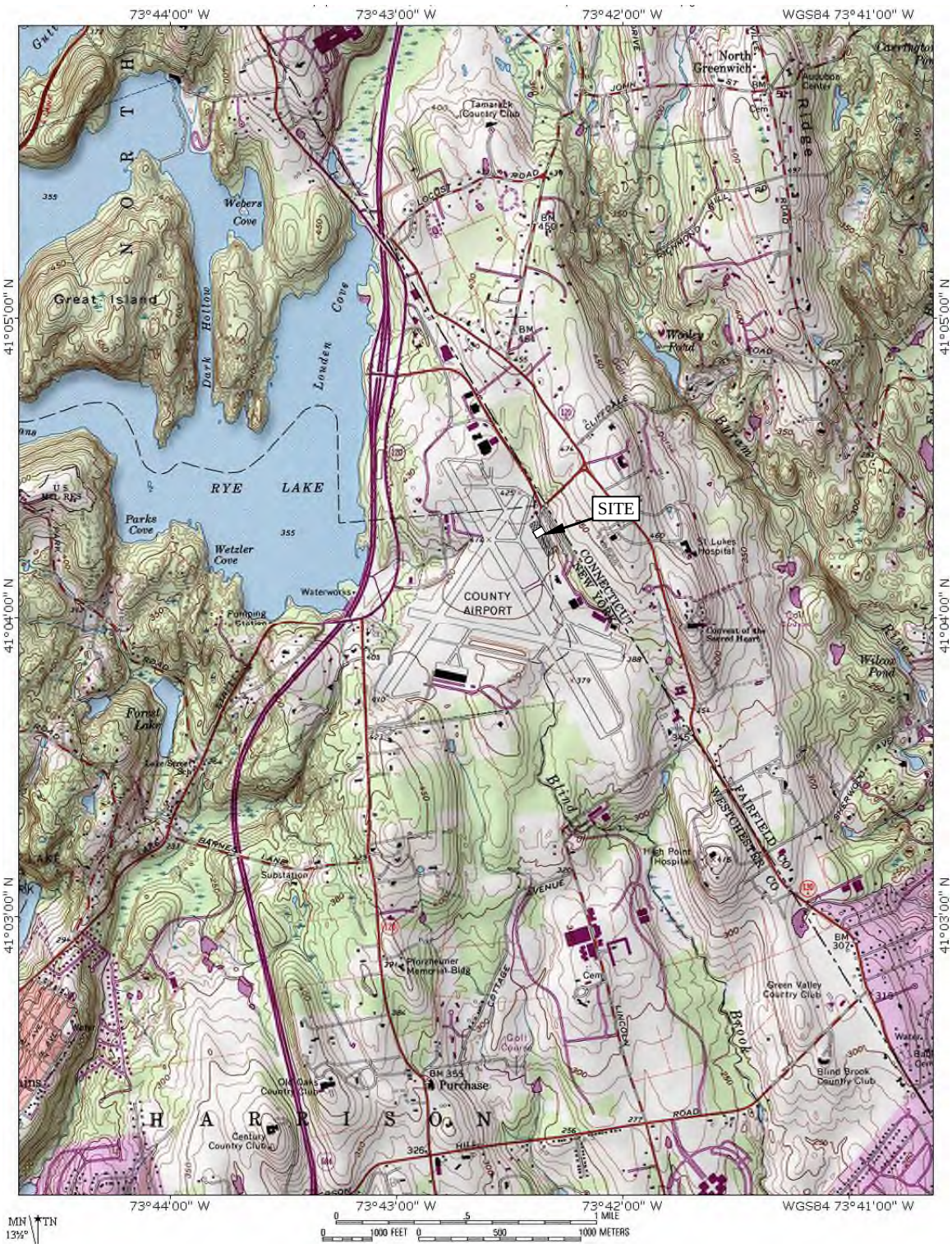
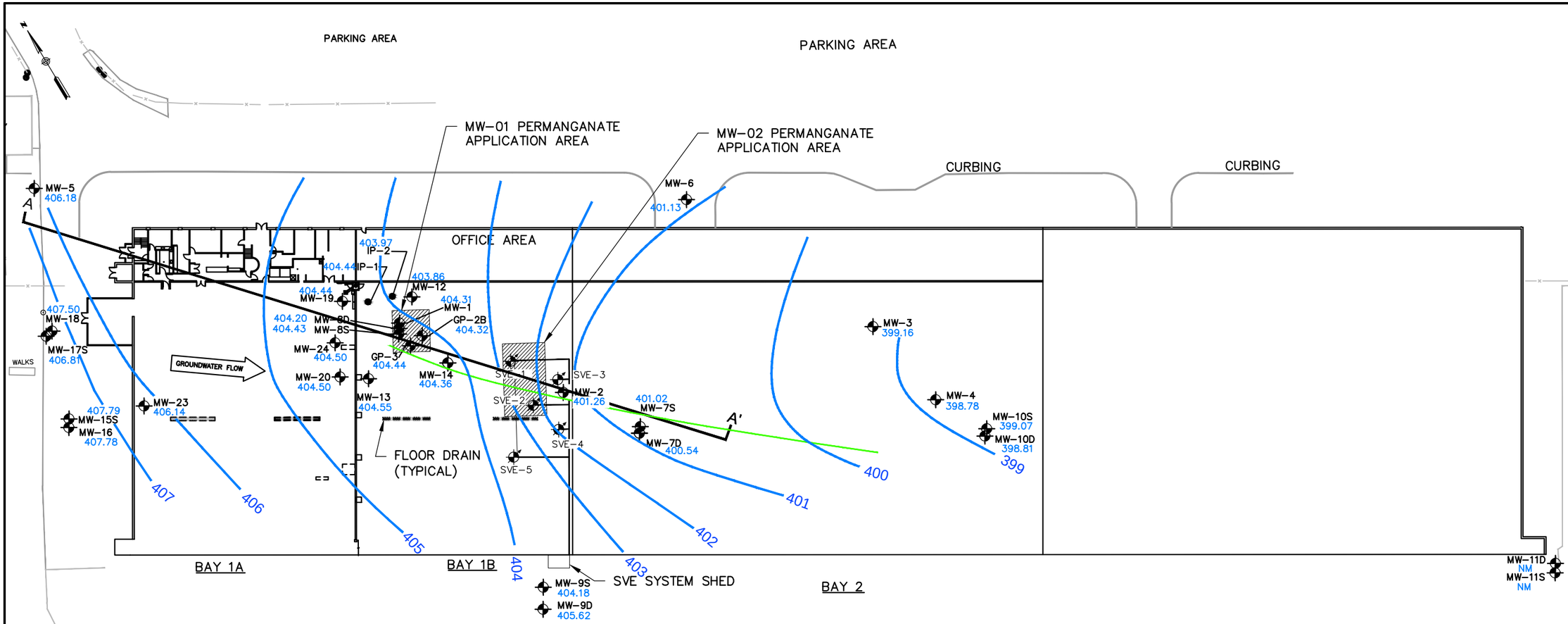


FIGURE 1
SITE LOCATION MAP

Westchester County Airport Hangar D1 Bay 1B
Site Number 360037



LEGEND:

- MW-02 — OVERBURDEN MONITORING WELL
- MW-09S — SHALLOW BEDROCK MONITORING WELL
- MW-09D — DEEP BEDROCK MONITORING WELL
- SVE-5 — SOIL VAPOR EXTRACTION (SVE) WELL
- IP 2 — INJECTION POINT
- 403 — GROUNDWATER ELEVATION
- GROUNDWATER CONTOUR, SHALLOW UNCONFINED FLOW
- NM — NOT MEASURED
- APPROXIMATE LOCATION OF BEDROCK RIDGE

MAP NOTES:

1. INFORMATION SHOWN HEREON WAS COMPILED FROM AN ACTUAL FIELD SURVEY CONDUCTED IN JUNE 15, 2011, REVISED JUNE 21, 2012.
2. NORTH ORIENTATION IS REFERENCED TO GRID NORTH AND IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE NAD 27.
3. VERTICAL DATUM ESTABLISHED FOR N.C.V.D. 1929.

60' 0 60' 120'

BAR SCALE
1" = 60'
CHECK GRAPHIC SCALE BEFORE USING

1520 HIGHLAND AVENUE
CHESHIRE, CONNECTICUT 06410
88.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

SITE BOUNDARIES AND GROUNDWATER CONTOUR MAP AUGUST 2014

DESIGNED BY: GR
DRAWN BY: PFF
CHECKED BY: AP
206924_U2-GW-05-14.dwg

EXXONMOBIL ENVIRONMENTAL SERVICES CO.

WESTCHESTER COUNTY AIRPORT HANGAR D

JOB NO: 206924
DATE: AUGUST 2014
SCALE: AS NOTED

FIGURE 2

Figure 3
Project Organization Chart and Resume Summaries
Page 1 of 2

Quality Assurance Project Plan
Westchester County Airport Hangar D1 Bay 1B
Harrison, New York

Project Organization Chart

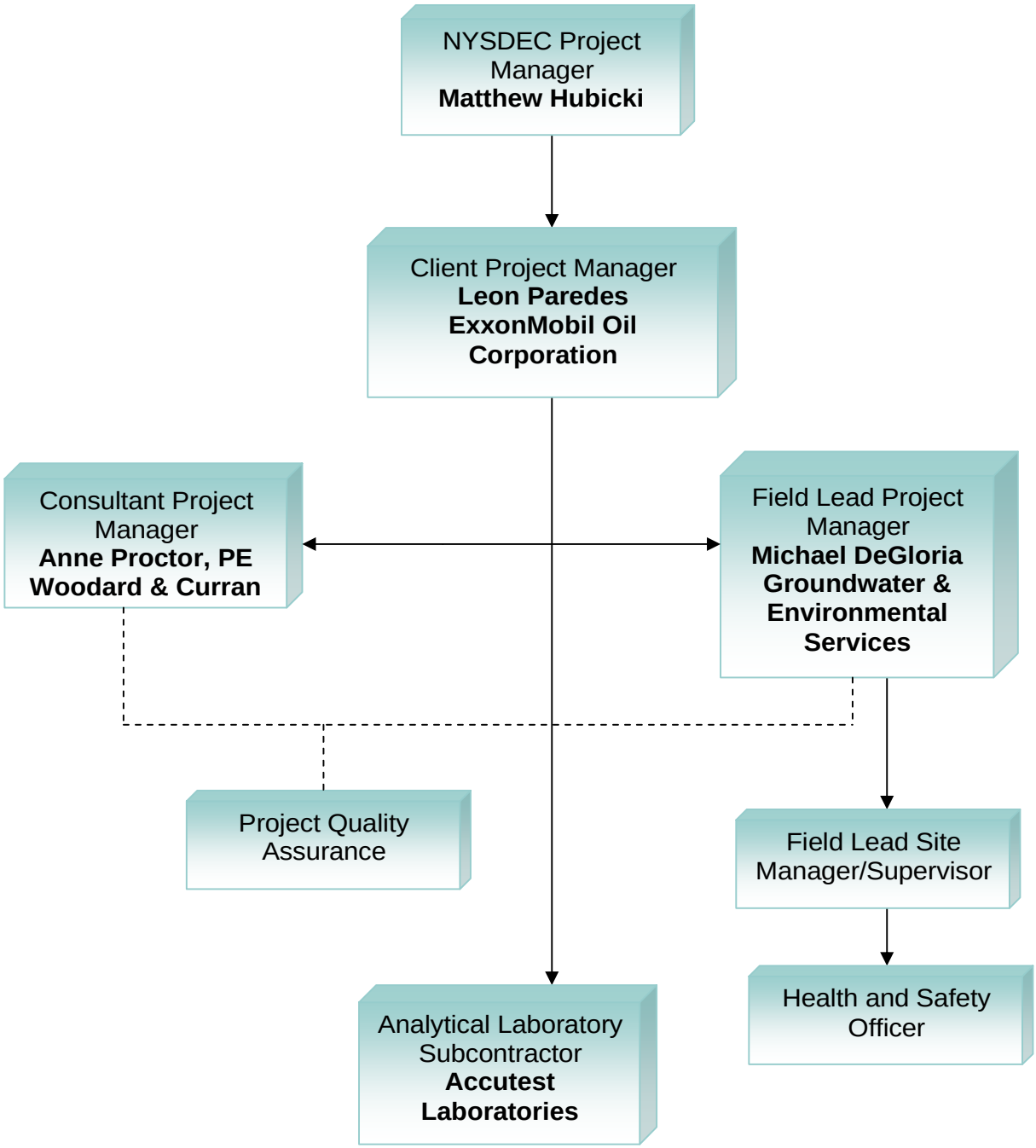


Figure 3
Project Organization Chart and Resume Summaries
Page 2 of 2

Quality Assurance Project Plan
Westchester County Airport Hangar D1 Bay 1B
Harrison, New York

Resume Summaries

Consultant Project Manager/Quality Assurance:

Name	Anne Proctor
Title	Sr. Project Manager
Organization Affiliation	Woodard & Curran
Responsibilities	Overall technical aspects of the program; maintains project files; and disseminates project data and results for analysis. Shares responsibilities for Project Quality Assurance with Field Lead Project Manager and acts as a primary point of contact for ExxonMobil PM.
Education	B. S. in Chemical Engineering
Experience	Over 25 years as an engineer and project manager in remediation and treatment projects; New York Professional Engineer.

Field-Lead Project Manager/Quality Assurance:

Name	Michael DeGloria
Title	Project Manager
Organization Affiliation	Groundwater & Environmental Services, Inc.
Responsibilities	Overall logistical aspects of the program; ensures field tasks are completed in accordance with project objectives, procedures, and schedule. Shares responsibilities for Project Quality Assurance with Consultant Project Manager, and acts as a primary point of contact for ExxonMobil PM.
Education	B.S. Water Resources, Hydrogeology/Geology
Experience	Over 15 years as a hydrogeologist and project manager in remediation projects.

APPENDIX A

DQO SUMMARY FORMS

APPENDIX A -- DQO SUMMARY FORM 1

SOIL

Site Name:	Westchester County Airport Hangar D1 Bay 1B
Media:	Soil
Use:	Site characterization, evaluate the need for further data, collection efforts, and remedial activities.
Data Types:	**Analytical:** EPA TCL Volatiles. **Field Measurements:** PID (or similar) screening **Physical:** Visual Inspection
Sampling Method(s):	Subsurface soil grab sampling via methods noted in the task-specific work plan and Section 4.2.1 of the QAPP.
Analytical Data Reviews:	EPA and APHA Methods analyzed by the Laboratory
Reporting Limits:	NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives for Unrestricted Use.
QC Samples Collected:	
Field:	Field Duplicate 5% (1 per 20 samples) Field Blank 5% (1 per 20 samples) Trip Blank 1/day or per shipment (whichever greater)
Laboratory:	Reagent Blank 1 per analysis batch Matrix Spike 1 per analysis batch Matrix Spike Dup. 5% or 1 per analysis batch
% External Data Validation:	10% or per task-specific work plan

APPENDIX A -- DQO SUMMARY FORM 2

GROUNDWATER

Site Name:	Westchester County Airport Hangar D1 Bay 1B
Media:	Groundwater
Use:	Site characterization, evaluate the need for further data, collection efforts, and remedial activities.
Data Types:	**Analytical:** EPA TCL Volatiles. **Field Measurements:** pH, conductivity, redox, turbidity, temperature, ORP, DO, and CO_2; refer to SOP in Appendix C. **Physical:** Visual Inspection
Sampling Method(s):	Geoprobe aquifer-specific sampling, fixed monitoring points via methods noted in the SMP or task-specific work plan and Section 4.2.2 of the QAPP.
Analytical Data Reviews:	EPA and APHA Methods analyzed by the Laboratory
Reporting Limits:	Technical and Operational Guidance Series (TOGS) 1.1.1. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Guidance Criteria - Lowest Water Class Criteria
QC Samples Collected:	
Field:	Field Duplicate 5% (1 per 20 samples) Field Blank 5% (1 per 20 samples) Trip Blank 1/day or per shipment
Laboratory:	Reagent Blank 1 per analysis batch Matrix Spike 1 per analysis batch Matrix Spike Dup. 5% or 1 per analysis batch
% External Data Validation:	10% or per task-specific work plan.

APPENDIX A -- DQO SUMMARY FORM 3

SOIL VAPOR AND AIR

Site Name:	Westchester County Airport Hangar D1 Bay 1B
Media:	Soil Vapor, Ambient (Indoor and Outdoor) Air
Use:	Indoor air quality, evaluate the need for further data, collection efforts, and remedial activities.
Data Types:	**Analytical:** EPA Method TO-15 Compendium List **Field Measurements:** Refer to SOP in Appendix C. **Physical:** Visual Inspection
Sampling Method(s):	Summa Canisters via methods noted in the SMP or task-specific work plan and Section 4.2.3 of the QAPP.
Reporting Limits:	0.25 ug/m3 for Vinyl Chloride, TCE and Carbon Tetrachloride, and 1 ug/m3 for all other compounds in ambient samples; 1 ug/m3 for all compounds in soil vapor
QC Samples Collected:	
Field:	Per task-specific work plan
Laboratory:	Batch Blank 1 per 24 hours Matrix Duplicate 5% Blank Spike 5% Blank Spike Dup. 5%
% External Data Validation:	10% or per task-specific work plan.

APPENDIX B

LABORATORY QUALITY ASSURANCE PLAN

(July 2014)

Quality Systems Manual

Volume XV, Revision 1: June 2014

Effective Date: February 2014

Document Control Number: 133

Nancy Cole, Laboratory Director
Technical Director-Inorganics

Phillip M. Worby, Director, Quality Assurance

WenWen Chi, Technical Director-Organics

Accutest Laboratories
2235 U.S. Route 130
Dayton, New Jersey 08810
732.329.0200

This document is the exclusive property of Accutest Laboratories.
Reproduction without the expressed written permission of Accutest Laboratories is prohibited.

Introduction

The Accutest Laboratories Quality Assurance System, detailed in this plan, has been designed to meet the quality program requirements of the National Environmental Laboratory Accreditation Conference (NELAC), ISO Guide 17025, the Department of Defense Environmental Laboratory Approval Program (DOD ELAP) and other National environmental monitoring programs. The plan establishes the framework for documenting the requirements of the quality processes regularly practiced by the Laboratory. The Quality Assurance Director is responsible for changes to the Quality Assurance Program, which is appended to the Quality System Manual (QSM) during the annual program review. The plan is also reviewed annually for compliance purposes by the Company President and Laboratory Director and edited if necessary. Changes that are incorporated into the plan are itemized in a summary of changes following the introduction. Plan changes are communicated to the general staff in a meeting conducted by the Director of Quality Assurance following the plan's approval.

The Accutest plan is supported by standard operating procedures (SOPs), which provide specific operational instructions on the execution of each quality element and assure that compliance with the requirements of the plan are achieved. Accutest employees are responsible for knowing the requirements of the SOPs and applying them in the daily execution of their duties. These documents are updated as changes occur and the staff is trained to apply the changes.

At Accutest, we believe that satisfying client requirements and providing a product that meets or exceeds the standards of the industry is the key to a good business relationship. However, client satisfaction cannot be guaranteed unless there is a system that assures the product consistently meets its design requirements and is adequately documented to assure that all procedural steps are executed, properly documented and traceable.

This plan has been designed to assure that this goal is consistently achieved and the Accutest product withstands the rigors of scrutiny that are routinely applied to analytical data and the processes that support its generation.

Summary of Changes
Accutest Laboratories Quality System Manual – February 2014

Section	Page	Description
Appendix IV	95	Revised Equipment List
Appendix II, III & IV	---	

Table of Contents

Sections	Title	Page
1.0	Quality Policy	5
2.0	Organization	6
3.0	Quality Responsibilities of the Management Team	9
4.0	Job Descriptions of Key Staff	16
5.0	Signatory Approvals	20
6.0	Documentation	22
7.0	Reference Standard Traceability	27
8.0	Test Procedures, Method References, & Regulatory Programs	29
9.0	Sample Management, Login, Custody, Storage & Disposal	34
10.0	Laboratory Instrumentation and Measurement Standards	42
11.0	Instrument Maintenance	45
12.0	Quality Control Parameters, Procedures, and Corrective Action	46
13.0	Corrective Action System	55
14.0	Procedures For Executing Client Specifications	58
15.0	Client Complaint Resolution Procedure	61
16.0	Control of Nonconforming Product	62
17.0	Confidentiality Protection Procedures	63
18.0	Quality Audits and System Reviews	65
19.0	Health & Safety	67
Appendices		
I	Glossary of Terms	71
II	Standard Operating Procedures Directory	78
III	Analytical Capabilities	87
IV	Laboratory Equipment	95

1.0 QUALITY POLICY

1.1 ***Accutest Mission***:

Accutest Laboratories provides analytical services to commercial and government clients in support of environmental monitoring and remedial activities as requested. The Laboratory's mission is dedicated to providing reliable data that satisfies client's requirements as explained in the following:

"Provide easy access, high quality, analytical support to commercial and government clients which meets or exceeds data quality objectives and provides them with the data needed to satisfy regulatory requirements and/or make confident decisions on the effectiveness of remedial activities."

These services are provided impartially and are not influenced by undue commercial or financial pressures which might impact the staff's technical judgment. Coincidently, Accutest does not engage in activities that endanger the trust in our independent judgment and integrity in relation to the testing activities performed.

1.2 ***Policy Statement***:

The management and staff of Accutest Laboratories share the responsibility for product quality and the commitment to the continual improvement of the quality system. Accordingly, Accutest's quality assurance program is designed to assure that all processes and procedures, which are components of environmental data production, meet established industry requirements, are adequately documented from a procedural and data traceability perspective, and are consistently executed by the staff. It also assures that analytical data of known quality, meeting the quality objectives of the analytical method in use and the data user's requirements, is consistently produced in the laboratory. This assurance enables the data user to make rational, confident, cost-effective decisions on the assessment and resolution of environmental issues.

The laboratory Quality System also provides the management staff with data quality and operational feedback information. This enables them to determine if the laboratory is achieving the established quality and operational standards, which are dictated by the client or established by regulation. The information provided to management, through the QA program, is used to assess operational performance from a quality perspective and to perform corrective action as necessary.

All employees of Accutest Laboratories participating in environmental testing receive quality system training and are responsible for knowing and complying with the system requirements. The entire staff shares Accutest's commitment to good professional practice.

1/07/14

Date

2.0 ORGANIZATION

2.1 ***Organizational Entity***. Accutest Laboratories is a privately held, independent testing laboratory founded in 1956 and registered as a New Jersey Corporation. The headquarters are located in Dayton, New Jersey where it has conducted business since 1987. Satellite laboratories are maintained in Marlborough, Massachusetts; Orlando, Florida, Houston, Texas, San Jose, California, Wheat Ridge, Colorado, and Scott Louisiana.

2.2 ***Management Responsibilities***

Requirement: Each laboratory facility has an established chain of command. The duties and responsibilities of the management staff are linked to the Chairman/CEO of Accutest Laboratories who establishes the agenda for all company activities.

President/CEO. Primary responsibility for all operations and business activities. Delegates authority to laboratory directors, general managers, and the quality assurance director to conduct day to day operations and execute quality assurance duties. Each of the seven operational entities (New Jersey, Florida, Massachusetts, Texas, California, Colorado, and Louisiana) report to the Chairman.

Laboratory Director. Executes day to day responsibility for laboratory operations including technical aspects of production activities and associated logistical procedures. Reports directly to the Presidnet/CEO.

Quality Assurance Director. Design, oversight, and facilitation responsibility for all Quality System elements identified in the Quality Program. Reports directly to the Presidnet/CEO.

Technical Directors (Organics/Inorganic). Responsible for day to day operations and activities of the organics and inorganics laboratories including scheduling, production and data quality. Reports directly to the Laboratory Director.

Organics Manager. Responsible for laboratory managers, supervisors and analyst performing daily laboratory procedures in semi-volatiles and organic prep.

Department Managers. Executes day to day responsibility for specific laboratory areas including technical aspects of production activities and associated logistical procedures. Directly report to the laboratory director.

Section Supervisors. Executes day to day responsibility for specific laboratory units including technical aspects of production activities and associated logistical procedures. Direct report to the Department Manager.

2.3 ***Chain of Command***

The responsibility for managing all aspects of the Company's operation is delegated to specific individuals, who have been assigned the authority to act in the absence of the senior staff. These individuals are identified in the following Chain of Command:

Phillip B. Rooney, Chairman
Gene Malloy, President & Chief Executive Officer
Chad Tate, Chief Financial Officer
Nancy Cole, Laboratory Director
Phillip Worby, Director, Corporate Quality Assurance
Matt Cordova, Director, Client Services

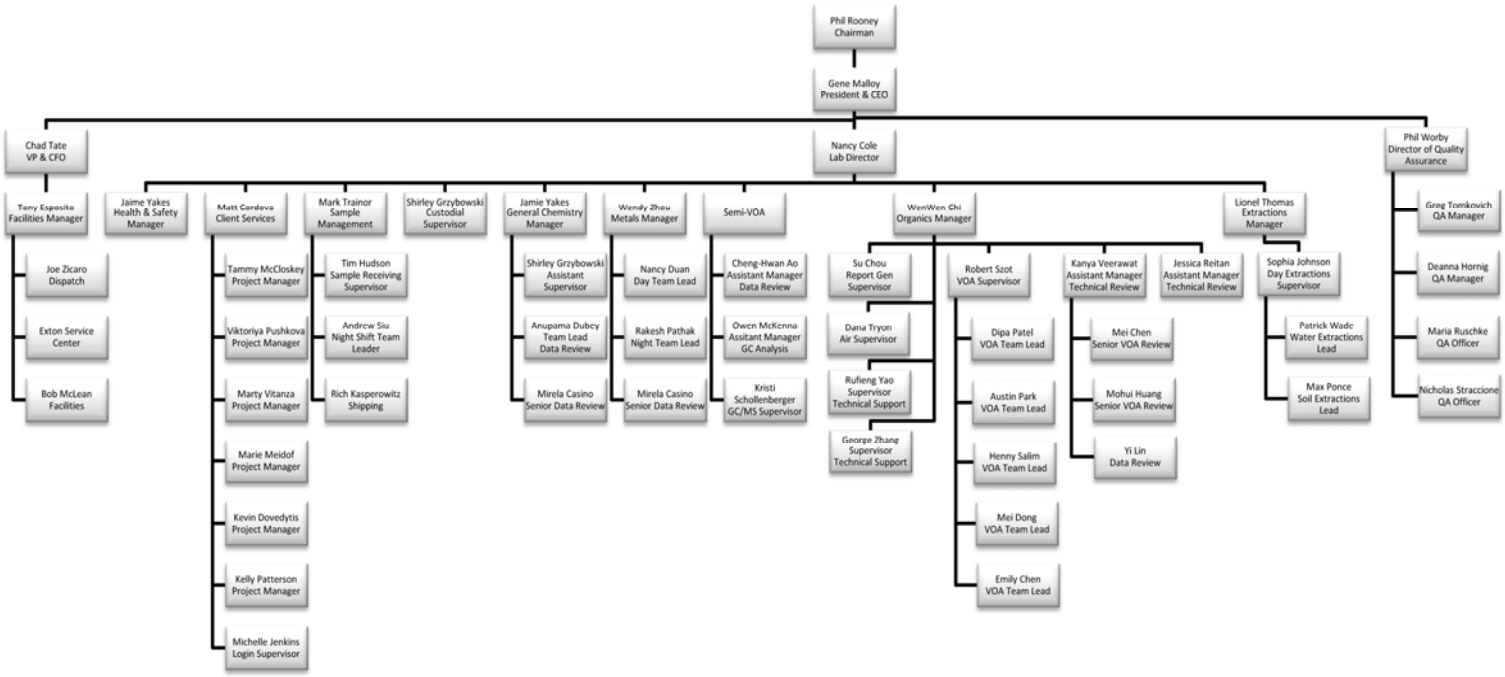
2.4 ***Organization Chart***

The hierarchy of the Company's operational control and oversight is illustrated in the Accutest Laboratories Organization Chart. Employees listed with an asterisk would be considered to be the appointed deputy in the event that the technical director or corporate quality assurance director are absent from their respective position for a period of time exceeding fifteen (15) consecutive calendar days. If this absence exceeds thirty-five (35) consecutive calendar days the laboratory shall notify the NJDEP-Office of Quality Assurance in writing.

Should this absence exceed sixty-five consecutive calendar days the DOD ELAP Accrediting Body shall be notified in writing.

Accutest New Jersey
Organization Chart
January 30, 2014

Core



3.0 QUALITY RESPONSIBILITIES OF THE MANAGEMENT TEAM

3.1 ***Requirement***: Each member of the management team has a defined responsibility for the Quality System. System implementation and operation is designated as an operational management responsibility. System design and implementation is designated as a Quality Assurance Responsibility.

Chairman. Primary responsibility for all quality activities. Delegates program responsibility to the Quality Assurance Director. Has the ultimate responsibility for implementation of the Quality System.

President/CEO. Primarily responsible for process improvements to all business aspects of the company.

Laboratory Director. Responsible for implementing and operating the Quality System in all laboratory areas. Responsible for the design and implementation of corrective action for defective processes. Has the authority to delegate Quality System implementation responsibilities.

Quality Assurance Director. Responsible for design, implementation support, training, and monitoring of the quality system. Identifies product, process, or operational defects using statistical monitoring tools and processes audits for elimination via corrective action. Empowered with the authority to halt production if quality issues warrant immediate action. Monitors implemented corrective actions for compliance.

Technical Directors. Responsible for overseeing the technical aspects of the quality assurance system as they are integrated into method applications and employed to assess analytical control on a daily basis. The Technical directors review and acknowledge the technical feasibility of proposed QA systems involving technical applications of applied methodology.

Department Managers. Responsible for applying the requirements of the Quality System in their section and assuring subordinate supervisors and staff apply all system requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Section Supervisors & Team Leaders. Responsible for applying the requirements of the Quality System to their operation and assuring the staff applies all system requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Quality Assurance Officers. Responsible for design support, implementation support, training, and monitoring support for the quality system. Conducts audits and product reviews to identify product, process, or operational defects using statistical monitoring tools and processes audits for elimination via corrective action. Provides support for implemented corrective actions for compliance. Serves as the primary alternate in the absence of the Quality Assurance Director.

Bench Analysts. Responsible for applying the requirements of the Quality System to the analyses they perform, evaluating QC data and initiating corrective action for quality control deficiencies within their control. Implements global corrective action as directed by superiors.

3.2 ***Program Authority***. Authority for program implementation originates with the Chairman who bears the ultimate responsibility for system design, implementation, and enforcement of requirements. This authority and responsibility is delegated to the Director of Quality Assurance who performs quality functions independently without the encumbrances or biases associated with operational or production responsibilities to ensure an honest, independent assessment of quality issues.

3.3 ***Data Integrity Policy***. The Accutest Data Integrity Policy reflects a comprehensive, systematic approach for assuring that data produced by the laboratory accurately reflects the outcome of the tests performed on field samples and has been produced in a bias free environment by ethical professionals. The policy includes a commitment to technical ethics, staff training in ethics and data integrity, an individual attestation to data integrity and procedures for evaluating data integrity. Senior management assumes the responsibility for assuring compliance with all technical ethics elements and operation of all data integrity procedures. The staff is responsible for compliance with the ethical code of conduct and for practicing data integrity procedures.

The Accutest Data Integrity Policy is as follows:

"Accutest Laboratories is committed to producing data that meets the data integrity requirements of the environmental regulatory community. This commitment is demonstrated through the application of a comprehensive data integrity program that includes ethics and data integrity training, data integrity evaluation procedures, staff participation and management oversight. Adherence to the specifications of the program assures that data provided to our clients is of the highest possible integrity and can be used for decision making processes with high confidence."

Data Integrity Responsibilities

Management. Senior management retains oversight responsibility for the data integrity program and retains ultimate responsibility for execution of the data integrity program elements. Senior management is responsible for providing the resources required to conduct ethics training and operate data integrity evaluation procedures. They also include responsibility for creating an environment of trust among the staff and being the lead advocate for promoting the data integrity policy and the importance of technical ethics. The Quality Assurance Director is the designated ethics officer for the Company.

Staff. The staff is responsible for adhering to the company ethics policy as they perform their duties and responsibilities associated with sample analysis and reporting. By executing this responsibility, data produced by Accutest Laboratories retains its high integrity characteristics and withstands the rigors of all data integrity checks.

The staff is also responsible for adhering to all laboratory requirements pertaining to manual data edits, data transcription and data traceability. These include the application of approved manual peak integration and documentation procedures. It also includes establishing traceability for all manual results calculations and data edits.

Ethics Statement. The Accutest ethics statement reflects the standards that are expected for businesses that provide environmental services to regulated entities and regulatory agencies on a commercial basis. The Ethics Policy is comprised of key elements that are essential to organizations that perform chemical analysis for a fee. As such, it focuses on elements related to personal, technical and business activities.

Accutest Laboratories provides analytical chemistry services on environmental matters to the regulated community. The data the company produces provides the foundation for determining the risk presented by a chemical pollutant to human health and the environment. The environmental industry is dependent upon the accurate portrayal of environmental chemistry data. This process is reliant upon a high level of scientific and personal ethics.

It is essential to the Company that each employee understands the ethical and quality standards required to work in this industry. Accordingly, Accutest has adopted a code of ethics, which each employee is expected to adhere to as follows:

- Perform chemical and microbiological analysis using accepted scientific practices and principles.
- Perform tasks in an honest, principled and incorruptible manner inspiring peers & subordinates.
- Maintain professional integrity as an individual.
- Provide services in a confidential, honest, and forthright manner.
- Produce results that are accurate and defensible.
- Report data without any considerations of self-interest.
- Comply with all pertinent laws and regulations associated with assigned tasks and responsibilities.

Data Integrity Procedures. Four key elements comprise the Accutest data integrity system. Procedures have been implemented for conducting data integrity training and for documenting that employees conform to the Accutest Data Integrity and Ethics policy.

The data integrity program consists of routine data integrity evaluation and documentation procedures to periodically monitor and document data integrity. These procedures are documented as SOPs. SOPs are approved and reviewed annually following the procedures

employed for all Accutest SOPs. Documentation associated with data integrity evaluations is maintained on file and is available for review.

Data Integrity Training. Accutest employees receive technical ethics training during new employee orientation. Employees are also required to refresh their ethical conduct agreement annually, which verifies their understanding of Accutest ethics policy and their ethical responsibilities. A brochure summarizing the details of the Accutest Data Integrity Policy is distributed to all employees with the Ethical Conduct Agreement. The refreshed agreement is appended to each individual's training file.

The training focuses on the reasons for technical ethics training, explains the impact of data fraud on human health and the environment, and illustrates the consequences of criminal fraud on businesses and individual careers. Accutest ethics policy and code of ethics are reviewed and explained for each new employee.

Training on data integrity procedures are conducted by individual departments for groups involved in data operations. These include procedures for manual chromatographic peak integration, traceability for manual calculations and data transcription.

Data Integrity Training Documentation. Records of all data integrity training are maintained in individual training folders. Attendance at all training sessions is documented and maintained in the training archive.

Accutest Data Integrity and Ethical Conduct Agreement. All employees are required to sign a Data Integrity and Ethical Conduct Agreement annually. This document is archived in individual training files, which are retained for duration of employment.

The Data Integrity and Ethical Conduct Agreement are as follows**:**

I. *I understand the high ethical standards required of me with regard to the duties I perform and the data I report in connection with my employment at Accutest Laboratories.*

II. *I have received formal instruction on the code of ethics that has been adapted by Accutest Laboratories during my orientation and agree to comply with these requirements.*

III. *I have received formal instruction on the elements of Accutest Laboratories' Data Integrity Policy and have been informed of the following specific procedures:*

   a. *Formal procedures for the confidential reporting of data integrity issues are available, which can be used by any employee,*

   b. *A data integrity investigation is conducted when data issues are identified that may negatively impact data integrity.*

   c. *Routine data integrity monitoring is conducted on sample data, which may include an evaluation of the data I produce,*

IV. *I have read the brochure detailing Accutest Laboratories Data Integrity and Ethics Program as required.*

V. *I am aware that data fraud is a punishable crime that may include fines and/or imprisonment upon conviction.*

VI. *I also agree to the following:*

a. *I shall not intentionally report data values, which are not the actual values observed or measured.*

b. *I shall not intentionally modify data values unless the modification can be technically justified through a measurable analytical process.*

c. *I shall not intentionally report dates and times of data analysis that are not the true and actual times the data analysis was conducted.*

d. *I shall not condone any accidental or intentional reporting of inauthentic data by other employees and immediately report it's occurrence to my superiors.*

e. *I shall immediately report any accidental reporting of inauthentic data by myself to my superiors.*

Data Integrity Monitoring. Documented procedures are employed for performing data integrity monitoring. These include regular data review procedures by supervisory and management staff (Section 12.7), supervisory review and approval of manual integrations and periodic reviews of GALP audit trails from the LIMS and all computer controlled analysis.

Data Review. All data produced by the laboratory undergoes several levels of review, which includes two levels of management review. Detected data anomalies that appear to be related to data integrity issues are isolated for further investigation. The investigation is conducted following the procedures described in this section.

Manual Peak Integration Review and Approval. Routine data review procedures for all chromatographic processes includes a review of all manual chromatographic peak integrations. This review is performed by the management staff and consists of a review of the machine integration compared to the manual integration. Manual integrations, which have been performed in accordance with Accutest manual peak integration procedures, are approved for further processing and release. Identification of samples and analytes in which manual integration had been necessary may be recorded in a report case narrative specific to a particular client and project requirement.

Manual integrations which are not performed to Accutest specifications are set aside for corrective action, which may include analyst retraining or further investigation as necessary.

GALP Audit Trail Review. Good Automated Laboratory Practice (GALP) audits are comprehensive data package audits that include a review of raw data, process logbooks, processed data reports and GALP audit trails from individual instruments and LIMS. GALP

audit trails, which record all electronic data activities, are available for the majority of computerized methodology and the laboratory information management system (LIMS). These audit trails are periodically reviewed to determine if interventions performed by technical staff constitute an appropriate action. The review is performed on a recently completed job and includes interviews with the staff who performed the analysis. Findings indicative of inappropriate interventions or data integrity issues are investigated to determine the cause and the extent of the anomaly.

Confidential Reporting of Data Integrity Issues. Data integrity concerns may be raised by any individual to their supervisor. Employees with data integrity concerns should always discuss those concerns with their immediate supervisors as a first step unless the employee is concerned with the confidentiality of disclosing data integrity issues or is uncomfortable discussing the issue with their immediate supervisors. The supervisor makes an initial assessment of the situation to determine if the concern is related to a data integrity violation. Those issues that appear to be violations are documented by the supervisor and referred to the Director of Quality Assurance for investigation.

Documented procedures for the confidential reporting of data integrity issues in the laboratory are part of the data integrity policy. These procedures assure that laboratory staff can privately discuss ethical issues or report items of ethical concern without fears of repercussions with senior staff.

Employees with data integrity concerns that they consider to be confidential are directed to the Corporate Human Resources Manager in Dayton, New Jersey. The HR Manager acts as a conduit to arrange a private discussion between the employee and the Corporate QA Director or a local QA Officer.

During the employee - QA discussion, the QA representative evaluates the situation presented by the employee to determine if the issue is a data integrity concern or a legitimate practice. If the practice is legitimate, the QA representative clarifies the process for the employee to assure understanding. If the situation appears to be a data integrity concern, the QA representative initiates a Data Integrity Investigation following the procedures specified in SOP EQA059.

Data Integrity Investigations. Follow-up investigations are conducted for all reported instances of ethical concern related to data integrity. Investigations are performed in a confidential manner by senior management according to a documented procedure. The outcome of the investigation is documented and reported to the company president who has the ultimate responsibility for determining the final course of action in the matter. Investigation documentation includes corrective action records, client notification information and disciplinary action outcomes, which is archived for a period of five years.

The investigations are conducted by the senior staff and supervisory personnel from the affected area. The investigations team includes the Laboratory Director and the Quality Assurance Director. Investigations are conducted in a confidential manner until it is completed and resolved.

The investigation includes a review of the primary information in question by the investigations team. The team performs a review of associated data and similar historical data to determine if patterns exist. Interviews are conducted with key staff to determine the reasons for the observed practices.

Following data compilation, the investigations team reviews all information to formulate a consensus conclusion. The investigation results are documented along with the recommended course of action.

Corrective Action, Client Notification & Discipline. Investigations that reveal systematic data integrity issues will be referred for corrective action, resolution and disposition (Section 13). If the investigation indicates that an impact to data has occurred and the defective data has been released to clients, client notification procedures will be initiated following the steps in Section 17.6.

In all cases of data integrity violations, some level of disciplinary action will be conducted on the responsible individual. The level of discipline will be consistent with the violation and may range from retraining and/or verbal reprimand to termination. A zero tolerance policy is in effect for unethical actions.

4.0 JOB DESCRIPTIONS OF KEY STAFF

4.1 ***Requirement***: Descriptions of key positions within the organization are defined to ensure that clients and staff understand duties and the responsibilities of the management staff and the reporting relationships between positions.

Chairman. Responsible for all laboratory operations and business activities. Establishes the company mission and objectives in response to business needs. Direct supervision of each laboratory director, client services, management information systems, quality assurance and health and safety.

President/CEO. Responsible for overall process improvement for all business processes. Is also responsible for Quality Assurance, IT Development and Health and Safety. Reports directly to the Chairman/CEO.

Laboratory Director. Reports to the company President/CEO. Establishes laboratory operations strategy. Direct supervision of client services, organic chemistry, inorganic chemistry, field services, and sample management. Maintains operational responsibility for the designated regional laboratories as defined in the Accutest Laboratories Organization Chart. Assumes the responsibilities of the CEO in his absence.

Vice President, Chief Information Officer. Reports to President/CEO. Develops IT Software and hardware agenda. Provides system strategies to compliment company objectives. Maintains all software and hardware used for data handling.

Vice President, Chief Financial Officer. Reports to the company President /CEO. Responsibilities include overseeing the Financial Accounting and Human Resource Department, Corporate Purchasing, Corporate IT Help Desk, and Salary and Benefit Administration.

Director, Quality Assurance. Reports to the company President/CEO and functions independently from laboratory operations. Establishes the company quality agenda, develops quality procedures, provides assistance to operations on quality procedure implementation, coordinates all quality control activities, monitors the quality system, and provides quality system feedback to management to be used for process improvement. Assumes the responsibilities of the CEO in the absence of the CEO and the President/CEO.

Director Client Services. Reports to the Laboratory Director. Establishes and maintains communications between clients and the laboratory pertaining to client requirements which are related to sample analysis and data deliverables. Initiates client orders and supervises sample login operations.

Manager, Organics (Organics Technical Director). Reports to the laboratory director. Directs the operations of the organics group, consisting of organics preparation and instrumental analysis. Establishes daily work schedule. Supervises method implementation, application, and data production. Responsible for following Quality System requirements.

Maintains laboratory instrumentation in an operable condition. Assumes the responsibilities of the Laboratory Director in his absence.

Manager, Inorganics (Inorganics Technical Director). Reports to the laboratory director. Directs the operations of the inorganics group, consisting of wet chemistry and the metals laboratories. Establishes daily work schedule. Supervises method implementation, application, and data production. Responsible for following Quality System requirements. Maintains laboratory instrumentation in an operable condition. Assumes the responsibilities of the Laboratory Director in his absence.

Manager, Field Services. Reports to the laboratory director. Conducts field sampling and analysis of "analyze immediately" parameters in support of ongoing field projects. Responsible for proper collection, preservation, documentation and shipment of field samples. Maintains field sampling and field instrumentation required to perform primary responsibilities.

Manager, Sample Management. Reports to the laboratory director. Develops, maintains and executes all procedures required for receipt of samples, verification of preservation, and chain of custody documentation. Responsible for maintaining and documenting secure storage, delivery of samples to laboratory units on request and courier services.

Manager, Health and Safety. Reports to the President/CEO. Responsible for developing company safety program and chemical hygiene plan. Reviews and updates these plans annually. Responsible for employee training on relevant health and safety topics. Documents employee training. Manages laboratory waste management program.

Supervisor, Wet Chemistry. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for wet chemistry parameters using valid, documented methodology. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements. Assumes the responsibilities of the Inorganics Manager in his absence.

Supervisor, Metals. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for metallic elements using valid, documented methodology. Documents all procedures and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements.

Supervisor, Organic Preparation. Reports to the organics manager. Executes the daily sample preparation schedule. Performs the extract of multi-media samples for organic constituents using valid, documented methodology. Prepares documentation for extracted samples. Assumes custody until transfer for analysis.

Technical Support Supervisor, Organics. Reports to the organic manager. Oversees all instrument maintenance and new equipment installation. Conducts method development and implementation tasks.

Assistant Manager, Organics. Reports to the organics manager. Expedites the analysis of samples and sample extracts. Executes daily analysis schedule. Supervises the analysis of samples for organic parameters using valid, documented methodology. Documents all data and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements. Assumes the responsibilities of the Organics Manager in his absence.

Supervisor, Report Generation. Reports to the organics manager. Compiles raw and processed sample data and assembles into client-ready reports. Initiates report scanning for archiving purposes. Maintains raw batch data in accessible storage. Mails completed reports to clients according to specified report turnaround schedule.

Quality Assurance Officers. Reports to the Director, Quality Assurance. Performs quality control data review for trend monitoring purposes. Conducts internal audits and prepares reports for management review. Oversees proficiency testing program. Process quality control data for statistical purposes. Assumes the responsibilities of the Quality Assurance Director in his absence.

4.2 ***Employee Screening, Orientation, and Training***.

All potential laboratory employees are screened and interviewed by human resources and technical staff prior to their hire. The pre-screen process includes a review of their qualifications including education, training and work experience to verify that they have adequate skills to perform the tasks of the job.

Newly hired employees receive orientation training beginning the first day of employment by the Company. Orientation training consists of initial health and safety training including general laboratory safety, personal protection and building evacuation. Orientation also includes quality assurance program training, data integrity training, and an overview of the Company's goals, objectives, mission, and vision.

All technical staff receives training to develop and demonstrate proficiency for the methods they perform. New analysts work under supervision until the supervisory staff is satisfied that a thorough understanding of the method is apparent and method proficiency has been demonstrated, through a precision and accuracy study that has been documented, reviewed and approved by the QA Staff. Data from the study is compared to method acceptance limits. If the data is unacceptable, additional training is required. The analyst may also demonstrate proficiency by producing acceptable data through the analysis of an independently prepared proficiency sample.

Individual proficiency is demonstrated annually for each method performed. Data from initial and continuing proficiency demonstrations are archived in the individual's training folder.

4.3 ***Training Documentation***. The human resources department prepares a training file for every new employee. All information related to qualifications, experience, external training

courses, and education are placed into the file. Verification documentation for orientation, health & safety, quality assurance, and ethics training is also included in the file.

Additional training documentation is added to the file as it is developed. This includes documentation of SOP understanding, data for initial and continuing demonstrations of proficiency, performance evaluation study data and notes and attendance lists from group training sessions.

The Quality Assurance Department maintains the employee training database. This database is a comprehensive inventory of training documentation for each individual employee. The database enables supervisors to obtain current status information on training data for individual employees on a job specific basis. It also enables the management staff to identify training documentation in need of completion.

Employee specific database records are created by human resources on the date of hire. Data base fields for job specific requirements such as SOP documentation of understanding and annual demonstration of analytical capability are automatically generated when the supervisor assigns a job responsibility. Employees acknowledge that their SOP responsibilities have been satisfied using a secure electronic process which updates the database record. Reports are produced which summarize the qualifications of individual employees or departments.

5.0 SIGNATORY APPROVALS

Requirement: Procedures have been developed for establishing the traceability of data and documents. The procedure consists of a signature hierarchy, indicating levels of authorization for signature approvals of data and information within the organization. Signature authority is granted for approval of specific actions based on positional hierarchy within the organization and knowledge of the operation that requires signature approval. SOP EQA032 Signature Authority explains the process of Accutest Signature Authority and the use of electronic signatures in the laboratory. A log of signatures and initials of all employees is maintained by the HR Staff for cross-referencing purposes.

5.1 *Signature Hierarchy*.

Chairman. Authorization for contracts and binding agreements with outside parties. Approval of final reports, quality assurance policy, SOPs, project specific QAPs, data review and approval in lieu of technical managers. Note: Contract signature authority resides with Company officers only, which include the Chairman, Chief Financial Officer and President/CEO Administration.

President/CEO. Approval of quality assurance policy in lieu of the Director, Quality Assurance. IT Development and Health and Safety purchase approvals in Lieu of IT and H & S managers.

Laboratory Director. Approval of final reports in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers. Establishes and implements technical policy.

Vice President, Chief Information Officer. Department specific supplies purchase. MIS policy.

Director, Quality Assurance. Approval of final reports and quality assurance policy in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers.

Director, Client Services. QAP and sampling and analysis plan approval. Project specific contracts, pricing, and price modification agreements. Approval and acceptance of incoming work, Client services policy.

Managers, Technical Departments. Methodology and department specific QAPs. Data review and approval, department specific supplies purchase. Technical approval of SOPs.

Manager, Sample Management. Initiation of laboratory sample custody and acceptance of all samples. Approval of department policies and procedures. Department specific supplies purchase.

Manager, Health & Safety. Approval of health and safety policy in the absence of the President and Executive Vice Presidnt. Approval of health and safety SOPs. Waste manifesting and approval.

Assistant Managers: Technical Departments. Data review approval, purchasing of expendable supplies.

Supervisor, Field Services. Sampling plan design and approval. Data review for field parameters. State form certification. Department policies and procedures. Department specific supplies purchase.

Supervisors, Technical Departments. Data review approval, purchasing of expendable supplies.

5.2 ***Signature Requirements***. All laboratory activities related to sample custody and generation or release of data must be approved using either initials, signatures or electronic, password protected procedures. The individual, who applies his signature initial or password to an activity or document, is authorized to do so within the limits assigned to them by their supervisor. All written signatures and initials must be applied in a readable format that can be cross-referenced to the signatures and initials log if necessary.

5.3 ***Signature and Initials Log***. The HR group maintains a signature and initials log. New employee signatures and initials are appended to the log on the first day of employment. Signature of individuals no longer employed by the company are retained, but annotated with their date of termination.

5.4 ***Electronic Signature Log.*** Key technical staff will sign a liability document for their signatures designating the use of their electronic signatures on an annual basis. Quality Assurance team keeps a wet copy of these signatures on form QA115.

6.0 DOCUMENTATION & DOCUMENT CONTROL

Requirement: Document control policies have been established which specify that any document used as an information source or for recording analytical or quality control information must be managed using defined document control procedures. Accordingly, policies and procedures required for the control, protection, and storage of any information related to the production of analytical data and the operation of the quality system to assure its integrity and traceability have been established and implemented in the laboratory. The system contains sufficient controls for managing, archiving and reconstructing all process steps which contributed to the generation of an analytical test result. Using this system, an audit trail for reported data can be produced, establishing complete traceability for the result.

6.1 ***Administrative Records***. Administrative (non-analytical) records are managed by the quality assurance department. These records consist of electronic documents which are retained in a limited access electronic directory or paper documents, which are released to the technical staff upon specific request.

Form Generation, Modification & Control. The quality assurance group approves and manages all forms used as either stand-alone documents or in logbooks to ensure their traceability. Forms are generated as computer files only and are maintained in a limited access master directory. The QA staff also manages and approves modifications to existing forms. Obsolete editions of modified forms are retained for seven years.

Approved forms are assigned a 5-character alphanumeric code. The first two alpha characters designate the department that uses the form; the next three digits are sequentially assigned number.

New forms must include the name Accutest Laboratories and appropriate spaces for signatures of approval and dates. Further design specifications are the responsibility of the originating department.

The technical staff is required to complete all forms to the maximum extent possible. If information for a specific item is unavailable, the analyst is required to "Z" the information block. The staff is also required to "Z" the uncompleted portions of a logbook or logbook form if the day's analysis does not fill the entire page of the form.

Logbook Control. All laboratory logbooks are controlled documents that are comprised of approved forms used to document specific processes. New logs are numbered and issued to a specific individual who is assigned responsibility for the log. Old logs are returned to QA for entry into the document archive system where they are retained for seven (7) years. Laboratory staff may hold a maximum of two consecutively dated logbooks of the same type in the laboratory including the most recently issued book to simplify review of recently completed analysis.

Controlled Documents. Key laboratory documents that are distributed internally and externally are numbered for tracking purposes. Individuals receiving documents, who must be

informed when changes occur, receive controlled copies of those documents. Controlled status simplifies document updates and retrieval of outdated documents. Control is maintained through a document numbering procedure and document control logbook which identifies the individual receiving the controlled document and the date of receipt. Key documents are also distributed as uncontrolled documents if the recipient does not require updated copies when changes occur. Key documents in uncontrolled status are numbered and tracked using the same procedures as controlled documents.

Quality Systems Manual (QSM). All QSMs are assigned a number prior to distribution. The number, date of distribution, and identity of the individual receiving the document are recorded in the document control logbook. The numbering system is restarted with each new volume, which corresponds to the annual revision of the QSM. Electronic versions are distributed as read only files that are password protected.

Standard Operating Procedures (SOPs). SOPs are maintained by pre-designating the numbers of official copies of documents that are placed into circulation within the laboratory. Official documents are copied to green paper and placed into the appropriate laboratory section as follows:

Administrative: One master copy for the administrative file.

Sample Management: One controlled green copy for the sample management file.

Organics Laboratories: Two controlled green copies, one for the affected laboratory area, and one for the organics laboratory file.

Inorganics Laboratories: Two controlled green copies, one for the affected laboratory area, and one for the inorganics laboratory file.

Field Services: One controlled green copy for each field sampling team (generally a single field technician).

The original, signed copy of the SOP is maintained in the master SOP binder by the QA staff. The QA staff collects outdated versions of SOPs as they are replaced and archived for a period of seven (7) years in the QA archives. Electronic versions of outdated SOPs are moved from the active SOP directory to the inactive directory.

6.2 ***Technical Records***. All records related to the analysis of samples and the production of an analytical result are archived in secure document storage or on electronic media and contain sufficient detail to produce an audit trail which re-creates the analytical result. These records include information related to the original client request, bottle order, sample login and custody, storage, sample preparation, analysis, data review and data reporting.

Each department involved in this process maintains controlled documents which enable them to maintain records of critical information relevant to their department's process.

6.3 ***Quality Control Support Data & Records***. All information and data related to the quality system is stored in a restricted access directory on the network server. Information on this directory is backed-up daily. Users of the quality assurance information and data have "read-only" access to the files contained in the directory. The QA staff and the laboratory director have write capability in this directory.

This directory contains all current and archived quality system manuals, SOPs, control limits, MDL studies, precision and accuracy data, official forms, internal audit reports, proficiency test scores and metrics calibration information.

The following information is retained in the directory:

- Quality System Manuals
- Standard Operating Procedures
- ASTM & NIST Methods
- Bottleware & Preservative QC Data
- Certification Documentation
- Change Management Data
- External Audit Reports
- Internal Audit Reports
- Corrective Action Database
- Laboratory Forms Directory
- Health & Safety Manuals
- Inactive Standard Operating Procedures
- Method Detection Limit Data
- Metrics Inventory & Calibration Data
- Microbiology Reagent Data
- Performance Limits
- Proficiency Test Scores & Statistics
- Project Specific Analytical Requirements
- QC Report Reviews
- Regulatory Agency Quality Documents
- Staff Bios And Job Descriptions
- State Specific Methods

6.4 ***Analytical Records***. All data related to the analysis of field samples are retained as either paper or electronic records that can be retrieved to compile a traceable audit trail for any reported result. All information is linked to the client job and sample number, which serves as a reference for all sample related information tracking.

Critical times in the life of the sample from collection through analysis to disposal are documented. This includes date and time of collection, receipt by the laboratory, preparation times and dates, analysis times and dates and data reporting information. Analysis times are calculated in hours for methods where holding time is specified in hours (≤72 hours).

Sample preparation information is recorded in a separate controlled logbook. It includes sample identification numbers, types of analysis, preparation and cleanup methods, sample weights and volumes, reagent lot numbers and volumes and any other information pertinent to the preparation procedure.

Information related to the identification of the instrument used for analysis is permanently attached to the electronic record. The record includes an electronic data file that indicates all instrument conditions employed for the analysis, including the type of analysis conducted. The analyst's identification is electronically attached to the record. The instrument tuning and calibration data is electronically linked to the sample or linked though paper logs which were used in the documentation of the analysis. Quality control and performance criteria are permanently linked to the paper archive or electronic file.

Paper records for the identity, receipt, preparation and evaluation of all standards and reagents used in the analysis are documented in prepared records and maintained in controlled documents or files. Lot number information linking these materials to the analysis performed is recorded in the logbooks associated with the samples in which they were used.

Manual calculations or peak integrations that were performed during the data review are retained as paper or scanned documents and included as part of the electronic archive. Signatures for data review are retained on paper or as scanned versions of the paper record for the permanent electronic file.

6.5 ***Confidential Business Information (CBI).*** Operational documents including SOPs, Quality Manuals, personnel information, internal operations statistics, and laboratory audit reports are considered confidential business information. Strict controls are placed on the release of this information to outside parties.

Release of CBI to outside parties or organizations may be authorized upon execution of a confidentiality agreement between Accutest and the receiving organization or individual. CBI information release is authorized for third party auditors and commercial clients in electronic mode as Adobe Acrobat .PDF format only.

6.6 ***Software Change Documentation & Control.*** Changes to software are documented as text within the code of the program undergoing change. Documentation includes a description of the change, reason for change and the date the change was placed into effect. Documentation indicating the adequacy of the change is prepared following the evaluation by the user who requested the change.

6.7 ***Report and Data Archiving***. Accutest Laboratories produces digital files of all raw and processed data which is maintained for a minimum period of seven (7) years. The archived files consist of all raw data files and source documents associated with the analysis of field samples and proficiency test samples. Data files and source documents associated with method calibration and project and method quality control are also archived. After seven years, the files may be discarded unless contractual arrangements exist which dictate different requirements. Client or regulatory agency specific data retention practices are employed for several government organizations such as the Department of Defense and the Massachusetts Department of Environmental Protection that require a retention period of ten (10) years. Data archiving may also be extended up to ten (10) years for specific commercial clients in response to contractual requirements.

Complete date and time stamped PDF reports are generated automatically from the laboratory information management system (LIMS) using the source documents archived on the document server. These source documents are maintained on a document server and archived to primary and clone tapes. The primary tapes remain on premises while the clone tapes are taken to a secure offsite location for permanent storage. Both the primary and clone tapes remain in storage for the remainder of the archive period.

6.8 ***Training***. The company maintains a training record for all employees that documents that they have received instruction on administrative and technical tasks that are required for the job they perform. Training records for individuals employed by the company are retained for a period of six months following their termination of employment.

Training File Origination. The Human Resources Group (HR) initiates training files. The QA staff, through the Assistant Quality Assurance officer, retains the responsibility for the maintenance and tracking of all training related documentation in the file. The file is begun on the first day of employment. Information required for the file includes a copy of the individual's most current resume, detailing work experience and a copy of any college diplomas and transcript(s). Information added on the first day includes documentation of health and safety training, quality assurance training and a signed data integrity training and ethical conduct agreement.

Training documentation, training requirements, analyst proficiency information and other training related support documentation is tracked using a customized database application (Section 4.3). Database extracts provide an itemized listing of specific training requirements by job function. Training status summaries for individual analysts portray dates of completion for job specific training requirements.

6.9 ***Technical Training***. The supervisor of each new employee is responsible for developing a training plan for each new employee. The supervisor evaluates the employees training progress at regular frequencies. Supporting documentation, including demonstration of capability and precision and accuracy studies, which demonstrate an analyst's proficiency for a specific test, are added to the training file as completed. Employees and supervisors verify documentation of understanding (DOU) for all assigned standard operating procedures in the training database. Certificates or diplomas for any off-site training are also added to the file.

7.0 REFERENCE STANDARD TRACEABILITY

Requirement: Documented procedures, which establish traceability between any measured value and a national reference standard, are established by the laboratory as required. All metric measurements are traceable to NIST reference weights or thermometers that are calibrated on a regular schedule. All chemicals used for calibration of a quantitative process are traceable to an NIST reference that is documented by the vendor using a certificate of traceability. The laboratory maintains a documentation system that establishes the traceability links. The procedures for verifying and documenting traceability are documented in standard operating procedures.

7.1 ***Traceability of Metric Measurements - Thermometers***. Accutest uses NIST thermometers to calibrate commercially purchased thermometers prior to their use in the laboratory and annually thereafter for liquid in glass thermometers or quarterly for electronic temperature measuring devices. If necessary, thermometers are assigned correction factors that are determined during their calibration using an NIST thermometer as the standard. The correction factor is documented in a thermometer calibration database and on a tag attached to the thermometer. The correction factor is applied to temperature measurements before recording the measurement in the temperature log. Calibration of each thermometer is verified and documented on a regular schedule. The NIST thermometer is checked for accuracy by an ISO 17025 approved vendor every five (5) years following the specifications for NIST thermometer calibration verification detailed in the united States Environmental Protection Agency's "Manual for the Certification of Laboratories Analyzing Drinking Water", Fifth Edition, February2005.

7.2 ***Traceability of Metric Measurements – Calibration Weights***. Accutest uses calibrated weights, which are traceable to NIST standard weights to calibrate all balances used in the laboratory. Balances are calibrated to specific tolerances within the intended use range of the balance. Calibration checks are required on each day of use. If the tolerance criteria are not achieved, corrective action specified in the balance calibration SOP is applied before the balance can be used for laboratory measurements. Recalibration of all calibration weights is conducted and documented on a biannual basis.

7.3 ***Traceability of Chemical Standards***. All chemicals, with the exception of bulk dry chemicals and acids, purchased as reference standards for use in method calibration must establish traceability to NIST referenced material through a traceability certificate. Process links are established that enable a calibration standard solution to be traced to its NIST reference certificate.
Chemical standards used for analysis must meet the purity specifications of the method. These specifications must be stated in the reagents section of the method SOP.

7.4 ***Assignment of Reagent, Bulk Chemical and Standard Expiration Dates.*** Expiration date information for all purchased standards, prepared standard solutions and selected reagents is provided to Accutest by the vendor as a condition of purchase. Neat materials, bulk chemicals including solvents, acids and inorganic reagents are not required to be purchased with expiration dates. An expiration date of five (5) years from the date of receipt shall be established. Prepared solutions are labeled with the expiration date provided by the

manufacturer. In-house prepared solutions are assigned expiration dates that are consistent with the method that employs their use unless documented experience indicates that an alternate date can be applied. If alternate expiration dates are employed, their use is documented in the method SOP. Expiration dates for prepared inorganic reagents, which have not exhibited instability, are established at two years from the date of preparation for tracking purposes.

The earliest expiration date has been established as the limiting date for assigning expiration dates to prepared solutions. The assignments of expiration dates that are later than the expiration date of any derivative solution or material are prohibited.

7.5 ***Documentation of Traceability***. Traceability information is documented in individual logbooks designated for specific measurement processes. The quality assurance group maintains calibration documentation for metric references in separate logbooks.

Balance calibration verification is documented in logbooks that are assigned to each balance. The individual conducting the calibration is required to initial and date all calibration activities. Any defects that occur during calibration are also documented along with the corrective action applied and a demonstration of return to control. Annual service reports and certificates are retained on file by the QA staff.

Temperature control is documented in logbooks assigned to the equipment being monitored. A calibrated thermometer is assigned to each individual item. Uncorrected and corrected measurements are recorded along with date and initials of the individual conducting the measurement on a daily or as used basis. Corrective action, if required, is also documented including the demonstration of return to control.

Initial traceability of chemical standards is documented via a vendor-supplied certificate (not available for bulk dry chemicals and acids) that includes lot number, expiration date and certified concentration information. Solutions prepared using the vendor supplied chemical standards are documented in logbooks assigned to specific analytical processes. Alternatively, documentation may be entered into the electronic standards and reagent tracking log. The documentation includes links to the vendor's lot number, an internal lot number, and dates of preparation, expiration date, and the preparer's initials.
Accutest employs commercially prepared standard solutions whose traceability can be demonstrated through a vendor supplied certificate of analysis that includes an experimental verification of the standard's true concentration. The test value for the verification analysis must agree within 1% of the vendor's true value before it can be employed for calibration purposes. If the test value differs from the nominal value by more than 1%, then the test value is used as the true value in laboratory calibrations and calculations. Purchased standards which do not have a certificate of analysis cannot be used for calibration or calibration verification purposes and are rejected or returned to the vendor.

Supervisors conduct regular reviews of logbooks, which are verified using a signature and date.

8.0 TEST PROCEDURES, METHOD REFERENCES, AND REGULATORY PROGRAMS

Requirements: The laboratory employs client specified or regulatory agency approved methods for the analysis of environmental samples. A list of active methods is maintained, which specifies the type of analyses performed and cross-references the methods to applicable environmental regulations. Routine procedures used by the laboratory for the execution of a method are documented in standard operating procedures. Method performance and sensitivity are demonstrated annually where required. Defined procedures for the use of method sensitivity limits for data reporting purposes are established by the Director of Quality Assurance and used consistently for all data reporting purposes.

8.1 ***Method Selection & Application***. Accutest employs methods for environmental sample analysis that are consistent with the client's application, which are appropriate and applicable to the project objectives. Accutest informs the client if the method proposed is inappropriate or outdated and suggests alternative approaches.

Accutest employs documented, validated regulatory methods in the absence of a client specification and informs the client of the method selected. These methods are available to the client and other parties as determined by the client. Documented and validated in-house methods may be applied if they are appropriate to the project. The client is informed of the method selection.

8.2 ***Standard Operating Procedures***. Standard operating procedures (SOP) are prepared for routine methods executed by the laboratory, processes related to laboratory operations and sample or data handling. All SOPs are formatted to meet the specifications established by the National Environmental Laboratory Accreditation Conference, which are detailed in Chapter Five – Quality Systems of the established Standards. The procedures describe the process steps in sufficient detail to enable an individual, who is unfamiliar with the procedure to execute it successfully.

SOPs are evaluated annually and edited if necessary. Reviewed SOPs that do not require modification include an evaluation summary form indicating that an evaluation was conducted and modifications were not needed. SOPs can be edited on a more frequent basis if changes are required for any reason. These may include a change to the methodology, elimination of systematic errors that dictate a need for process changes or modifications to incorporate a new version of the method promulgated by the originating regulatory agency. Procedural modifications are indicted using a revision number. SOPs are available for client review at the Accutest facility upon request.

The complete list of the laboratories SOPs available as of the date of publication of this QSM version are detailed in Appendix II.

8.3 ***Method Validation***. Standard methods from regulatory sources are primarily used for all analysis. Standard methods do not require validation by the laboratory. Non-standard, in-house methods are validated prior to use. Validation is also performed for standard methods

applied outside their intended scope of use. Validation is dependent upon the method application and may include analysis of quality control samples to develop precision and accuracy information for the intended use. A final method validation report is generated, which includes all data in the validation study. A statement of adequacy and/or equivalency is included in the report. A copy of the report is archived in the quality assurance directory of the company server.

Non-standard methods are validated prior to use. This includes the validation of modified standard methods to demonstrate comparability with existing methods. Demonstrations and validations are performed and documented prior to incorporating technological enhancements and nonstandard methods into existing laboratory methods used for general applications. The demonstration includes method specific requirements for assuring that significant performance differences do not occur when the enhancement is incorporated into the method. Validation is dependent upon method application and may include the analysis of quality control samples to develop precision and accuracy information for intended use.

The study procedures and specifications for demonstrating validation include comparable method sensitivity, calibration response, method precision; method accuracy and field sample consistency for several classes of analytical methods are detailed in this document. These procedures and specifications may vary depending upon the method and the modification.

8.4 ***Estimated Uncertainty.*** A statement of the estimated uncertainty of an analytical measurement accompanies the test result when required. Estimated uncertainty is derived from the performance limits established for spiked samples of similar matrices. The degree of uncertainty is derived from the negative or positive bias for spiked samples accompanying a specific parameter. When the uncertainty estimate is applied to a measured value, the possible quantitative range for that specific parameter at that measured concentration is defined. Well recognized regulatory methods that specify values for the major sources of uncertainty and specify the data reporting format do not require a further estimate of uncertainty.

8.5 ***Demonstration of Capability***. Confirmation testing is conducted to demonstrate that the laboratory is capable of performing the method before its application to the analysis of environmental samples. The results of the demonstration tests are compared to the quality control specifications of the method to determine if the performance is acceptable.

Capability demonstrations are conducted initially for each method on every instrument and annually on a method specific basis thereafter. Acceptable demonstrations are documented for individual training files and retained by the QA staff. New analytes, which are added to the list of analytes for an accredited method, are evaluated for applicability through a demonstration of capability similar to those performed for accredited analytes.

8.6 ***Method Detection Limit Determination***. Annual method detection limit (MDL) studies are performed as appropriate for routine methods used in the laboratory. MDL studies are also performed when there is a change to the method that affects how the method is performed or when an instrumentation change that impacts sensitivity occurs. The procedure used for determining MDLs is described in 40 CFR, Part 136, and Appendix B. Studies are performed for each method on water, soil and air matrices for every instrument that is used to perform

the method. MDLs are established at the instrument level. The highest MDL of the pooled instrument data is used to establish a laboratory MDL. MDLs are experimentally verified through the analysis of spiked quality control samples at 2-4 times the concentration of the experimental MDL. The verification is performed on every instrument used to perform the analysis. The quality assurance staff manages the annual MDL determination process and is responsible for retaining MDL data on file. Approved MDLs are appended to the LIMS and used for data reporting purposes.

8.7 ***Limit of Detection (LOD).*** For the DoD ELAP the limit of detection (LOD) for each method and target analyte of concern is established for each instrument that is used to perform the method. The LOD is established by spiking a water and/or soil matrix at approximately two to three times the calculated MDL (for a single-analyte standard) or one to four times the calculated MDL (for a multi-analyte standard). The LOD undergoes all sample processing steps and is validated by the qualitative identification of the analytes of interest. The spike concentration establishes the LOD and must be verified quarterly.

8.8 ***Instrument Detection Limit Determination***. Instrument detection limits (IDLs) are determined for all inductively coupled argon plasma emission spectrophotometers and mass spectrometers. The IDL is determined for the wavelength (emission) of each element and the ion (mass spectrometry) of each element used for sample analysis. The IDL data is used to estimate instrument sensitivity in the absence of the sample matrix. IDL determinations are conducted at the frequency specified in the appropriate SOPs' for ICP and ICP/MS analysis.

8.9 ***Method Reporting Limit.*** The method reporting limit for organic methods is determined by the concentration of the lowest calibration standard in the calibration curve. This value is adjusted based on several sample preparation factors including sample volume, moisture content (soils), digestion, distillation or dilution. The low calibration standard is selected by department managers as the lowest concentration standard that can be used for calibration while continuing to meet the calibration linearity criteria of the method being used. The validity of the method reporting limits are confirmed through the analysis of a spiked quality control sample at the method reporting limit concentration. By definition, detected analytes at concentrations below the low calibration standard cannot be accurately quantitated and are qualified as estimated values.

The reporting limit for inorganics methods is defined as the concentration which is greater than the MDL where method quality control criteria has been achieved. The reporting limit for general chemistry methods employing multiple point calibrations must be greater than or equal to the concentration of the lowest standard of the calibration range.

The reporting limit established for both organic and inorganic analysis is above the calculated method detection limit where applicable.

8.10 ***Limit of Quantitation (LOQ).*** For the DoD ELAP the limit of quantitation (LOQ) for each analyte of concern is determined. The LOQ is set within the range of calibration is greater than the established LOD. Precision and bias criteria for the LOQ are established to meet client requirements and are verified quarterly.

8.11 ***Reporting of Quantitative Data.*** Analytical data for all methods is reported without qualification to the reporting limit established for each method. Data, for organic methods may be reported to the established method detection limit depending upon the client's requirements provided that all qualitative identification criteria for the detected parameter have been satisfied. All parameters reported at concentrations between the reporting limit and the method detection limit are qualified as estimated.

Data for inorganic methods are reported to the established method reporting limits. Inorganic data for specific methods may also be reported to the established method detection limit at client request. However, this data is always qualified as estimated.

Measured concentrations of detected analytes that exceed the upper limit of the calibration range are either diluted into the range and reanalyzed or qualified as an estimated value. The only exception to this applies to ICP and ICP/MS analysis, which can be reported to the upper limit of the experimentally determined linear range without qualification.

8.12 ***Precision and Accuracy Studies***. Annual precision and accuracy (P&A) studies, which demonstrate the laboratories ability to generate acceptable data, are performed for all routine methods used in the laboratory. The procedure used for generating organic P&A data is referenced in the majority of the regulatory methodology in use. The procedure requires quadruplicate analysis of a sample spiked with target analytes at a concentration in the working range of the method. This data may be compiled from a series of existing blank spikes or laboratory control samples. Accuracy (percent recovery) of the replicate analysis is averaged and compared to established method performance limits. Values within method limits indicate an acceptable performance demonstration. Precision and accuracy date is also used to annually demonstrate analytical capability for individual analysts. Annual demonstration of capability data is archived in individual training files.

8.13 ***Method Sources & References.*** The Quality Assurance Staff maintains a list of active methods used for the analysis of samples. This list includes valid method references from sources such as USEPA, ASTM or Standard Methods designations and the current version and version date.

Updated versions of approved reference methodology are placed into use as changes occur. The Quality Assurance Director informs operations management of changes in method versions as they occur. The operations management staff selects an implementation date. The operations staff is responsible for completing all method use requirements prior to the implementation date. This includes modification of SOPs, completion of MDL and precision and accuracy studies and staff training. Documentation of these activities is provided to the QA staff who retains this information on file. The updated method is placed into service on the implementation date and the old version is de-activated.

Multiple versions of selected methods may remain in use to satisfy client specific needs. In these situations, the default method version becomes the most recent version. Client specific needs are communicated to the laboratory staff using method specific analytical method codes,

which clearly depict the version to be used. The old method version is maintained as an active method until the specified client no longer requires the use of the older version.

Accutest will not use methodology that represents significant departures from the reference method unless specifically directed by the client. If clients direct the laboratory to use a method modification that represents a significant departure from the reference method, the request will be documented in the project file.

8.14 ***Analytical Capabilities***. Appendix III provides a detailed listing of the methodology employed for the analysis of test samples.

9.0 SAMPLING, SAMPLE MANAGEMENT, LOGIN, CUSTODY, STORAGE AND DISPOSAL

Requirement: The laboratory must employ a system which ensures that client supplied product or supplied product (the sample) is adequately evaluated, acknowledged, and secured upon delivery to the laboratory. The system also assures that product chain of custody is maintained and that sample receipt conditions and preservation status are documented and communicated to the client and internal staff. The login procedure assigns, documents, and maps the specifications for the analysis of each unique sample to assure that the requested analysis is performed on the correct sample and enables the sample to be tracked throughout the laboratory analytical cycle. The system includes procedures for reconciling defects in sample condition or client provided data, which are identified at sample arrival. The system specifies the procedures for proper sample storage, transfer to the laboratory, and disposal after analysis. The system is also documented in standard operating procedures.

9.1 ***Order Receipt and Entry***. New orders are initiated and processed by the client services group (See Chapter 14, Procedures for Executing Client Specifications). The new order procedure includes mechanisms for providing bottles to clients, which meet the size, cleanliness, and preservation specifications for the analysis to be performed.

For new orders, the project manager prepares a bottle request form, which is submitted to sample management. This form provides critical project details to the sample management staff, which are used to prepare and assemble the sample bottles for shipment to the client prior to sampling.

The bottle order is assembled using bottles that meet USEPA specifications for contaminant free sample containers. Accutest uses a combination of commercially supplied pre-cleaned bottles and bottles that have been tested for residual contamination and verified to meet USEPA specifications prior to use. Sterile bottles for microbiological samples are purchased from commercial sources.

Bottles, which are not purchased pre-cleaned, are checked to assure that they are free of contamination from targeted analytes before being released for use. Sterile bottles are checked for contamination with each lot. The QA staff retains a copy of the documentation of in-house contamination and sterility checks and maintains the responsibility for approving and releasing bottle lots for use following a review of the check data.

Preservative solutions that are specified for the analysis requested are dispensed into the sample bottle prior to shipment. All preservative solutions are prepared in the laboratory or purchased from commercial suppliers. Each solution is checked to assure that it is free of contamination from the compounds being analyzed before being released for use.

Reagent water for trip and field blanks is poured into appropriately labeled containers. All bottles are packed into ice chests with blank chain of custody forms and the original bottle order form. Completed bottle orders are delivered to clients using Accutest couriers or commercial carriers for use in field sample collection.

9.2 ***Sampling***. Documented procedures are employed by the field staff for field sample collection and are accessible during sample collection activities. Field activities are documented in controlled notebooks which detail relevant field conditions, site data and the results of field measurements. Appropriate custody procedures for collected samples are initiated by the field staff at the time of sample collection. Samples are documented, labeled and preserved according to the specifications of the method and/or regulatory program prior to being shipped to the laboratory.

9.3 ***Sample Receipt and Custody***. Samples are delivered to the laboratory using a variety of mechanisms including Accutest couriers, commercial shippers, and client self-delivery. Documented procedures are followed for arriving samples to assure that custody and integrity are maintained and handling/ preservation requirements are documented and maintained.

Sample custody documentation is initiated when the individual collecting the sample collects field samples. Custody documentation includes all information necessary to provide an unambiguous record of sample collection, sample identification, and sample collection chronology. Initial custody documentation employs either Accutest or client generated custody forms.

Accutest generates a chain of custody in situations where the individuals who collected the sample did not generate custody documentation in the field.

Accutest defines sample custody as follows:

∴ The sample is in the actual custody or possession of the assigned responsible person,

∴ The sample is in a secure area.

The Accutest facility is defined as a secure facility. Perimeter security has been established, which limits access to authorized individuals only. Visitors enter the facility through the building lobby and must register with the receptionist prior to entering controlled areas. While in the facility, visitors are required to wear a visitor's badge and must be accompanied by their hosts at all times. After hours, building access is controlled using a computerized passkey reader system. This system limits building access to individuals with a pre-assigned authorization status. After hours visitors are not authorized to be in the building. Clients delivering samples after hours must make advanced arrangements through client services and sample management to assure that staff is available to take delivery and maintain custody.

Upon arrival at Accutest, the sample custodian reviews the chain of custody for the samples received to verify that the information on the form corresponds with the samples delivered. This includes verification that all listed samples are present and properly labeled, checks to verify that samples were transported and received at the required temperature, verification that the sample was received in proper containers, verification that sufficient volume is available to conduct the requested analysis, and a check of individual sample containers to verify test specific preservation requirements including the absence of headspace for volatile compound analysis.

Sample conditions and other observations are documented on the chain of custody by the sample custodian prior to completing acceptance of custody and in an online database that creates a permanent record of all sample login activities. The sample custodian accepts sample custody upon verification that the custody document is correct. Discrepancies or non-compliant situations are documented and communicated to the Accutest project manager, who contacts the client for resolution. The resolution is documented and communicated to sample management for execution.

The sample management staff maintains an electronic sample receipt log. This log details all sample-related information in a searchable database that is updated upon data entry and backed up daily. The log records include critical date information, numbers of samples, numbers of bottles for each parameter, descriptions of bottles for each parameter, preservation conditions, bottle refrigerator location, and bottle conditions. Data entry into the log is secured using individual passwords.

During initial login, each bottle is assigned a unique number and is labeled with a barcode corresponding to that number. A bar-coding and scanning system electronically tracks sample custody transfers between individuals within the laboratory. Internal custody documentation may be required for compliance with regulatory agency or contractual specifications. A documented, chronological record of each sample transfer identifying each individual having possession of the sample is created in the laboratory information management system, which can be printed and included in data reports to demonstrate continuous custody.

9.4 ***Laboratory Preservation of Improperly Preserved Field Samples.*** Accutest will attempt to preserve field samples that were received without proper preservation to the extent that it is feasible and supported by the methods in use. Laboratory preservation of improperly preserved or handled field samples is routinely performed for metals samples. Special handling procedures may also be applied to improperly preserved volatile organics.

Aqueous metals samples that were not nitric acid preserved to pH 2 in the field are laboratory preserved and held for twenty (24) hours to equilibrate prior to analysis. Aqueous metals samples requiring field filtration may be filtered in the laboratory within seventy-two (72) hours of receipt provided that the sample has not been acid preserved.

Unpreserved volatile organics samples may be analyzed within seven (7) days to minimize degradation of volatile organics if the laboratory is notified in advance of the failure to preserve upon collection. Laboratory preservation of unpreserved aqueous samples is not possible. A pH check of volatile organic samples prior to analysis will compromise the sample by allowing volatile organics to escape during the check. If the laboratory is not notified of the failure to field preserve an aqueous volatile organic sample, the defect will not be identified until sample analysis has been completed and the data is qualified accordingly.

9.5 ***Sample Tracking Via Status Change.*** An automated, electronic LIMS procedure records sample exchange transactions between departments and changes in analytical status. This system tracks all preparation, analytical, and data reporting procedures to which a sample is subjected while in the possession of the laboratory. Each individual receiving samples must

acknowledge the change in custody and operational status in the LIMS. This step is required to maintain an accurate electronic record of sample status, dates of analytical activity, and custody throughout the laboratory.

Sample tracking is initiated at login where all chronological information related to sample collection dates and holding times are entered into the LIMS. This information is entered on an individual sample basis.

9.6 ***Sample Acceptance Policy***. Incoming samples must satisfy Accutest's sample acceptance criteria before being logged into the system. Sample acceptance is based on the premise that clients have exercised proper protocols for sample collection. This includes complete documentation, sufficient volume, proper chemical preservation, temperature preservation, sample container sealing and labeling, and appropriate shipping container packing.

The sample management staff will make every attempt to preserve improperly preserved samples upon arrival. However, if preservation is not possible, the samples may be refused unless the client authorizes analysis. No samples will be accepted if holding times have been exceeded or will be exceeded before analysis can take place unless the client authorizes analysis.

Sample acceptance criteria include proper custody and sample labeling documentation. Proper custody documentation includes an entry for all physical samples delivered to the laboratory with an identification code that matches the sample bottle and a date and signature of the individual who collected the sample and delivered them to the laboratory.

Accutest reserves the right to refuse any sample which in its sole and absolute discretion and judgment is hazardous, toxic and poses or may pose a health, safety or environmental risk during handling or processing. The company will not accept samples for analysis using methodology that is not performed by the laboratory or for methods that lab does not hold valid accreditations unless arrangements have been made to have the analysis conducted by a qualified subcontractor.

9.7 ***Assignment of Unique Sample Identification Codes***. Unique identification codes are assigned to each sample bottle to assure traceability and unambiguously identify the tests to be performed in the laboratory.

The sample identification coding process begins with the assignment of a unique alphanumeric job number. A job is defined as a group of samples received on the same day, from a specific client pertaining to a specific project. A job may consist of groups of samples received over a multi-day period. The first character of the job number is an alpha-character that identifies the laboratory facility. The next characters are numeric and sequence by one number with each new job.

Unique sample numbers are assigned to each bottle collected as a discrete entity from a designated sample point. This number begins with the job number and incorporates a second series of numbers beginning at one and continuing chronologically for each point of collection. The test

to be performed is clearly identified on the bottle label. Multiple sample bottles collected for analysis of the same parameter are numbered bottle 1, 2, … etc.

Alpha suffixes may be added to the sample number to identify special designations such as subcontracted tests, in-house QC checks, or re-logs. Multiple sample bottles for a specific analysis are labeled Bottle 1, Bottle 2, etc.

9.8 ***Subcontracted Analysis***. Subcontract laboratories are employed to perform analysis not performed by Accutest. The quality assurance staff evaluates subcontract laboratories to assure their quality processes meet the standards of the environmental laboratory industry prior to engagement. Throughout the subcontract process, Accutest follows established procedures to assure that sample custody is maintained and the data produced by the subcontractor meets established quality criteria.

*Subcontracting Procedure***.** Subcontracting procedures are initiated through several mechanisms, which originate with sample management. Samples for analysis by a subcontractor are logged into the Accutest system using regular login procedures. If subcontract parameters are part of the project or sample management has received subcontracting instructions for a specific project, a copy of the chain of custody is given to the appropriate project manager with the subcontracted parameters highlighted. This procedure triggers the subcontract process at the project management level. The project manager contacts an approved subcontractor that carries accreditation in the venue of the project location to place the subcontract order. A subcontract order form (SOF) is simultaneously prepared in electronic format, by the project manager and filed with the original chain of custody. The SOF and the subcontract chain of custody are forwarded to sample management, via E-Mail, for processing. A copy is filed with the original CoC.

Sample management signs the subcontract chain of custody and ships the sample(s) to the subcontractor. The subcontract CoC is filed with the original CoC and the request for subcontract. Copies are distributed to the login department, the project manager, sample management and the client.

Clients are verbally notified of the need to subcontract analysis as soon as the need is identified by the client services staff. This may occur during the initial project setup or at the time of login if the project setup had not been initiated through the client services staff. Copies of the subcontract CoC and the original CoC, which are electronically distributed to clients, constitutes documented client notification of the laboratories intent to subcontract analysis.

Subcontractor data packages are reviewed by the QA Staff to assess completeness and quality compliance. If completeness defects are detected, the subcontractor is asked to immediately upgrade the data package. If data quality defects are detected, the QA staff retains the package for further review. The QA staff will pursue a corrective action solution before releasing defective data to the client.

Approved subcontract data is entered into the laboratory information management system (LIMS) if possible and incorporated into the final report. All subcontract data is footnoted to

provide the client with a clear indication of its source. Copies of original subcontract data are included in the data report depending on the reporting level specified by the client. Applicable subcontractor accreditation information is provided with the subcontractor data.

*Subcontract Laboratory Evaluation***.** The QA staff evaluates subcontract laboratories prior to engagement. The subcontract laboratory must provide Accutest with proof of a valid certification to perform the requested analysis for the venue where they were collected and for a specific program should an approval or accreditation be required. In addition, the QA staff may require a copy of the laboratory's Quality Systems Manual, copies of SOPs used for the subcontracted analysis, a copy of the most recent performance evaluation study for the subcontracted parameter, copies of the internal data integrity policy and copies of the most recent regulatory agency or third party accreditor audit report. Certification verification must be submitted to Accutest annually. If possible, the QA staff may conduct a site visit to the laboratory to inspect the quality system. Accutest Laboratories assumes the responsibility for the performance of all subcontractors who have successfully demonstrated their qualifications and should obtain an example data deliverable package prior to initiation of subcontract work for compliance review. Qualification of a subcontract laboratory may be bypassed if the primary client directs Accutest to employ a specific subcontractor.

9.9 ***Sample Storage***. Following sample transfer to the sample custodian, samples are assigned to various secured, refrigerated storage areas depending upon the test to be performed and the matrix of the samples. The location (refrigerator and shelf) of each sample is recorded on the chain of custody adjacent to the line corresponding to each sample number and also entered into the LIMS. Samples remain in storage until the laboratory technician requests that they be transferred into the laboratory for analysis.

Second shift staff is authorized to retrieve samples from storage and initiate custody transfer. All sample request forms must be completed regardless of who performs the transfer.

Samples for volatile organics analysis are placed in storage in designated refrigerators by the sample custodian and immediately transferred to the organics group control. Sample custody is transferred to the department designee. These samples are segregated according to matrix to limit opportunities for cross contamination to occur.

Organics staff is authorized to retrieve samples from these storage areas for analysis. When analysis is complete, the samples are placed back into storage.

9.10 ***Sample Login***. Following sample custody transfer to the laboratory, the documentation that describes the clients analytical requirements are delivered to the sample login group for coding and entry to the Laboratory Information Management System (LIMS). This process translates all information related to collection time, turnaround time, sample analysis, and deliverables into a code which enables client requirements to be electronically distributed to the various departments within the laboratory for scheduling and execution.

The technical staff is alerted to client or project specific requirements through the use of a unique project code that is electronically attached to the job during login. The unique project

code directs the technical staff to controlled specifications documents detailing the unique requirements.

9.11 ***Sample Retrieval for Analysis***. Individual laboratory departments prepare and submit written requests to the sample custodian to retrieve samples for analysis. The sample custodian retrieves all samples except volatile organics and delivers them to the requesting department. Retrieval priorities are established by the requesting department and submitted to the sample custodian when multiple requests are submitted. Internal custody transfers using the bar code scanning system occur whenever the samples change hands or locations.
After sample analysis has been completed, the department requests pick-up and return of the sample to the storage area. The sample custodian retrieves the sample and completes the custody transfer from the department of the transfer back to sample management or sample storage.

9.12 ***Sample Disposal***. Accutest retains all samples and sample extracts under proper storage for a minimum of 30 days following completion of the analysis report. Longer storage periods are accommodated on a client specific basis if required. Samples may also be returned to the client for disposal.
Accutest disposes of all laboratory wastes following the requirements of the Resource Conservation and Recovery Act (RCRA). The Company has obtained and maintains a waste generator identification number, NJD982533622.

Sample management generates a sample disposal dump sheet from the LIMS tracking system each week, which lists all samples whose holding period has expired. Data from each sample is compared to the hazardous waste criteria established by the New Jersey Department of Environmental Protection (NJDEP).

Samples containing constituents at concentrations above the criteria are labeled as hazardous and segregated into four general waste categories for disposal as follows:

- Waste Oil
- Soil (solids – positive and negative hazardous characteristics)
- Mixed Aqueous
- Sludges (semi-solids)
- PCB Hazardous Waste (USEPA 40 CFR 761 criteria).

Non-hazardous aqueous samples are diluted and disposed directly into the laboratory sink. All aqueous liquids pass through a neutralization system before entering the municipal system. Solid samples are emptied into consolidation drums and disposed as hazardous waste or non-hazardous wastes depending upon the results of hazardous characteristics determination. Samples classified as PCB hazardous wastes are labeled and packaged according to the requirements in 40 CFR 761.

Empty glass and plastic bottles from aqueous and solid samples are segregated for recycling. Recycled materials are collected by a commercial contractor and transferred to a county

transfer facility for separation into various materials categories. These operations are classified as secure facilities employing cameras, security guards and fiber optic security systems.
The recyclable material is transported to a recycling facility for further processing. Separated glass is transported to a processing facility where it is acid washed in two, separate wash baths, rinsed in boiling water and ground into ½ inch chunks. The chunks are transported to an end product user for re-manufacturing into a glass product.

Separated plastic is transported to a processing facility where it is acid washed to remove the labels and adhesives and boiled for sterilization. The sample containers and any remaining labels are shredded and ground resulting in complete destruction of remaining labels the ground material is sent by rail car or tractor-trailer to various end users that melt and reform the material into useful products of their industry. The recycling facility employs a Code of Ethics in which all client names are confidential and are not divulged to any individual or corporation without written permission from the client.

Laboratory wastes are collected by waste stream in designated areas throughout the laboratory. Waste streams are consolidated twice each week by the waste custodian and transferred to stream specific drums for disposal through a permitted waste management contractor. Filled, consolidated drums are tested for hazardous characteristics and scheduled for removal from the facility for appropriate disposal based on the laboratory data.

All solvent extracts and digestates are collected for disposal following the thirty-day holding period and drummed according to their specific waste stream category. Chlorinated solvent extracts are drummed as chlorinated wastes (i.e., Methylene Chloride). Non-chlorinated solvent extracts are drummed as non-chlorinated wastes (i.e., acetone, hexane, methanol, and mixed solvents). Digestates are collected for disposal following the thirty-day holding period and drummed as corrosive liquid containing metals.

10.0 LABORATORY INSTRUMENTATION AND MEASUREMENT STANDARDS

Requirement: The laboratory has established procedures, which assure that instrumentation is performing to a pre-determined operational standard prior to the analysis of any samples. In general, these procedures follow the regulatory agency requirements established in promulgated methodology. The instrumentation selected to perform specified analysis are uniquely identified and capable of providing the method specified uncertainty of measurement needed. These procedures are documented and incorporated into the standard operating procedures for the method being executed.

10.1 ***Mass Tuning – Mass Spectrometers***. The mass spectrometer tune and sensitivity is monitored to assure that the instrument is assigning masses and mass abundances correctly and that the instrument has sufficient sensitivity to detect compounds at low concentrations. This is accomplished by analyzing a specific mass tuning compound at a fixed concentration. If the sensitivity is insufficient to detect the tuning compound, corrective action must be performed prior to the analysis of standards or samples. If the mass assignments or mass abundances do not meet criteria, corrective action must be performed prior to the analysis of standards or samples.

10.2 ***Wavelength Verification – Spectrophotometers***. Spectrophotometer detectors are checked on a regular schedule to verify proper response to the wavelength of light needed for the test in use. If the detector response does not meet specifications, corrective action (detector adjustment or replacement) is performed prior to the analysis of standards or samples.

10.3 ***Inter-element Interference Checks (Metals)***. Inductively Coupled Plasma Emission Spectrophotometers (ICP) are subject to a variety of spectral interferences, which can be minimized or eliminated by applying interfering element correction factors and background correction points. Interfering element correction factors are checked on a specified frequency through the analysis of check samples containing high levels of interfering elements. Analysis of single element interferant solutions is also conducted at a specified frequency.

If the check indicates that the method criteria have not been achieved for any element in the check standard, the analysis is halted and data from the affected samples are not reported. Sample analysis is resumed after corrective action has been performed and the correction factors have been re-calculated.

New interfering element correction factors are calculated and applied whenever the checks indicate that the correction factors are no longer meeting criteria. At a minimum, correction factors are replaced once a year.

Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) also is subject to isobaric elemental and polyatomic ion interferences. These interferences are corrected through the use of calculations. The accuracy of corrections is dependent on the sample matrix and instrument conditions and is verified by quality control checks on individual runs.

10.4 ***Calibration and Calibration Verification***. Many tests require calibration using a series of reference standards to establish the concentration range for performing quantitative analysis. Instrument calibration is performed using standards that are traceable to national standards. Method specific procedures for calibration are followed prior to any sample analysis. In general, if a reference method does not specify the number of calibration standards, the minimum number is two (one of which is at the reporting limit or limit of quantitation).

Calibration is performed using a linear regression calculation or calibration factors calculated from the curve. The calibration must meet method specific criteria for linearity or precision. If the criteria are not achieved, corrective action (re-calibration or instrument maintenance) is performed. The instrument must be successfully calibrated before analysis of samples can be conducted.

Initial calibration for metals analysis performed using inductively coupled plasma (ICP) employs the use of a single standard and a calibration blank to establish linearity. Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) can be calibrated using either a two point or a multi-point calibration, as long as all quality control criteria for the analysis can be achieved. The calibration blank contains all reagents that are placed into the calibration standard with the exception of the target elements. Valid calibration blanks must not contain any target elements.

Initial calibrations must be verified using a single concentration calibration standard from a second source (i.e. separate lot or different provider). The continuing validity of existing calibrations must be regularly verified using a single calibration standard. The response to the standard must meet pre-established criteria that indicate the initial calibration curve remains valid. If the criteria are not achieved corrective action (re-calibration) is performed before any additional samples may be analyzed.

If continuing calibration verification results are outside established criteria, data associated with the verification may be fully useable under the following conditions:

- When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported.

- When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level.

Calibration verification is also performed whenever it appears that the analytical system is out of calibration or no longer meets the calibration requirements. It is also performed when the time period between calibration verifications has expired.

Sample results are quantitated from the initial instrument calibration unless otherwise required by regulation, method, or program specific criteria.

10.5 ***Linear Range Verification and Calibration (ICP & ICP/MS Metals)***. Linear range verification is performed for all ICP and ICP/MS instrumentation. The regulatory program or analytical method specifies the verification frequency. A series of calibration standards are analyzed over a broad concentration range. The data from these analyses are used to determine the valid analytical range for the instrument. ICP instrument calibration is routinely performed using a single standard at a concentration within the linear range and a blank.

Some methods or analytical programs require a low concentration calibration check to verify that instrument sensitivity is sufficient to detect target elements at the reporting limit. The analytical method or regulatory program defines the criteria used to evaluate the low concentration calibration check. If the low calibration check fails criteria, corrective action is performed and verified through reanalysis of the low concentration calibration check before continuing with the field sample analysis. . ICP-MS instrument calibration is normally performed using multiple standards within the linear range and a blank, but may be done with a single standard at a concentration within the linear range and a blank.

10.6 ***Retention Time Development and Verification (GC)***. Chromatographic retention time windows are developed for all analysis performed using gas chromatographs with conventional detectors. An initial experimental study is performed, which establishes the width of the retention window for each compound. The retention time width of the window defines the time ranges for elution of specified target analytes on the primary and confirmation columns. Retention time windows are established upon initial calibration, applying the retention time range from the initial study to each target compound. Retention times are regularly confirmed through the analysis of an authentic standard during calibration verification. If the target analytes do not elute within the defined range during calibration verification, the instrument must be recalibrated and new windows defined. New studies are performed when major changes, such as column replacement are made to the chromatographic system.

10.7 ***Equipment List.*** See Appendix IV for a listing of all equipment used for measurement and/or calibration in laboratory processes.

11.0 INSTRUMENT MAINTENANCE

Requirement. Documented procedures have been established for conducting equipment maintenance. The procedure includes maintenance schedules if required or documentation of daily maintenance activities. All instrument maintenance activities are documented in instrument specific logbooks.

11.1 ***Routine, Daily Maintenance***. Routine, daily maintenance is required on an instrument specific basis and is performed each time the instrument is used. Daily maintenance includes activities to insure a continuation of good analytical performance. This may include performance checks that indicate if non-routine maintenance is needed. If performance checks indicate the need for higher level maintenance, the equipment is taken out of service until maintenance is performed. Analysis cannot be continued until all performance checks meet established criteria and a return to operational control has been demonstrated and documented. The individual assigned to the instrument is responsible for daily maintenance.

11.2 ***Non-routine Maintenance***. Non-routine maintenance is initiated for catastrophic occurrences such as instrument failure. The need for non-routine maintenance is indicated by failures in general operating systems that result in an inability to conduct required performance checks or calibration. Equipment in this category is taken out of service, tagged accordingly and repaired before attempting further analysis. Before initiating repairs, all safety procedures for safe handling of equipment during maintenance, such as lock-out/tag-out are followed. Analysis is not resumed until the instrument meets all operational performance check criteria, is capable of being calibrated and a return to operational control has been demonstrated and documented. Section supervisors are responsible for identifying non-routine maintenance episodes and initiating repair activities to bring the equipment on-line. This may include initiating telephone calls to maintenance contractors if necessary. They are responsible for documenting all details related to the occurrence and repair.

11.3 ***Scheduled Maintenance***. Modern laboratory instrumentation rarely requires regular preventative maintenance. If required, the equipment is placed on a schedule, which dictates when maintenance is needed. Examples include annual balance calibration by an independent provider or ICP preventative maintenance performed by the instrument manufacturer. Section supervisors are responsible for initiating scheduled maintenance on equipment in this category. Scheduled maintenance is documented using routine documentation practices.

11.4 ***Maintenance Documentation***. Routine and non-routine maintenance activities are documented in logbooks assigned to instruments and equipment used for analytical measurements. The logbooks contain preprinted forms, which specify the required maintenance activities. The analyst or supervisor performing or initiating the maintenance activity is required to check the activity upon its completion and initial the form. This includes documenting that the instrument has been returned to operational control following the completion of the activity. Non-routine maintenance (repairs, upgrades) is documented on the back page of the service log.

12.0 QUALITY CONTROL PARAMETERS, PROCEDURES, AND CORRECTIVE ACTION

Requirement: All procedures used for test methods incorporate quality control parameters to monitor elements that are critical to method performance. Each quality parameter includes acceptance criteria that have been established by regulatory agencies for the methods in use. Criteria may also be established through client dictates or through the accumulation and statistical evaluation of internal performance data. Data obtained for these parameters during routine analysis must be evaluated by the analyst, and compared to the method criteria in use. If the criteria are not achieved, the procedures must specify corrective action and conformation of control before proceeding with sample analysis. QC parameters, procedures, and corrective action must be documented within the standard operating procedures for each method. In the absence of client specific objectives the laboratory must define qualitative objectives for completeness and representativeness of data.

12.1 ***Procedure***. Bench analysts are responsible for methodological quality control and sample specific quality control. Each method specifies the control parameters to be employed for the method in use and the specific procedures for incorporating them into the analysis. These control parameters are analyzed and evaluated with every designated sample group (batch).

The data from each parameter provides the analyst with critical decision making information on method performance. The information is used to determine if corrective action is needed to bring the method or the analysis of a specific sample into compliance. These evaluations are conducted throughout the course of the analysis. Each control parameter is indicative of a critical control feature. Failure of a methodological control parameter is indicative of either instrument or batch failure. Failure of a sample control parameter is indicative of control difficulties with a specific sample or samples.

Sample Batch. All samples analyzed in the laboratory are assigned to a designated sample batch, which contains all required quality control samples and a defined maximum number of field samples that are prepared and/or analyzed over a defined time period. The maximum number of field samples in the batch is 20. Accutest has incorporated the NELAP batching policy as the sample-batching standard. This policy incorporates the requirement for blanks and spiked blanks as a time based function as defined by NELAP. Accordingly, the specified time period for a sample batch is 24 hours. Matrix spike/matrix spike duplicate, matrix spikes and duplicates are defined as sample frequency based functions and may be applied to several batches until the frequency requirement has been reached. A matrix spike/matrix spike duplicate, matrix spikes and/or duplicate is required every 20 samples.

Client criteria that defines a batch as a time based function which includes a matrix spike/matrix spike duplicates as a contractual specification will be honored. The typical batch contains a blank and a laboratory control sample (LCS or spiked blank). Batch documentation includes lot specifications for all reagents and standards used during preparation of the batch.

12.2 ***Methodological Control Parameters and Corrective Action***. Prior to the analysis of field samples the analyst must determine that the method is functioning properly. Specific control

parameters indicate whether critical processes meet specified requirements before continuing with the analysis. Method specific control parameters must meet criteria before sample analysis can be conducted. Each of these parameters is related to processes that are under the control of the laboratory and can be adjusted if out of control.

Method Blank. A method blank is analyzed during the analysis of any field sample. The method blank is defined as a sample. It contains the same standards (internal standards, surrogates, matrix modifiers, etc.) and reagents that are added to the field sample during analysis, with the exception of the sample itself. If the method blank contains target analytes(s) at concentrations that exceed method detection limit concentrations (organics) or reporting limit concentrations (inorganics), the source of contamination is investigated and eliminated before proceeding with sample analysis. Target analyte(s) in method blanks at concentrations no greater than one-half of the reporting limit concentrations (metals) may be requested on a client or project specific basis. Systematic contamination is documented for corrective action and resolved following the established corrective action procedures.

Laboratory Control Samples (LCS or Spiked Blanks). A laboratory control sample (spiked blank or commercially prepared performance evaluation sample) is analyzed along with field samples to demonstrate that method accuracy is within acceptable limits. These spike solutions may be from different sources than the sources of the solutions used for method calibration depending upon the method requirements. All target components are included in the spike mixture over a two year period. The performance limits are derived from published method specifications or from statistical data generated from the analysis of laboratory method performance samples. Spiked blanks are blank matrices (reagent water or clean sand) spiked with target parameters and analyzed using the same methods used for samples. Accuracy data is compared to laboratory derived limits to determine if the method is in control. Laboratory control samples (LCS) are commercially prepared spiked samples in an inert matrix. Performance criteria for recovery of spiked analytes are pre-established by the commercial entity preparing the sample. The sample is analyzed in the laboratory as an external reference.

Accuracy data is compared to the applicable performance limits. If the spike accuracy exceeds the performance limits, corrective action, as specified in the SOP for the method is performed and verified before continuing with a field sample analysis. In some cases, decisions are made to continue with sample analysis if performance limits are exceeded, provided the unacceptable result has no negative impact on the sample data.

Blanks and spikes are routinely evaluated before samples are analyzed. However, in situations where sample analysis is performed using an autosampler, they may be evaluated after sample analysis has occurred. If the blanks and spikes do not meet criteria, sample analysis is repeated.

Proficiency Testing. Proficiency test samples (PTs) are single or double blind spikes, introduced to the laboratory to assess method performance. PTs may be introduced as double blinds submitted by commercial clients, single or double blinds from regulatory agencies, or internal blinds submitted by the QA group.

A minimum of two single blind studies must be performed each year for every parameter in aqueous and solid matrices for each field of testing for which the laboratory maintains accreditation. Proficiency samples must be purchased as blinds from an A2LA accredited vendor. Data from these studies are provided to the laboratory by the vendor and reported to accrediting agencies. If unsatisfactory performance is noted, corrective action is performed to identify and eliminate any sources of error. A new single blind must be analyzed if required to demonstrate continuing proficiency.

PT samples performed for accrediting agencies or clients, which do not meet performance specifications, require a written summary that documents the corrective action investigation, findings, and corrective action implementation. A copy of this summary shall be submitted to the NELAC Primary Accrediting Authority, NJDEP Office of Quality Assurance for review.

Single or double blind proficiency test samples may be employed for self-evaluation purposes. Data from these analyses are compared to established performance limits. If the data does not meet performance specifications, the system is evaluated for sources of acute or systematic error. If required, corrective action is performed and verified before initiating or continuing sample analysis.

Trend Analysis for Control Parameters. The quality assurance staff is responsible for continuous analytical improvement through quality control data trend analysis. Accuracy data for spiked parameters in the spiked blank are statistically evaluated daily for trends indicative of systematic problems. Data from LCS parameters and surrogates are pooled on a method, matrix, and instrument basis. This data is evaluated by comparison to existing control and warning limits. Trend analysis is performed automatically as follows:

- Any point outside the control limit
- Any three consecutive points between the warning and control limits
- Any eight consecutive points on the same side of the mean.
- Any six consecutive points increasing or decreasing

The results of the trend analysis are transmitted as .PDF files for supervisory evaluation prior to sample analysis. Trends that indicate the potential loss of statistical control are further evaluated to determine the impact on data quality and to determine if corrective action is necessary. If corrective action is indicated, the supervisor informs the analysts of the corrective actions to be performed. Return to control is demonstrated before analysis resumes.

12.3 ***Sample Control Parameters and Corrective Action***. The analysis of samples can be initiated following a successful demonstration that the method is operating within established controls. Additional controls are incorporated into the analysis of each sample to determine if the method is functioning within established specifications for each individual sample. Sample QC data is evaluated and compared to established performance criteria. If the criteria are not achieved the method or the SOP specifies the corrective action required to continue sample analysis. In many cases, failure to meet QC criteria is a function of sample matrix and cannot be remedied. Each parameter is designed to provide quality feedback on a defined aspect of the sampling and analysis episode.

Duplicates. Duplicate sample analysis is used to measure analytical precision. This can also be equated to laboratory precision for homogenous samples. Precision criteria are method dependent. If precision criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before sample data can be reported.

Laboratory Spikes & Spiked Duplicates. Spikes and spiked duplicates are used to measure analytical precision and accuracy for the sample matrix selected. Precision and accuracy criteria are method dependent. If precision and accuracy criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before reporting sample data. All target components are included in the spike mixture over a two year period.

Serial Dilution (Metals). Serial dilutions of metals samples are analyzed to determine if analytical matrix effects may have impacted the reported data. If the value of the serially diluted samples does not agree with the undiluted value within a method-specified range, the sample matrix may be causing interferences, which may lead to either a high or low bias. If the serial dilution criterion is not achieved, it must be flagged to indicate possible bias from matrix effects.

Post Digestion Spikes. Digested samples are spiked and analyzed to determine if matrix interferences are biasing the results when the pre-digestion spike (matrix spike) recovery falls outside the control limits. It may also be used to determine potential interferences per client's specification. The sample is spiked at the concentration specified in the method SOP. No action is necessary if the post digestion spike is outside of the method criteria, unless a preparation problem is suspected with the spike, in which case the post digestion spike should be re-prepared and reanalyzed.

Surrogate Spikes (Organics). Surrogate spikes are organic compounds that are similar in behavior to the target analytes but unlikely to be found in nature. They are added to all quality control and field samples to measure method performance for each individual sample. Surrogate accuracy limits are derived from published method specifications or from the statistical evaluation of laboratory generated surrogate accuracy data. Accuracy data is compared to the applicable performance limits. If the surrogate accuracy exceeds performance limits, corrective action, as specified in the method or SOP is performed before sample data can be reported.

Internal Standards (Organic Methods). Internal standards are retention time and instrument response markers added to every sample to be used as references for quantitation. Their response is compared to reference standards and used to evaluate instrument sensitivity on a sample specific basis. Internal standard retention time is also compared to reference standards to assure that target analytes are capable of being located by their individual relative retention time.

If internal standard response criteria are not achieved, corrective action or additional action may be required. The recommended action must be completed before sample data can be reported.

If the internal standard retention time criteria are not achieved corrective action or additional action may be required. This may include re-calibration and re-analysis. Additional action must be completed before sample data is reported.

Internal Standards (ICP and ICP/MS Metals). Internal standards are used on ICP instruments to compensate for variations in response caused by differences in sample matrices. Multiple internal standards are used for each sample on ICP/MS instruments to compensate for variations in response caused by differences in sample matrices. This adjustment is performed automatically during sample analysis. The internal standard response of replicated sample analysis is monitored to detect potential analytical problems. If analytical problems are suspected, then the field samples may be reanalyzed or reanalyzed upon dilution to minimize the interferences. A different internal standard may be employed for quantitation in situations where the field sample contains the element typically used as the internal standard.

12.4 ***Laboratory Derived Quality Control Criteria.*** Control criteria for in-house methods and client specific modifications that exceed the scope of published methodology are defined and documented prior to the use of the method. The Quality Assurance Director is responsible for identifying additional control criteria needs. Control parameters and criteria, based on best technical judgment are established using input provided by the operations staff. These control parameters and criteria are documented and incorporated into the method.

The laboratory-derived criteria are evaluated for technical soundness on spiked samples prior to the use of the method on field samples. The technical evaluation is documented and archived by the Quality Assurance Staff.

When sufficient data from the laboratory developed control parameter is accumulated, the data is statistically processed and the experimentally derived control limits are incorporated into the method.

12.5 ***Bench Review & Corrective Action***. The bench chemists are responsible for all QC parameters. Before proceeding with sample analysis, they are required to successfully meet all instrumental QC criteria. They have the authority to perform any necessary corrective action before proceeding with sample analysis. Their authority includes the responsibility for assuring that departures from documented policies and procedures do not occur.

The bench chemists are also responsible for all sample QC parameters. If the sample QC criteria are not achieved, they are authorized and required to perform the method specified corrective action before reporting sample data.

12.6 ***Data Qualifiers***. An alpha character coding system is employed for defining use limitations for reported data. These limitations are applied to analytical data by the analyst to clarify the usefulness of the reported data for data user. Common data qualifiers and their definitions are as follows:

Organics.

J: Indicates an estimated value. Applied to calculated concentrations for tentatively identified compounds and qualitatively identified compounds whose concentration is below the reporting limit, but above the MDL.

N: Indicates qualitative evidence of a tentatively identified compound whose identification is based on a mass spectral library search and is applied to all TIC results.

C: Applied to pesticide data that has been qualitatively confirmed by GC/MS.

B: Used for analytes detected in the sample and its associated method blank.

E: Applied to compounds whose concentration exceeds the upper limit of the calibration range.

Metals and Inorganics.

B: Applied if the reported concentration value was less than the reporting limit but greater than the MDL.

U: Applied if the reading is less than the MDL (or IDL if IDL reporting is being used).

E: Estimated concentration caused by the presence of interferences, normally applied when the serial dilution is out.

N: Spike sample recovery not within control limits.

*: Duplicate or matrix spike duplicate analysis not within control limits.

12.7 ***QA Monitoring***. The QA staff conducts a spot review of completed data packages prior to client release for specified projects. This review includes an examination of QC data for compliance and trends indicative of systematic difficulties. If non-conformances are detected, the QA staff places an immediate stop on the release of the data and initiates corrective action to rectify the situation. The data package is released when the package becomes compliant with all quality requirements. If compliance is not possible, the data is qualified and an appropriate case narrative is generated for inclusion in the data package.

If the review reveals trends indicative of systematic problems, QA initiates an investigation to determine the cause. If process defects are detected, a corrective action is implemented and monitored for effectiveness.

Performance Limits. The Quality Assurance Director is responsible for compilation and maintenance of all precision and accuracy data used for performance limits. Quality control data for all test methods are accumulated and stored in the laboratory information management system (LIMS). Parameter specific QC data is extracted annually and statically processed to develop laboratory specific warning limits and control limits. The new limits are reviewed and approved by the supervisory staff prior to their use for data assessment. The new limits are used to evaluate QC data for compliance with method requirements for a period of one year. Laboratory generated limits appear on all data reports.

12.8 ***Data Package Review***: Accutest employs multiple levels of data review to assure that reported data has satisfied all quality control criteria and that client specifications and requirements have been met. Each production department has developed specific data review procedures, which must be completed before data is released to the client.

Analytical Review. The analyst conducts the primary review of all data. This review begins with a check of all instrument and method quality control and progresses through sample quality control, concluding with a check to assure that the client's requirements have been executed. Analyst checks focus on a review of qualitative determinations and checks of precision and accuracy data to verify that existing laboratory criteria have been achieved. Checks at this level may include comparisons with project specific criteria if applicable. The analyst has the authority and responsibility to perform corrective action for any out-of-control parameter or nonconformance at this stage of review.

Analysts who have met the qualification criteria for the method in use perform secondary, peer level data reviews. Analyst qualification requirements include a valid demonstration of capability and demonstrated understanding of the method SOP. Section supervisors may perform secondary review in-lieu of a peer review. Supervisors review 100% of the data produced by their department. It includes a check of all manual calculations; an accuracy check of manually transcribed data from bench sheets to the LIMS, a check of calibration and continuing calibration, all QC criteria and a comparison of the data package to client specified requirements. Also included are checks to assure the appropriate methodology was applied and that all anomalous information was properly flagged for communication in the case narrative. Supervisors have the authority to reject data and initiate re-analysis, corrective action, or reprocessing.

All laboratory data requiring manual entry into LIMS system is double-checked by the analysts performing initial data entry and the section supervisor. Verification of supervisory review is indicated on the raw data summary by the supervisor's initials and date.

Electronic data that is manually edited at the bench by the primary analyst is automatically flagged by the instrument data system indicating an override by the analyst. All manual overrides must be verified and approved by a supervisor who initials and dates all manual changes.

Hard copies of manually integrated chromatographic peaks are printed that clearly depict the manually drawn baseline. The hard copy is reviewed and approved by the section supervisor (initialed and dated) and included in the data package of all full tier reports or the archived batch records of commercial report packages.

Edits to electronic data that have already been committed to the LIMS database are controlled through the use of the Master Edit function in LIMS. Permission to access this program is limited to those approved by the upper levels of laboratory management and is controlled by the Information Technology staff. A GALP electronic audit record trail is maintained for all changes that are made and is automatically appended to the record.

The group manager performs a tertiary review on a spot check basis. This review includes an evaluation of QC data against acceptance criteria and a check of the data package contents to assure that all analytical requirements and specifications were executed.

Report Generation Review. The report generation group reviews all data and supporting information delivered by the laboratory for completeness and compliance with client specifications. Missing deliverables are identified and obtained from the laboratory. The group also reviews the completed package to verify that the delivered product complies with all client specifications. Non-analytical defects are corrected before the package is sent to the client.

Project Management/Quality Control Review. Spot-check data package reviews are performed by the project management staff. Project management reviews focus on project specifications. If the project manager identifies defects in the product prior to release, he initiates immediate corrective action to rectify the situation.

The QA staff performs a post-delivery check of completed data packages to verify completeness and compliance with established quality control procedures. Approximately 10% of Full-Deliverables data packages are reviewed. A formal checklist is used to assess data report completeness and accuracy. Detected deficiencies are documented on the checklist and corrective actions initiated as necessary. Data review checklists are electronic documents, which are archived in the QA Directory of the network server.

The QA review focuses on all elements of the deliverable including the client's specifications and requirements, analytical quality control, sample custody documentation and sample identification. QA reviews at this step in the production process are geared towards systematic process defects, which require procedural changes to effect a corrective action. However, if defects are identified that have an adverse affect on data, the client is immediately informed following standard notification procedures. QA data review is not used in lieu of a peer level review or a supervisory review.

Data Reporting. Analytical data is released to clients following a secondary review by the group supervisor. Data release at this stage of the process is limited to electronic information, which is released to clients through a secure, encrypted, password protected, Internet connection. Hard copy support data is compiled by the report generation group and assembled into the final report. The report is sent to the client following reviews by the report generation staff.

All data reports include specified information, which is required to identify the report and its contents. This information includes a title, name and address of the laboratory, a unique report number, total number of pages in the report, clients name and address, analytical method identification, arriving sample condition, sample and analysis dates, test results with units of measurement, authorized signature of data release, statement of applicability, report reproduction restrictions and NELAC requirements certification. Data reports for the Department of Defense ELAP also include the time of preparation and analysis.

12.9 ***Electronic Data Reduction.*** Raw data from sample analysis is entered into the laboratory information management system (LIMS) using automated processes or manual entry. Final data processing is performed by the LIMS using procedures developed by the Company.

All LIMS programs are tested and validated prior to use to assure that they consistently produce correct results. The Information Technology Staff performs software validation testing. The testing procedures are documented in an SOP. Software programs are not approved for use until they have demonstrated that they are capable of performing the required calculations.

12.10 ***Representativeness***. Data representativeness is based on the premise that qualitative and quantitative information developed for field samples is characteristic of the sample that was collected by the client and analyzed in the laboratory. The laboratory objective for representativeness defines data as representative if the criteria for all quality parameters associated with the analysis of the sample are achieved.

12.11 ***Comparability***. Analytical data is defined as comparable when data from a sample set analyzed by the laboratory is representatively equivalent to other sample sets analyzed separately regardless of the analytical logistics. The laboratory will achieve 100% comparability for all sample data which meets the criteria for the quality parameters associated with its analysis using the method requested by the client.

13.0 CORRECTIVE ACTION SYSTEM

Requirement. The laboratory employs polices and procedures for correcting defective processes, systematic errors, and quality defects enabling the staff to systematically improve product quality. The system includes procedures for communicating items requiring corrective action to responsible individuals, corrective action tracking procedures, corrective action documentation, monitoring of effectiveness, and reports to management. The system is fully documented in a standard operating procedure. Individual corrective actions and responses are documented in a dedicated database.

13.1 ***Procedure***. Corrective action is the step that follows the identification of a process defect. The type of defect determines the level of documentation, communication, and training necessary to prevent re-occurrence of the defect or non-conformance. The formal system is maintained by the quality assurance department. Operations management is responsible for working within the system to resolve identified deficiencies.

Routine Corrective Action. Routine corrective action is defined as the procedures used to return out of control analytical systems back to control. This level of corrective action applies to all analytical quality control parameters or analytical system specifications.

Bench analysts have full responsibility and authority for performing routine corrective action. The resolution of defects at this level does not require a procedural change or staff re-training. The analyst is free to continue work once corrective action is complete and the analytical system has been returned to control. Documentation of routine corrective actions is limited to logbook comments for the analysis being performed.

Process Changes. Corrective actions in this category require procedural modifications. They may be the result of systematic defects identified during audits, the investigation of client inquiries, failed proficiency tests, product defects identified during data review, or method updates. Resolution of defects of this magnitude requires formal identification of the defect, development and documentation of a corrective action plan, and staff training to communicate the procedural change.

Technical Corrective Action. Technical corrective action encompasses routine corrective action performed by bench analysts for out of control systems and corrective actions performed for data produced using out of control systems. Technical corrective action for routine situations is conducted using the procedures detailed above.

Non-routine corrective actions apply to situations where the bench analysts failed to perform routine corrective action before continuing analysis. Supervisors and Department Managers perform corrective action in these situations. Documentation of all non-routine corrective actions is performed using the corrective action system.

Sample re-analysis is conducted if sufficient sample and holding time remain to repeat the analysis using an in-control system. If insufficient sample or holding time remains, the data is processed and qualifiers applied that describe the out of control situation. The occurrence is

further documented in the case narrative and in the corrective action response. The corrective action must include provisions for retraining the analysts who failed to perform routine corrective action.

13.2 ***Documentation & Communication***. Routine corrective actions are documented as part of the analytical record. Notations are made in the comments section of the analytical chronicle or data sheet detailing the nonconformance and corrective action. Continuation of the analysis indicates that return to control was successful.

Corrective actions for process changes are documented, tracked and monitored for effectiveness. Supervisors or senior staff members may initiate corrective actions by generating a corrective action using the corrective action database application.

The corrective action database is an Access application. The initiator generates the corrective action investigation form, which is documented, tracked, distributed to responsible parties and archived through the application. The application assigns a tracking number, initiation data and due date to each action and copies the corrective action form to the database. E-mail message containing the form is automatically distributed to the responsible parties for resolution.

The responsible party identifies the root cause of the defect, initiates the immediate fix and develops and implements the procedural change. Existing documentation such as SOPs are edited to reflect the change. The affected staff is informed of the procedural change through a formal training session. The training is documented and copies are placed into individual training files. The corrective action form is completed by the responsible party and returned to the QA staff via e-mail using the database application.

Initial and completed corrective action forms are maintained in the corrective action database. This entire database is backed up and archived daily. The corrective action tracking form is maintained as an active report in the database.

Monitoring. The QA Staff monitors the implemented corrective action until it is evident that the action has been effective and the defect has been eliminated. The corrective action database is updated by QA to reflect closure of the corrective action. The QA staff assigns an error code to the corrective action for classification of the type of errors being committed. Additional monitoring of the corrective action is conducted during routine laboratory audits.

Additional monitoring of the corrective action is conducted by adding the corrective action to a verification list by the QA staff at closure. Verification is performed by the QA Staff to assure that the corrective action has remained in effect is scheduled for six (6) months from the initial closure date.

If QA determines that the corrective action response has not effectively remedied the deficiency, the process continues with a re-initiation of the corrective action. Corrective action continues until the defect is eliminated. If another procedural change is required, it is treated as a new corrective action, which is documented and monitored using established procedures.

Client Notification. Defective processes, systematic errors, and quality defects, detected during routine audits may have negative impacts on data quality. In some cases, data that has been released to clients may be affected. If defective data has been released for use, Accutest will notify the affected clients of the defect and provide specific details regarding the magnitude of the impact to their data.

14.0 PROCEDURES FOR EXECUTING CLIENT SPECIFICATIONS

Requirement. Systems have been established for evaluating and processing client specifications for routine and non-routine analytical services. The systems enable the client services staff to identify, evaluate, and document the requested specifications to determine if adequate resources are available to perform the analysis. The system includes procedures for communicating the specifications to the laboratory staff for execution and procedures for verifying the specifications have been executed.

14.1 ***Client Specific Requirements***. The project manager is the primary contact for clients requesting laboratory services. Client specifications are communicated using several mechanisms. The primary sources of information are the client's quality assurance project plan (QAPjP) and the analytical services contract both of which detail the analytical, quality control and data reporting specifications for the project. In the absence of a QAPjP, projects specifications can also be communicated using contracts, letters of authorization, or letters of agreement, which may be limited to a brief discussion of the analytical requirements and the terms and conditions for the work. These documents may also include pricing information, liabilities and scope of work, in addition to the analytical requirements. QAPjPs include detailed analytical requirements and data quality objectives, which supersede those found in the referenced methods. This information is essential to successful project completion.

The client services staff provides additional assistance to clients who are unsure of the specifications they need to execute the sampling and analysis requirements of their project. They provide additional support to clients who require assistance in results interpretation as needed, provided they possess the expertise required to render an opinion.

The project manager is responsible for obtaining project documents, which specify the analytical requirements. Following project management review, copies are distributed to the QA Director and the appropriate departmental managers for review and comment. The original QAPjP is filed in a secure location.

14.2 ***Requirements for Non-Standard Analytical Specifications***. Client requirements that specify departures from documented policies, procedures, or standard specifications must be submitted to Accutest in writing. These requirements are reviewed and approved by the technical staff before the project is accepted. Once accepted, the non-standard requirements become analytical specifications, which follow the routine procedure for communicating client specifications. Departures from documented policies, procedures, or standard specifications that do not follow this procedure are not permitted.

14.3 ***Evaluation of Resources.*** A resource evaluation is completed prior to accepting projects submitted by clients. The evaluation is initiated by the client services staff who prepares a brief synopsis that includes the logistical requirements of the project. Logistical specifications for new projects are summarized in writing for evaluation by the affected departments. The specifications are evaluated by the department manager from a scheduling and hardware resources perspective. The project is not accepted unless the department managers have the necessary resources to execute the project according to client specifications.

14.4 ***Documentation***. New projects are initiated using a project set up form, which is completed prior to the start of the project. This form details all of the information needed to correctly enter the specifications for each client sample into the laboratory information management system (LIMS). The form includes data reporting requirements, billing information, data turnaround times, QA level, state of origin, and comments for detailing project specific requirements. The project manager is responsible for obtaining this information from the client and completing the form prior to sample arrival and login.

Sample receipt triggers project creation and the login process. The information on the set-up form is entered into the LIMS immediately prior to logging in the first sample. The set up form may be accompanied by a quotation, which details the analytical product codes and sample matrices. These details are also entered into the LIMS during login.

Special information is distributed to the laboratory supervisors and login department in electronic or hardcopy format upon project setup. All, project specific information is retained by the project manager in a secure file. The project manager maintains a personal telephone log, which details conversations with the client regarding the project.

Department managers prepare summary sheets that detail client specific analytical requirements for each test. Bench analysts use these sheets to obtain information regarding client specific analytical requirements before analyzing samples. A program code is established for each client that links the client specifications to a client project. This code is attached to a project by the project manager at login and listed on the work list for each work group conducting analysis for clients with standing requirements.

14.5 ***Communication***. A pre-project meeting is held between client services and the operations managers to discuss the specifications described in the QAPjP, contract and/or related documents. Project logistics are discussed and finalized and procedures are developed to assure proper execution of the client's analytical specifications and requirements. Questions, raised in the review meeting, are discussed with the client for resolution. Exceptions to any requirements, if accepted by the client, are documented and incorporated into the QAPjP or project documentation records.

Non-standard specifications for individual clients are documented in the LIMS at the client account level or program level. Simple specifications are documented as comments for each project. Once entered into the LIMS, these specifications become memorialized for all projects related to the client account. Complex specifications are assigned program codes that link the specification to detailed analytical specifications.

Upon sample arrival, these specifications are accessed through a terminal or printed as a hard copy and stored in a binder for individuals who require access to the specification. Specifications that are not entered into the LIMS are prohibited unless documented in an interdepartmental memo, which clearly identifies the project, client and effective duration of the specification.

14.6 ***Operational Execution***. A work schedule is prepared for each analytical department on a daily basis. Analytical specifications or program codes from recently arrived samples have now been entered into the LIMS database. The database is sorted by analytical due date and holding time, into product specific groups. Samples are scheduled for analysis by due date and holding time. The completed schedule, which is now defined as a work list, is printed. The list contains the client requested product codes, program codes and specifications required for the selected sample(s). Special requirements are communicated to the analyst using the comments section or relayed through verbal instructions provided by the supervisor. The bench analyst assumes full responsibility for performing the analysis according to the specifications printed on the work sheet.

14.7 ***Verification***. Prior to the release of data to the client, laboratory section managers and the report generation staff review the report and compare the completed product to the client specifications documentation to assure that all requirements have been met. Project managers perform a spot check of projects with unique requirements to assure that the work was executed according to specifications.

15.0 CLIENT COMPLAINT RESOLUTION PROCEDURE

Requirement. The laboratory follows a formal system for managing and reconciling client complaints. The system includes procedures for documenting the complaint and communicating it to the appropriate department for resolution. The system also includes a quality assurance evaluation to determine if the complaint is related to systematic defects requiring corrective action and process changes.

15.1 ***Procedure***. Client complaints are communicated to client services representatives, quality assurance staff, or senior management staff for resolution. The individual receiving the complaint retains the responsibility for documentation and communicating the nature of the complaint to the responsible department(s) for resolution. The responsible party addresses the complaint. The resolution is communicated to quality assurance (QA) and the originator for communication to the client. QA reviews the complaint and resolution to determine if systematic defects exist. If systematic defects are present, QA initiates a corrective action for the responsible party who develops and implements a response that eliminates the defect. If systematic defects are not present and the resolution is satisfactory, the QA Staff will close the complaint/inquiry with a no further action is necessary tag.

15.2 ***Documentation***. Client's complaints are documented by the individual receiving the complaint using the Data Query and Corrective Action Inquiry Process. This process generates an E-Mail message that contains detailed information essential to the complaint resolution. A record of the telephone conversation is maintained by client services. The message is distributed to the QA staff and the party bearing responsibility for resolution by E-Mail. The complaint resolution is documented on the message by the responsible party and returned to the originator. A copy is sent to QA for review and database archiving.

15.3 ***Corrective Action***. Responses to data queries are required from the responsible party. At a minimum, the response addresses the query and provides an explanation to the complaint. Formal corrective action may focus on the single issue expressed in the complaint. Corrective action may include reprocessing of data, editing of the initial report, and re-issue to the client. If the QA review indicates a systematic error, process modification is required. The defective process at the root of the complaint is changed. SOPs are either created or modified to reflect the change. The party responsible for the process implements process changes.

15.4 ***QA Monitoring***. Process changes, implemented to resolve systematic defects, are monitored for effectiveness by QA. If monitoring indicates that the process change has not resolved the defect, QA works with the department management to develop and implement an effective process. If monitoring indicates that the defect has been resolved, monitoring is slowly discontinued and the corrective action is closed. Continued monitoring is incorporated as an element of the annual system audit.

16.0 CONTROL OF NONCONFORMING PRODUCT

Requirement: Policies and procedures have been developed and implemented that describe the procedures employed by the laboratory when any aspect of sample analysis or data reporting do not conform to established procedures or client specifications. These procedures include steps to ensure that process defects are corrected and affected work is evaluated to assess its impact to the client.

Procedure. Nonconforming product is identified through routine internal review and audit practices or through client inquiry. The individuals who identify the nonconformance or receiving a nonconformance inquiry immediately inform the Laboratory Director and the Quality Assurance Director. The Laboratory Director initiates an evaluation of the nonconformance through the Quality Assurance Department and takes full responsibility for managing the process and identifying the course of action to take, initiating corrective action and mitigating the impact of the nonconformance to the client. Reference SOP EQA 065 Control of Non-Conforming Product and EQA 038 Complaints & Data Inquiry for specific procedures on handling non-conformances and Data Inquires.

16.1 ***Corrective Action.*** The outcome of the evaluation dictates the course of action. This includes client notification when the quality of data reported has been impacted and may also include corrective action if applicable. Immediate corrective action is performed using the procedures specified in Accutest SOP EQA011. However, additional action may be required including cessation of analysis and withholding and or recalling data reports. If the evaluation indicates that nonconforming data may have been issued to clients, the client is immediately notified and data may be recalled following the procedures specified in SOP EQA011. If work has been stopped because of a nonconformance, the Laboratory Director is the only individual authorized to direct a resumption of analysis.

Nonconformances caused by systematic process defects require retraining of the personnel involved as an element of the corrective action solution.

17.0 CONFIDENTIALITY PROTECTION PROCEDURES

Requirements: Policies and procedures have been developed to protect client data from release to unauthorized parties or accidental release of database information through accidental electronic transmission or illegal intrusion. These policies have been communicated to clients and staff. Electronic systems are regularly evaluated for effectiveness.

17.1 ***Client Anonymity***. Information related to the Company's clients is granted to employees on a "need to know" basis. An individual's position within the organization defines his "need to know". Individuals with "need to know" status are given password access to systems that contain client identity information and access to documents and document storage areas containing client reports and information. Access to client information by individuals outside of the Company is limited to the client and individuals authorized by the client.

Individuals outside of the Company may obtain client information through subpoena issued by a court of valid jurisdiction. Clients are informed when subpoenas are received ordering the release of their information.

Client information may be released directly to regulatory agencies without receiving client authorization under specified circumstances. These circumstances require that the regulatory agency have statutory authority under the regulations for laboratory certification and that Accutest's operations fall under the purview of the regulation. In these situations, Accutest will inform the client of the regulatory agencies request for information pertaining to his data and proceed with the delivery of the information to the regulatory agency.

17.2 ***Documents***. Access to client documents is restricted to employees in need to know positions. Copies of all client reports are stored in secure electronic archives with restricted access. Reports and report copies are distributed to individuals who have been authorized by the client to receive them. Data reports or data are not released to third parties without verbally expressed or written permission from the client.

17.3 ***Electronic Data***.

Database Intrusion. Direct database entry is authorized for employees of Accutest only on a need to know basis. Entry to the database is restricted through a user specific multiple password entry system. Direct access to the database outside the facility is possible through secured channels set up by accutest. A unique password is required for access to the local area network. A second unique password is required to gain access to the database. The staff receives read or write level authorization on a hierarchical privilege basis.

Internet Access. Access to client information is through an HTTP Web application only. It does not contain a mechanism that allows direct access to the database. Clients can gain access to their data only using a series of Accutest assigned client and user specific passwords. The viewable data, which is encrypted during transmission, consists of an extraction of database information only.

Client Accessibility. Accessibility to client data delivered via electronic means follows strict protocols to insure confidentiality. Clients accessing electronic data are assigned a company account. The account profile, which is established by the MIS staff, grants explicit access to specific information pertaining to the client's project activity. Passwords are assigned on an individual basis within a client account. These accounts can be activated or deactivated by the MIS staff only.

17.4 ***Information Requests***. Client specific data or information is not released to third parties without verbally expressed or written permission from the client. Written permission is required from third parties, who contact the Company directly for the release of information. Verbal requests will be honored only if they are received directly from the client. These requests must be documented in a record of communication maintained by the authorized recipient.

17.5 ***Transfer of Records***. Archived data, which has previously been reported and transmitted to clients, is the exclusive property of Accutest Laboratories. In the event of a cessation of business activities due to business failure or sale, The Company's legal staff will be directed to arrange for the final disposition of archived data.

The final disposition of archived data will be accomplished using the approach detailed in the following sequence:

1. All data will be transferred to the new owners for the duration of the required archive period as a condition of sale.

2. If the new owners will not accept the data or the business has failed, letters will be sent to clients listed on the most recent active account roster offering them the option to obtain specific reports (identified by Accutest Job Number) at their own expense.

3. A letter will be sent to the NELAC accrediting authority with organizational jurisdiction over the company offering them the option to obtain all unclaimed reports at their own expense.

4. All remaining archived data will be recycled using the most expedient means possible.

18.0 QUALITY AUDITS AND SYSTEM REVIEWS

Requirement: The quality assurance group conducts regularly scheduled audits of the laboratory to assess compliance with quality system requirements, technical requirements of applied methodology, and adherence to documentation procedures. The information gathered during these audits is used to provide feedback to senior management and perform corrective action where needed for quality improvement purposes.

18.1 ***Quality System Reviews***. Quality system reviews are performed annually by the Quality Assurance Director for the Company President. In this review, the laboratory is evaluated for compliance with the laboratory Quality Systems Manual (QSM) and the quality system standards of the National Environmental Laboratory Accreditation Conference. Findings, which indicate non-compliance or deviation from the QSM, are flagged for corrective action. Corrective actions require either a return to compliance or a plan change to reflect an improved quality process. The Quality Assurance Director is responsible for making and documenting changes to the QSM. These changes are reviewed by the Company President and The Laboratory Director prior to the approval of the revised system.

18.2 ***Quality System Audits.*** Quality system audits are conducted to evaluate the effectiveness and laboratory compliance with individual quality system elements. These audits are conducted on an established schedule. Audit findings are documented and communicated to the management staff and entered into the corrective action system for resolution. If necessary, retraining is conducted to assure complete understanding of the system requirements.

18.3 ***Test Method Assessments.*** Test Method Assessments are performed throughout the year following an established schedule. Selected analytical procedures are evaluated for compliance with standard operating procedures (SOPs) and method requirements. If non-conformances exist, the published method serves as the standard for compliance. SOPs are edited for compliance if the document does not reflect method requirements. Analysts are trained to the new requirements and the process is monitored by quality assurance. Analysts are retrained in method procedures if an evaluation of bench practices indicates non-compliance with SOP requirements.

18.4 ***Documentation Audits***. Documentation audits are conducted quarterly. This audit includes a check of measurement processes that require manual documentation. It also includes checks of data archiving systems and a search to find and remove any inactive versions of SOPs that may still be present in the laboratory and being accessed by the analysts. Non-conformances are corrected on the spot. Procedural modifications are implemented if the evaluation indicates a systematic defect.

18.5 ***Corrective Action Monitoring***. Defects or non-conformances that are identified during client or internal audits are documented in the corrective action systems and corrected through process modifications and/or retraining. Once a corrective action has been designed and implemented, it is monitored for compliance on a regular basis by the QA staff. Spot

corrections are performed if the staff is not following the new procedure. Monitoring of the corrective action continues until satisfactory implementation has been verified.

18.6 ***Preventive Action.*** Laboratory systems or processes, which may be faulty and pose the potential for non-conformances, errors, confusing reports or difficulties establishing traceability may be identified during internal audits. These items are highlighted for systematic change using the corrective action system and managed to resolution using the procedures for corrective action identified in EQA041.

18.7 ***Client Notification.*** Defective processes, systematic errors, and quality defects, detected during routine audits may have negative impacts on data quality. In some cases, data that has been released to clients may be affected. If defective data has been released for use, Accutest will immediately notify the affected clients of the defect and provide specific details regarding the magnitude of the impact to their data.

18.8 ***Management Reports.*** Formal reports of all audit and proficiency testing activity are prepared for the management staff and presented as they occur. Additional reports may be presented orally at regularly scheduled staff meetings

Management reports may also address the following topics:

- Status and results of internal and external audits,
- Status and results of internal and external proficiency testing,
- Identification of quality control problems in the laboratory,
- Discussion of corrective action program issues,
- Status of external certifications and approvals,
- Status of staff training and qualifications,
- Discussion of new quality system initiatives.
- Recommendations for further action on listed items are included in the report.

19.0 HEALTH AND SAFETY

Requirement. The company operates a formal health and safety program that complies with the requirements of the Occupational Health and Safety Administration. The program consists of key policies and practices that are essential to safe laboratory operation. All employees are required to receive training on the program elements. Job specific training is conducted to assure safe practices for specific tasks. All employees are required to participate in the program, receive initial and annual training, and comply with the program requirements. All plan and program requirements are detailed in the Health and Safety Program Manual.

19.1 **Policy.** Accutest Laboratories will provide a safe and healthy working environment for its employees and clients while protecting the public and preserving the Company's assets and property. The company will comply with all applicable government regulations pertaining to safety and health in the laboratory and the workplace.

The objective of the Accutest Health and Safety Program is to promote safe work practices that minimize the occurrence of injuries and illness to the staff through proper health and safety training, correct laboratory technique application and the use of engineering controls.

19.2 **Responsibilities.** The Health and Safety Program assists managers, supervisors and non-supervisory employees in control of hazards and risks to minimize the potential for employee and client injuries, damage to client's property and damage or destruction to Accutest's facility.

The Health, Safety and Facilities Manager is responsible for implementing the Program's elements and updating its contents as necessary. He also conducts periodic audits to monitor compliance and assess the program's effectiveness. The Health, Safety and Facilities Manager is also responsible for creating and administering safety training for all new and existing employees.

The employee is responsible for following all safety rules established for their protection, the protection of others and the proper use of protective devices provided by the Company. The employee is also expected to comply with the requirements of the program at all times. Department Managers and Supervisors are responsible for ensuring the requirements of the Safety Program are practiced daily. The Company President retains the ultimate responsibility for the program design and implementation.

19.3 **Program Elements.** The Accutest Health and Safety Program consists of key program elements that compliment the company's health and safety objective. These elements form the essence of the health and safety policy and assure that the objectives of the program are achieved.

Safety Education and Training and Communication. Training is conducted to increase the staff's awareness of laboratory hazards and their knowledge of the safety practices and procedures required to protect them from those hazards. It is also used to communicate general safety procedures required for safe operation in a chemical laboratory.

Initial health and safety training for new employees is conducted during orientation. The training focuses on the Accutest Safety and Health Program and includes specific training for the hazards that may be associated with the employees duties. Training is also conducted for all program elements focusing on general, acceptable, laboratory safety procedures. Targeted training is conducted to address hazards or safety procedures that are specific to individual employee's work assignments. All training activities are documented and archived in individual training folders, A health and safety training inventory is maintained in the training database.

Safety Committee. The safety committee provides the employee with an opportunity to express their views and concerns on safety issues in a forum where those concerns will be addressed. This committee meets monthly to assure that the interests of the company and the well being of the employee are protected. They also serve as a catalyst for elevating the level of safety awareness among their peers.

Hazard Identification and Communication. The hazard communication program enables employees to readily identify laboratory hazards and the procedures to protect themselves from those hazards. This program complies with OSHA's Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200 that requires the company to adopt and adhere to the following key elements:

- Material Safety Data Sheets (MSDS) must be available to any employee wishing to view them,
- The Company must maintain a Hazardous Chemicals Inventory (by location), which is updated on an annual basis,
- Containers are properly labeled,
- All employees must be provided with annual Hazard Communication and Right to Know training,

The hazard communication program also complies with the requirements of the New Jersey Worker and Community Right to Know Law, NJAC 8:95.

Identification of Workplace Hazards. The workplace hazard identification procedures have been designed to assure that hazards that have the potential to cause personnel injury or destruction of property are identified, managed and/or systematically eliminated from the operation. This system eliminates hazards, limits the potential for injury and increases the overall safety of the work environment.

Employee Exposure Assessment. Employee exposure assessment is performed to identify and evaluate potential exposure hazards associated with the employees work station. The exposure assessment data is used to determine if changes or modifications to the work station are needed to limit exposure to laboratory conditions that could negatively affect an employee's existing medical conditions.

Bloodborne Pathogens. Accutest has implemented the OSHA Bloodborne Pathogen Standard, 29CFR1910.1030 to reduce occupational exposure to Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and other bloodborne pathogens that employees may encounter in their workplace.

Respiratory Protection Plan. The respiratory protection plan assures that Accutest employees are protected from exposure to respiratory hazards. This program is used in situations where engineering controls and/or safe work practices do not completely control the identified hazards. In these situations, respirators and other protective equipment are used. Supplemental respiratory protection procedures are applied to specified maintenance personnel, employees who handle hazardous wastes in the hazardous waste storage area, and any employee that voluntarily elects to wear a respirator.

Chemical Hygiene Plan. The Chemical Hygiene Plan complies with the requirements of the Occupational Safety and Health Administration's Occupational Exposure to Hazardous Chemicals in the Laboratory Standard, 29 CFR 1910.1450. This plan establishes procedures, identifies safety equipment, personal protective equipment, and work practices that protect employees from the potential health hazards presented by hazardous chemicals in the laboratory if properly used and/or applied.

Chemical Spill Response Plan. The chemical spill response plan has been designed to minimize the risks from a chemical spill or accidental chemical release in the laboratory. Risk minimization is accomplished through a planned response that follows a defined procedure. The staff has been trained to execute spill response procedures according to the specifications of the plan, which identifies the appropriate action to be taken based on the size of the spill.

Emergency Action & Evacuation Plan. The Emergency Action and Evacuation Plan details the procedures used to protect and safeguard Accutest's employees and property during emergencies. Emergencies are defined as fires or explosions, gas leaks, building collapse, hazardous material spills, emergencies that immediately threaten life and health, bomb threats and natural disasters such as floods, hurricanes or tornadoes, terrorism or terrorist actions. The plan identifies and assigns responsibility for executing specific roles in situations requiring emergency action. It also describes the building security actions coinciding with the "Alert Condition", designated by the Department of Homeland Security.

Lockout/Tagout Plan. Lockout/tagout procedures have been established to assure that laboratory employees and outside contractors take steps to render equipment inoperable and/or safe before conducting maintenance activities. The plan details the procedures for conducting maintenance on equipment that has the potential to unexpectedly energize, start up, or release energy or can be operated unexpectedly or accidentally resulting in serious injury to employees. The plan ensures that employees performing maintenance render the equipment safe through lock out or tag out procedures.

Personal Protection Policy. Policies have been implemented which detail the personal protection requirements for employees. The policy includes specifications regarding engineering controls, personal protective equipment (PPE), hazardous waste, chemical exposures, working

with chemicals and safe work practices. Safety requirements specific to processes or equipment are reviewed with the department supervisor or the Health and Safety Manager before beginning operations.

Visitor and Contractor Safety Program. A safety brochure is given to all visitors and contractors who visit or conduct business at the facility. The brochure is designed to inform anyone who is not an employee of Accutest Laboratories of the laboratories safety procedures. The brochure directs them to follow all safety programs and plans while on Accutest property. This program also outlines procedures for visitors and contractors in the event of an emergency. Visitors are required to acknowledge receipt and understanding of the Accutest policy annually.

Appendix I

Glossary of Terms

GLOSSARY OF TERMS

Acceptance Criteria: specified limits placed on characteristics of an item, process, or service defined in requirement documents.

Accuracy: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator.

Analyst: the designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.

Audit: a systematic evaluation to determine the conformance to quantitative *and qualitative* specifications of some operational function or activity.

Batch: environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group.

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.

Blind Sample: a sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.

Calibration: to determine, by measurement or comparison with a standard, the correct value of each scale reading on a meter, instrument, or other device. The levels of the applied calibration standard should bracket the range of planned or expected sample measurements.

Calibration Curve: the graphical relationship between the known values, such as concentrations of a series of calibration standards and their instrument response.

Calibration Method: a defined technical procedure for performing a calibration.

Calibration Range: the range of concentrations between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a singe-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.

Calibration Standard: a substance or reference material used to calibrate an instrument.

Certified Reference Material (CRM): a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation, which is issued by a certifying body.

Chain of Custody: an unbroken trail of accountability that ensures the physical security of samples and includes the signatures of all who handle the samples.

Confirmation: verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to second column confirmation, alternate wavelength, derivatization, mass spectral, interpretation, alternative detectors or, additional cleanup procedures.

Continuing Calibration Verification: the verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models.

Corrective Action: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.

Data Reduction: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form.

Demonstration of Capability: a procedure to establish the ability of the analyst to generate acceptable accuracy.

Document Control: the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.

Duplicate Analyses: the analyses or measurements of the variable of interest performed identically on two sub-samples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

Field of Testing: NELAC's approach to accrediting laboratories by program, method and analyte. Laboratories requesting accreditation for a program-method-analyte combination or for an up-dated/improved method are required submit to only that portion of the accreditation process not previously addressed (see NELAC, section 1.9ff).

Laboratory Control Sample (such as laboratory fortified blank, spiked blank, or QC check sample): a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes from a source independent of the calibration standards or a material containing known and

verified amounts of analytes. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

Limit of Detection (LOD): an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific. DoD clarification is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

Limit of Quantitation (LOQ): the minimum levels, concentrations, or quantities of a target analyte that can be reported with a specified degree of confidence. DoD clarification is the lowest concentration that produces a quantitative result within specified limits of precision and bias. The LOQ shall be at or above the concentration of the lowest initial calibration standard.

Matrix: the component or substrate that contains the analyte of interest. For purposes of batch and QC requirement determinations, the following matrix distinctions shall be used:

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source. Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt-water source such as the Great Salt Lake. Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Solids: includes soils, sediments, sludges and other matrices with >15% settlable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.

Biota: animal or plant tissue, consisting of entire organisms, homogenates, and/or organ or structure specific subsamples.

Matrix Spike (spiked sample or fortified sample): a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest, which is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses.

Method Detection Limit: the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

National Environmental Laboratory Accreditation Program (NELAP): the overall National Environmental Laboratory Accreditation Program.

NELAC Standards: the plan of procedures for consistently evaluating and documenting the ability of laboratories performing environmental measurements to meet nationally defined standards established by the National Environmental Laboratory Accreditation Conference.

Performance Audit: the routine comparison of independently obtained *qualitative and quantitative* measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.

Precision: the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms.

Preservation: refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample.

Proficiency Testing: a means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source.

Proficiency Test Sample (PT): a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria.

Quality Assurance: an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Control: the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users.

Quality Manual: a document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.

Quality System: a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

Reporting Limits: the maximum or minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be quantified with the confidence level required by the data user.

Reagent Blank (method reagent blank or method blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.

Reference Material: a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Reference Method: a method of known and documented accuracy and precision issued by an organization recognized as competent to do so.

Reference Standard: a standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived.

Replicate Analyses: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval.

Sample Duplicate: two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis.

Spike: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.

Standard: the document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of NELAC and meets the approval requirements of NELAC procedures and policies.

Traceability: the property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.

Validation: the process of substantiating specified performance criteria.

Work Cell: A defined group of analysts that together perform the method analysis. Members of the group and their specific functions within the work cell must be fully documented. A "work cell" is considered to be all those individuals who see a sample through the complete process of preparation, extraction, or

analysis. The entire process is completed by a group of capable individuals; each member of the work cell demonstrates capability for each individual step in the method sequence.

Appendix II

Standard Operating Procedures Directory

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Air Toxics	Air Analysis by TO-15	EAT001
Air Toxics	Summa Canister Cleaning and Certification	EAT002
Air Toxics	Air Analysis of Tedlar Bag/Summa Canister by TO-3	EAT003
Air Toxics	Laboratory Analysis of Dissolved Gases in Aqueous Samples	EAT004
Air Toxics	Air Analysis by NJDEP – SRWM Low Level USEPA TO-15	EAT005
Air Toxics	Calibration of Flow Controllers	EAT006
Air Toxics	Air Analysis by TO-15 for Minnesota Department of Health	ETA007
General Chem	Percent Solids - SM2540 G-97, ASTM D4643-00	EGN007
General Chem	Anionic Surfactants As MBAS	EGN008
General Chem	Nonionic Surfactants as CTAS	EGN009
General Chem	Total Solids, 160.3, SM2540 B-97	EGN010
General Chem	Composite Sample	EGN015
General Chem	Total Dissolved Solids (Total Filterable Residue) SM2540 C-97	EGN020
General Chem	Settlable Solids, 160.5	EGN021
General Chem	Nitrate/Nitrite & Nitrate Only By Cad. Red. Analysis	EGN026
General Chem	Total Volatile Solids, 160.4	EGN030
General Chem	Chlorine, Total Residual And Free	EGN033
General Chem	Total Alkalinity, 310.1	EGN037
General Chem	Acidity (pH 8.2)	EGN044
General Chem	Bicarbonate, Carbonate, Free Carbon Dioxide	EGN045
General Chem	Petroleum Hydrocarbons By IR	EGN062
General Chem	Viscosity	EGN067
General Chem	Total Suspended Solids (Non-Filterable Residue)	EGN087
General Chem	Chemical Oxygen Dem: Hach 8000, Aqueous Samples - Soil Modified	EGN099
General Chem	Hardness As Caco3 By Titration	EGN101
General Chem	Orthophosphate	EGN102
General Chem	Nitrogen, Nitrite -Total-Waters/Soluble-Soils	EGN103
General Chem	Turbidity, 180.1	EGN116
General Chem	Sulfide	EGN118
General Chem	Sulfite.	EGN119
General Chem	Apparent Color By Visual Comparison Method	EGN120
General Chem	Specific Conductance At 25.0 C	EGN124
General Chem	Chloride	EGN131
General Chem	Turbidity for Metals Drinking Waters	EGN132
General Chem	Odor & Odor at Elevated Temp.(Threshold Odor Test)	EGN133
General Chem	Biological Oxygen Demand (5 Day BOD)	EGN134
General Chem	Winkler Titration For DO Standardization	EGN135
General Chem	Dissolved Oxygen	EGN136
General Chem	Reactive Sulfide And Reactive Cyanide	EGN137
General Chem	Ignitability	EGN140
General Chem	TCLP - Semivolatiles/Metals Extraction	EGN141
General Chem	TCLP- Volatiles Extraction	EGN142
General Chem	Paint Filter Test	EGN143
General Chem	Cyanides Amenable To Chlorination Preparation	EGN144
General Chem	Temperature	EGN146
General Chem	Iodine, Colorimetric Analysis	EGN148
General Chem	pH by Electrode – Water	EGN151
General Chem	Salinity - SM182520B	EGN158
General Chem	pH & Corrosivity for Soils/ Solid Wastes SW486 9045	EGN200
General Chem	BTU (Gross Calorific Value)	EGN202

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
General Chem	Percent Sulfur	EGN203
General Chem	Bulk Density (Dry Basis)	EGN204
General Chem	Percent Ash (Dry Basis)	EGN205
General Chem	Total Organic Content	EGN206
General Chem	Cyanide (Lachat Autoanalyzer)	EGN207
General Chem	Total Chlorine ASTM D808-91	EGN208
General Chem	Total Organic Chlorine ASTM D808-91	EGN209
General Chem	Total Kjeldahl Nitrogen (Lachat Autoanalyzer)	EGN210
General Chem	Specific Gravity	EGN211
General Chem	Hexavalent Chromium (Soils)	EGN214
General Chem	Ammonia (Lachat Autoanalyzer)	EGN216
General Chem	Phenols (Lachat Autoanalyzer)	EGN217
General Chem	Total Organic Halides	EGN218
General Chem	Total Organic Halides, Solid And Oil Matrices	EGN219
General Chem	Pour Point	EGN221
General Chem	Base Sediment In Petroleum Samples	EGN222
General Chem	Water Content In Petroleum Samples	EGN223
General Chem	Ignitability, Bunsen Burner Method	EGN226
General Chem	Organic Matter (Loss on Ignition)	EGN227
General Chem	Sulfide Analysis For Reactive Sulfides	EGN228
General Chem	Hexavalent Chromium In Waters by EPA 7196a Mod.	EGN230
General Chem	Hexavalent Chromium In Waters by SM18 4500 CR D	EGN231
General Chem	Total Petroleum Hydrocarbons by IR With ASE Extract.	EGN232
General Chem	Total Organic Carbon In Soil Samples	EGN233
General Chem	Total Organic Carbon In Aqueous Samples	EGN234
General Chem	pH and Corrosivity for Aqueous and Multiphasic Wastes	EGN238
General Chem	Synthetic Precipitation Leaching Procedure for Non-Volatile Anal.	EGN239
General Chem	Synthetic Precipitation Leaching Procedure for Volatile Analytes	EGN240
General Chem	Cation Exchange Capacity Of Soils (Sodium Acetate)	EGN242
General Chem	Ferrous Iron	EGN243
General Chem	Freon-113 Recycling Procedure	EGN246
General Chem	Specific Gravity (For Sludges And Solids)	EGN247
General Chem	N-Hexane Extract. Mat. & Silica Gel Treatment by Gravimetric Anal.	EGN249
General Chem	Oil & Grease – Gravimetric Anal. (So & Sl) – Hexane Extraction	EGN250
General Chem	Neutral Leaching of Solid Waste Sam. Using Shake Extraction	EGN252
General Chem	Oxidation-Reduction Potential	EGN253
General Chem	Titrametric Method For Free Carbon Dioxide	EGN255
General Chem	Total Phosphorous EPA 365.3	EGN256
General Chem	Dissolved Silica	EGN257
General Chem	Grain Size and Sieve Testing	EGN258
General Chem	Hardness By Calculation	EGN259
General Chem	Spectrophotometer Calibration Check	EGN260
General Chem	Massachussetts Sieve Test	EGN262
General Chem	Volatile Suspended Solids	EGN264
General Chem	Unburned Combustibles (Volatile Solids)	EGN266
General Chem	Particulate Matter	EGN267
General Chem	Elutriate Preparation	EGN268
General Chem	Phosphorus, Hydrolyzable	EGN271
General Chem	Perchlorate by Ion Chromatography in Groundwater and Soil	EGN272
General Chem	Percent Lipids by Gravimetric Analysis	EGN273
General Chem	Cyanide Distillation/Aqueous Samples/Micro Method	EGN275

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
General Chem	Cyanide Distillation/Soil Samples/Micro Method	EGN276
General Chem	Calibration of General Chemistry Distillation Tubes	EGN277
General Chem	Phenols Distillation, Water Samples	EGN279
General Chem	Phenols Micro Distillation, Soil Samples	EGN280
General Chem	Inorganic Anions Determination by ion chromatography using IC 2000	EGN281
General Chem	Leaching of Solid Waste Samples using China Leaching Procedure	EGN283
General Chem	Ammonia Distillation, Water & Solid samples	EGN284
General Chem	Weak Acid Dissociable Cyanide / Micro-Distillation Method	EGN286
General Chem	Ferrous Iron for Hexavalent Chromium Sample Characterization	EGN288
General Chem	Calibration of Coliform Collection Bottles	EGN287
General Chem	Inorganic Carbon by Calculation	EGN289
General Chem	Procedure for Homogenization of Biota Samples	EGN290
General Chem	Hexavalent Chromium in Water by Ion Chromatography	EGN291
General Chem	Hexavalent Chromium in Soils by Ion Chromatography	EGN292
General Chem	Procedure for Wand Mixer Homogenization of Soil Samples	EGN293
General Chem	Hydrogen Sulfide	EGN294
General Chem	TCLPME-Multiple Extractions Procedure	EGN295
General Chem	Modified Elutriate Preparation	EGN296
General Chem	Procedure for Particle Size Reduction (Crushing) of Solid Matrices	EGN297
General Chem	Acid Volatile Sulfides	EGN298
General Chem	Pore Water Extraction from Soils for NVOC and Metals Analysis	EGN299
General Chem	Iodide, Colorimetric Analysis	EGN300
General Chem	Percent Solids and Moisture in Soil/Solid Matrices	EGN301
General Chem	Un-Ionized Ammonia	ENG302
General Chem	Density, ASTM Definition	EGN303
General Chem	HEM by Gravimetric Analysis Using Solid Phase Extraction	EGN304
General Chem	Hexavalent Chromium on Wipe Samples	EGN305
General Chem	Modified Mehlich Buffer pH	EGN306
General Chem	Screening Procedure to test for presence of sulfide	EGN307
General Chem	Black Carbon in Soil Samples	EGN308
General Chem	Physical Appearance (Sample Description)	EGN309
General Chem	Orthophosphate	EGN310
Facilities Maint.	Facilities Maintenance	EFM001
Field Operations	Aqueous Grab Sampling Procedures	EFP001
Field Operations	Use of Automatic Wastewater Sampler	EFP002
Field Operations	Free and Total residual Chlorine	EFP003
Field Operations	Decontamination of Sampling Equipment	EFP004
Field Operations	Dissolved Oxygen	EFP005
Field Operations	Dissolved Oxygen by Winkler Titration	EFP006
Field Operations	Metal Sample Field Filtering Procedure	EFP008
Field Operations	Sampling Procedure for Monitoring Wells	EFP013
Field Operations	Subsurface Soil Sampling Procedure	EFP016
Field Operations	Surface Soil Sampling Procedure	EFP017
Field Operations	Residential Potable Well Sampling Procedure	EFP018
Field Operations	Potable Water Line Sampling Procedure	EFP019
Field Operations	Sampling for NJ Private Well Testing Act	EFP020
Field Operations	Field Sampling CEOrdinates by GPS	EFP021
Field Operations	Sampling Drinking Water Wells for Volatile Organics	EFP022
Field Operations	Sampling Drinking Water Wells for Metals	EFP023
Field Operations	Sampling Drinking Water Wells for Nitrates & Nitrites	EFP024

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Field Operations	Sampling Drinking Water Wells for Gross Alpha	EFP025
Field Operations	Sampling Drinking Water Wells for Coliform Bacteria	EFP026
Field Operations	Sampling Drinking Water Wells for pH	EFP027
Field Operations	Documentation Requirements for Field Services	EFP028
Field Operations	Field Oxidation-Reduction Potential	EFP029
Field Operations	Turbidity, Field Test	EFP030
Field Operations	Analysis for Dissolved Oxygen by DO Probe	EFP031
Field Operations	Field pH in Water by Electrode	EFP032
Field Operations	Field Measurement of Specific Conductance and Resistivity	EFP033
Health & Safety	Contamination Avoidance Procedure	EHS001
Health & Safety	Measuring Face Velocities in Laboratory Fume Hoods	EHS002
Health & Safety	Proper Handling of Compressed Gas Cylinders	EHS003
Health & Safety	Sample and Waste Disposal (Formerly ESM003)	EHS004
Health & Safety	Handling and Management of Inorganic Wastes (Formerly EGN265)	EHS005
Health & Safety	Handling, Treatment, and Disposal of Foreign Soils	EHS006
Health & Safety	Management of Industrial Product Samples	EHS007
Health & Safety	Organic Prep Air Monitoring	EHS008
Health & Safety	Laboratory Visitor Safety Procedure	EHS009
Information Tech	Information Security & Integrity Procedure	EMI001
Information Tech	Procedures for Requesting Software or Software Revisions	EMI002
Information Tech	Development, Implementation, Delivery, & Revision of EDDs	EMI003
Information Tech	Data Systems Maintenance and Information Handling	EMI006
Metals Analysis	Mercury Analysis of Non-Potable and Potable Water Samples	EMA215
Metals Analysis	Metals by ICP-MS: EPA 200.8	EMA216
Metals Analysis	Metals by ICP-MS: SW846 6020	EMA217
Metals Analysis	Metals by ICP Atomic Emission Spectrometry using Solid State ICP	EMA222
Metals Analysis	Metals by ICP Atomic Emission Spectrometry – EPA 200.7	EMA223
Metals Analysis	Low Level Mercury by EPA 1631	EMA224
Metals Analysis	Low Level Mercury by EPA 245.7	EMA225
Metals Analysis	Metals by inductively coupled plasma-Mass Spectrometry (ICP-MS)	EMA226
Metals Analysis	Metals by Inductively coupled plasma atomic emission spectrometry (ICP) using Using Solid State ICP	EMA227
Metals Analysis	Cold Vapor Analysis of Mercury For Soil Samples	EMA228
Metals Prep	Digestion of DW for ICP Analysis	EMP048
Metals Prep	Non-Potable Waters Digestion For ICP/Flame Analysis	EMP070
Metals Prep	Soil Digestion For ICP Analysis	EMP073
Metals Prep	Non-Potable Water Digestion for Flame/ICP (Total & Dissolved)	EMP081
Metals Prep	Digestion Of Non-Potable Waters For Total Recoverable Metals	EMP200
Metals Prep	Metals Spiking Solution and Standards Preparation and Use	EMP202
Metals Prep	Calibration of Metals Digestion Tubes	EMP203
Metals Prep	ICP and ICP/MS Analysis of TPPM-10 Filters	EMP207
Metals Prep	Digestion of Waters for Acid Extractable Metals	EMP208
Metals Prep	Lab Preservation Filtration of Metals Samples	EMP209

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Microbiology	Microbiological Quality Control	EMB001
Microbiology	Coliform, Total By Colilert, SM18 9223 B	EMB002
Microbiology	Total Coliform: Membrane Filtration/Fecal Coliform Confirmation	EMB003
Microbiology	Total Plate Count SM18 9215B	EMB008
Microbiology	General Petroleum Degraders	EMB009
Microbiology	Calibration of Microbiology Coliform Collection Bottles	EMB010
Microbiology	Coliform, Fecal	EMB127
Organics-GC	Semi-Volatile Petroleum Products in H2O-NJOQA25	EGC101
Organics-GC	Dibromo-3-chloropropane & 1,2,3-Trichloropropane	EGC504
Organics-GC	Volatile Aromatics in Wastewater by EPA-602	EGC602
Organics-GC	Acrolein and Acrylonitrile by EPA 603	EGC603
Organics-GC	Pesticides & PCBs in Wastewater by EPA 608	EGC608
Organics-GC	Polyaromatic Hydrocarbons	EGC610
Organics-GC	1,2-DBE, 1,2-DB-3-CP & 1,2,3-TCP by Micro-extraction and GC	EGC8011
Organics-GC	Volatile Aromatics Halocarbons by SW8021	EGC8021B
Organics-GC	Pesticides Analysis by SW8081	EGC8081
Organics-GC	PCB Analysis SW8082	EGC8082
Organics-GC	PAHs by SW846-8100	EGC8100
Organics-GC	Herbicides by SW846 – 8151	EGC8151
Organics-GC	Conn. Total Semi-volatile Petroleum Hydrocarbons	EGCCTGRO
Organics-GC	Alcohols by Direct Aqueous Injection GC/FID SW 8015	EGCALDAI
Organics-GC	Analysis of Explosives by GC/ECD	EGCBUSACH-PPM
Organics-GC	Connecticut Extractable Petroleum Hydrocarbon Analysis	EGCCTETPH
Organics-GC	Petroleum Range Organics Analysis By GC/FID (Florida)	EGCFLPRO
Organics-GC	Massachusetts Extractable Petroleum Hydrocarbons	EGCMAEPH
Organics-GC	Massachusetts Volatile Petroleum Hydrocarbons	EGCMAVPH
Organics-GC	New Jersey Extractable Petroleum Hydrocarbons	EGCNJEPH
Organics-GC	Oil Identification by Gas Chromatography Fingerprint	EGCOILID
Organics-GC	Texas Total Petroleum Hydrocarbons	EGCTX1005
Organics-GC	Wisconsin Diesel Range Organics	EGCWIDRO
Organics-GC/MS	Volatile Organics in Drinking Water by EPA 524	EMS524
Organics-GC/MS	Volatile Organics in Wastewater by EPA 624	EMS624
Organics-GC/MS	Semi-Volatile Organics by EPA 625	EMS625
Organics-GC/MS	Volatile Organics by SW8260B	EMS8260B
Organics-GC/MS	Ethylene/Propylene Glycol Analysis DAI-GC/MS(SIM)	EMS8260DAI
Organics-GC/MS	Semi-Volatile Organics by SW8270	EMS8270
Organics-GC/MS	NDMA By chemical Ionization Gas Chromatography/mass spectrometry (GC/MS) With large volume injection	EMSNDMA
Organics Prep	Prep of Base Neutral/Acid Extractables: Water Matrices	EOP001
Organics Prep	Extraction of Semivolatile Organics from Solids By Sonication	EOP003
Organics Prep	Alumina Cleanup of Organic Extracts: SW3610	EOP005
Organics Prep	Continuous Liquid/Liquid Extraction Water: SW3520C	EOP007
Organics Prep	Sulfur Cleanup of Organic Extracts: SW846 3660B	EOP011

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Organics Prep	Testing & Approval Of Organics Solvents	EOP013
Organics Prep	Preparation & Use of MDL Check Solution	EOP014
Organics Prep	Preparation of Petroleum Oils & Organic Wastes for PCBs by SW 8082	EOP017
Organics Prep	Removal of Sulfur from Extracts with Tetrabutylammonium Sulfite	EOP018
Organics Prep	Soxhlet Extraction of Solids For Semi-Volatile Organics	EOP020
Organics Prep	Preparation of Petroleum Products for EPA 8081	EOP021
Organics Prep	Preparation of Petroluem Products for BNA by EPA 8270C	EOP022
Organics Prep	Preparation for Aqueous DRO for Wisconsin	EOP023
Organics Prep	Solvent Extraction for Soil/Sediment DRO for Wisconsin	EOP024
Organics Prep	Pressurized Fluid Extraction (ASE)	EOP040A
Organics Prep	Microwave Extraction of Pesticides &/or PCBs from solid samples	EOP3546
Organics Prep	Calibration of Extract Vials	EOP026
Organics Prep	Alumina Column Cleanup SW3611	EOP3611
Organics Prep	Florisil Column Cleanup SW3620	EOP3620
Organics Prep	Silica Gel Cleanup SW3630	EOP3630
Organics Prep	Acid Base Partitioning SW3650	EOP3650
Organics Prep	Sulfuric Acid/Permanganate Cleanup SW3665	EOP3665
Organics Prep	Purge-And-Trap Extraction Of Aqueous Samples	EOP5030
Organics Prep	Collection/Preservation of Solids for VO Analysis: 5035	EOP5035
Organics Prep	Cleanup of Organic Extracts by Gel Permeation Chromatography	EOPGPC
Organics - LC	PAHs By HPLC Using SW-846 Method 8310	ELC8310
Project Mgmt	Procedure For The Management Of Client Projects	EPM001
Project Mgmt	Client Specific Method Modifications	EPM002
Project Mgmt	Procedure For The Notification Of DW Exceedences	EPM003
Project Mgmt	Data Entry for Sample Log-In	EPM004
Quality Assurance	Preparation, Approval, Distribution & Archiving of SOPs	EQA001
Quality Assurance	Calibration of Analytical Balances	EQA002
Quality Assurance	Calibration of Thermometers	EQA003
Quality Assurance	Calibration and Use of Auto-Pipettes	EQA004
Quality Assurance	Temperature Monitoring-	EQA005
Quality Assurance	Sample Container Cleaning & Quality Control	EQA006
Quality Assurance	Calibration of Kuderna-Danish Collection Tubes	EQA007
Quality Assurance	Preparation and Analysis of Sample Preservatives	EQA008
Quality Assurance	Personnel Training and Analyst Proficiency	EQA009
Quality Assurance	Sample Batching Procedure	EQA010
Quality Assurance	Corrective Action Procedure	EQA011
Quality Assurance	Glassware Preparation For Inorganic Lab Use	EQA012
Quality Assurance	Preparation Of Glassware For Organics Extraction	EQA013
Quality Assurance	Standards Traceability Documentation Procedure	EQA014
Quality Assurance	Template for Standard Operating Procedures	EQA016
Quality Assurance	Management/Reporting Of Proficiency Test (PT) Samples	EQA017
Quality Assurance	Creating/Distributing/Tracking Internal Chains Of Custody	EQA018
Quality Assurance	Creating New Accounts	EQA019
Quality Assurance	Creating New Projects	EQA020
Quality Assurance	Creating Product Codes	EQA021
Quality Assurance	Procedures For The Purchase Of Laboratory Supplies	EQA023
Quality Assurance	Control & Archiving Of Laboratory Documents	EQA025
Quality Assurance	Confidentiality Protection Procedures	EQA027

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Quality Assurance	Quality System Review	EQA028
Quality Assurance	Contract Review	EQA029
Quality Assurance	Procedure for the Development and Application of MDLs and RLs	EQA030
Quality Assurance	Subcontracting Procedures	EQA031
Quality Assurance	Signature Authority	EQA032
Quality Assurance	Review of Inorganic Data	EQA034
Quality Assurance	Review of Organic Data	EQA035
Quality Assurance	Documentation of Equipment Maintenance	EQA036
Quality Assurance	Procedures for Accepting Departures from Laboratory Specifications	EQA037
Quality Assurance	Client Complaints Resolution Procedure	EQA038
Quality Assurance	Employee Technical Ethics Responsibilities	EQA039
Quality Assurance	Internal Audit Procedure	EQA041
Quality Assurance	Procedure for Obtaining Representative Sample Aliquots	EQA042
Quality Assurance	Procedure for Development &use of In-House Q C Criteria	EQA043
Quality Assurance	Manual Integration of Chromatographic Peaks	EQA044
Quality Assurance	Deionized Water Quality Control	EQA046
Quality Assurance	Management and Control of Change	EQA047
Quality Assurance	Laboratory Equipment Purchase and Removal From Service	EQA048
Quality Assurance	Calibration of Microliter Syringes	EQA049
Quality Assurance	Autosampler Vial Labeling Procedure (formally EOP041-01)	EQA050
Quality Assurance	pH for Volatile Samples	EQA051
Quality Assurance	Semivolatile Spike Solution Accuracy Verification	EQA053
Quality Assurance	Quality Control Review of Data Packages	EQA054
Quality Assurance	Procedures for Determining Method Comparability	EQA055
Quality Assurance	Refrigerator Storage Holding Blank Procedure	EQA056
Quality Assurance	Data Integrity Training Procedure	EQA057
Quality Assurance	Data Integrity Monitoring Procedure	EQA058
Quality Assurance	Procedure for Conducting Data Integrity Investigations	EQA059
Quality Assurance	Quality Control Requirements for Organics by GC/GCMS using EPA 500 & 600 Series, SW846 8000 Series and CLP Methodologies	EQA060
Quality Assurance	Procedure for the Confidential Reporting of Data Integrity Issues	EQA061
Quality Assurance	Calibration of Volumetric Dispensers for Volume Critical Processes	EQA062
Quality Assurance	Calibration of Volumetric Dispensers / Non-Critical Volumes Processes	EQA063
Quality Assurance	Glassware Preparation for use in VOA analysis	EQA064
Quality Assurance	Control of Non-Conforming Product	EQA065
Quality Assurance	Client Notification of Key Personnel Changes	EQA066
Quality Assurance	Review of Inorganic Notebooks	EQA067
Quality Assurance	Disposal of Spent Semi-Volatile Organic Extracts	EQA068
Quality Assurance	Compressed Gas Management	EQA069
Quality Assurance	Procedure for Tracking Quality Control Non-Conformances	EQA070
Quality Assurance	Procedure for the Development and Application of Experimental Method Detection Limits, limits of detection, and limits of quantitation for inorganic applications	EQA071
Quality Assurance	Procedure for Particle Size Reduction (Crushing)/Homogenization of solid matrices	EQA072
Quality Assurance	Compositing Samples	EQA073
Report Generation	Report Generation–Data Package	ERG002
Sample Mgmt.	Sample Storage	ESM001
Sample Mgmt.	Chain Of Custody And Log In Procedure	ESM002

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Sample Mgmt.	Temperature Maintenance Of Shipping CEOlers	ESM004
Sample Mgmt.	CEOler Packaging And Shipping Procedure	ESM008
Sample Mgmt.	Procedures for Sample Couriers	ESM011
Sample Mgmt.	Summa Canister Shipment & Retrieval: NJDEP 03-X-35135	ESM012

Appendix III

Analytical Capabilities

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Alkalinity	SM 2320 B	Drinking Water	Inorganic Analysis
Ammonia	SM 4500-NH_3 H	Drinking Water	Inorganic Analysis
Chloride, Fluoride, Sulfate	EPA 300.0	Drinking Water	Inorganic Analysis
Chlorine, Total Residual	SM 4500-CL F	Drinking Water	Inorganic Analysis
Color, Apparent	SM 2120 B	Drinking Water	Inorganic Analysis
Conductivity	SM 2510 B	Drinking Water	Inorganic Analysis
Cyanide	EPA 335.4	Drinking Water	Inorganic Analysis
Foaming Agents (MBAS)	SM 5540 C	Drinking Water	Inorganic Analysis
Nitrate	EPA 353.2	Drinking Water	Inorganic Analysis
Nitrite	SM 4500-NO_2 B	Drinking Water	Inorganic Analysis
Odor	SM 2150 B	Drinking Water	Inorganic Analysis
Organic Carbon, Total (TOC)	SM 5310 B	Drinking Water	Inorganic Analysis
Dissolved Organic Carbon (DOC)	5310 B, C, D	Drinking Water	Inorganic Analysis
Orthophosphate	SM 4500-P E	Drinking Water	Inorganic Analysis
Perchlorate	EPA 314.0	Drinking Water	Inorganic Analysis
pH, Hydrogen Ion	SM 4500-H^+ B	Drinking Water	Inorganic Analysis
Silica, Dissolved	SM 4500-Si D(18th/19th ed)	Drinking Water	Inorganic Analysis
Temperature	SM 2550 B	Drinking Water	Inorganic Analysis
Total Dissolved Solids	SM 2540 C	Drinking Water	Inorganic Analysis
Total Organic Halides (TOX)	SM 5320 B	Drinking Water	Inorganic Analysis
Turbidity	EPA 180.1	Drinking Water	Inorganic Analysis
Hardness, Calcium	EPA 200.7	Drinking Water	Metals Analysis
Hardness, Total	EPA 200.7	Drinking Water	Metals Analysis
Hardness, Total	SM 2340 C	Drinking Water	Metals Analysis
Mercury	EPA 245.1	Drinking Water	Metals Analysis
Metals	EPA 200.7	Drinking Water	Metals Analysis
Metals	EPA 200.8	Drinking Water	Metals Analysis
All Categories Sample Handling Procedures	Other N.J.A.C. 7:18-6&9	Drinking Water	PWTA Sampling Parameters
DBCP, EDB & TCP	EPA 504.1	Drinking Water	Organics Analysis
Volatile Organics	EPA 524.2	Drinking Water	Organics Analysis
Total Coliform/E. Coli	SM 9223 B	Drinking Water	Microbiology
Heterotrophic Bacteria	SM 9215 B	Drinking Water	Microbiology
Acidity as $CaCO_3$	SM 2310 B-11	Wastewater	Inorganic Analysis
Alkalinity as $CaCO_3$	SM 2320 B-11	Wastewater	Inorganic Analysis
Ammonia	SM20 4500-NH_3-B+H-11	Wastewater	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Biochemical Oxygen Demand	SM 5210 B-11	Wastewater	Inorganic Analysis
Bromide, Chloride, Fluoride, Sulfate	EPA 300.0	Wastewater	Inorganic Analysis
Carbonaceous BOD (CBOD)	SM 5210 B-11	Wastewater	Inorganic Analysis
Chemical Oxygen Demand (COD)	SM 5220 B or C-11, Hach 8000	Wastewater	Inorganic Analysis
Chloride	SM 4500-Cl C-11	Wastewater	Inorganic Analysis
Chlorine, Total Residual	SM 4500-Cl F-11	Wastewater	Inorganic Analysis
Chromium (VI)	SM 3500-Cr D	Wastewater	Inorganic Analysis
Chromium (VI)	EPA 218.6	Wastewater	Inorganic Analysis
Color, Apparent	SM 2120 B-11	Wastewater	Inorganic Analysis
Cyanide (Sample Preparation)	SM 4500-CN C+E	Wastewater	Inorganic Analysis
Cyanide (Analytical Finish)	EPA 335.4	Wastewater	Inorganic Analysis
Cyanide Amenable to Chlorine	SM 4500-CN-B or C-11+G-11	Wastewater	Inorganic Analysis
Hardness, Total as $CaCO_3$	SM 2340C-11	Wastewater	Inorganic Analysis
Iron, Ferrous	SM 4500-Fe B-11	Wastewater	Inorganic Analysis
Kjeldahl Nitrogen, Total	EPA 351.2	Wastewater	Inorganic Analysis
Nitrate/Nitrite	EPA 353.2	Wastewater	Inorganic Analysis
Nitrite	SM 4500-NO_2 B-11	Wastewater	Inorganic Analysis
Oil & Grease, HEM-LL	EPA 1664A	Wastewater	Inorganic Analysis
Oil & Grease, SGT-HEM, Non-Polar	EPA 1664A	Wastewater	Inorganic Analysis
Organic Nitrogen	SM 4500-N B+G	Wastewater	Inorganic Analysis
Orthophosphate	EPA 365.3	Wastewater	Inorganic Analysis
Oxygen, Dissolved, Winkler	SM4500P E-11SM 4500-O C-11	Wastewater	Inorganic Analysis
Oxygen, Dissolved	SM 4500-O G-11	Wastewater	Inorganic Analysis
pH Hydrogen Ion	SM 4500-HB-11	Wastewater	Inorganic Analysis
pH Aqueous Electrometric	SW-846 9040C	Wastewater	Inorganic Analysis
Temperature Thermometric	SM 2550 B-00	Wastewater	Inorganic Analysis
Phenols	EPA 420.1+420.4	Wastewater	Inorganic Analysis
Phenols (Analytical Finish)	SW846 9066	Wastewater	Inorganic Analysis
Phosphorus (Total)	EPA 365.3	Wastewater	Inorganic Analysis
Residue, Filterable (TDS)	SM 2540 C-11	Wastewater	Inorganic Analysis
Residue, Nonfilterable (TSS)	SM 2540 D-11	Wastewater	Inorganic Analysis
Residue, Settlable	SM 2540 F	Wastewater	Inorganic Analysis
Residue, Total	SM 2540 B-11	Wastewater	Inorganic Analysis
Residue, Volatile	EPA 160.4	Wastewater	Inorganic Analysis
Total, fixed, and volatile solids (SQAR)	SM 2540 G, 18th Ed.	Wastewater	Inorganic Analysis
Salinity	SM 2520 B	Wastewater	Inorganic Analysis
Silica, Dissolved	SM 4500-Si D	Wastewater	Inorganic Analysis
Specific Conductance	SM 2510 B-11	Wastewater	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Specific Conductance	SW846 9050A	Wastewater	Inorganic Analysis
Sulfide (S)	SM 4500-S B,C + F-11	Wastewater	Inorganic Analysis
Sulfite (SO_3)	SM 4500-SO_3 B-11	Wastewater	Inorganic Analysis
Surfactants (Methylene Blue)	SM 5540 C-11	Wastewater	Inorganic Analysis
Temperature	SM 2550 B-00	Wastewater	Inorganic Analysis
Total Organic Carbon (TOC)	SM 5310 B-11	Wastewater	Inorganic Analysis
Total Organic Halides (TOX)	SW846 9020B	Wastewater	Inorganic Analysis
Turbidity	EPA 180.1	Wastewater	Inorganic Analysis
Metals, Total – Water	SW846 3010A	Wastewater	Metals Prep
Metals, Total – Water, Rec. + Dissolved	SW846 3005A	Wastewater	Metals Prep
Hardness, Total as $CaCO_3$	EPA 200.7	Wastewater	Metals Analysis
Hardness, Total as $CaCO_3$	SM 2340 C-11	Wastewater	Metals Analysis
Mercury	EPA 245.1	Wastewater	Metals Analysis
Metals, ICP	EPA 200.7	Wastewater	Metals Analysis
Metals, ICP/MS	EPA 200.8	Wastewater	Metals Analysis
Mercury, Low-Level	EPA 245.7	Wastewater	Metals Analysis
Mercury, Low-Level	EPA 1631E	Wastewater	Metals Analysis
Mercury, Liquid Waste	SW846 7470A	Wastewater	Metals Analysis
Separatory Funnel Extraction	SW-846 3510C	Wastewater	Semivolatile Organics
Continuous Liquid-Liquid Extraction	SW-846-3520C	Wastewater	Semivolatile Organics
Purge & Trap Aqueous	SW-846 5030B	Wastewater	Volatile Organics
Acrolein & Acrylonitrile	EPA 603	Wastewater	Organics Analysis
Base/Neutrals and Acids	EPA 625	Wastewater	Organics Analysis
Extractable Petroleum Hydrocarbons	NJDEP EPH	Wastewater	Organics Analysis
Organochlorine Pests & PCBs	EPA 608	Wastewater	Organics Analysis
Petroleum Hydrocarbons	NJ-OQA-QAM-25	Wastewater	Organics Analysis
Volatile Organics	EPA 624	Wastewater	Organics Analysis
Volatile Organics GC/MS, Extract or Dir Inj, Capillary	SW-846 8270C SW-846 8270D	Wastewater	Semivolatile Organic Analysis
Coliform, Fecal (Count per 100 mL)	SM 9222 D-97	Wastewater	Microbiology
Coliform, Total (Count per 100 mL)	SM 9222 B-97	Wastewater	Microbiology
Heterotrophic Plate Count	SM 9215 B	Wastewater	Microbiology
Acid Soluble/Insoluble Sulfides	SW846 9034	Solid/Haz. Waste	Inorganic Analysis
Bomb Calorimetry	ASTM D-240	Solid/Haz. Waste	Inorganic Analysis
Bromide, Chloride, Fluoride, Sulfate	SW846 9056	Solid/Haz. Waste	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Cation, Exchange Capacity	SW846 9081	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI) Digestion	SW846 3060A	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI)	SW846 7196A	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI)	SW846 7199	Solid/Haz. Waste	Inorganic Analysis
Corrosivity/pH, >20% H2O	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
Cyanide	SW846 9010B	Solid/Haz. Waste	Inorganic Analysis
Cyanide, Amenable to Chlorine	SW846 9010B	Solid/Haz. Waste	Inorganic Analysis
Cyanide	SW846 9012B	Solid/Haz. Waste	Inorganic Analysis
Extractable Organic Halides	SW846 9023	Solid/Haz. Waste	Inorganic Analysis
Free Liquid	SW846 9095	Solid/Haz. Waste	Inorganic Analysis
Ignitability	SW846 1010A	Solid/Haz. Waste	Inorganic Analysis
Oil & Grease, HEM	EPA 1664A	Solid/Haz. Waste	Inorganic Analysis
Oil & Grease and Sludge, HEM	SW846 9071B	Solid/Haz. Waste	Inorganic Analysis
pH, Hydrogen Ion	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
pH, Hydrogen Ion, Waste, >20% Water	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
pH, Soil and Waste	SW846 9045C	Solid/Haz. Waste	Inorganic Analysis
Phenols (Sample Preparation)	SW846 9065	Solid/Haz. Waste	Inorganic Analysis
SPLP Metals/Organics	SW846 1312	Solid/Haz. Waste	Inorganic Analysis
TCLP Metals/Semi Volatile Organics	SW846 1311	Solid/Haz. Waste	Inorganic Analysis
TCLP Volatile Organics	SW846 1311	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon (TOC)	SW846 9060 A	Solid/Haz. Waste	Inorganic Analysis
Metals, Solids	SW846 3050B	Solid/Haz. Waste	Metals Prep
Mercury, Solid Waste	SW846 7471A	Solid/Haz. Waste	Metals Analysis
Metals by ICP	SW846 6010C	Solid/Haz. Waste	Metals Analysis
Metals by ICP/MS	SW846 6020	Solid/Haz. Waste	Metals Analysis
Semivolatiles, Acid/Base Partition	SW846 3650B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Alumina Cleanup	SW846 3610B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Alumina Cleanup (Petro)	SW846 3611B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Florisil Cleanup	SW846 3620B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Gel Permeation Cleanup	SW846 3640A	Solid/Haz. Waste	Organics Prep
Semivolatiles, Silica Gel Cleanup	SW846 3630C	Solid/Haz. Waste	Organics Prep
Semivolatiles, Sulfur Cleanup	SW846 3660B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Sulfuric Acid/MnO_2	SW846 3665A	Solid/Haz. Waste	Organics Prep
Semivolatile Prep, Pressurized Fluid	SW846 3545	Solid/Haz. Waste	Organics Prep
Semivolatile Prep, Waste Dilution	SW846 3580A	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Solid, Sonication	SW846 3550B	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Solids, Soxhlet	SW846 3540C	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Water	SW846 3520C	Solid/Haz. Waste	Organics Prep

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Semivolatile Prep Water	SW846 3510C	Solid/Haz. Waste	Organics Prep
Volatile, Headspace	SW846 3810	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Solids–High	SW846 5035H	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Solids–Low	SW846 5035L	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Water	SW846 5030B	Solid/Haz. Waste	Organics Prep
Microwave Extraction	SW846 3546	Solid/Haz. Waste	Organics Prep
Alcohols	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Base/Neutrals and Acids	SW846 8270C	Solid/Haz. Waste	Organics Analysis
Chlorinated Herbicides	SW846 8151A	Solid/Haz. Waste	Organics Analysis
DBCP, EDB & TCP	SW846 8011	Solid/Haz. Waste	Organics Analysis
Diesel Range Organic	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Dissolved Gas/Aqueous Media	RSK-175	Solid/Haz. Waste	Organics Analysis
Ethylene Glycol & Propylene Glycol	SW846 8260B	Solid/Haz. Waste	Organics Analysis
Extractable Petroleum Hydrocarbons	NJDEP EPH	Solid/Haz. Waste	Organics Analysis
Gasoline Range Organic	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Organochlorine Pesticides	SW846 8081	Solid/Haz. Waste	Organics Analysis
PCBs	SW846 8082	Solid/Haz. Waste	Organics Analysis
Petroleum Hydrocarbons	NJ-OQA-QAM-25	Solid/Haz. Waste	Organics Analysis
Volatile Organics	SW846 8260B	Solid/Haz. Waste	Organics Analysis
Volatile Organics	EPA TO- 3	Clean Air Act	Organics Analysis
Volatile Organics	EPA TO-15	Clean Air Act	Organics Analysis

Method Capabilities—Non-NELAC Methods

Analytes	Method Number	Program	Chemistry Field
Phenols	EPA 420.4	Drinking Water	Inorganic Analysis
Carbon Dioxide	SM 4500-CO_2 C or D	Wastewater	Inorganic Analysis
Iodide	SM 4500-I B	Wastewater	Inorganic Analysis
Iodine	SM 4500-I B	Wastewater	Inorganic Analysis
Nonionic Surfactants as CTAS	SM 5540 D	Wastewater	Inorganic Analysis
Particulate Matter	EPA 160.2M	Wastewater	Inorganic Analysis
Petroleum Hydrocarbons	EPA 418.1	Wastewater	Inorganic Analysis
Phosphorus, Hydrolyzable	EPA 365.3	Wastewater	Inorganic Analysis
Redox Potential vs H^+	ASTM D1498-76	Wastewater	Inorganic Analysis
Specific Gravity	ASTM D1298-85	Wastewater	Inorganic Analysis
Total Organic Content	ASTM D2974-87	Wastewater	Inorganic Analysis
Unburned Combustibles	EPA 160.1+160.4	Wastewater	Inorganic Analysis
Viscosity	ASTM D445/6	Wastewater	Inorganic Analysis
Volatile Suspended Solids	EPA 160.2+160.4	Wastewater	Inorganic Analysis
Weak Acid Dissociable Cyanide Prep	SM 4500-CN I	Wastewater	Inorganic Analysis
Ammonia	EPA 350.1M	Solid/Haz. Waste	Inorganic Analysis
Ammonia	EPA 350.2M	Solid/Haz. Waste	Inorganic Analysis
Base Sediment	ASTM D473-81	Solid/Haz. Waste	Inorganic Analysis
Bulk Density (Dry Basis)	ASTM D2937-94M	Solid/Haz. Waste	Inorganic Analysis
Chemical Oxygen Demand	HACH 8000M	Solid/Haz. Waste	Inorganic Analysis
Chloride	EPA 325.3M	Solid/Haz. Waste	Inorganic Analysis
Combustion, Bomb Oxidation	SW846 5050	Solid/Haz. Waste	Inorganic Analysis
Grain Size & Sieve Testing	ASTM D422-63	Solid/Haz. Waste	Inorganic Analysis
Heat Content, BTU	ASTM D3286-85	Solid/Haz. Waste	Inorganic Analysis
Ignitability (Flashpoint)	ASTM D93-90/SW846 Ch 7	Solid/Haz. Waste	Inorganic Analysis
Multiple Extractions	SW846 1320	Solid/Haz. Waste	Inorganic Analysis
Neutral Leaching Procedure	ASTM D3987-85	Solid/Haz. Waste	Inorganic Analysis
Nitrate/Nitrite	EPA 353.2M	Solid/Haz. Waste	Inorganic Analysis
Organic Matter (Ignition Loss)	AASHTO T267-86M	Solid/Haz. Waste	Inorganic Analysis
Orthophosphate	EPA 365.2M	Solid/Haz. Waste	Inorganic Analysis
Percent Ash (Dry Basis)	ASTM D482-91	Solid/Haz. Waste	Inorganic Analysis
Percent Solids	ASTM D4643-00	Solid/Haz. Waste	Inorganic Analysis
Percent Sulfur	ASTM D129-61	Solid/Haz. Waste	Inorganic Analysis
Petroleum Hydrocarbons	EPA 418.1M	Solid/Haz. Waste	Inorganic Analysis
Phosphorus, Total	EPA 365.3M	Solid/Haz. Waste	Inorganic Analysis
Phosphorus, Hydrolyzable	EPA 365.3M	Solid/Haz. Waste	Inorganic Analysis
Pour Point	ASTM D97-87	Solid/Haz. Waste	Inorganic Analysis
Reactive Cyanide	SW846 7.3.3.2	Solid/Haz. Waste	Inorganic Analysis

Method Capabilities—Non-NELAC Methods

Analytes	Method Number	Program	Chemistry Field
Reactive Sulfide	SW846 7.3.4.2	Solid/Haz. Waste	Inorganic Analysis
Redox Potential vs H^+	ASTM D1498-76M	Solid/Haz. Waste	Inorganic Analysis
Specific Gravity of Solids	ASTM D1429-86M	Solid/Haz. Waste	Inorganic Analysis
Sulfide (S)	EPA 376.1 M	Solid/Haz. Waste	Inorganic Analysis
Sulfite (SO_3)	EPA 377.1M	Solid/Haz. Waste	Inorganic Analysis
Total Chlorine	ASTM D808-91	Solid/Haz. Waste	Inorganic Analysis
Total Kjeldahl Nitrogen	EPA 351.2M	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon	CORP ENG 81	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon	LLOYD KAHN 1988	Solid/Haz. Waste	Inorganic Analysis
Total Organic Chlorine	ASTM D808-91M	Solid/Haz. Waste	Inorganic Analysis
Total Plate Count	SM 9215BM	Solid/Haz. Waste	Inorganic Analysis
Total Volatile Solids	EPA 160.4M	Solid/Haz. Waste	Inorganic Analysis
Water Content	ASTM D95-83	Solid/Haz. Waste	Inorganic Analysis
Extractable Petroleum HCs	Massachusetts EPH	Solid/Haz. Waste	Organics Analysis
Extractable Petroleum HCs	Missouri DRO	Solid/Haz. Waste	Organics Analysis
Total Petroleum Hydrocarbons	FLDEP FL-PRO	Solid/Haz. Waste	Organics Analysis
Total Petroleum Hydrocarbons	Connecticut ETPH	Solid/Haz. Waste	Organics Analysis
Volatile Petroleum HCs	Massachusetts VPH	Solid/Haz. Waste	Organics Analysis
Volatile Petroleum HCs	Missouri GRO	Solid/Haz. Waste	Organics Analysis

Appendix IV

Laboratory Equipment

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-QR	Hewlett Packard 5890 / PID / FID / Entech AutoAir7000	3336A51044	HP Chemstation	HP Enviroquant	Air Laboratory	1993
GC-AA	GC Agilent 7890A/AutoSampler 7693	CN10361127/CN10330122	HP Chemstation	HP Enviroquant	Air Laboratory	N/A
GC-II	GC HP5890	N/A	HP Chemstation	HP Enviroquant	Air Laboratory	N/A
GCMS-2W	Agilent Technologies 5973 / 6890N AS Entech 7016CA	CN10413022 / US40646500	HP Chemstation	HP Enviroquant	Air Laboratory	2004
GCMS-3W	Agilent Technologies 5973 / 6890N Entech 7016A	CN10425086 / US41746669 / 1351	HP Chemstation	HP Enviroquant	Air Laboratory	2007
GCMS-Q	Hewlett-Packard 5890ll / 5971 MSD / Entech Air Samp 7000	3033A31092 / 3188A02934	HP Chemstation	HP Enviroquant	Air Laboratory	1993
GCMS-W	Agilent Technologies 5973 / 6890N AS Entech 7016CA	US44621451 / CN10517032 / 1119	HP Chemstation	HP Enviroquant	Air Laboratory	2005
GCMS- 4W	Agilent O-I Analytical 4660	N/A	HP Chemstation	HP Chemstation	Air Laboratory	N/A
OVEN – 10A	Barnstead / Lab Line LC	0404-4596	None	None	Air Laboratory	N/A
OVEN – 10B	Barnstead / Lab Line LC	0404-4595	None	None	Air Laboratory	N/A
OVEN – 10C	Barnstead/ Lab Line LC	0404-4597	None	None	Air Laboratory	N/A
OVEN -10D	Barnstead / Lab Line LC	0404-4594	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-1)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-2)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-3)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-4)	None	None	None	Air Laboratory	N/A

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
DO Meter	YSI-51B	92A035818	None	None	Field Serv.	1998
DO Meter	YSI-55/12ft	00C0598BG	None	None	Field Serv.	2000
PH Meter-9	Orion 250A	O18019	None	None	Field Serv.	2007
PH Meter-10	YSI	JC02538	None	None	Field Serv.	2007
PH Meter-11	YSI	JC02540	None	None	Field Serv.	2010
SCON Meter	YSI-30	J0183	None	None	Field Serv.	2004
Balance-Top Load	Ohaus Adventure AV212 (B-36)	8029131104	None	None	IC Lab	2008
ASE	Dionex ASE 200	99030375	None	None	Inorganics	1999
Balance-Top Load	Sartorious B4100 (B-13)	38080035	None	None	Inorganics	Pre-2000
Balance-Top Load	Denver Inst. Co. XL500 (B-14)	B045530	None	None	Inorganics	Pre-2000
Balance-Top Load	Ohaus Navigator (B-15)	121370273	None	None	Inorganics	2002
Balance-Top Load	Ohaus Explorer (B-16)	E1581119212171	None	None	Inorganics	2001
Balance-Top Load	Ohaus Adventurer (B-21)	E1021218270448	None	None	Inorganics	2001
Balance-Top Load	Ohaus Adventurer AV412 (B-27)	8026251106	None	None	Inorganics	2005
Balance-Top Load	Sartorius TE31025 (B-32)	21950273	None	None	Inorganics	2007
Balance-Top Load	Ohaus Adventure AV212 (B-35)	8029171184	None	None	Inorganics	2008
Balance-Top Load	Ohaus Adventurer-Pro (B-38)	8030441010	None	None	Inorganics	2009

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Balance-Analytical	Mettler AE 160 (B-5)	C11620	None	None	Inorganics	1999
Balance-Analytical	Ohaus Adventurer (B-24)	1225032523P	None	None	Inorganics	2004
Balance-Top Load	Denver P-214 (B-39)	25450279	None	None	Inorganics	2010
Balance-Top Load	Denver P-214 (B-40)	25550445	None	None	Inorganics	2010
Calorimeter	PARR 1261EA	1499	None	None	Inorganics	1996
DO Meter	YSI 5000	07B1560	None	None	Inorganics	2008
DO Meter	YSI-50B	91L034801	None	None	Inorganics	1988
FIA Analyzer	Lachat Quikchem 8000	A83000-1402	Omnion FIA	Omnion FIA	Inorganics	1999
FIA	Lachat Quikchem 8500	13200001620	Omnion FIA	Omnion FIA	Inorganics	2013
Flashpoint	Koehler – K16200	R07002563B	None	None	Inorganics	2010
Hg Analyzer	HYDRAA II	64013	Envoy	Envoy	Inorganics	2011
Hg Analyzer 7	Hydra II	64631	Envoy	Envoy	Inorganics	2013v
Hg Analyzer	Leeman Mercury Analyzer HYDRAAF Gold+	9003	WIN Hg Runner	WIN Hg Runner	Inorganics	2010
IC-2	Dionex ICS2000	02090737	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-3	Dionex ICS2000	02110028	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-4	Dionex ICS2000	04060060	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-6	Dionex ICS3000	06040160	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2006

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
IC-8	Dionex IC5000	11030895	Dionex Chrom Client	Dionex Chrom Client	Inorganics	
IC-9	Dionex IC5000+	13120208	Dionex Chrom Client	Dionex Chrom Client	Inorganics	2013
IR Spec.	Buck Scientific HC-404	687	None	None	Inorganics	1997
Oven 22	Total Dissolved Solids(180°C)	13-10104	None	None	Inorganics	2014
PH Meter-4	Orion 710A	3978	None	None	Inorganics	1996
PH Meter-12	Thermo Orion 310	14011	None	None	Inorganics	2003
PH-EH Meter-22	Thermo Orion 4 Star	SN00742	None	None	Inorganics	2008
PH Meter-23	Thermo Orion Model 310	SN013786	None	None	Inorganics	2008
PH Meter-46	Thermo Orion 4 Star	B10299	None	None	Inorganics	2008
PH Meter-47	Thermo Orion 4 Star	B04869	None	None	Inorganics	2008
PH Meter-48	Thermo-Orion 4 Star	B05968	None	None	Inorganics	2008
PH Meter-49	Orion Star Series	B27588	None	None	Inorganics	2010
PH Meter-50	Orion Star Series	B27564	None	None	Inorganics	2010
pH Meter-57	VWR Symphony B10P	14087S0006	None	None	Inorganics	2014
SCON Meter	Amber Science 1056	01020851056-101	None	None	Inorganics	2001
SCON Meter	Orion 145+	78035	None	None	Inorganics	2004
Solvent Extractor	Horizon SPE-DEX 3000XL	09-1031	None	None	Inorganics	2010

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Solvent Evaporator	Horizon SPEED VAP III	09-0739	None	None	Inorganics	2010
TOC-V Analyzer	Shimadzu TOC-V CSH	H52504400192NK	Shimadzu TOC Control	Shimadzu TOC Control	Inorganics	2007
TOC-L Analyzer	Shimadzu TOC-L	H52516900071	Shimadzu TOC Control	Shamadzu TOC Control	Inorganics	2012
TOC-L Analyzer	Shimadzu TOC-L	H52515000114NK	Shimadzu TOC Control	Shimadzu TOC Control	Inorganics	2013
TOX Analyzer	Mitsubishi TOX-10E	75R04185	None	None	Inorganics	1996
TOX Analyzer	Mitsubishi TOX-100	A7M 42997	None	None	Inorganics	2008
UVVIS Spec C	Spectronix 20 Genesys	3SGA122034	None	None	Inorganics	2000
UVVIS Spec D	Spectronix 20 Genesys	3SGF170020	None	None	Inorganics	2007
UVVIS Spec E	Spectronix 20 Genesys	3SGD.352011	None	None	Inorganics	2007
UVVIS Spec G	Thermo Electron Corp. Genesys 20	3SGJ238001	None	None	Inorganics	2007
UVVIS Spec H	Thermo Electron Corp. Genesys 20	3SGJ306016	None	None	Inorganics	2007
UVVIS Spec F	Spectronix 20 Genesys	356329906	None	None	Microbiology	2007
UVVIS Spec L	Thermo Electron Corp. Genesys 20	3SGS073003	None	None	Inorganics	2014
Autoclave	Napco Model 8000 DSE	603033111	None	None	Microbiology	2011
Incubator (BOD)	VWR	0702499	None	None	Microbiology	2011
Incubator(BOD)	ISOTEMP	317646	None	None	Microbiology	2010
Incubator (Plates)	Thelco Precision	4-D-5	None	None	Microbiology	N/A

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Incubator (Plates)	Theclo Precision	11T3	None	None	Microbiology	N/A
Refrigerator	R-44	0503MCBR980W0087	None	None	Microbiology	N/A
Incubator-Water Bath	INC-2	1200991	None	None	Microbiology	N/A
ICP	Thermo ICP 6500 Duo	ICP-20074909	ITEVA	ITEVA	Metals Analysis	2007
ICP	Thermo ICP 6500 Duo	ICP-20072601	ITEVA	ITEVA	Metals Analysis	2007
ICP-MS	Thermo Elemental X-Series ICP-MS	X0180	Thermo PlasmaLab	Thermo PlasmaLab	Metals Analysis	2003
ICP-MS	Agilent 7700 Series	JP10340551	MassHunter Workstation	MassHunter Workstation	Metals Analysis	2010
Balance-Top Load	Ohaus Adventurer AR3130 (B-26)	1240-P	None	None	Metals Prep	2004
Hot Block 1	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 2	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 3	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 4	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 5	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 6	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 7	Environmental Express	N/A	None	None	Mercury Prep	
Hot Block 8	Environmental Express	N/A	None	None	Mercury Prep	
Balance-Top Load	Ohaus Scout II (B-20)	BJ320905	None	None	Methanol Prep	2002

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Balance-Top Load	Ohaus Scout II (B-25)	BJ514770	None	None	Methanol Prep	2004
Balance-Top Load	Ohaus Adventurer Pro (B-46)	B304755401	None	None	Organic Prep	Pre-2000
Balance-Top Load	Ohaus Adventurer Pro (B-45)	B033051054	None	None	Organic Prep	2002
Balance-Top Load	Ohaus Adventurer Pro (B-42)	B031331113	None	None	Organic Prep	2007
Balance-Top Load	Ohaus Adventurer Pro (B-49)	B318282471	None	None	Organic Prep	2008
GPC4	Waters 717	717-000152	None	None	Organic Prep	1992
Microwave	MARS 6 CEM	MJ2659 (warranty expires june 2014)	None	None	Organic Prep	2013
Microwave	MARS 6 CEM	MJ2198	None	None	Organic Prep	2013
Microwave	MARS 6 CEM	MJ2197	None	None	Organic Prep	2013
TurboVap	Biotage (# 5)	TV11Z6N16677	None	None	Organic Prep	N/A
TurboVap	Biotage (# 6)	TV1127N16629	None	None	Organic Prep	N/A
TurboVap	Biotage (#10)	TV1232N17271	None	None	Organic Prep	N/A
TurboVap	Biotage (#11)	TV1239N17342	None	None	Organic Prep	N/A
Sonicator	Sonics Vibracell VC 750	31800A	None	None	Organic Prep	2000
Sonicator	TEKMAR Sonicator	6916	None	None	Organic Prep	1997
Water Bath 1	Organomation	13385	None	None	Organic Prep	
Water Bath 2	Thermo Scientific	176676-1289	None	None	Organic Prep	2014

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Water Bath 3	Organomation	58471	None	None	Organic Prep	
Water Bath 4	Organomation	58421	None	Noe	Organic Prep	2014
Water Bath 5	Organomation	58422	None	None	Organic Prep	2014
Water Bath 6	Organomation	58423	None	None	Organic Prep	2014
Water Bath 7	Organomation	58379	None	None	Organic Prep	2014
Water Bath 8	Organomation	58424	None	None	Organic Prep	2014
Water Bath 9	Organomation	58425	None	None	Organic prep	
Water Bath 10	Organomation	58394	None	None	Organic prep	2014
Water Bath 11	Organomation	58384	None	None	Organic prep	2014
Mini Water Bath	Thermo Scientific	176577-1292	None	None	Organic prep	2014
Centrifuge	Thermo Scientific	41394883	None	None	Organic Prep	2014
N-EVAP 1	Organomation	59301	None	None	Organic Prep	2014
N-EVAP 2	Organomation	58202	None	None	Organic Prep	2014
GC-SN	Hewlett Packard 5890 GC/5970 MSD/ OI 4551/4560	2623A08318/2637A01687/D538475262/1542461919	HP Chemstation	Hp Enviroquant	Organics, Screen Room	Re-Built 2012
GC-SR	Hewlett-Packard 5890 / FID / Tekmar 7000	2612A07448	HP Chemstation	HP Enviroquant	Organics; Screening	1992
GC-SV	Hewlett-Packard 5890 / FID / OI4551 / 4560	LR47-359C / N244460743 / 3336A58859	HP Chemstation	HP Enviroquant	Organics; Screening	1996
GC-QT	Agilent Technologies 6890N	US10148124	HP Chemstation	HP Enviroquant	Organics; SVOCs	2002

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-UV	Hewlett-Packard 5890 / Dual FID / OI 4551 / 4560	2921A23322	HP Chemstation	HP Enviroquant	Organics; SVOCs	1996
GC-WW	Hewlett-Packard 6890 / Dual ECD / HP 7673 AS	US00010037	HP Chemstation	HP Enviroquant	Organics; SVOCs	1997
GC-XX	Hewlett-Packard 6890 / Dual ECD / HP 7683 AS	US00022968	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GC-NP	Hewlett-Packard 5890 / PID / FID / Tekmar solatek 72	3336A58858	HP Chemstation	HP Enviroquant	Organics; Volatiles	1995
GC-SC	Hewlett-Packard 5890 / FID / OI4551 / 4560	2443AO3797	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GC-ST	Hewlett-Packard 5890 / FID / NPD / HP 7673 AS / Tek	314OA38871	HP Chemstation	HP Enviroquant	Organics; Volatiles	1996
GC-2Y/2Z	Agilent Technologies 6890N & N10149	CN10407032 / CN40327643 / CN40434847	HP Chemstation	HP Enviroquant	Organics; SVOCs	2004
GC-OA/OB	Agilent Technologies 6890N	US10240147	HP Chemstation	HP Enviroquant	Organics; SVOCs	2002
GC-YZ/ZZ	Hewlett-Packard 6890 / PID / FID / OI HP GC System Injector	US00011065 / US83806744	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-B	Hewlett-Packard 5890ll+ / 5972 MSD / Agilent 7673	3336A61054 / 3524A03106	HP Chemstation	HP Enviroquant	Organics; SVOCs	1996
GC-EF	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2541A06786	HP Chemstation	HP Enviroquant	Organics; Volatiles	1992
GC-JK	Hewlett-Packard 5890 / PID / Hall / 4552 / 4560ARCHON	3336A51043	HP Chemstation	HP Enviroquant	Organics; Volatiles	1994
GC-LM	Hewlett-Packard 6890 / PID / FID / OI 4551 / 4560 P&T	US00008927	HP Chemstation	HP Enviroquant	Organics; Volatiles	1998
GCMS-L	Hewlett-Packard 5890 / 5970 MSD / OI 4551 / 4560 P&T	2921A22898 / 2623A01291	HP Chemstation	HP Enviroquant	Organics; Volatiles	1992
GC-SY	Hewlett-Packard 5890 / FID / OI4551A / 4560	2643A10503	HP Chemstation	HP Enviroquant	Organics; Screening	1990
GC-2G (I)	Agilent Technologies 6890N / 7683	CN10450110	HP Chemstation	HP Enviroquant	Organics; SVOCs	2005
GC-3G (J)	Agilent Technologies 6890N / 7683	CN10450109	HP Chemstation	HP Enviroquant	Organics; SVOCs	2005

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-3Y/3Z	Agilent Technologies 7890A / 7683B Dual FID	CN10735014 / CN73345070	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GC-4G	Agilent Technologies 6890N / 7693	CN10361136 / CN10340093	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GC-4Y/4Z	Agilent Technologies 7890A / 7683B Dual FID	CN10832133 / CN83252932	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GC-AB	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2750A16635	HP Chemstation	HP Enviroquant	Organics; SVOCs	1990
GC-CD	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	3336A58788	HP Chemstation	HP Enviroquant	Organics; SVOCs	1995
GC-G1/1H	Agilent Technologies 6890N / 7683	US10322012 / CN23326744	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
GC-GH	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2938A25059	HP Chemstation	HP Enviroquant	Organics; SVOCs	1990
GC-II	Hewlett-Packard 5890 Series II	3203A40375	HP Chemstation	HP Enviroquant	Organics; SVOCs	1994
GCMS-2M	Agilent Technologies 5973 / 6890N AS 4552 / 12720	CN10612028 / US60532578 / CN61031719	HP Chemstation	HP Enviroquant	Organics; SVOCs	2006
GCMS-2P	Agilent Technologies 5975C / 7890A	US10237403 / CN10241022	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GCMS-3E	Agilent Technologies 5975 / 6890N Agilent 7683	CN10614011 / US61332852 / CN73943902	HP Chemstation	HP Enviroquant	Organics; SVOCs	2006
GCMS-3M	Agilent Technologies 5975B / 6890N / Agilent 7683B	US65125107 / CN10703029 / CN61933091	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GCMS-3P	Agilent Technologies 5975C / 7890A	US83111119 / CN10361163	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GCMS-4M	Agilent Technologies 5975C / 7890A Agilent 7683B	US73317574 / CN1074251 / US94209706	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GCMS-F	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00034179 / US84202752 / US01140200	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-H	Hewlett-Packard 5890ll+ / 5972 MSD / HP 7673 AS	3336A58190 / 3501A02356	HP Chemstation	HP Enviroquant	Organics; SVOCs	1995
GCMS-M	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00021813 / US802111003 / US81501001	HP Chemstation	HP Enviroquant	Organics; SVOCs	1999

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GCMS-P	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10251064 / US21844596 / CN24828486	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
GCMS-R	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00021820 / US81211033 / CN40334835	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-Z	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10251028 / US21844586 / CN24828485	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
HPLC-1	Agilent Technologies 1100 Series G1321A / G1315B / G1316A / G1379A	DE33205279; DE33219455 ; DE33234553; JP13210348	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
Balance-Top Load	Ohaus Sport (B-28)	7124230518	None	None	Organics; Volatiles	2005
Balance-Top Load	Ohaus Adventure AV412 (B-34)	8028391117	None	None	Organics; Volatiles	2007
GC-AA	Agilent 7890A / AS 7683B	CN10832133 / US08232002	HP Chemstation	HP Enviroquant	Organics; Volatiles	2008
GCMS-1A	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10314026 / US30945331	HP Chemstation	HP Enviroquant	Organics; Volatiles	2003
GCMS-1B	Agilent Technologies 7890A / 5975C Teledyne / Tekmar AquaTek AS	CN10845177 / US83111119	HP Chemstation	HP Enviroquant	Organics; Volatiles	2008
GCMS-1C	Agilent Technologies 5973 / 6890N AS 4551 / 4560	CN10425085 / US41746667	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2A	Agilent Technologies 5973 / 6890N AS Tekmar Solatek 72	CN10314028 / US30945325	HP Chemstation	HP Enviroquant	Organics; Volatiles	2003
GCMS-2B	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10441033 / US 43146954	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2C	Agilent Technologies 5973 / 6890N AS 4551A / 4560	CN10441035 / US 43146953	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2D	Agilent Technologies 5973 / 6890N AS 4552 / 4560	CN10432038 / US43146771	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2E	Agilent Technologies 5975 / 6890N AS 4551A / 4660	CN10612046 / US60532596	HP Chemstation	HP Enviroquant	Organics; Volatiles	2006
GCMS-3A	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10432042 / US43146776	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-3B	Agilent Technologies 6890 / 5973 / OI 4551A / 4660	US10240044 / US21844015	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GCMS-3C	Agilent Technologies 5973 / 6890N AS 45551A / 4660	CN10517038 / US44621480	HP Chemstation	HP Enviroquant	Organics; Volatiles	2005
GCMS-3D	Agilent Technologies 5975B / 6890N AS 4551A / 4660	CN10637120 / US62724193	HP Chemstation	HP Enviroquant	Organics; Volatiles	2006
GCMS-4B	Agilent Technologies 5975C / 7890A	US10323601 / CN10361158	HP Chemstation	HP Enviroquant	Organics; Volatiles	2010
GCMS-4D	Agilent Technologies 5975C / 7890A	US10237301 / CN10241019	HP Chemstation	HP Enviroquant	Organics; Volatiles	2010
GCMS-A	Hewlett-Packard 6890 / 5973 MSD / OI 4552 / 4560 ARCHON	US00033272 / US94212183	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-C	Hewlett-Packard 5890 / 5970 MSD / HP OI 4552 / 4560	2643A122671 / 2807A1146	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GCMS-D	Hewlett-Packard 6890 / 5973 MSD / OI 4551 / 4560 P&T	US00030551 / US93122843	HP Chemstation	HP Enviroquant	Organics; Volatiles	2001
GCMS-E	Hewlett-Packard 6890 / 5973 MSD / OI 4551 / 4560 P&T	US00031161 / US93112044	HP Chemstation	HP Enviroquant	Organics; Volatiles	2001
GCMS-G	Hewlett-Packard 5890ll / 5970 MSD / OI 4552 / 4660	2919A22540 / 2807A11004	HP Chemstation	HP Enviroquant	Organics; Volatiles	1989
GCMS-I	Hewlett-Packard 5890 / 5970 MSD / OI 4551 / 4560	2623A08318 / 2637A01687	HP Chemstation	HP Enviroquant	Organics; Volatiles	1986
GCMS-J	Hewlett-Packard 5890 / 5970 MSD / OI 4552 / 4560 P&T	2643A11557 / 3034A12779	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GCMS-K	Hewlett-Packard 5890l1 / 5970 MSD / OI 4551 / 4560 P&T	2750A116838 / 2905A11628	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GCMS-N	Hewlett-Packard 5890 / 5970 MSD / Tekmar 2000 / 2032 P&T	2750A17088 / 2716A10218	HP Chemstation	HP Enviroquant	Organics; Volatiles	1988
GCMS-S	Hewlett-Packard 6890 / 5973 MSD / OI 4552 / 4660 ARCHON	US00024322 / US82311313	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-T	Hewlett-Packard 6890 / 5973 MSD / OI 4551A / 4660 P&T	US00024323 / US82311482	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-U	Hewlett-Packard 6890 / 5973 MSD / HP 4551A / 4660	US00032623 / US94212203	HP Chemstation	HP Enviroquant	Organics; Volatiles	1999
GCMS-V	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10149085 / US10441917	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GCMS-X	Agilent Technologies 5973 / 6890N AS 4552 / 4660	US21843889 / US10239071	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
GCMS-Y	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10240013 / US21844012	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
Balance-Top Load	Ohaus Adventurer AV412 (B-29)	8026391019	None	None	Out of service	2005
Balance-Analytical	ACCU LA 110 (B-10)	70405919	None	None	Out of service	2001
PH Meter-13	VWR IS B20	5942	None	None	Sample Managament	2010
Balance-Top Load	Ohaus Adventure AV412 (B-33)	8028391184	None	None	Sample Management	2007
Balance-Top Load	Ohaus Adventurer AV412 (B-30)	8026391160	None	None	Screen	2005

Accutest Laboratories
Standard Operating Procedure

Lab Manager _____

QA Manager _____

Effective Date 2/11/14

TEST NAME: METHOD 8260C, VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/ MASS SPECTROMETRY (GC/MS)

METHOD REFERENCE: SW846 8260C (Revision 3, August 2006)

Revised Sections: 11.12.2, 11.12.3, Table 10

1.0 SCOPE AND APPLICATION

1.1 This SOP describes the analytical procedures, which are utilized by Accutest to acquire samples for analysis of volatile organic compounds by gas chromatographic/mass spectrometric (GC/MS) following purge and trap utilizing the internal standard technique. The compounds in Table 1 may be determined by this method. An option has been included for the analysis of 1,4-Dioxane by selected ion monitoring GC/MS (GC/SIM-SIM).

1.2 This analytical method is designed for nearly all types of samples, regardless of water content, including ground water, aqueous sludges, liquors, waste solvents, oily wastes, tars, filter cakes, sediments and soils.

1.3 The applicable concentration range of this method is compound, matrix, and instrument dependent. Volatile water-soluble compounds can be included in this analytical technique. However, for some low-molecular weight halogenated hydrocarbons, aromatics, ketones, nitriles, acetates, acrylates, ethers, and sulfides, quantitation limits are approximately ten times higher because of poor purging efficiency. Determination of some structural isomers (i.e. xylenes) may also be hampered by coelution.

2.0 SUMMARY OF METHOD

2.1 Volatile compounds are introduced into the gas chromatograph by purge-and-trap (Method 5030/5035). Method 5030 may be used directly on ground water samples. Method 5035 is used for low-concentration and medium-concentration soils, sediments, and wastes. Medium concentration samples are preserved and stored in methanol prior to purge-and-trap analysis.

2.2 An inert gas is bubbled through a 5 ml sample contained in a specifically designed purging chamber at ambient temperature. The purgeables are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and backflushed with the inert gas to desorb the purgeables onto a gas chromatographic (GC) column.

2.3 The volatile compounds are separated by the temperature programmed GC column and detected using a mass spectrometer, which is used to provide both qualitative and quantitative information.

2.4 The peaks detected are qualitated by comparison to characteristic ions and retention times specific to the known target list of compounds.

2.5 Once identified the compound is quantitated by comparing the response of major (quantitation) ion relative to an internal standard technique with an average response factor generated from a calibration curve.

2.5 Once identified the compound is quantitated by comparing the response of major (quantitation) ion relative to an internal standard technique with an average response factor generated from a calibration curve.

2.6 Additional unknown peaks with a response > 10 % of the closest internal standard may be processed through a library search with comparison to a database of approximately 75,000 spectra. An estimated concentration is quantitated by assuming a response factor of 1.

2.7 Water soluble volatile organic and other poor purging compounds maybe analyzed using this methodology, however this method is not the method of choice for these compounds and the laboratory's ability to achieve all calibration and quality control criteria for this method cannot be guaranteed. These compounds are noted as (pp) in Table 7.

2.8 The method includes an analytical option for the analysis of 1,4-Dioxane by GC/MS-SIM. The selected ions that are characteristic of the analytes of interest are analyzed using lower concentrations of calibration standards under the same MS conditions. SIM analysis is performed upon client request and is documented in the report.

3.0 REPORTING LIMIT AND METHOD DETECTION LIMIT

3.1 Reporting Limit. The reporting limit for this method is established at the lowest concentration standard in the calibration curve and may vary depending on matrix interferences, sample volume or weight and percent moisture. Detected concentrations below this concentration cannot be reported without qualification. See Table 10.

3.1.1 Compounds detected at concentrations between the reporting limit and MDL are quantitated and qualified as "J", estimated value. Program or project specifications may dictate that "J" qualified compounds are not to be reported.

3.2 Method Detection Limit. Experimentally determine MDLs using the procedure specified in 40 CFR, Part 136, Appendix B. This value represents the lowest reportable concentration of an individual compound that meets the method qualitative identification criteria.

3.2.1 Experimental MDLs must be determined annually for this method.

3.2.2 Process all raw data for the replicate analysis in each MDL study. Forward the processed data to the QA group for archiving.

4.0 DEFINITIONS

BLANK - an analytical sample designed to assess specific sources of laboratory contamination. See individual types of Blanks: Method Blank, Instrument Blank, Storage Blank, Cleanup Blank and Sulfur Blank.

4-BROMOFLUOROBENZENE (BFB) - the compound chosen to establish mass spectral instrument performance for volatile (VOA) analyses.

CALIBRATION FACTOR (CF) - a measure of the gas chromatographic response of a target analyte to the mass injected. The calibration factor is analogous to the Relative Response Factor (RRF) used in the Volatile and Semivolatile fractions.

CONTINUING CALIBRATION - analytical standard run every 12 hours to verify the initial calibration of the system.

CONTINUOUS LIQUID-LIQUID EXTRACTION - used herein synonymously with the terms continuous extraction, continuous liquid extraction, and liquid extraction. This extraction technique involves boiling the extraction solvent in a flask and condensing the solvent above the aqueous sample. The condensed solvent drips through the sample, extracting the compounds of interest from the aqueous phase.

EXTRACTED ION CURRENT PROFILE (EICP) - a plot of ion abundance versus time (or scan number) for ion(s) of specified mass (Es).

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the mass spectrometer to the target compounds.

INTERNAL STANDARDS - compounds added to every standard, blank, matrix spike, matrix spike duplicate, sample (for volatiles), and sample extract (for semivolatiles) at a known concentration, prior to analysis. Internal standards are used as the basis for quantitation of the target compounds.

MATRIX - the predominant material of which the sample to be analyzed is composed. For the purpose of this SOP, a sample matrix is either water or soil/sediment. Matrix is <u>not</u> synonymous with phase (liquid or solid).

MATRIX SPIKE - aliquot of a matrix (water or soil) fortified (spiked) with known quantities of specific compounds and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery.

MATRIX SPIKE DUPLICATE - a second aliquot of the same matrix as the matrix spike (above) that is spiked in order to determine the precision of the method.

METHOD BLANK - an analytical control consisting of all reagents, internal standards and surrogate standards that is carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background and reagent contamination.

METHOD DETECTION LIMITS (MDLs) - The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. MDLs must be determined approximately once per year for frequently analyzed parameters.

PERCENT DIFFERENCE (%D) - As used in this SOP and elsewhere to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference.)

PERCENT MOISTURE - an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105°C. The percent moisture determined in this manner also includes contributions from all compounds that may volatilize at or below 105 ^{o}C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

PRIMARY QUANTITATION ION - a contract specified ion used to quantitate a target analyte.

REAGENT WATER - water in which an interferant is not observed at or above the minimum detection limit of the parameters of interest.

RECONSTRUCTED ION CHROMATOGRAM (RIC) - a mass spectral graphical representation of the separation achieved by a gas chromatograph: a plot of total ion current versus retention time.

RELATIVE PERCENT DIFFERENCE (RPD) - As used in this SOP and elsewhere to compare two values, the relative percent difference is based on the mean of the two values, and is reported as an absolute value, i.e., always expressed as a positive number or zero. (In contrast, see percent difference.)

RELATIVE RESPONSE FACTOR (RRF) - a measure of the relative mass spectral response of an analyte compared to its internal standard. Relative Response Factors are determined by analysis of standards and are used in the calculation of concentrations of analytes in samples.

RELATIVE RETENTION TIME (RRT) - the ratio of the retention time of a compound to that of a standard (such as an internal standard).

INSTRUMENT BLANK – a system evaluation sample containing lab reagent grade water with internal standards and surrogate standards added. An instrument blank is used to remove and/or evaluate residual carryover from high level standards, spike samples and field samples.

5.0 HEALTH & SAFETY

5.1 The analyst must follow normal safety procedures as outlined in the Accutest Health and Safety Plan and Personal Protection Policy, which include the use of safety glasses and lab coats. In addition, all acids are corrosive and must be handled with care. Flush spills with plenty of water. If acids contact any part of the body, flush with water and contact the supervisor.

5.2 The toxicity or carcinogenicity of each reagent used in this method has not been precisely determined; however, each chemical must be treated as a potential health hazard. Exposure to these reagents must be reduced to the lowest possible level. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets must be made available to all personnel involved in these analyses.

5.3 The following analytes covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene, carbon tetrachloride, 1,4-dichlorobenzene, 1,2-dichlorethane, hexachlorobutadiene, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, chloroform, 1,2-dibromoethane, tetrachloroethene, trichloroethene, and vinyl chloride. Primary standards of these toxic compounds must be prepared in a hood. A NIOSH/Mass approved toxic gas respirator must be worn when the analyst handles high concentrations of these toxic compounds.

6.0 INTERFERENCES

6.1 The data from all blanks, samples, and spikes must be evaluated for interferences.

6.2 Impurities in the purge gas, organic compounds out-gassing from the plumbing ahead of the trap, and solvent vapors in the laboratory account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of

the analysis by running laboratory reagent blanks. The use of non-TFE tubing, non-TFE thread sealants, or flow controllers with rubber components in the purging device must be avoided.

6.3 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal into the sample during shipment and storage. A trip blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

6.4 Contamination by carry-over can occur whenever high level and low-level samples are sequentially analyzed.

6.4.1 Whenever an unusually concentrated sample is encountered, it must be followed by an analysis of an instrument blank to check for cross contamination. Refer to Table 11 for compounds that may cause carryover for this method.

6.4.2 It may be necessary to wash the purging device with methanol, rinse it with organic-free water, and then dry the purging device in an oven at 105^0 C. Follow the instrument manual for instructions on cleaning. Document the occurrence in the maintenance log and notify the manager/supervisor.

6.4.2.1 Clean and bake purging tube.

6.4.2.2 Clean or replace purge needle.

6.4.2.3 Clean and bake sample filter or sparge filter.

6.4.2.4 Clean and bake sample loop.

6.4.2.5 Replace trap if necessary.

6.4.2.6 Replace water management module if necessary.

6.4.2.7 Rinse transfer line with methanol. <u>Caution:</u> disconnect the trap before rinsing.

6.4.3 In extreme situations, the entire purge-and trap device may require dismantling and cleaning. Follow the instrument's manual for instructions on disassembly. Document the occurrence in the maintenance log and notify the manager/supervisor. Screening of the samples prior to purge-and-trap GC/MS analysis is highly recommended to prevent contamination of the system. This is especially true for soil and waste samples.

6.4.4 If the contamination has been transferred to gas chromatograph, any of the following approaches may be used to cleanup the instrument.

6.4.4.1 Baking out the column between analyses.

6.4.4.2 Change the injector liner to reduce the potential for cross-contamination.

6.4.4.3 Remove a portion of the analytical column in the case of extreme contamination.

6.4.5 The oven temperature program must include a post-analysis bake out period to ensure that semivolatile hydrocarbons are stripped from the chromatographic column.

6.4 Special precautions must be taken during the analysis to avoid contamination from methylene chloride and other common laboratory solvents.

6.5.1 The sample storage and analytical area must be isolated from all atmospheric sources of methylene chloride or other common solvents.

6.5.2 Laboratory clothing worn by the analyst must be clean and used in designated areas only. Clothing previously exposed to solvent vapors in the organics sample preparation laboratory can contribute to sample contamination.

7.0 SAMPLE HANDLING AND PRESERVATION AND HOLDING TIME

7.1 HANDLING and PRESERVATION

7.1.1 Water samples

7.1.1.1 Container - 40 ml glass screw-cap VOA vial with Teflon-faced silicone septum. The 40-ml glass VOA vials are pre-cleaned and certified.

7.1.1.2 Collect all samples in duplicate. Test all samples for residual chlorine using test paper for free and total chlorine. If samples contain residual chlorine, three milligrams of sodium thiosulfate must be added for each 40 ml of water sample.

7.1.1.3 Fill sample bottles to overflowing, but do not flush out the dechlorinating agent. Sample must be taken with care so as to prevent any air or bubbles entering vials creating headspace.

7.1.1.4 Adjust the pH of all samples to ≤ 2 at the time of collection, but after dechlorination, by carefully adding two drops of 1:1 HCl for each 40 ml of sample. Seal the sample bottles, Teflon face down, and mix for one minute. Or VOA vials containing the preservative(HCL) may be used.

<u>Note</u>: Do not mix the sodium thiosulfate with the HCl in the sample bottle prior to sampling.

7.1.1.5 The samples must be protected from light and refrigerated at 0 - $\leq 6\,^{\circ}C$ from the time of receipt until analysis.

7.1.2 Soil Samples

7.1.2.1 Refer to the SOP for SW846 Method 5035 for preservation requirement of non-aqueous solids.

7.2 HOLDING TIME

7.2.1 Water Samples.

7.2.1.1 All samples are to be analyzed within 14 days of sampling (HCl preserved for aqueous sample) unless otherwise specified by the contract. The sample preservation deficiency is noted in the analytical run logbook when the analyst checks the pH at the bench. If the pH is not <2, the analyst notifies the supervisor, who then notifies Client Service Dept. A comment is added to the result page and Non-Conformance Summary.

7.2.2 Soil Samples

7.2.2.1 Refer to the SOP for SW846 Method 5035 for holding time requirement of non-aqueous solids.

7.2.2.2 All samples are analyzed within 14 days of sampling unless otherwise specified.

8.0 APPARATUS AND MATERIALS

8.1 SYRINGE

8.1.1 10, 25, 50, 100, 500 and 5000 µl graduated syringes, manually held (Hamilton/equiv.).

8.1.2 5 ml and 50 ml glass gas tight syringes with Luerlok end, if appropriate for the purging device.

8.2 BALANCE

8.2.1 Analytical balance capable of weighing 0.0001 gram.

8.2.2 Top loading balance capable of weighing 0.1 gram.

8.3 PURGE AND TRAP DEVICES

8.3.1 The autosampler models are used for purging, trapping and desorbing the sample into GC column.

- O.I. Model 4560 sample concentrator with 4551 vial multi-sampler
- O.I. Model 4560 sample concentrator with 4552 Water/Soil multi-sampler

8.3.2 The sample purge vial must be designed to accept 5 ml samples with a water column at least 3 cm deep.

8.3.3 The auto-sampler is equipped with a heater capable of maintaining the purge chamber at 40 °C to improve purging efficiency. The heater is to be used for low level soil/sediment analysis, but not for water or medium level soil/sediment analysis.

8.3.4 The OI #10 trap is 42 cm with an inside diameter of 0.105 inches. The trap must be packed to contain the following absorbents (3-ring) and must be conditioned at 180 °C for 30 minutes by backflushing with a Helium gas flow at least 20 ml/min before initial use.

- Tenax (2,6-Diphenylene oxide polymer).
- Silica gel.
- Carbon Molecule Sieve (CMS).

8.3.5 The desorber must be capable of rapidly heating the trap to 190^0 C for desorption. Do not exceed 210 ^{0}C during bake-out mode. Alternatively, follow manufacturer's instructions.

8.3.6 The response of chloromethane and bromonethane can be tracked for thermal decomposition products formed. If levels over the calibration requirement, the trap must be replaced and the system re-calibrated after the manager/supervisor been notified.

8.4 GAS CHROMATOGRAPH/MASS SPECTROMETER SYSTEM

8.4.1 Gas Chromatograph.

8.4.1.1 An analytical system complete with a temperature programmable gas chromatograph and all required accessories including syringes, analytical columns, and gases.

8.4.1.2 The injection port must be suitable for split or splitless with appropriate interface.

8.4.1.3 The narrow bore capillary column is directly coupled to the source for HP-6890 or Agilent 6890 model.

8.4.1.4 The wide bore capillary column is interfaced through a jet separator to the source for HP-5890 model.

8.4.2 Column.

- 75 m x 0.53mm ID x 3 μm film thickness capillary column coated with DB-624 (J&W Scientific), or equivalent. Condition as per manufactures directions.

- 105 m x 0.53mm ID x 3 μm film thickness capillary column coated with HP-VOA, or equivalent. Condition as per manufactures directions.

- 60 m x 0.25mm ID x 1.4 μm film thickness capillary column coated with DB-624 (J&W Scientific), or equivalent. Condition as per manufactures directions.

- 60 m x 0.45mm ID x 1.7 μm film thickness capillary column coated with DB-VRX (J&W Scientific), or equivalent. Condition as per manufactures directions.

8.4.3 Mass Spectrometer.

8.4.3.1 HP5973, HP5970 Agilent 5973, or Agilent 5975 is capable of scanning from 35 to 300 amu every 2 seconds or less, utilizing a 70 volt (nominal) electron energy in the electron impact ionization mode.

8.4.3.2 The mass spectrometer must be capable of producing a mass spectrum which meets all the criteria in Table 3 when injecting or purging 50 ng of the GC/MS tuning standard - Bromofluorobenzene (BFB).

8.4.3.3 SIM Mode – Capable of selective ion grouping at specified retention times for increased compound sensitivity (Table 2a).

8.5 DATA SYSTEM

8.5.1 Data Acquisition and Instrument Control (HP Chemstation) **-** A computer system is interfaced to the mass spectrometer, which allows the continuous acquisition and storage on a machine-readable media (disc) of all mass spectra obtained throughout the duration of the chromatographic program.

8.5.2 Data Processing (HP Enviroquant) - The software accommodates searching of GC/MS data file for target analytes which display specific fragmentation patterns. The software also allows integrating the abundance of an EICP between specified time or scan number limits. The data system includes the recent version of the EPA/NBS or NIST98 mass spectral library for qualitative searches of non-target compounds present in the chromatogram. The data system flags all data files that have been edited manually by laboratory personnel.

8.5.3 Off line Magnetic Tape Storage Device (Lagato Networker) - The magnetic tape storage device copies data for long-term, off-line storage.

9.0 REAGENTS AND STANDARDS

9.1 Solvent

9.1.1 Methanol: purge-and-trap grade quality or equivalent. Store separately, away from the other solvents.

9.2 Reagent Water

9.2.1 Reagent water is defined as water in which an interferant is not observed at the method detection limit of the parameters of interest.

9.2.2 Reagent water is generated by either passing tap water through a bed of approximately one pound of activated carbon or by using the water purification system at Accutest that is a series of deionizers and carbon cartridges.

9.3 Stock Standard Solutions

9.3.1 Commercially prepared standards used.

9.3.1.1 EPA Method 524.2 Volatiles (78 components): Absolute (or equivalent) at 200 μg/ml or 2,000 μg/ml concentration.

9.3.1.2 Custom Volatiles Mix A: Restek (or equivalent) at 2,000 μg/ml concentration.

9.3.1.3 Custom Volatiles Mix B: Restek (or equivalent) at 2,000 - 100,000 μg/ml concentration.

9.3.1.4 VOC Gas Mixture: Ultra (or equivalent) contains 200 μg/ml or 2,000 μg/ml of the following compounds in methanol.

- Bromomethane
- Chloroethane
- Chloromethane
- Dichlorodifluoromethane
- Trichlorofluoromethane
- Vinyl Chloride

9.3.1.5 Multiple neat compounds.

9.3.1.6 Surrogate standard mixture: Ultra (or equivalent) at a concentration of 2,500 μg/ml each surrogate compound.

- 1,2-Dichloroethane-d_4
- Dibromofluoromethane
- Toluene-d_8
- 4-Bromofluorobenzene

9.3.1.7 Internal standard mixture: Ultra (or equivalent) at a concentration of 2,000 μg/ml for all the compounds except Tert Butyl Alcohol-d_9, which is from Absolute (or equivalent) at a concentration of 50,000 μg/ml. The following five internal standards are used that exhibit similar analytical behavior to the compounds of interest.

- 1,4-Dichlorobenzene-d_4
- 1,4-Difluorobenzene
- Chlorobenzene-d_5
- Pentafluorobenzene
- Tert Butyl Alcohol-d_9

9.3.1.8 1,4-Dioxane Solution for SIMS : Ultra (or equivalent) at 100 μg/ml in methanol .

9.3.2 Unopened stock standard (ampoules) must be stored according to manufacturer's documented holding time and storage temperature recommendations (usually placed on the ampoule).

9.3.3 After opened, stock standards, internal standards, and surrogate solutions must be replaced after 6 months (one month for purgeable gases standard) or sooner if manufacture expiration date come first or comparison with quality control check samples indicates degradation.

9.3.4 Store all stock standards in vials with minimal headspace and Teflon lid liners after open, protect from light, and refrigerate to –10°C or colder or as recommended by the standard manufacturer.

9.3.5 Return the standards to the freezer as soon as the analyst has completed mixing or diluting the standards to prevent the evaporation of volatile target compounds.

9.4 Internal Standard and Surrogate Solution

9.4.1 Five internal standard and surrogate spiking solutions are prepared in methanol per Table 8.A.

9.4.1.1 25 µg /ml internal standard and surrogate mixture.

9.4.1.2 250 µg /ml internal standard and surrogate mixture.

9.4.1.3 100 µg/ml surrogate mixture.

9.4.1.4 25 µg /ml internal standard mixture.

9.4.1.5 250 µg /ml internal standard mixture.

9.4.2 A calibration range must be constructed for the surrogate compounds. Accordingly, appropriate amounts of surrogates are mixed with each calibration solution to define a range similar to the target compounds.

9.4.3 Each 5 ml sample, QC sample, and blank undergoing analysis must be spiked with any one of the above spiking solutions (depending upon the type of standards addition modules used), resulting in a concentration of 50 µg/l of each compound.

9.4.4 Prepare fresh internal standard and surrogate spiking solutions every six months, or sooner, if manufacturer's expiration dates come first or if the solution has degraded or evaporated.

9.5 Secondary Dilution Standards

9.5.1 Using stock standard solutions, prepare secondary dilution standards in methanol containing the compounds of interest, either singly or mixed together.

9.5.1.1 100 µg /ml V8260 mixture: prepared from 2,000 µg /ml stock solution. (see Table 8-C)

9.5.1.2 100 µg /ml V8260 custom mixture: prepared from 2,000 µg /ml stock solution. (see Table 8-C)

9.5.1.3 100 µg /ml Gas mixture: prepared from 2,000 µg /ml stock solution. (see Table 8-C)

9.5.2 Replace after one month for non-gas mixtures (one week for gas mixtures) or sooner if manufacture expiration date come first or comparison with quality control check samples indicates degradation.

9.5.3 Store all secondary dilution standards in vials with no headspace and Teflon lid liners, protect from light, and refrigerate to – 10°C or colder or according to manufacturer's storage temperature recommendation.

.

9.5.4 Return the standards to the freezer as soon as preparation is finished to prevent the evaporation of volatile compounds.

9.6 Aqueous Calibration Standard Solutions

9.6.1 Initial Calibration Standards

9.6.1.1 Prepare a minimum of five aqueous calibration standard solutions containing the surrogate compounds as Table 8-D.1 or 8-D.2.

9.6.1.2 To prepare a calibration standard, add a measured volume of secondary dilution standard solutions and the surrogate spiking solution to an aliquot of reagent water in the flask. Use a micro-syringe and rapidly inject the methanol standard into the expanded area of the filled volumetric flask. Remove the needle as quickly as possible after injection. Bring to volume. Mix by inverting the flask three times only. Discard the contents contained in the neck of the flask.

9.6.1.2.1 1,4-Dioxane for SIMS analysis is prepared from primary stock standard (100ppm).

9.6.2 Continuing Calibration Standard

9.6.2.1 A continuing calibration standard at a concentration of 50 µg/l is prepared as the scheme outlined in Table 8-E.

9.6.3 Aqueous standards are not stable and may be stored up to 24 hours if held in Teflon sealed screw-cap vials with zero headspace at 4°C (± 2°C). Protect the standards from light. If not so stored, they must be discarded after use, unless they are set up to be purged by an autosampler.

9.6.4 When using an autosampler, standards may be retained up to 12 hours if they are in purge tubes connected via the autosampler to the purge and trap device.

9.7 Second Source Calibration Check Standard (ICV)

9.7.1 Prepare the second source calibration check standards from separate sources of stock standards from the calibration curve following the procedures in Section 9.6. At a minimum, an ICV must be analyzed with every initial calibration.

9.7.2 For 1,4-Dioxane via SIMS: Prepare the second source calibration check standard using 2.5 µl of a 1000ppm (Absolute or equivalent) to 50 mL of reagent water which yields a 50 ppb standard.

9.8 4-Bromofluorobenzene (BFB) Standard

9.8.1 Two BFB solutions are prepared in methanol per Table 8-B.

9.8.1.1 25 µg /ml solution for direct injection.

9.8.1.2 250 μg /ml solution for purging.

9.8.2 The solution must be replaced after 6 months or sooner if mass spectrum indicates degradation or if manufacture expiration date comes first.

10.0 CALIBRATION

10.1 Daily Maintenance. Routine Daily maintenance must be performed before any tuning, calibration or sample analysis activities are initiated. These include checks of the following items:

Purge and Trap Device:

Clean & bake purge tube
Bake trap and transfer lines
Check or refill internal/surrogate spike solution on SIM/SAM vials
Clean/replace syringe (if necessary)
Change and refill rinse bottle
Empty and rinse waste bottle

GC Oven: (if necessary)

Change septum
Change liner
Clip column, indicated by carbon build-up

10.2 Initial Calibration

10.2.1 The calibration range covered for routine analysis under RCRA, and SIM, employs standards of 1(specified compounds only), (2)*, 5, 10, 20, 50, 100, 200,(300 or 400)* μg/l. (*instrument dependent). A minimum of five standards must be run sequentially. The low calibration standard defines the reporting limit. Lower concentration standards (1.0 or 2.0 μg/l) may be needed to meet the reporting limit requirements of state specific regulatory programs. Refer to Table 8-D-1 and 8-D-2 for calibration standard preparation.

10.2.2 A calibration range may be constructed for each surrogate compound. Accordingly, add appropriate amounts of each surrogate compound to the calibration solution to define a range similar to the target compounds.

10.2.2.1 For most samples and spikes both the internal standard and the surrogate are added automatically. When doing an initial calibration surrogates are added manually. In order to compensate for the difference between the automatic and manual surrogate additions a correction factor must be applied to the amount of surrogate added in Table 8-D. To determine the correction factor divide the surrogate concentration from an automatic injection by the surrogate concentration from a manual injection for each of the surrogates. Average the result for each of the surrogates to determine the correction factor. Finally multiply the correction factor by the appropriate amount of surrogate from Table 8-D and add this amount to the standard.

10.2.2.2 Optional: Historically the surrogate compounds have been included in the multi-point initial calibration at variable concentrations in order to evaluate

the linear response as with any target analyte. However, with improvements in instrumentation and more reliance on the autosampler, an option is available depending on the project-specific data quality requirements for allowing the autosampler to spike the initial calibration standards with surrogates in the same manner as the samples are spiked. With this option the surrogate standards in the initial calibration can be averaged to develop a response factor and an effective one point calibration with the sole purpose to measure the surrogate recovery using the same concentration for each sample analysis. For this calibration option the surrogate linear response is less important, since multiple concentrations of surrogates are not being measured. Instead, the surrogate concentration remains constant throughout and the recovery of this known concentration can easily be attained without demonstrating if the response is linear.

10.2.3 For water and medium-level soil calibration: Transfer and fill up (no air space) each standard to labeled 40 ml vial and cap with Teflon septum, then place the vial into O.I. sample tray.

10.2.4 For low-level soil calibration: Transfer 5 ml of each standard to labeled 40 ml vial and cap with Teflon septum, then place the vial into O.I. sample tray.

10.2.4.1 When calibrating for Method 5035 low-level samples, if the sodium bisulfate option was used, add 1g of sodium bisulfate to the 40-ml vial before aliquot 5 ml of each standard into vial otherwise do not add sodium bisulfate. This is equivalent to the amount of sodium bisulfate added to the samples and will maintain a consistent purging efficiency of the compounds. Cap the vial with Teflon septum and place it into O.I sample tray.

10.2.5 The linear range covered by this calibration is the highest concentration standard.

10.2.6 Program the autosampler to add internal standard mixture(and optionally surrogate) to each standard. This results in a concentration of 50 µg/l for each internal standard (and surrogate).

10.2.6.1 For O.I. SIM spiker: Automatically adds 10 µl of 25 µg/ml internal standard solution **(**Section 9.4.1.4) or Internal Standard/Surrogate solution (Section 9.4.1.1) to each standard.

10.2.6.2 For O.I. SAM spiker: Automatically adds 1 µl of 250 µg/ml internal standard solution (Section 9.4.1.5) or Internal Standard/Surrogate solution Section 9.4.1.2) to each standard.

10.2.7 Analyze the standard solutions using the conditions established in Section 11.0. Whenever the highest concentration standard is analyzed, it is usually followed by the analyses of two reagent water blanks. Further analysis may not proceed until the blank analysis is demonstrated to be free of interferences.

10.2.8 Each analyte is quantitatively determined by internal standard technique using the closest eluting internal standard and the corresponding area of the major ion. See Table 7.

10.2.9 The Response Factor (RF) is defined in Section 13.1. Calculate the mean RF for each target analyte using minimum of five RF values calculated from the initial calibration curve.

10.2.10 For the initial calibration to be valid, the following criteria must be met.

10.2.10.1 The percent relative standard deviation (% RSD) (see Section 13.2) of all target analytes should be less than or equal to 20%.

10.2.10.2 If the average response factor criteria cannot be achieved, and if the problem is associated with one or more of the standards, reanalyze the standards and recalculate the RSD. The instrument logbook must have clear documentation as to what the suspected problem was.

10.2.10.2.1 A calibration standard is allowed to be repeated only once; if the second trial fails, a new initial calibration must be performed. Notify the team leader/manager. Document this occurrence in the instrument log.

10.2.10.3 Alternately, if the average response factor criteria cannot be achieved, the calibration range can be narrowed by dropping the low or high point of the curve.

10.2.10.3.1 The changes to the upper end of the calibration range will affect the need to dilute samples above the range, while changes to the lower end will affect the overall sensitivity of the method. Consider the regulatory limits or action levels associated with the target analytes when adjusting the lower end.

10.2.10.4 If the average response factor criteria still cannot be achieved, employ an alternative calibration linearity model. Specifically, linear regression using a least squares approach may be employed.

10.2.10.4.1 If Linear regression is employed select the linear regression calibration option of the mass spectrometer data system. Do not force the regression line through the origin and do not employ 0,0 as a sixth calibration standard.

10.2.10.4.2 The correlation coefficient (r value) must be $\geq$0.99 for each compound to be acceptable.

10.2.10.4.2.1 When calculating the calibration curves using the linear regression model, a minimum quantitation check on the viability of the lowest calibration point must be performed by re-fitting the response from the low concentration calibration standard back into the curve.

10.2.10.4.2.2 The recalculated concentration of the low calibration point must be within $\pm$ 30% of the standard's true concentration

10.2.10.5 The initial calibration criteria for this method applies to all additional compounds of concern specified by the client.

10.2.10.6 If more than 10% of the compounds included with the initial calibration exceed the 20% RSD limit and do not meet the minimum correlation coefficient for the linear calibration option, then the chromatographic system is considered too reactive for the analysis to begin. Perform corrective action and recalibrate if the calibration criteria cannot be achieved

10.2.10.7 It is recommended that the minimum response factor for the most common target analytes in table 12 must be demonstrated for each individual calibration level as a means to ensure that these compounds are behaving as expected. In addition, meeting the minimum response factor criteria for the lowest calibration standard is critical in establishing and demonstrating the desired sensitivity.

10.2.10.8 The relative retention times of each target analyte in each calibration standard must agree within 0.06 relative retention time units.

10.3 Initial Calibration Verification (ICV) - Second Source Calibration Check Standard

10.3.1 The calibration is verified with a calibration check standard at 50 µg/l from an external source (Section 9.7). It must be analyzed immediately following the initial calibration.

10.3.2 The percent difference (% D) (Section 13.3) for this standard must meet the criteria of 20% for all the target compounds.

10.3.2.1 If % D is greater than 30%, reanalyze the second source check. If the criteria cannot be met upon re-injection, re-prepare the second source solution using a fresh ampoule and repeat the process.

10.3.2.2 If the %D criteria cannot be achieved after re-preparation of the second source, prepare a third source and repeat the process. Make fresh calibration standards using one of the two standard sources that matches each other and repeat the initial calibration.

10.4 Continuing Calibration Verification Standard(CCV)

10.4.1 A continuing calibration verification standard at a concentration near mid-level of the initial calibration range (50 µg/l) must be acquired every 12 hrs or at the beginning of each analytical batch.

10.4.1.1 For water and medium level soil analysis: Transfer and fill up (no air space) the calibration verification standard to labeled 40 ml vial and cap with Teflon septum, then place the vial into O.I. sample tray. Analyze as per Section 11.7.

10.4.1.1.1 Vary the concentration of the continuing calibration verification standard on alternate verifications (i.e. every other calibration verification) using an alternative concentration standard. The standard selected must be lower than the midpoint calibration standard.

10.4.1.2 For low-level soil analysis: Transfer 5 ml of the calibration verification standard to labeled 40 ml vial and cap with Teflon septum, then place the vial into O.I. sample tray. Analyze as per Section 11.7.

10.4.1.2.1 When calibrating for Method 5035 low-level samples, if the sodium bisulfate option was used add 1g of sodium bisulfate to the 40-ml vial before aliquot 5 ml of the calibration verification standard into vial, otherwise do not use sodium bisulfate. This is equivalent to the amount of sodium bisulfate added to the samples and will maintain a consistent purging efficiency of the compounds. Analyze as per Section 11.7.

10.4.1.3 A continuing calibration standard is analyzed whenever the analyst suspects that the analytical system is out of calibration. If the calibration cannot be verified, corrective action is performed to bring the system into control. Analysis may not continue until the system is under control.

10.4.2 For the continuing calibration to be valid, all of the following specified criteria must be met.

10.4.2.1 Each of the most common target analytes in the calibration verification standard should meet the minimum response factors as noted in Table 12. This criterion is particularly important when the common target analytes are also critical project-required compounds. This is the same check that is applied during the initial calibration.

10.4.2.1.1 If the minimum response factors are not met, the system should be evaluated, and corrective action should be taken before sample analysis begins..

10.4.2.2 All target compounds of interest must be evaluated using a 20%variability criterion. Use percent difference when performing the average response factor model calibration. Use percent drift when calibrating using a regression fit model. If the percent difference or percent drift for a compound is less than or equal to 20%, then the initial calibration for that compound is assumed to be valid.

10.4.2.3 Due to the large numbers of compounds that may be analyzed by this method, some compounds will fail to meet the criteria. If the criterion is not met (i.e., greater than 20% difference or drift) for more than 20% of the compounds included in the initial calibration, then corrective action must be taken prior to the analysis of samples.

10.4.2.4 In cases where compounds fail, they may still be reported as non-detects if it can demonstrated that there was adequate sensitivity to detect the compound at the applicable quantitation limit. For situations when the failed compound is present, the concentrations must be reported as estimated values.

10.4.2.4.1 Compounds with response factors that exceed the 20% D in the CCV compared to the initial calibration with high bias may only be reported when the target analyte is non-detect

10.4.2.4.2 Compounds that do not meet the 20% D in the CCV compared to the initial calibration due to low response factors can only be reported if the low sensitivity of the instrument is still achieved. This sensitivity must be verified by running a low level standard

check at the RL. If a positive result for the compound is found then adequate sensitivity has been demonstrated and the run can proceed. Non-detect results for samples may be reported, positive results are re-analyzed.

10.4.3 If the first continuing calibration verification(CCV) does not meet criteria, a second consecutive standard can be analyzed immediately. If the second CCV fails to meet criteria then corrective actions shall be performed. Such as: auto-tuning, routine system cleaning and routine system maintenance. Notify the team leader/manager.

10.4.3.1 If the second CCV trial fails, the lab must demonstrate acceptable performance after corrective action with two consecutive passing calibration verifications(CCVs) OR a new initial calibration. The Instrument Logbook and Maintenance Logbook must have clear documented notations as to what the problem was and what corrective action was implemented.

10.4.3.1.1 If the lab has not verified calibration, samples cannot be analyzed.

10.4.3.1.2 However, in the case where samples are analyzed on the system where the CCV does not meet the criteria the data must be flagged.

10.4.3.1.2.1 The data may be usable if the response for the verification exceed high(high bias) and the associated samples are non-detects.

10.4.3.1.2.2 If the criteria for the CCV is low (low bias), those sample results may be reported only if they exceed a maximum regulatory limit/decision level.

10.4.3.2 If the calibration verification is being performed using an auto sampler for night batch, two (2) vials of standard solution are placed in the device for analysis. The second standard must meet continuing calibration criteria and is used for calibration verification. The second check may be discarded only if there is a purge failure or incorrect spike concentration provided the first calibration standard meets the requirement. In this case, the first calibration standard is used as calibration verification following team leader/manager approval. Document this occurrence on instrument log.

10.4.3.2.1 Both CCVs must be evaluated. If vial 1 fails and vial 2 passes this meets the criteria of 10.4.3 of consecutive and immediate passing CCV.

10.4.3.2.2 If CCV number 2 fails, the analysis cannot continue unless it was determined that there was an isolated mechanical failure.

10.4.4 If any of the internal standard areas change by a factor of two (- 50% to + 100%) or the retention time changes by more than 30 seconds from the midpoint standard of the last initial calibration, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate.

10.4.5.1 Reanalyze the continuing calibration standard. New initial calibration is required if reanalyzed standard continues to fail the internal standard requirements.

10.4.5.2 All samples analyzed while the system was out of control must be reanalyzed following corrective action.

10.5 Corrective Action Maintenance For Failed Tuning and Calibration Procedures

10.5.1 Inability to achieve criteria for instrument tuning or calibration may indicate the need for instrument maintenance. Maintenance may include routine system cleaning and replacement of worn expendables or the need for outside service if the scope of the repair exceeds the capability of the staff.

10.5.2 If maintenance is performed on an instrument, return to control must be demonstrated before analysis can continue. Return to control is demonstrated as follows:

10.5.2.1 Successful instrument tune using PFTBA.

10.5.2.2 Successful tune verification by the analysis of 4-bromofluorobenzene.

10.5.2.3 Successful initial calibration or continuing calibration.

11.0 PROCEDURE

11.1 Instrument conditions.

11.1.1 Recommended instrument conditions are listed in Table 2 and 2a (SIM only). Modifications of parameters specified with an asterisk are allowed as long as criteria of calibration are met. Any modification must be approved by team leader/manger.

11.1.2 Optimize GC conditions for analyte separation and sensitivity. Once optimized, use the same GC conditions for the analysis of all standards, blanks, samples, and QC samples.

11.2 Purge and Trap Device conditions.

11.2.1 See Table 2.

11.2.2 Daily Maintenance. Routine Daily maintenance must be performed before any tuning, calibration or sample analysis activities are initiated. These include checks of the following items:

<u>Purge and Trap Device:</u>

- Clean & bake purge tube.
- Bake trap and transfer lines.
- Check or refill internal/surrogate spike solution on SIM/SAM vials.
- Clean/replace syringe (if necessary).
- Change and refill rinse bottle.
- Empty and rinse waste bottle.

11.3 Step 1: Daily GC/MS performance check.

11.3.1 Every 12 hours, either

- Inject 2 µl (50 ng) of BFB solution directly on column or
- Purge 10 µg/l of 5ml (50ng) to GC column.

11.3.2 The GC/MS system must be checked to verify acceptable performance criteria are achieved (see Table 3).

11.3.3 This performance test must be passed before any samples, blanks or standards are analyzed. Evaluate the tune spectrum using three mass scans from the chromatographic peak and a subtraction of instrument background.

11.3.3.1 Select the scans at the peak apex and one to each side of the apex.

11.3.3.2 Calculate an average of the mass abundances from the three scans.

11.3.3.3 Background subtraction is required. Select a single scan in the chromatogram that is absent of any interfering compound peaks and no more than 20 scans prior to the elution of BFB. The background subtraction must be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the tuning compound peak.

11.3.4 If all the criteria are not achieved, the analyst must retune the mass spectrometer with team leader/manager and repeat the test until all criteria are met.

11.3.4.1 Alternatively, an additional scan on each side of the peak apex may be selected and included in the averaging of the mass scans. This will provide a mass spectrum of five averaged scans centered on the peak apex. NOTE: The selection of additional mass scans for tuning may only be performed with supervisory approval on a case by case basis.

11.3.4.2 Note: All subsequent standards, samples, MS/MSDs BS, and blanks associated with a BB analysis must use identical mass spectrometer conditions.

11.3.5 The injection time of the acceptable tune analysis is considered the start of the 12-hour clock.

11.3.6 Until performance check is acceptable, then calibration check (step 2) can be analyzed.

11.4 Step 2 : Daily calibration check

11.4.4 Initial calibration

11.4.1.1 Refer to Section 10.2.

11.4.1.2 An initial calibration must be established (or reestablished) on each instrument:

- Prior to any sample analyses;
- Whenever a new column is installed;
- Whenever instrument adjustments that affect sensitivity are made; and
- Whenever a continuing calibration standard fails to meet the specified acceptance criteria, on the second trial.

11.4.5 Initial Calibration Verification - Second Source Calibration Check Standard

11.4.2.1 This standard is only analyzed when initial calibration provided. Refer to Section 10.3.

11.4.6 Continuing Calibration verification standard

11.4.3.1 Refer to Section 10.4.

11.4.7 The method blank (step 3) cannot be analyzed until the continuing calibration verification meets the criteria.

11.5 Step 3 : Method blank

11.5.4 The acceptable method blank must be analyzed for every 12-hour time period or sooner.

11.5.1.1 Water and medium-level soil samples - Place a 40 ml vial, filled with DI water onto the autosampler.

11.5.1.2 Low-level soil samples without sodium bisulfate - Transfer 5 ml of DI water to a 40 ml vial and cap with Teflon septum, then place the vial into O.I. sample tray.

11.5.1.2.1 Low-level soil samples with sodium bisulfate (Method 5035) - Add 1g of sodium bisulfate to a 40 ml vial before aliquot 5 ml of DI water into the vial and cap with Teflon septum, then place the vial onto the autosampler.

11.5.5 Program the autosampler to add internal standard and surrogate solution to the method blank for a concentration of 50 µg/l for each internal standard and surrogate.

11.5.2.1 For O.I. SIM spiker: Automatically adds 10 µl of 25 µg/ml internal standard and surrogate solution (Section 9.4.1.1) to the method blank.

11.5.2.2 For O.I. SAM spiker: Automatically adds 1 µl of 250 µg/ml internal standard and surrogate solution (Section 9.4.1.2) to the method blank.

11.5.6 No compound can be present above the laboratory's MDL. If common laboratory solvents (i.e. methylene chloride, acetone) are present in the sample between the MDL and RL, the analyst must determine if the contamination will negatively impact data quality. If the contamination impacts data quality, all affected samples must be re-analyzed.

11.5.7 Surrogates must meet recovery criteria specified in house limits.

11.5.8 If the method blank does not meet surrogate criteria or contains target analytes above the MDL, then

11.5.5.1 All samples analyzed following an out of control method blank must be reanalyzed.

11.5.5.2 Check for the potential of contamination interference from the following areas. Make sure all items are free contamination.

- the analytical system,
- dust and vapor in the air,
- glassware and
- Reagents.

11.5.5.3 Re-analyze the method blank following the system evaluation. In this situation, the instrument logbook must have clear documented notations as to what the problem was and what corrective action was implemented to enable the second blank to pass.

11.5.5.4 If re-analyzed method blank remains out of control, notify team leader or manager.

11.5.9 If two consecutive method blanks are analyzed during unattended operations, the second analysis must meet criteria for the subsequent sample analysis to be valid. Always report the second method blank. The second analysis can only be discarded because of a purge failure provided that the first blank meets the requirement. In this case, the first blank is reported following team leader/manager approval. Document this occurrence on the instrument log.

11.5.10 The blank spike (BS) (step 4) cannot be analyzed until the method blank meets criteria.

11.6 Step 4: Blank spike (BS)

11.6.4 An acceptable blank spike must be analyzed with every analytical batch. The maximum number of samples per analytical batch is twenty.

11.6.5 Spike 50 ml of reagent water with appropriate amount of the standards to prepare a blank spike containing 50 μg/L of each analyte. In situations where lower detection limits are required, a blank spike at 20 μg/L may be prepared. The stock solution for the BS must be from a different source than the initial calibration solution. Refer to Table 8-F for the preparations of the blank spikes.

11.6.2.1 Water and medium-level soil samples - Place a 40 ml vial, filled with DI water onto the autosampler.

11.6.2.2 Low-level soil samples without sodium bisulfate - Aliquot 5 ml of the blank spike into vial and cap with Teflon septum, then place the vial into O.I. sample tray.

11.6.2.2.1 Low-level soil samples with sodium bisulfate for Method 5035 - Add 1g of sodium bisulfate to labeled 40 ml vial before aliquot 5 ml of the blank spike into vial and cap with Teflon septum, then place the vial into O.I. sample tray.

11.6.6 Initiate auto addition of internal standard and surrogate into the syringe per 11.5.2.

11.6.7 Compare the percent recoveries (% R) (see Section 13.5) to the in house limits acceptance criteria. If a blank spike is out of control, all the associated samples must

be reanalyzed. The exception is if the blank spike recovery is high and no hits reported in associated samples and QC batch. In that case, the sample results can be reported with footnote (remark) and no further action is required. Or if the blank spike recovery is low and the hits in the samples are above regulatory levels.

11.6.8 Do not analyze samples and MS/MSD (step 5) unless the BS meets acceptance criteria.

11.7 Step 5: Samples /MS/MSD analysis

11.7.4 All samples and standard solutions must be allowed to warm to ambient temperature before analysis.

11.7.5 Select the sample dilution factor to assure the highest concentration analyte is above the calibration range midpoint, but below the upper limit of the range depend on project requirements. See Table 9 for dilution guideline.

- Utilize FID screen data.
- Utilize acquired sample data.
- Utilize the history program.
- Sample characteristics (appearance, odor).

11.7.6 Water samples.

11.7.3.1 Using <u>O.I.Model 4560 sample concentrator with 4551 or 4552 vial multisampler,</u>

- Place the 40 ml vial in the tray, or
- Load 5ml sample into purge tube if sample volume limited.

11.7.7 Sediment/ soil sample

11.7.4.1 <u>Low-level soil method</u>

11.7.4.1.1 Collect the sample using the procedures detailed in the SOP for SW846 Method 5035 low - level soil samples.

11.7.4.1.2 Weigh out 5 g of each sample into a labeled vial. Add 5 ml of reagent water and cap the vial quickly. Transfer the 40ml vial to the autosampler tray. Stir and heat the sample at the time of analysis.

11.7.4.2 <u>Medium-level soil method</u>

11.7.4.2.1 Collect the sample using the procedures detailed in the SOP for SW846 Method 5035 medium - level soil samples.

11.7.4.2.2 Select a methanol aliquot of appropriate volume (see Table 9) determined via screening and transfer to 40 ml of reagent water.

11.7.5 Program the autosampler to inject the internal standard and surrogate solution into the robotic syringe used to withdraw sample from the 40 ml vial. This addition to 5 ml of sample is equivalent to a concentration of 50 μg/L of each internal standard and surrogate.

11.7.5.1 For O.I. SIM spiker: Automatically adds 10 µl of 25 µg/ml internal standard and surrogate solution (Section 9.4.1.1) to each sample.

11.7.5.2 For O.I. SAM spiker: Automatically adds 1 µl of 250 µg/ml internal standard and surrogate solution (Section 9.4.1.2) to each sample.

11.7.6 Purge the sample for 11 minutes with Helium.

11.7.6.1 Low-level soil sample must be performed at 40 °C while the sample is being agitated with the magnetic stirring bar or other mechanical means.

11.7.6.2 To improve the purging efficiency of water-soluble compounds, aqueous samples may also be purged at 40 °C as long as all calibration standards, samples and QC samples are purged at the same temperature and acceptable method performance is demonstrated.

11.7.7 One sample is randomly selected from each analytical batch of similar matrix types and spiked in duplicate to determine whether the sample matrix contributes bias to the analytical results. A matrix spike and matrix spike duplicate are performed by spiking the sample for a concentration of 50 µg/l or 50 µg/kg based on 5 g dry weight. In situations where lower detection limits are required, a blank spike at lower concentration may be prepared.

11.7.8 Desorb the sample for 4 minutes by rapidly heating the trap to 190 °C while backflushing with Helium. Desorb time may require performance optimum between 2.0 and 4.0 minutes as dictated by trap manufacturers specifications or instrument characteristics.

11.7.9 Program the purge and trap system to automatically rinse purge tube at least twice with heated organic-free water (reagent water) between analyses to avoid carryover of target compounds. For samples containing large amounts of water-soluble materials, suspended solids, high-boiling compounds, or high purgeable levels, it may be necessary to wash out the purging device with methanol solution between analyses, rinse it with distilled water.

11.7.10 Bake the trap at least 10 minutes at 210 °C to remove any residual purgeable compounds.

11.7.11 If the initial analysis of the sample or a dilution of the sample has a response for any ion of interest that exceeds the working range of the GC/MS system, the sample must be reanalyzed at a higher dilution.

11.7.11.1 When ions from a compound in the sample saturate the detector, this analysis must be followed by the analysis of reagent water blank. If the blank analysis is not free of interferences, then the system must be decontaminated. Sample analysis may not resume until the blank analysis is demonstrated to be free of interferences.

11.8 Sample dilutions

11.8.1 Using Screening Data to Determine Dilution Factors

11.8.1.1 Dilution for High Concentration Analytes Exceeding The Calibration Range

11.8.1.1.1 The highest concentration target compound detected in the screen data is compared to the highest concentration calibration standard used for determinative volatile organics analysis.

11.8.1.1.1.1 Divide the calibration concentration of the highest concentration calibration standard by the screen concentration.

11.8.1.1.1.2 If the result is >1, sample dilution is considered.

11.8.1.1.2 The result from step 11.8.1.1.1 determines the dilution factor. The dilution factor is targeted to assure that the highest concentration diluted analyte is at the mid-range concentration of the calibration curve for the determinative analysis.

11.8.1.1.3 In all cases a conservative approach to dilution is applied to minimize the increase of detection and reporting limits

11.8.1.2 Dilution for High Concentration Matrix Interferences

11.8.1.2.1 The peak height of the background is compared to the peak height of the later eluting calibration standards from the screening analysis.

11.8.1.2.1.1 A rough estimate of background concentration is calculated by dividing the background peak height by the peak height of the selected screening standard and multiplying by its concentration.

11.8.1.2.2 If the result is >1, sample dilution is considered.

11.8.1.2.3 The result from step 11.8.1.2.1 determines the dilution factor. The dilution factor is targeted to avoid Carry-over contamination between samples and facilitate qualitative and quantitative analysis of target compounds present in the sample.

11.8.1.2.4 In all cases a conservative approach to dilution is applied to minimize the increase of detection and reporting limits

11.8.2 If the concentration of any target compound in any sample exceeds the initial calibration range, a new aliquot of that sample must be diluted and re-analyzed. Until the diluted sample is in a sealed sample vial, all steps in the dilution procedure must be performed without delay.

11.8.3 Water Samples.

11.8.3.1 Prepare all dilutions of water samples in volumetric flasks (10 ml to 100 ml). Intermediate dilutions may be necessary for extremely large dilutions.

11.8.3.2 Calculate the approximate volume of reagent water, which will be added to the volumetric flask, and add slightly less than this quantity to the flask. Refer to Table 9 for dilution guideline.

11.8.3.3 Inject the proper sample aliquot from a syringe into the volumetric flask. Dilute the flask to the volume mark with reagent water. Cap the flask and invert the flask three times.

11.8.3.4 Fill a 40 ml sample vial and seal with a Teflon baked silicon septa, load the diluted sample into the autosampler and analyze according to Section 11.7.

11.8.3 Low-level Soil Samples.

11.8.3.1 The screening data are used to determine which is the appropriate sample preparation procedure for the particular sample, the low-level soil method or the medium-level soil method.

11.8.3.2 If any target compound exceeds the initial calibration range from the analysis of 5 g sample, a smaller sample size must be analyzed. However, the smallest sample size permitted is 0.5 g. If smaller than 0.5 g sample size is needed to prevent any target compounds from exceeding the initial calibration range, the medium level method must be used.

11.9 Data interpretation

11.9.1 Qualitative identification.

11.9.1.1 The targeted compounds shall be identified by analyst with competent knowledge in the interpretation of mass spectra by comparison of the sample mass spectrum to the mass spectrum of a standard of the suspected compound.

11.9.1.2 The characteristic ions for target compounds that can be determined are listed in Table 7. Table 4 and Table 5 list the characteristic ions for internal standards and surrogate compounds respectively.

11.9.1.3 The criteria required for a positive identification are listed below.

11.9.1.3.1 The sample component must elute at the same relative retention time (RRT) as the daily standard. Criteria are the RRT of sample component must be within ± 0.06 RRT units of the standard component.

11.9.1.3.2 The relative intensities of these ions must agree within ± 30 % between the daily standard and sample spectra. (Example: For an ion with an abundance of 50 % in the standard spectra, the corresponding sample abundance must be between 20 and 80 %.)

11.9.1.3.2.1 Compounds can have secondary ions outside criteria from co-eluting compounds and/or matrix effect that can contribute to ion abundances. The interference on ion ratios can't always be subtracted out by software programs resulting in qualified compound identification.

11.9.1.3.2.2 Quantitation reports display compounds that have secondary ions outside the ratio criteria with a "#" flag.

11.9.1.3.2.3 Any quant reports with compounds that are deemed to be reportable despite the “#” flag, will be initialed in the “#” column by the analyst. Further review to the reporting of qualified compounds will be done by a supervisor or team leader and initialed on the quantitation.

11.9.1.3.3 Structural isomers that produce very similar mass specrtra must be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25 % of sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

11.9.2 Quantitative analysis

11.9.2.1 Once a target compound has been identified, its concentration (Section 13.4) will be based on the integrated area of the quantitation ion, normally the base peak (Table 7). The compound is quantitated by internal standard technique with an average response factor generated from the initial calibration curve.

11.9.2.2 If the sample produces interference for the primary ion, use a secondary ion to quantitate (see Table 7). This is characterized by an excessive background signal of the same ion, which distorts the peak shape beyond a definitive integration. Also interference could severely inhibit the response of the internal standard ion. This secondary ion must also be used to generate new calibration response factors.

11.10 Library search for tentatively identified compounds.

11.10.1 If a library search is requested, the analyst must perform a forward library search of NBS or NIST98 mass spectral library to tentatively identify 15 non-reported compounds.

11.10.2 Guidelines for making tentative identification are listed below.

11.10.2.1 These compounds must have a response greater than 10 % of the nearest internal standard. The response is obtained from the integration for peak area of the Total Ion Chromatogram (TIC).

11.10.2.2 The search is to include a spectral printout of the 3 best library matches for a particular substance. The results are to be interpreted by analyst.

11.10.2.3 Molecular ions present in the reference spectrum must be present in the sample spectrum.

11.10.2.4 Relative intensities of major ions in the reference spectrum (ions > 10 % of the most abundant ion) must be present in the sample spectrum.

11.10.2.5 The relative intensities of the major ions must agree within ± 20 %. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must between 30 and 70%).

11.10.2.6 Ions present in the sample spectrum but not in the reference spectrum must be reviewed for possible background contamination or presence of coeluting compounds.

11.10.2.7 Ions present in the reference spectrum but not in the sample spectrum must be verified by performing further manual background subtraction to eliminate the interference created by coeluting peaks and/or matrix interference.

11.10.2.8 Quantitation of the tentatively identified compounds is obtained from the total ion chromatogram based on a response factor of 1 and is to be tabulated on the library search summary data sheet.

11.10.2.9 The resulting concentration must be reported indicating: (1) that the value is estimate, and (2) which internal standard was used to determine concentration. Quantitation is performed on the nearest internal standard.

11.11 An instrument blank is a system evaluation sample containing lab reagent grade water with internal standards and surrogates. An instrument blank is used to remove and or evaluate residual carryover from high level standards, spike samples and field samples. Since target compound lists have expanded to overlap some volatile and semi-volatile compounds, instrument blanks are necessary to remove carryover contamination.

11.11.1 The compounds that may exhibit carryover for this method are listed in Table 11.

11.11.2 If instrument blanks following a standard or spike sample exhibits carrry-over effect, then any samples that show the same carryover profile, after a comparable concentration must be considered suspect and rerun for confirmation. For example, if an instrument blank has 1ppb detected after a 200ppb standard, then any sample following a sample containing 200ppb or above of the same compound must be confirmed for possible carryover.

11.11.3 If an Instrument Blank(s) was run following suspect high concentration samples and it exhibits the same carryover profile after a comparable concentration must be considered suspect and rerun for confirmation.

11.11.4 In some cases, several instrument blanks may have to be run to eliminate contamination from over loaded samples.

11.11.5 The analytical system is considered free of carryover, when no target analytes can be detected above the MDL.

11.12 Selected Ion Monitoring (SIM) Option Selected Ion Monitoring (SIM) Option

11.12.1 Instrument Set-Up: Modify the method for SIM analysis and define ion groups with retention times, ions and dwell times to include base peak ion for the target compounds of interest, surrogates, and internal standards (Table 2a.) Select a mass dwell time of 50 milliseconds for all compounds.

11.12.2 Calibration: Calibrate the mass spectrometer in the selected ion monitoring mode using 6 calibration standards of 2, 5, 10, 20, 50, 100, 200 ug/l. Spike each standard with the SIM specific internal standard solution at 4ug/ml. Calculate individual response factors and response factor RSDs. The initial calibration must meet the criteria in section 10.2.10.

11.12.3 Initial Calibration Verification. Verify the initial calibration after its completion using a 50 ug/l calibration standard purchased or prepared from a second standards reference materials source. The initial calibration verification must meet the criteria of Section 10.3.

11.12.4 Continuing Calibration Verification. Verify the initial calibration every 12 hours using a 50 ug/l calibration. The continuing calibration verification must meet the criteria of Section 10.4.

11.12.5 Surrogate Standard Calculation.. Report surrogate spike accuracy for the surrogates spiked for the full scan GC/MS analysis.

12.0 QUALITY CONTROL

12.1 QC Requirements Summary

BFB	Beginning of the analytical shift and every 12 hours
ICV - Second Source Calibration Check Standard	Following initial calibration
Calibration Verification Standard	Every 12 hours
Method Blank	Every 12 hours
Blank Spike	One per analytical batch*
Matrix Spike	One per analytical batch*
Matrix Spike Duplicate	One per analytical batch*
Surrogate	Every sample and standard
Internal Standard	Every sample and standard

*The maximum number of samples per analytical batch is twenty.

12.2 Daily GC/MS Performance Check - BFB

12.2.1 Refer to Section 11.3.

12.3 Second Source Calibration Check Standard

12.3.1 Refer to Section 10.3.

12.3.2 Calibration Verification Standard

12.3.3 Refer to Section 10.4.

12.5 Method Blank

12.5.1 Refer to Section 11.5.

12.6 Blank Spike

12.6.1 Refer to Section 11.6.

12.7 Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

12.7.1 One sample is selected at random from each analytical batch of similar matrix types and spiked in duplicate to check precision and accuracy.

12.7.2 Assess the matrix spike recoveries (Section 13.5) and relative percent difference (RPD) (Section 13.6) against the control limits..

12.7.3 If the matrix spike recoveries do not meet the criteria, check the blank spike recovery to verify that the method is in control. If the blank spike did not meet criteria, the method is out of control for the parameter in question and must be reanalyzed or qualified with an estimate of potential bias. Otherwise, matrix interference is assumed and the data is reportable. No further corrective action is required.

12.8 Surrogates

12.8.1 All standards, blanks, samples, and matrix spikes contain surrogate compounds, which are used to monitor method performance. If the recovery of any surrogate compound does not meet the control limits, the result must be flagged and:

12.8.1.1 The calculation must be checked.

12.8.1.2 The sample must be reanalyzed if the recovery of any one surrogate is out of control limit.

12.8.2 If the sample exhibits matrix interference, defined as excessive signal levels from target or non-target interfering peaks. In this case, reanalysis may not be required following team leader/manager approval.

12.8.3 If surrogate recoveries are acceptable upon reanalysis, the data from the reanalysis is reported. If the reanalysis date did not meet the hold time, then both sets of data must be submitted with the reanalysis reported.

12.8.4 If surrogates are still outside control limits upon reanalysis, then both sets of data must be submitted with the first analysis reported.

12.9 Internal Standard

12.9.1 Retention time for all internal standards must be within ± 30 seconds of the corresponding internal standard in the latest continuing calibration or 50 µg/l standard of initial calibration.

12.9.2 The area (Extracted Ion Current Profile) of the internal standard in all analyses must be within 50 to 200 % of the corresponding area in the latest calibration standard (12 hr. time period).

12.9.3 If area of internal standard does not meet control limits, the calculations must be checked. If a problem is not discovered, the sample must be reanalyzed.

12.9.4 If areas are acceptable upon reanalysis, the reanalysis data is reported.

12.9.5 If areas are unacceptable upon reanalysis, then both sets of data are submitted with the original analysis reported.

13.0 CALCULATION

13.1 Response Factor (RF)

$$RF = \frac{As \times Cis}{Ais \times Cs}$$

where:
As = Area of the characteristic ion for the compound being measured.
Ais = Area of the characteristic ion for the specific internal standard.
Cs = Concentration of the compound being measured (ug/l).
Cis = Concentration of the specific internal standard (ug/l).

13.2 Percent Relative Standard Deviation (% RSD)

$$\%RSD = \frac{SD}{RFav} \times 100$$

where:
SD = Standard Deviation
RFav = Average response factor from initial calibration.

13.3 Percent Difference (%D)

$$\%D = \frac{(RFav - RFcv)}{RFav} \times 100$$

where:
RFcv = Response factor from Calibration Verification standard.
RFav = Average response factor from initial calibration.

13.4 Concentration (Conc.)

<u>For water:</u>

$$Conc.\ (\mu g/l) = \frac{Ac \times Cis \times Vp}{Ais \times RF \times Vi}$$

<u>For soil/sediment low level</u> (on a dry weight basis):

$$Conc.\ (\mu g/kg) = \frac{Ac \times Cis \times Vp}{Ais \times RF \times Ws \times M}$$

<u>For soil/ sediment medium level (on a dry weight basis)</u>

$$Conc.\ (\mu g/kg) = \frac{Ac \times Cis \times Vp \times Vt}{Ais \times RF \times Vme \times Ws \times M}$$

Where:
Ac = Area of characteristic ion for compound being measured.
Ais = Area of characteristic ion for internal standard.
Cis = Concentration of internal standard
RF = Response factor of compound being measured(from initial calibration)
Vi = Initial volume of water purged (ml)
Vp = 5 ml (Total Purge Volume)
Vme = Volume of Methanol aliquot
Vt = Ml Solvent + ((100-% solid)/100 x Ws)
Ws = Weight of sample extracted (g).
M = (100 - % moisture in sample) / 100 or % solids / 100

13.5 Percent Recovery (% R)

$$\% R = \frac{\text{Concentration found}}{\text{Concentration spiked}} \times 100$$

13.6 Relative Percent Difference (RPD)

$$RPD = \frac{|MSC - MSDC|}{(1/2)(MSC+MSDC)} \times 100$$

Where:
MSC = Matrix Spike Concentration
MSDC = Matrix Spike Duplicate Concentration

13.7 Linear regression by the internal standard technique.

$$C_s = \left(\frac{\frac{A_s}{A_{is}} - b}{A} \right) \times C_{is}$$

Where:
Cs = concentration of target analyte
As = Area of target analyte
Cis = concentration of the internal standard
b = Intercept
a = slope of the line

$$a = \frac{N \Sigma xy - \Sigma x \Sigma y}{N \Sigma x^2 - (\Sigma x)^2}$$

$$b = \frac{\Sigma y - a \Sigma x}{N}$$

N = number of points
x = amount of analyte
y = response of instrument

13.8 Correlation Coefficient

$$r = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2 \Sigma(y - \bar{y})^2}}$$

Where r = correlation coefficient
x = amount of analyte
y = response of instrument

$\bar{x}$ = average of x values

$\bar{y}$ = average of y values

14.0 DOCUMENTATION

14.1 The Analytical Logbook records the analysis sequence; the logbook must be completed daily. Each instrument will have a separate logbook.

14.1.1 If samples require reanalysis, a brief explanation of the reason must be documented in the Comments section.

14.2 Standards Preparation Logbook must be completed for all standard preparations. All information must be completed; the page must be signed and dated by the appropriate person.

14.2.1 The Accutest lot number must be cross-referenced on the standard vial.

14.3 Instrument Maintenance Logbook must be completed when any type of maintenance is performed on the instrument. Each instrument has a separate log.

14.4 Any corrections to laboratory data must be done using a single line through the error. The initials of the person and date of correction must appear next to the correction.

14.5 Supervisory (or peer) personnel must routinely review (at least once per month) all laboratory logbooks to ensure that information is being recorded properly. Additionally, the maintenance of the logbooks and the accuracy of the recorded information must also be verified during this review.

15.0 POLLUTION PREVENTION & WASTE MANAGEMENT

15.1 Users of this method must perform all procedural steps in a manner that controls the creation and/or escape of wastes or hazardous materials to the environment. The amounts of standards, reagents, and solvents must be limited to the amounts specified in this SOP. All safety practices designed to limit the escape of vapors, liquids or solids to the environment must be followed. All method users must be familiar with the waste management practices described in section 15.2.

15.2 Waste Management. Individuals performing this method must follow established waste management procedures as described in the waste management SOP, EHS004. This document describes the proper disposal of all waste materials generated during the testing of samples as follows:

15.2.1 Non hazardous aqueous wastes

15.2.2 Hazardous aqueous wastes

15.2.3 Chlorinated organic solvents

15.2.4 Non-chlorinated organic solvents

15.2.5 Hazardous solid wastes

15.2.6 Non-hazardous solid wastes

Table 1. TARGET COMPOUNDS		
Acetone	1,4-Dichlorobenzene	Methylene Bromide
Acetonitrile	Dichlorodifluoromethane	Methylene Chloride
Acrolein	1,1-Dichloroethane	1-Methylnaphthalene (1)
Acrylonitrile	1,2-Dichloroethane	2-Methylnaphthalene (1)
Allyl Chloride	1,1-Dichloroethene	Naphthalene
Benzene	cis-1,2-Dichloroethene	2-Nitropropane (1)
Benzyl chloride	trans-1,2-Dichloroethene	Pentachloroethane
Bromobenzene	1,2-Dichloropropane	Propionitrile
Bromochloromethane	1,3-Dichloropropane	Propyl Acetate (1)
Bromodichloromethane	2,2-Dichloropropane	n-Propylbenzene
Bromoform	1,1-Dichloropropene	Styrene
Bromomethane	cis-1,3-Dichloropropene	Tert Butyl Alcohol
2-Butanone (MEK)	trans-1,3-Dichloropropene	tert-Amyl Methyl Ether
Butyl Acetate (1)	1,4-Dioxane	tert-Butyl Ethyl Ether
n-Butyl Alcohol (1)	Epichlorohydrin (1)	1,1,1,2-Tetrachloroethane
n-Butylbenzene	Ethyl Acetate	1,1,2,2-Tetrachloroethane
sec-Butylbenzene	Ethyl Ether	Tetrachloroethene
tert-Butylbenzene	Ethyl Methacrylate	Tetrahydrofuran
Carbon Disulfide	Ethylbenzene	Toluene
Carbon Tetrachloride	p-Ethyltoluene (1)	trans-1,4-Dichloro-2-Butene
Chlorobenzene	Freon 113	1,2,3-Trichlorobenzene
Chlorodifluoromethane (1)	Heptane (1)	1,2,4-Trichlorobenzene
Chloroethane	Hexachlorobutadine	1,1,1-Trichloroethane
2-Chloroethyl Vinyl Ether	Hexachloroethane	1,1,2-Trichloroethane
Chloroform	Hexane (1)	Trichloroethene
Chloromethane	2-Hexanone	Trichlorofluoromethane
Chloroprene (2-chloro-1,3-butadiene)	Iodomethane (Methy iodide)	1,2,3-Trichloropropane
o-Chlorotoluene	IsoAmyl Alcohol (1)	1,2,4-Trimethlylbenzene
p-Chlorotoluene	Isobutyl Alcohol	1,3,5-Trimethylbenzene
Cyclohexane (1)	Isopropyl Acetate (1)	2,2,4 Trimethylpentane
Cyclohexanone	Isopropylbenzene	Vinyl Acetate
di-Isobutylene (1)	p-Isopropyltoluene	Vinyl Chloride
di-Isopropyl Ether	Methacrylonitrile	Vinyltoluene (1)
1,2-Dibromo-3-Chloropropane	Methyl Acetate (1)	m,p-Xylene
Dibromochloromethane	3 Methyl-1-Butanol (1)	o-Xylene
1,2-Dibromoethane	Methyl Tert Butyl Ether	Ethanol
Dibromomethane (1)	Methylcyclohexane	Methyl Acrylate
1,2-Dichlorobenzene	Methyl Methacrylate	1-chloro-1,1-difluoroethane
1,3-Dichlorobenzene	4-Methyl-2-pentanone (MIBK)	1,1,1-trifluoroethane
1,1-dichloro-1-fluroethane	2,2-Dichloropropane	

(1) NELAC Accreditation is not offered for this compound. Results may not be useable for regulatory purposes in States where this accreditation option is not offered.

Table 2. RECOMMENDED OPERATING CONDITION	
Gas Chromatograph/ Mass Spectrometer	
Carrier Gas (linear velocity)	Helium at *30 cm/sec
Mass range	35 – 300 amu
Electron Energy	70 volts (nominal)
Scan time	not to exceed 2 sec. per scan
Injection port temperature	200 - 225 °C
Source temperature	200 - 250 °C
Transfer line temperature	220 - 280 °C
Analyzer temperature	220 - 250 °C
Gas Chromatograph temperature program*	
Initial temperature	*40 °C
Time 1	*3 minutes
Column temperature rate	*8 degrees/min.
Final temperature	*220 °C.- 240 °C
Total run time	*25 – 50 mins
Purge and Trap Device	
Purge time	9 min. (at 40 °C for low-level soil) SIM – 6 min @ 50 °C
Desorb**	4 min. at 190 °C
Bake	>10 min. at 210 °C
Transfer line	100 - 130 °C
Valve temperature	approx. transfer line temperature

* Parameter modification allowed for performance optimization provided operational and QC criteria is achieved.(must be approved by team leader/manager)

** Desorb time may require performance optimum between 2.0 and 4.0 minutes as dictated by trap manufacturers specifications or instrument characteristics

Table 2a – SIM Group Parameters		
Group No.	**Retention Time (minutes)**	**Ions**
1	0 – 10.8	58, 65, 66, 88
2	10.8 – 16.0	95, 174, 176, 98, 100, 70

Table 3. BFB KEY IONS AND ION ABUNDANCE CRITERIA	
Mass	**Ion Abundance Criteria**
50	15-40% of mass 95
75	30-60% of mass 95
95	Base peak, 100% relative abundance
96	5-9% of mass 95
173	< 2% of mass 174
174	> 50% of mass 95
175	5-9% of mass 174
176	>95% and <101% of mass 174
177	5-9% of mass 176

Table 4. INTERNAL STANDARD QUANTITION IONS	
Internal Standard	**Primary/Secondary Ions**
1,4-Difluorobenzene	114 / 63,88
Chlorobenzene-d5	117 / 82, 119
Pentafluorobenzene	168
1,4-Dichlorobenzene-d4	152 / 115, 150
Tert Butyl Alcohol-d9	65/66
Internal Standard (SIM)	
Tert Butyl Alcohol-d9	65/66

Table 5. SURROGATE QUANTITION IONS	
Surrogate Compound	**Primary/Secondary Ions**
1,2 Dichloroethane – d_4	102
Dibromofluoromethane	113
Toluene-d8	98
4-Bromofluorobenzene	95 / 174, 176

Table 7. Volatile Internal Standards with Corresponding Analytes Assigned for Quantitation					
Analyte	**Primary Characteristic Ion**	**Secondary Characteristic Ion (s)**	**Analyte**	**Primary Characteristic Ion**	**Secondary Characteristic Ion (s)**
Tert Butyl Alcohol-d9			Dibromomethane	93	95, 174
Tert Butyl alcohol	59	57	Di-isobutylene	57	
Ethanol	45	46	Epichlorohydrin (pp)	57	57, 49, 62, 51
Pentafluorobenzene			Ethyl methacrylate	69	69, 41, 99, 86, 114
1,1,1-Trichloroethane	97	99, 61	Heptane	57	
1,1-Dichlorethane	63	65, 83	Hexane	56	
1,1-Dichloroethene	96	61, 63	Isopropyl acetate	43	
2,2-Dichloropropane	77	97	Methyl cyclohexane	83	
2-Butanone (pp)	72	43, 72	Methyl methacrylate	69	69, 41, 100, 39
Acetone (pp)	58	43	n-Butanol (pp)	56	41
Acetonitrile (pp)	41	41, 40, 39	Propyl Acetate	43	
Acrolein (pp)	56	55,58	tert Amyl Methyl Ether	73	
Acrylonitrile (pp)	53	52, 51	Toluene	92	91
Allyl Chloride	41		Toluene-d_8	98	
Bromochloromethane	128	49, 130	trans-1,3-Dichloropropene	75	77, 39
Bromomethane	94	96	Trichloroethene	95	97, 130, 132
Carbon disulfide	76	78			
Chlorodifluouromethane	51	86	**Chlorobenzene-d5**	117	82,119
Chloroethane	64	66	1,1,1,2-Tetrachloroethane	131	133, 119
Chloroform	83	85	1,2-Dibromoethane	107	109, 188
Chloromethane	50	52	1,3-Dichloropropane	76	78
Chloroprene	53	53, 88, 90, 51	Bromoform	173	175, 254
cis-1,2-Dichloroethene	96	61, 98	Butyl Acetate	56	
Cyclohexane	84		Chlorobenzene	112	77, 114
Dibromofluoromethane	113		Dibromochloromethane	129	127
Dichlorodifluoromethane	85	87	Ethylbenzene	91	106
Dichloroethane-d_4	102	65	m-Xylene	106	91
Diethyl ether	74	45, 59	o-Xylene	106	91

Table 7. Volatile Internal Standards with Corresponding Analytes Assigned for Quantitation

Analyte	Primary Characteristic Ion	Secondary Characteristic Ion (s)	Analyte	Primary Characteristic Ion	Secondary Characteristic Ion (s)
Diisopropyl ether	45	102	p-Xylene	106	91
Ethyl acetate (pp)	88	43, 45, 61	Styrene	104	78
Ethyl tert Butyl Ether	59		Tetrachloroethene	164	129,131,166
Freon 113	151				
Iodomethane	142	127, 141	**1,4 Dichlorobenzene-d4**	152	115,150
Isobutyl alcohol (pp)	43	43, 41, 42, 74	1,1,2,2-Tetrachloroethane	83	131, 85
Methacrylonitrile (pp)	41	41, 67, 39, 52, 66	1,2,3-Trichlorobenzene	180	182, 145
Methyl Acetate	43	74	1,2,3-Trichloropropane	75	77
Methylene chloride	84	86, 49	1,2,4-Trichlorobenzene	180	182, 145
Methyl-t-butyl ether	73	57	1,2,4-Trimethylbenzene	105	120
Propionitrile (ethyl cyanide)(pp)	54	54, 52, 55, 40	1,2-Dibromo-3-chloropropane(pp)	75	155, 157
Tetrahydrofuran	42		1,2-Dichlorobenzene	146	111,148
trans-1,2-Dichloroethene	96	61, 98	1,3,5-Trimethylbenzene	105	120
Trichlorofluoromethane	151	101, 153	1,3-Dichlorobenzene	146	111, 148
Vinyl acetate	43	86	1,4-Dichlorobenzene	146	111, 148
Vinyl chloride	62	64	2-Chlorotoluene	91	126
Methyl Acrylate	55	85	4-Bromofluorobenzene	95	174, 176
2,2,4 Trimethylpentane	57				
1-chloro-1, 1-difluoroethane	65	45,85			
1,1,1-trifluoroethane	69	69,45			
1,1-dichloro-1-fluroethane	81	45,61			
2,2-Dichloropropane	77	97,79			
1,4 Difluorobenzene	114	63, 88	4-Chlorotoluene	91	126
1,1,2-Trichloroethane	83	97, 85	Benzyl chloride	91	91, 126, 65, 128
1,1-Dichloropropene	75	110, 77	Bromobenzene	156	77, 158
1,2 Dichloroethane	62	98	Cyclohexanone	55	
1,2 Dichloropropane	63	112	Hexachlorobutadiene	225	223, 227
1,4-Dioxane (pp)	88	88, 58, 43, 57	Hexachloroethane (pp)	201	166, 199, 203
2-Chloroethyl-vinylether (pp)	63	65, 106	Isopropylbenzene	105	120
2 – Hexanone	43	58,57,100	Naphthalene	128	-
2-Hexanone (pp)	43	58, 57, 100	n-Butylbenzene	91	92, 134
2-Nitropropane	46	-	n-Propylbenzene	91	120
3 Methyl –1 butanol	55		Pentachloroethane (pp)	167	167,130,132,165,169
4-Methyl-2-pentanone (pp)	100	43, 58, 85	p-isopropyltoluene	119	134,91
Benzene	78	-	sec-Butylbenzene	105	134
Bromodichloromethane	83	85, 127	tert-Buytlbenzene	119	91, 134
Carbon tetrachloride	117	119	trans-1,4-Dichloro-2-butene (pp)	53	88, 75
cis-1,3-Dichloropropene	75	77, 39			
Methylcyclohexane	83		**(pp) = Poor Purging Efficiency**		

Table 7-1 SIM - Volatile Internal Standards with Corresponding Analytes Assigned for Quantitation

Analyte	Primary Characteristic Ion	Secondary Characteristic Ion (s)
Tert Butyl Alcohol-d9		
1,4-Dioxane	88	58
Toluene –d8	98	100
4-BFB	95	174, 176

Table 8. STANDARDS PREPARATION

A) Internal standard and Surrogate mixtures:

	a) 25/250 µg/ml	b) 250/2,500 µg/ml
Internal Standard Mixture (2,000 µg/ml)	1.25 ml	1 .25 ml
Tert Butyl Alcohol-d_9 (50,000 µg/ml)	0.5 ml	0.5 ml
Surrogate Mixture (2,500 µg/ml)	1 ml	1 ml
Methanol	97.25 ml	7.25 ml
Total	100 ml	10 ml

- 25/250 µg /ml internal standard and surrogate mixture: The mixture is prepared by measuring 1.25ml of 2,000 µg /ml Internal Standard Mixture (Ultra or equivalent), 0.5 ml of 50,000 µg/ml TBA-d_9 (Absolute or equivalent), 1 ml of 2,500 µg /ml Method 8260A Surrogate Standard Mixture (Ultra or equivalent) and bringing to 100 ml with methanol.

- 250/2,500 µg /ml internal standard and surrogate mixture: The mixture is prepared by measuring 1.25 ml of 2,000 µg /ml Internal Standard Mixture (Ultra or equivalent), 0.5 ml of 50,000 µg/ml TBA-d_9 (Absolute or equivalent), 1 ml of 2,500 µg /ml Method 8260A Surrogate Standard Mixture (Ultra or equivalent) and bringing to 10 ml with methanol.

- 100 µg/ml surrogate mixture: The solution is prepared at 100 µg/ml by measuring 0.4 ml of 2,500 µg/ml Method 8260A Surrogate Standard Mixture (Ultra or equivalent) and bringing to 10 ml with methanol.

- 25/250 µg /ml internal standard mixture: The solution is prepared by measuring 1.25 ml of 2,000 µg /ml Internal Standard Mixture (Ultra or equivalent), 0.5 ml of 50,000 µg/ml TBA-d_9 (Absolute or equivalent), and bringing to 100 ml with methanol.

- 250/2,500 µg /ml internal standard mixture: The solution is prepared by measuring 1.25 ml of 2,000 µg /ml Internal Standard Mixture (Ultra or equivalent), 0.5 ml of 50,000 µg/ml TBA-d_9 (Absolute or equivalent), and bringing to 10 ml with methanol.

B) Bromofluorobenzene (BFB):

	a) 25 µg/ml	b)) 250 µg/ml
BFB (25,000 µg/ml)	0.1 ml	0.1 ml
Methanol	99.9 ml	9.9 ml
Total	100 ml	10 ml

- 25 µg /ml solution for direct injection: The BFB is prepared at 25 µg /ml by measuring 0.1 ml of 25,000 µg /ml (Absolute Stock or equivalent) and diluting to 100 ml with methanol.

- 250 µg /ml solution for purging: The BFB is prepared at 250 µg /ml by measuring 0.1 ml of 25,000 µg /ml (Absolute Stock or equivalent) and diluting to 10 ml with methanol.

Table 8. STANDARD PREPARATION (Continued)

C) Secondary dilution standards:

2nd Dilution Standards	Stock Solution	Concentration (µg/ml)	Volume Added (µl)	Final Volume in Methanol (ml)	Final Concentration (µg/ml)
V8260 Mixture	EPA Method 524.2 Volatiles	2,000	2,500	50	100
	Acrolein	Neat (90%)	66.2		1,000
	Acrylonitrile*	Neat	25		500+
	Propionitrile**	Neat	58.9		1,000++
	Di-iso Butylene	Neat	7.1		100
	Cyclohexane	Neat	6.5		100
	Cyclohexanone	Neat	52.9		1,000
V8260 Custom Mixture	Custom Volatiles Mix A	2,000	2,500	50	100
	Custom Volatiles Mix B	2,000 -100,000	2,500		100 - 5,000
	Epichlorohydrin	Neat	21.4		500
	Iso-Amyl alcohol	Neat	125		2,000
	2-Chloroethyl vinyl ether	Neat	20.1		500
	Ethyl tert-butyl ether	Neat	6.8		100
	Tert-Amyl methyl ether	Neat	6.56		100
	Benzyl chloride	Neat	4.6		100
Gas Mixture	VOC Gas Mixture	2,000	1,000	20	100

- 100 µg /ml V8260 mixture: The mixture is prepared at 100 µg /ml by measuring 2 ml of 2,000 µg /ml EPA Method 524.2 Volatiles stock standard, appropriate amount of some neat compounds, and bringing to 50 ml with methanol.
  * Acrylonitrile = 400 µg /ml (Neat) + 100 µg /ml (EPA Method 524.2 Volatiles)
  ** Propionitrile = 900 µg /ml (Neat) + 100 µg /ml (EPA Method 524.2 Volatiles)

- 100 µg /ml V8260 custom mixture: The mixture is prepared at 100 - 5,000 µg /ml by measuring 2.5ml of 2,000 µg /ml Custom Volatiles Mix A, 2.5 ml of 2,000 - 100,000 µg/ml Custom Volatiles Mix B, appropriate amount of some neat compounds, and bringing to 50 ml with methanol.

- 100 µg /ml gas mixture ***: The mixture is prepared at 100 µg /ml by measuring 1 ml of 2,000 µg /ml stock standard and bring to 20 ml with methanol.
  ******* Gas mixture must be prepared weekly.

Table 8. STANDARD PREPARATION (Continued)

D).1 Initial Calibration Standards: using DI water bring to 50 ml final volume: all mixtures used must be **secondary dilution** standards at **100 ppm**.

Standard and Surrogate Concentration	V8260 Mix (100 ppm)	V8260 Custom Mix (100 ppm)	Gas compound Mix (100 ppm)	Surrogate Mix (100ppm)
1 ppb	0.5 µl	0.5 µl	0.5 µl	0.5 µl#
2 ppb *	1.0 µl	1.0 µl	1.0 µl	1.0 µl#
5 ppb	2.5 µl	2.5 µl	2.5 µl	2.5 µl#
10 ppb *	5 µl	5 µl	5 µl	5 µl#
20 ppb	10 µl	10 µl	10 µl	10 µl#
50 ppb	25 µl	25 µl	25 µl	25 µl#
100 ppb	50 µl	50 µl	50 µl	50 µl#
200 ppb	100 µl	100 µl	100 µl	100 µl#
300 ppb *	150 µl	150 µl	150 µl	150 µl#
400 ppb *	200 µl	200 µl	200 µl	200 µl#

* depending upon the instrument.
\# See Section 10.2.2.1 for correction factor.

- When calibrating for Method 5035 low-level soil samples, add 1g of sodium bisulfate to the 40-ml vial before aliquot 5 ml of each standard into vial. This is equivalent to the amount of sodium bisulfate added to the samples and will maintain a consistent purging efficiency of the compounds.

D).2 Initial Calibration Standards for 1,4-Dioxane using SIMS

Standard and Surrogate Concentration (ppb)	1,4-Dioxane Solution (100ppm)	Surrogate Mix (100ppm)	DI Water – Final Volume (ml)
2	2 µl	1 µl	100
5	5 µl	2 µl	100
25	25 µl	5 µl	100
50	25 µl	2.5 µl	50
100	50 µl	5 µl	50
200	100 µl	10 µl	50
400	200 µl	20 µl	50

Table 8. STANDARD PREPARATION (Continued)

E) Continuing Calibration Standard: using DI water bring to 50 ml final volume: All mixtures used are secondary dilution standards at 100 ppm.

Concentration	V8260 Mix (100 ppm)	V8260 Custom Mix (100 ppm)	Gas compound Mix (100 ppm)
50 ppb	25 µl	25 µl	25 µl

- When calibrating for Method 5035 low-level soil samples, add 1g of sodium bisulfate to the 40-ml vial before aliquot 5 ml of the continuing calibration standard into vial. This is equivalent to the amount of sodium bisulfate added to the samples and will maintain a consistent purging efficiency of the compounds.

F) Blank Spike (BS): using DI water bring to 50 ml final volume: All mixtures used are 100 ppm secondary dilution standards.

Concentration	V8260 Mix (100 ppm)	V8260 Custom Mix (100 ppm)	Gas compound Mix (100 ppm)
50 ppb	25 ul	25 ul	25 ul

For lower detection level required (test code: V8260LL)

Concentration	V8260 Mix (100 ppm)	V8260 Custom Mix (100 ppm)	Gas compound Mix (100 ppm)
20 ppb	10 ul	10 ul	10 ul

- When calibrating for Method 5035 low-level soil samples, add 1g of sodium bisulfate to the 40-ml vial before aliquot 5 ml of the blank spike into vial. This is equivalent to the amount of sodium bisulfate added to the samples and will maintain a consistent purging efficiency of the compounds.

Table 9. GUIDELINE FOR DILUTION PREPARATION

Water Sample

Dilution	Sample amount taken	Final volume A (volumetric)	Take from final volume A	Final volume B (volumetric)
1:2	25 ml	50 ml		
1:5	10 ml	50 ml		
1:10	5 ml	50 ml		
1:20	2.5 ml	50 ml		
1: 25	2 ml	50 ml		
1:50	1 ml	50 ml		
1:100	0.5 ml	50 ml		
1:200	250 µl	50 ml		
1:250	200 µl	50 ml		
1:500	100 µl	50 ml		
1:1000	50 µl	50 ml		
1:2000	25 µl	50 ml		
1:2500	20 µl	50 ml		
1:5000	10 µl	50 ml		
1:10000	0.5 ml	50 ml	0.5 ml	50 ml
1:20000	0.5 ml	50 ml	250 µl	50 ml
1:25000	0.5 ml	50 ml	200 µl	50 ml
1:50000	0.5 ml	50 ml	100 µl	50 ml
1:100000	0.5 ml	50 ml	50 µl	50 ml

Soil-Low level (Non-Encore sample)

Dilution	Sample amount taken	Final volume
1:2	2.5 gram	5 ml
1:5	1 gram	5 ml
1:10	0.5 gram	5 ml

Soil-medium level

Additional Dilution	Sample in Methanol amount taken	Final volume (volumetric)
1:1	1 ml	50 ml
1:2	0.5 ml	50 ml
1:5	200 µl	50 ml
1:10	100 µl	50 ml
1:20	50 µl	50 ml
1: 25	40 µl	50 ml
1:50	20 µl	50 ml
1:100	10 µl	50 ml
1:200	5 µl	50 ml
1:250	4 µl	50 ml
1:500	2 µl	50 ml

Table 10. REPORTING LIMITS

Compound	Water	Soil	Compound	Water	Soil
	µg/l	µg/kg		µg/l	µg/kg
Chlorodifluoromethane	5	5	Chloroform	1	5
Dichlorodifluoromethane	5	5	Freon 113	5	5
Chloromethane	1	5	Methacrylonitrile	10	10
Vinyl chloride	1	5	Butyl Acetate	5	5
Bromomethane	2	5	1,1,1-Trichloroethane	1	5
Chloroethane	1	5	Heptane	5	5
Trichlorofluoromethane	5	5	n-Propyl acetate	5	5
Ethyl ether	5	5	2-Nitropropane	10	10
Acrolein	50	50	Tetrahydrofuran	10	10
1,1-Dichloroethene	1	5	2-Chloroethyl Vinyl Ether	10	25
Tertiary butyl alcohol	25	25	n-Butyl alcohol	250	250
Acetone	10	10	Cyclohexane	5	5
Methyl acetate	5	5	Carbon Tetrachloride	1	5
Allyl chloride	5	5	1,1-Dichloropropene	5	5
Acetonitrile	100	100	Isopropyl Acetate	5	5
Iodomethane	2	5	Benzene	1	1
Iso-butyl alcohol	50	50	1,2-Dichloroethane	1	1
Carbon disulfide	2	5	Trichloroethene	1	5
Methylene chloride	2	5	Methyl methacrylate	10	10
Methyl tert butyl ether	1	1	1,2 Dichloropropane	1	5
Trans-1,2-Dichloroethene	1	5	Di-isobutylene	5	5
Di-isopropyl ether	5	5	Dibromomethane	5	5
2-Butanone	10	10	1,4 Dioxane	125	125
1,1-Dichloroethane	1	5	Bromodichloromethane	1	5
Hexane	5	5	cis-1,3-Dichloropropene	1	5
Chloroprene	5	5	4-Methyl-2-pentanone	5	5
Acrylonitrile	50	50	Toluene	1	1
Vinyl acetate	10	10	trans-1,3-Dichloropropene	1	5
Ethyl acetate	5	5	Ethyl methacrylate	10	10
2,2-Dichloropropane	5	5	1,1,2-Trichloroethane	1	5
Cis-1,2-Dichloroethene	1	5	2-Hexanone	5	5
Bromochloromethane	5	5	Cyclohexanone	50	200

Table 10. REPORTING LIMITS (Continued)

Compound	Water	Soil	Compound	Water	Soil
	µg/l	µg/kg		µg/l	µg/kg
Tetrachloroethene	1	5	4-Chlorotoluene	5	5
1,3-Dichloropropane	5	5	1,3,5-Trimethylbenzene	2	5
Dibromchloromethane	1	5	tert-Butylbenzene	5	5
1,2-Dibromoethane	1	1	1,2,4 Trimethylbenzene	2	5
Chlorobenzene	1	5	sec-Butylbenzene	5	5
1,1,1,2-Tetrachloroethane	5	5	1,3-Dichlorobenzene	1	5
Ethylbenzene	1	1	p-Isopropyltoluene	5	5
M,p-Xylene	1	1	1,4-Dichlorobenzene	1	5
o-Xylene	1	1	1,2-Dichlorobenzene	1	5
Styrene	5	5	n-Butylbenzene	5	5
Bromoform	4	4	1,2-Dibromo-3-choropropane	10	10
Isopropylbenzene	2	5	1,2,4-Trichlorobenzene	2	5
Bromobenzene	5	5	Hexachlorobutadiene	5	5
1,1,2,2-Tetrachloroethane	1	5	Naphthalene	5	5
Trans-1,4-Dichloro-2-butene	5	5	1,2,3-Trichlorobenzene	5	5
1,2,3-Trichloropropane	5	5	Epichlorohydrin	100	100
n-Proplybenzene	5	5	3-Methyl-1-butanol	5	5
2-Chlorotoluene	5	5	Hexachloroethane	5	5
Ethanol	100	200	Methyl Acrylate	5	--
Benzyl Chloride	5	5	Methylcyclohexane	5	5
2,2,4 Trimethylpentane	5	5	1,1,1 trifluoroethane Freon 143a	5	10
1-chloro-1,1-difluoroethane Freon 142b	5	10	1,1-dichloro-1-fluoroethane Freon 141b	5	5

Table 11. COMPOUNDS THAT MAY EXHIBIT CARRYOVER

Compound
1,2,4-Trichlorobenzene
Hexachlorobutadiene
Naphthalene
1,2,3-Trichlorobenzene

Table 12 RECOMMENDED MINIMUM RELATIVE RESPONSE FACTOR CRITERIA FOR INITIAL AND CONTINUING CALIBRATION VERIFICATION

Compound	Minimum Response Factor	Typical Response Factor
Dichlorofluoromethane	0.100	0.327
Chloromethane	0.100	0.537
Vinyl chloride	0.100	0.451
Bromomethane	0.100	0.255
Chloroethane	0.100	0.254
Trichlorofuoromethane	0.100	0.426
1,1 Dichloroethene	0.100	0.313
Freon 113	0.100	0.302
Acetone	0.100	0.151
Carbon Disulfide	0.100	1.163
Methyl Acetate	0.100	0.302
Methylene chloride	0.100	0.380
trans-1,2 Dichloroethene	0.100	0.351
cis-1,2 Dichloroethene	0.100	0.376
Methyl tert-butyl Ether	0.100	0.847
1,1 Dichloroethane	0.200	0.655
2-Butanone	0.100	0.216
Chloroform	0.200	0.557
1,1,1 Trichloroethane	0.100	0.442
Cyclohexane	0.100	0.579
Carbon Tetrachloride	0.100	0.353
Benzene	.0.500	1.368
1,2 Dichloroethane	0.100	0.443
Trichloroethene	0.200	0.338
Methylcyclohexane	0.100	0.501
1,2-Dichloropropane	0.100	0.382
Bromodichloromethane	0.200	0.424
cis-1,3-Dichloropropene	0.200	0.537
trans-1,3 - Dichloropropene	0.100	0.515
4-Methyl-2-Pentanone	0.100	0.363
Toluene	0.400	1.577

1,1,2-Trichloroethane	0.100	0.518

Compound	Minimum Response Factor	Typical Response Factor
Tetrachloroethene	0.200	0.606
2-Hexanone	0.100	0.536
Dibromochloromethane	0.100	0.652
1,2 Dibromoethane	0.100	0.634
Chlorobenzene	0.500	1.733
Ethyl benzene	0.100	2.827
m,p-Xylene	0.100	1.080
o-Xylene	0.300	1.073
Styrene	0.300	1.916
Bromoform	.0100	0.413
Isopropylbenzene	0.100	2.271
1,1,2,2-Tetrachloroethane	0.300	0.782
1,3-Dichlorobenzene	0.600	1.408
1,4-Dichlorobenzene	0.500	1.427
1,2-Dichlorobenzene	0.400	1.332
1,2-Dibromom-3-chloropropane	0.050	0.129
1,2,4-Trichlorobenzene	0.200	0.806

Compound List Report
Product: V8260TCL20 TCL Volatile Organics
Matrix: AQ Aqueous

Jul 16, 2014 12:59 pm

Method List: VAIX8260 AQ
Report List: VTCL20 ALL
RL/MDL Factor: 1

Method Ref: SW846 8260B
VOA TCL List

LJ44686
LJ43234

Compound	CAS No.	RL	MDL	Units
Acetone	67-64-1	10	2.6	ug/l
Benzene	71-43-2	0.5	0.21	ug/l
Bromochloromethane	74-97-5	5	0.49	ug/l
Bromodichloromethane	75-27-4	1	0.28	ug/l
Bromoform	75-25-2	2	0.31	ug/l
Bromomethane	74-83-9	2	0.39	ug/l
2-Butanone (MEK)	78-93-3	10	2.5	ug/l
Carbon disulfide	75-15-0	2	0.5	ug/l
Carbon tetrachloride	56-23-5	1	0.24	ug/l
Chlorobenzene	108-90-7	1	0.27	ug/l
Chloroethane	75-00-3	1	0.56	ug/l
Chloroform	67-66-3	1	0.2	ug/l
Chloromethane	74-87-3	1	0.33	ug/l
Cyclohexane	110-82-7	5	0.37	ug/l
1,2-Dibromo-3-chloropropane	96-12-8	5	1.2	ug/l
Dibromochloromethane	124-48-1	1	0.25	ug/l
1,2-Dibromoethane	106-93-4	1	0.23	ug/l
1,2-Dichlorobenzene	95-50-1	1	0.16	ug/l
1,3-Dichlorobenzene	541-73-1	1	0.26	ug/l
1,4-Dichlorobenzene	106-46-7	1	0.24	ug/l
Dichlorodifluoromethane	75-71-8	5	0.73	ug/l
1,1-Dichloroethane	75-34-3	1	0.35	ug/l
1,2-Dichloroethane	107-06-2	1	0.3	ug/l
1,1-Dichloroethene	75-35-4	1	0.5	ug/l
cis-1,2-Dichloroethene	156-59-2	1	0.33	ug/l
trans-1,2-Dichloroethene	156-60-5	1	0.51	ug/l
1,2-Dichloropropane	78-87-5	1	0.43	ug/l
cis-1,3-Dichloropropene	10061-01-5	1	0.28	ug/l
trans-1,3-Dichloropropene	10061-02-6	1	0.32	ug/l
Ethylbenzene	100-41-4	1	0.4	ug/l
Freon 113	76-13-1	5	0.45	ug/l
2-Hexanone	591-78-6	5	1.7	ug/l
Isopropylbenzene	98-82-8	1	0.26	ug/l
Methyl Acetate	79-20-9	5	3.1	ug/l
Methylcyclohexane	108-87-2	5	0.22	ug/l
Methyl Tert Butyl Ether	1634-04-4	1	0.26	ug/l
4-Methyl-2-pentanone(MIBK)	108-10-1	5	1.1	ug/l
Methylene chloride	75-09-2	2	0.81	ug/l
Styrene	100-42-5	2	0.26	ug/l
1,1,2,2-Tetrachloroethane	79-34-5	1	0.39	ug/l
Tetrachloroethene	127-18-4	1	0.35	ug/l
Toluene	108-88-3	1	0.22	ug/l
1,2,3-Trichlorobenzene	87-61-6	5	0.26	ug/l
1,2,4-Trichlorobenzene	120-82-1	5	0.22	ug/l
1,1,1-Trichloroethane	71-55-6	1	0.32	ug/l
1,1,2-Trichloroethane	79-00-5	1	0.28	ug/l
Trichloroethene	79-01-6	1	0.25	ug/l
Trichlorofluoromethane	75-69-4	5	0.28	ug/l
Vinyl chloride	75-01-4	1	0.17	ug/l
m,p-Xylene		1	0.45	ug/l
o-Xylene	95-47-6	1	0.2	ug/l
Xylene (total)	1330-20-7	1	0.2	ug/l

52 compounds reported in list VTCL20

ACCUTEST LABORATORIES
STANDARD OPERATING PROCEDURE

Lab Manager: _____

QA Manager: _____

Effective Date: 10/14/13

Title: Air Analysis by TO-15

Reference: EPA TO-15 and TO15 NJDEP-LL

Revised Sections: 11.5.3, 11.5.4, 11.5.5

1.0 SCOPE AND APPLICATION

1.1 This method is for the analysis of volatile organics on whole ambient air samples collected in summa canisters. This procedure is applicable to all compounds listed under EPA method TO-15 as the cryofocusing technique can trap a wide range of polar and non-polar compounds.

2.0 METHOD SUMMARY

2.1 A whole air sample collected in a summa passivated canister or Restek "Silcocan", is concentrated by adsorption and cryofocusing and introduced into a GC/MS for target compound analysis.

2.2 The GC/MS is calibrated with a minimum 5 level curve with quantitation performed by internal standard technique. Standards are purchased as commercial certified gas standards and dynamically diluted into working calibration standards.

2.3 A nominal sample volume of 400cc is used and adjusted if necessary based on dilutions and/or canister pressurization. Air is drawn out of a canister and trapped on a glass bead trap, tenax trap and cyrofocused prior to introduction into the GC/MS. The GC oven is temperature programmed to separate the compounds of interest with detection by a mass selective detector.

2.4 This method is applicable to the compounds listed on Table 5 which, are routinely calibrated.

3.0 REPORTING LIMIT AND METHOD DETECTION LIMIT

3.1 Reporting Limit. The reporting limit for this method is established at the low calibration standard used in the analysis. Detected concentrations below these reporting limits cannot be reported without qualification. Total volatiles based on total peak areas as calibrated to the total area of pentane or heptane have a reporting limit of 10ppbv. See Table 5.

3.2 Method Detection Limit Study. Experimentally determine MDLs using the procedure specified in 40 CFR, Part 136, Appendix B.

3.2.1 Experimental MDLs must be determined annually for this method. The spike concentration must be at or below the reporting limit.

3.2.2 MDL studies are to be performed with volumes of spiked zero air that is routinely analyzed for live samples (i.e. 400cc).

3.2.3 Process all raw data for the replicate analysis in each MDL study. Forward the processed data to the QA group for archiving.

4.0 DEFINITIONS

CALIBRATION FACTOR (CF) - a measure of the gas chromatographic response of a target analyte to the mass injected. The calibration factor is analogous to the Relative Response Factor (RRF) used in the Volatile and Semivolatile fractions.

CONTINUING CALIBRATION - analytical standard run every 24 hours to verify the initial calibration of the system.

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the mass spectrometer to the target compounds.

MATRIX DUPLICATE - a second aliquot of the same matrix as the sample analyzed in order to determine the precision of the method.

METHOD BLANK - an analytical control consisting of all reagents, internal standards and surrogate standards (or SMC's for VOA), that is carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background and reagent contamination.

METHOD DETECTION LIMIT (MDL) The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. MDLs are determined approximately once per year for frequently analyzed parameters.

PERCENT DIFFERENCE (%D) - As used in this SOW and elsewhere to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference.)

RELATIVE PERCENT DIFFERENCE (RPD) - As used in this SOW and elsewhere to compare two values, the relative percent difference is based on the mean of the two values, and is reported as an absolute value, i.e., always expressed as a positive number or zero. (In contrast, see percent difference.)

REPORTING LIMIT (RL) – The reporting limit is established at either the method detection limit or the lowest concentration standard in the calibration curve, depending on the requirements of different specific regulatory programs. Detected concentration below this concentration cannot be reported without qualification.

ZERO AIR **–** Ultra purity grade **c**ommercially available compressed air. Contains less than 0.1ppm of hydrocarbons, 1ppm of carbon dioxide and carbon monoxide, and less than 5ppm moisture.

5.0 HEALTH & SAFETY

5.1 The analyst must follow normal safety procedures as outlined in the Accutest Laboratory Safety Manual which includes the use of safety glasses and lab coats. In addition, all acids are corrosive and must be handled with care. Flush spills with plenty of water. If acids contact any part of the body, flush with water and contact the supervisor

5.2 The toxicity or carcinogenicity of each reagent used in this method has not been precisely determined; however, each chemical must be treated as a potential health hazard. Exposure to these reagents must be reduced to the lowest possible level. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets must be made available to all personnel involved in these analyses.

5.3 The following analytes covered by this method have been tentatively classified as known or suspected human or mammalian carcinogens: benzene, carbon tetrachloride, chloroform, and vinyl chloride. Primary standards of these toxic compounds must be prepared in a hood. A NIOSH/Mass approved toxic gas respirator must be worn when the analyst handles high concentrations of these toxic compounds.

5.4 Releasing pressurized summa canisters must be performed under a ventilation hood.

6.0 HOLDING TIME & PRESERVATION

6.1 30 days for canisters from collection to analysis.

6.2 Summa Canisters are stored at ambient temperature.

7.0 INTERFERENCES

7.1 High CO2 samples such as landfill gas may freeze and restrict flow on the traps causing reduced sample volume.

7.2 Common laboratory solvents such as methylene chloride, ethanol, hexane, iso-propanol, freon-113 and acetone may be detected at low level concentrations. The values qualified with a “B” if they are also detected in the method blank.

7.3 Isopropanol and Ethanol(as described in TO15 NJDEP-LL)

7.3.1 High concentrations of isopropanol and ethanol in indoor air samples are causing laboratories to conduct unnecessary dilutions of samples. These two alcohols are present in numerous products found in residences and businesses. Ethanol is also a gasoline additive. This is one source of the elevated levels of the alcohols in the samples.

7.3.2 The commercial gas suppliers are routinely adding these two compounds to the standard gas mixtures; therefore, if the compounds are in the standards, the concentrations of the compounds must be reported in the samples. Ethanol has been reported by the standard manufacturers not to be stable within the standard mixtures.

7.3.3 Isopropanol is used as tracer gas compounds for soil gas analysis. The presence of this compound in soil gas samples may be an indication that the seal around the tubing was not tight. However, the presence of these compounds in soil gas when the alcohols were not used as the tracer gas may be indication of another source of contamination.

7.3.4 If these compounds are of concern at site, then this method may not be appropriate for the reporting of these compounds and a different method should be proposed. Laboratory certification will be required for any proposed method.

7.3.5 The laboratory is not required to dilute the sample to bring the concentration of the two alcohols compounds within the calibration range of the instrument.

8.0 APPARATUS

8.1 Hewlett Packard 5890 series II GC with 5971 MSD,

8.2 Agilent 6890 GC with 5973 MSD.

8.3 Agilent 6890 and 7890A GC with 5975 MSD

8.4 PC based Hewlett Packard Chemstation with Enviroquant software.

8.5 Entech model 7016CA 16-position canister autosampler.

8.6 Entech model 7100 pre-concentrator.

8.7 30”Hg-30psig “NIST” traceable pressure/vac gauge, accurate to 0.25%, for sample receipt check and pressurization, if necessary.

8.8 1- Liter certified (as per SOP EAT002) “mini” canisters or silcocans evacuated to under 0.05mm Hg.

8.9 6- Liter certified (as per SOP EAT002) passivated summa canisters or silcocans evacuated to under 0.05mm Hg. A separate group must be maintained for method blank analysis

8.10 Passive flow controllers equipped with particulate filter – Entech CS1200 or equivalent

8.11 Flow controller critical orifices for varying sampling time ranges (see table 10).

8.12 Digital Flow Meter for flow controller calibration

8.13 Various gas tight syringes for standard and sample dilutions.

8.14 Various swagelok fittings.

8.15 Syringe adapters for summa canisters if manual injection or dilution needed.

8.16 Tedlar Bags – for secondary sample dilutions.

9.0 STANDARDS AND REAGENTS

The manufacturer brands listed may be substituted with equivalent standards. Refer to table 5 for a list of compounds in the TO-14 reporting list, TO-15 reporting list, and add-on compounds.

9.1 Spectra Gases certified internal/surrogate gas standard at the following concentrations.

- Bromochloromethane 40ppbv
- 1,4-Difluorobenzene 40ppbv
- Chlorobenzene-d5 40ppbv
- 4-bromofluorobenzene 40ppbv

9.2 Spectra Gases certified 1ppmv TO-15 stock gas standard.

9.3 Spectra Gases certified 1ppmv second source TO-15 stock gas standard (for LCS)

9.4 Spectra Gases 1ppmv Napthalene gas standard with 3ppmv Bromoform as a stabilizer.

9.5 Absolute Standards 1000 ug/ml naphthalene standard in methanol.

9.6 Reagent grade organic free water.

9.7 Air Gas brand Ultra Zero Grade air

9.8 Air Gas brand Ultra High Purity (UHP) helium

9.9 Air Gas liquid nitrogen Dewar

9.10 Standards dilution canister preparation

9.10.1 All canisters must be certified and under full vacuum.

9.10.2 Make sure sampling valve is closed. Using a wrench, remove the protective swagelok cap exposing the ¼” threaded sampling port.

9.10.3 Add 80ul of organic free reagent grade water into the threaded port of the evacuated 6-Liter canister and attach a syringe adaptor for standard introduction.

9.11 Stock gas standard preparation

9.11.1 Place the stock gas standard cylinder of interest in or near the evacuation hood and attach syringe adaptor to gas regulator.

9.11.2 Turn on stock standard valve and regulate delivery pressure to approximately 5psig and let purge for a few seconds.

9.11.3 Attach gas tight standard syringe and draw a full volume to rinse. Expel contents under the hood and proceed to standard concentration of interest.

9.12 Calibration Standards

9.12.1 **40ppbv "standard" compound list**

9.12.1.1 With a 500cc gas tight syringe, measure 400cc of the 1ppm stock standard.

9.12.1.2 Attach the syringe to a prepared 6-Liter canister.

9.12.1.3 Open the sampling valve and draw in the entire 400 cc.

9.12.1.4 Close the valve and remove the syringe adaptor.

9.12.1.5 Attach a zero air supply to the canister equipped with a fine metering regulator and a NIST vacuum/pressure gauge.

9.12.1.6 Adjust the air pressure regulator to 9.8psig and slowly open the canister sampling valve only enough to hear the air draw but keeping a positive reading on the NIST gauge reading from dipping below 0 psig.

9.12.1.7 The final pressure of 9.8psig equates to an actual volume of 10-liters in a 6-liter canister.

9.12.1.8 Once the pressure equilibrates, first close the canister valve and then the air supply.

9.12.1.9 Let standard equilibrate for 30 minutes prior to use.

9.12.2 **2ppbv "standard" compound list**

9.12.2.1 With a 500cc gas tight syringe, measure 500cc of the 40ppbv standard that is equipped with a syringe adaptor.

9.12.2.2 Follow the remaining steps outlined in 9.12.1.2 through 9.12.1.9

9.12.3 **0.4ppbv "standard " compound list** -

9.12.3.1 With a 500cc gas tight syringe, measure 100cc of the 40ppbv standard that is equipped with a syringe adaptor.

9.12.3.2 Follow the remaining steps outlined in 9.12.1.2 through 9.12.1.9

9.13 Blank Spike (BS)Laboratory Control Standard (LCS)

9.13.1 **40ppbv BS standard**

9.13.4.1 Follow the same procedure as 9.12.1 using the 1ppmvBS stock standards.

9.13.4.2 100cc of this standard is used for an equivalent 10ppbv BS.

9.14 Method Blank

9.14.1 A separate stock of canisters is maintained for use exclusively as method blanks. These canisters are not to be used for field sampling.

9.14.2 Inject approximately 80ul of organic free reagent water into the threaded port of an evacuated 6-Liter canister. Do not open valve as the water will be drawn in when the zero air is attached.

9.14.3 A 6 liter evacuated canister is filled and pressurized to approximately 15 psig with zero grade air.

9.15 Working Standards Storage Period

9.15.2 Any working standards or LCS must not be used after 30 days from preparation or of the stock standard expiration date if this date is sooner. An expiration date of 30 days after the preparation date must me documented on the standards tag and standards logbook.

10.0 SUMMA CANISTER HANDLING

10.1 Canister Cleaning and Certification – Refer to Accutest Laboratories SOP EAT002

10.2 Canister Shipping

10.2.1 Record prepared certified summa canister (Refer to SOP EAT002) and vacuum in canister logbook. Vacuum must be recorded to the nearest 0.2” hg Vacuum.

10.2.2 Grab samples are summa canisters without flow controllers taking about 20 seconds to fill.

10.3 Flow Controller Calibration

10.3.1 For integrated sampling, a canister must be equipped with a clean calibrated detachable flow controller.

10.3.2 Select and install the appropriate critical orifice (table 10) that corresponds to the desired sampling period.

10.3.3 The flow controller is calibrated by attaching it to a “practice” canister under vacuum and adjusting the flow control calibrator while measuring the flow in cc/min with a flow meter.

10.3.4 Slight vacuum (1 to 8”Hg) remains in the canister after sampling to indicate a consistent sampling event. Therefore the flow controller is calibrated at a rate not to completely fill the canister.

10.3.5 For a 24 hour sample, a flow of 3.8cc/min theoretically fills a 6-Liter canister with 5.47 liters of sample (3.8cc/min)(60min)(24 hr).

10.4 Canister Receipt

10.4.1 Upon receipt of the canister, the pressure or vacuum must be checked to ensure proper sampling was performed. If excessive vacuum (>15” Hg) is measured the client is notified to inquire about the shortened sampling period and re-sampling.

10.4.2 The pressure or vacuum along with received date and lab sample number must be recorded in the canister logbook to the nearest 0.2 “hg vacuum or 0.2 psig if under positive pressure.

10.4.3 Canisters received at greater than or equal to 8” Hg vacuum, must be pressurized to ensure sample draw with the diaphragm pump.

10.4.4 Canisters pressurized upon receipt must not exceed 6.5 Liters total. Refer to the “Canister Pressurization Calculation” in table 6.

10.4.5 If a flow controller was supplied, the flow must be verified upon receipt and recorded in the logbook.

10.5 Canister Retention Time

10.5.1 Canisters that are shipped from the lab are no longer considered as being stored under controlled conditions. A 15 day period is the maximum allowed field holding period.

10.5.2 All canisters transferred out of controlled storage must be returned to the lab for recleaning and certification. This requirement applies to canisters that were not used for sampling, but were stored in an uncontrolled environment.

10.5.3 In-house canister retention time. Once the canisters have undergone the final evacuation as detailed in SOP EAT002, they may be stored in the laboratory for 2 months.

11.0 Calibration

11.1 Entech Autosampler/ Concentrator conditions

11.1.1 7016CA autosampler Valve: 100°C

11.1.2 Transfer Line: 80°C

11.1.3 7100 Concentrator

	Internal	Standard	Sample	Sweep Gas	Transfer
Preflush (sec)	5	2	15	5	-
Flow Rate (sccm)	100	150	150	100	15
Vol (cc/min)	100	varies	varies	75	40

Note: the mass flow controller may have a false reading in standby, as in 5 or 6. The trapping cc/min must be increased by this amount as per the manufacturer (100 must be set at 105 or 106 in this case).

	Trap	Preheat	Desorb	Bake
Module 1	-150 ^{o}C	20 ^{o}C	20 ^{o}C	150 ^{o}C/ 10 min
Module 2	-10 ^{o}C	no	180 ^{o}C	190 ^{o}C/ 3.5 min
Module 3	-150 ^{o}C	100 ^{o}C	4.5min	100 ^{o}C/ 3min

GC/MS Transfer line 100 ^{o}C

Total event cycle time 35 min

11.2 GC Conditions

11.2.1 Hewlett Packard 5980 or Agilent 6890 gas chromatograph.

11.2.2 Column – Restek 60 meter RTX-1, 0.25mm id, 1.0 um film thickness.

11.2.3 Helium carrier gas at approx. 12psig column head pressure.

11.2.4 GC Temperatures:

Injection port	120 ^{o}C
Detector	280 ^{o}C
Oven	40 ^{o}C held for 5min 8 ^{o}C /min to 210 ^{o}C and held for 0.0min 25 °C/min to 260 °C and held for 3.0min
Total runtime	29.25 min
Electronic Pressure Control:	Constant Flow at 1.4cc/min
Purge Valve	Off at 1.00 min

11.2.5 Optimize GC conditions for compound separation and sensitivity. Baseline separation of benzene and carbon tetrachloride is an indication of acceptable chromatographic performance.

11.3 Mass Spectrometer Conditions

11.3.1 Hewlett Packard 5971, Agilent 5973, or Agilent 5975 MSD with linear quadrupole.

11.3.2 Scan from 35-300 amu every 1.0 seconds or less utilizing a 70 volt (nominal) electron energy in the electron impact ionization mode.

11.3.3 Set baseline noise threshold to 250 with a solvent delay of approximately 3.3 minutes or just before the elution of propylene.

11.3.4 Mass spectrum must meet all the criteria in Table 1 when injecting 100cc of 20ppbv 4-Bromofluorobenzene (BFB). This is equivalent to 5ppbv when considering a 400cc nominal volume.

11.4 Data System

11.4.1 A computer system containing the latest compatible version Hewlett Packard chemstation software interfaced to the mass spectrometer.

11.4.2 Set the data acquisition mode method to the conditions described in 12.3.

The software performs continuous acquisition and storage on machine- readable media (disc) of all mass spectra obtained throughout the duration of the chromatographic program.

11.4.3 The data analysis mode method defines each compound retention time, characteristic ions (table 4), and calibration to identify and quantify each compound in the data file.

11.4.4 The quantitation is performed by internal standard option using multi-point calibration and multipoint internal standards.

11.4.5 The NIST mass spectral library (75,000 compounds) is used for non- target peak tentative identification.

11.5 Daily BFB system performance tuning.

11.5.1 The 40ppbv internal standard and 40ppbv surrogate is attached to the internal standard port of the Entech 7100 utilizing flushed 1/8” copper tubing.

11.5.2 100cc of this standard is sampled which is equivalent to 5ppbv of BFB.

11.5.3 The GC/MS and Entech concentrator conditions are the same as in section 11.1-11.3.

11.5.4 Evaluate the tune spectrum using three mass scans from the chromatographic peak and a subtraction of instrument background.

11.5.4.1 Select the scans at the peak apex and one to each side of the apex.

11.5.4.2 Calculate an average of the mass abundances from the three scans.

11.5.5 Background subtraction is required. Select a single scan in the chromatogram that is absent of any interfering compound peaks and no more than 20 scans prior to the elution of BFB. The background subtraction should be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the tuning. Spectra of the background subtracted BFB peak must be checked to verify acceptable performance criteria are achieved (see Table 1).

11.5.6 This performance test must be passed before any samples, blanks, or standards are analyzed.

11.5.7 If all the criteria are not achieved, the analyst must retune the mass spectrometer and repeat the test until all criteria are met.

11.5.8 The injection time of the acceptable tune analysis is considered the start of the 24-hour clock.

11.6 Initial Calibration

11.6.1 All volumes are calculated based on a nominal volume of 400cc.

11.6.2 A multi-level calibration is performed utilizing 0.04, 0 .1, 0.2, 0.5, 5, 10, 20, and 40 ppbv.

11.6.2.1 The 0.2ppbv standard, with the exception of propylene and ethanol, must be part of the calibration curve to satisfy the reporting limits. The propylene and ethanol curves must contain the 0.5ppbv.

11.6.2.2 Saturation may occur on some of the highly polar compounds (alcohols, 1,4-dioxane) that may require removing of the 40ppbv standard from the calibration curve in order to meet criteria.

11.6.2.3 A minimum of 5 calibration points must be used for each compound.

11.6.2.4 A 0.04ppbv may be analyzed for limited projects and limited compounds upon client request.

11.6.3 The 0.4, 2.0 and 40ppbv calibration standards are attached to sample ports on the Entech 7100.

11.6.4 Considering a nominal volume of 400cc, volumes of 40cc and 100cc are sampled from the 0.4ppbv standard (9.12.3) for the 0.04 and 0.1 standards respectively. Volumes of 40cc and 100cc are sampled from the 2ppbv standard (9.12.2) for the 0.2 and 0.5, standards. Volumes of 50, 100, 200 and 400 are sampled from the 40ppbv standard (9.12.1) for the 5, 10, 20, and 40ppbv.

11.6.5 Internal standard/ surrogate- volume is 100cc of the stock standard (8.1) for all standards, samples and quality control resulting in a 10ppbv internal standard and 5ppbv surrogate standard concentration.

11.6.6 Detector Saturation - Occasionally, several compounds in higher concentration standards exhibit chromatographic peak saturation. Unsymmetrical peaks that initially appear to be symmetrical that exhibit a perpendicular drop to the baseline are characteristic of peak saturation. The apex of a saturated peak looks abnormal and may exhibit a plateau. Saturated chromatographic peaks must not be used in the calibration curve and must be eliminated from the calibration. This results in decreased concentration for the upper calibration range limit.

11.6.7 The Relative Response Factor (RRF) is calculated for each compound at every standard level.

11.6.8 Mean Relative Response Factor - Calculate the average of the values obtained at the five concentrations.

11.6.9 Percent Relative Standard Deviation (% RSD) is calculated for all calibration levels

11.6.10 Calculate the Relative Retention Time (RRT) for each target compound over the initial calibration range.

11.6.11 Mean Relative Retention Time- Calculate the mean of the relative retention times for each analyte target compound over the initial calibration range.

11.6.12 The following criteria must be met for the initial calibration to be valid.

11.6.12.1 The percent relative standard deviation must be less than 30 %, with the exception of naphthalene.

11.6.12.2 Up to two compounds may exceed 30% but must be less than 40% for a valid initial calibration, with the exception of naphthalene.

11.6.12.3 The relative retention time for each target compound at each calibration level must be within 0.06 RRT units of the mean relative retention time for the compound.

11.6.12.4 The area response of each calibration level must be within 40% of the mean area response over the initial calibration range for each internal standard.

11.6.12.5 The retention time shift for each of the internal standards at each calibration level must be within 20 seconds (0.33 minutes) of the mean retention time over the initial calibration range for each internal standard.

11.6.12.6 If the acceptance criteria are not met due to peak saturation the high standard can be dropped for that compound, but a minimum of 5 standards must be used. This will lower the upper calibration range and may require additional dilutions. If a particular standard(s) are the cause of the failure, rerun that standard(s) one time only. If this fails then the calibration curve must be rerun.

11.7 Continuing calibration

11.7.1 A continuing calibration check standard is analyzed at 10ppbv, which is equivalent to 100cc of the 40ppbv standard. Calibration checks must be acquired every 24 hrs.

11.7.2 A 10ppbv naphthalene standard is analyzed every 24 hours when samples are requested for naphthalene. A 10ppbv standard is equivalent to 100cc of the 40ppbv naphthalene standard.

11.7.3 The percent difference (%D) for all continuing calibration compounds must be less than 30%.

11.7.4 If the continuing calibration check fails to meet the criteria, it is repeated one time. If it fails a second time, corrective action is taken and a new initial calibration must be performed.

11.7.4.1 Corrective Action may include but is not limited to: tuning the instrument, cleaning the source, changing or clipping the column. All maintenance must be recorded in the maintenance logbook.

11.8 Initial Calibration Verification (ICV) Second Source Standard

11.8.1 Prepare the second source calibration check standards from separate sources of stock standards from the calibration curve. An ICV must be analyzed immediately after each initial calibration.

11.8.1.1 The percent difference(%D) for all compounds on the “standard list” must be less than 30 % for all compounds.

11.8.1.2 If the ICV fails to meet the criteria then the compounds that failed must not be reported for that Initial Calibration..

12.0 SAMPLE ANALYSIS

12.1 Internal Standard

12.1.1 100 cc of the internal/ surrogate standard is equivalent to 10ppbv that is added to all standards, samples and QC.

12.1.2 If any of the internal standard areas change by greater than +/-40% or retention time changes by more than 0.33 minutes from the last daily calibration check standard the mass spectrometer must be inspected for malfunctions and corrections be made, as appropriate.

12.2 Method Blank

12.2.1 A separate stock of canisters is maintained for use exclusively as method blanks. These canisters are not to be used for field sampling.

12.2.2 To monitor for possible laboratory contamination, laboratory method blanks are analyzed at least once in a 24-hour analytical sequence. All steps in the analytical procedure are performed on the blank

12.2.3 A volume of 400cc is sampled from the method blank as prepared in 10.5. This volume is the most dilution air that could be added to any sample to verify the dilution air source along with the procedure is non-detect for all compounds.

12.2.4 Method blanks are analyzed and evaluated before any samples can be run and must be less than the MDL for all target compounds. The surrogate must meet the acceptance criteria in table 3. Occasionally, lab background such as isopropanol cannot be fully eliminated and is flagged appropriately in any samples
.

12.2.5 If the method blank fails to meet these criteria the source of contamination must be determined and the method blank be rerun before any samples are run.

12.3 Blank Spike(BS) and Blank Spike Duplicate(BSD) An external source standard.

12.3.1 A Blank Spike (BS)is prepared to contain 40ppbv each analyte from a source other than the calibration standard. 100 cc of the BS is sampled in duplicate BSD for a 10ppbv.

12.3.2 Percent recoveries (% R) (see section 14.2) must fall within 70-130%. All of the compounds must be within acceptable ranges with one exception. The BS is acceptable if a few compounds have a bias high recovery as long as no hits are reported in associated samples.

12.3.3 Relative Percent Difference (RPD) (see section 14.3) must be less than or equal to 30%. All of the compounds reported as target compounds must be within acceptable ranges.

12.3.4 If laboratory control samples do not meet criteria, calculations are checked. A new BS must be prepared and analyzed and possibly a new calibration if the problem isn't rectified.

12.4 Sample analysis – General

12.4.1 Unknown samples are screened by the TO-3/PID/FID system or a GC/MS system dedicated to screening.

12.4.2 A sample volume of 400cc at ambient temperature and pressure is standard for analysis to achieve the reporting limits required. Smaller sample amounts down to 20 cc can be sampled accurately with the concentrators mass flow controller.

12.4.3 Sample volumes are adjusted accordingly (table 6) when canisters are received with excess vacuum and require dilution air (8.7) in order for the concentrator to draw an accurate volume.

12.4.4 Samples requiring further dilution beyond the minimum 20cc (greater than 20X) that can be sampled from the primary sample canister are prepared as secondary dilutions in additional canisters or tedlar bags. This practice is commonly used for soil vapor samples.

12.4.5 Secondary dilution information is recorded in the secondary dilution log (table 7).

12.5 Summa canister sample analysis

12.5.1 Check canister pressure and document upon laboratory receipt.

12.5.2 The canister is pressurized upon receipt if excessive vacuum remains at receipt (>/=8 "Hg). If the canister is pressurized, the sampling volume must be adjusted to compensate for the dilution. Refer to the "Canister Pressurization Calculation" in table 6.

12.6 Sample Dilution

12.6.1 Less sample volume can be designated by the concentrator software down to 20cc. With normal volume being 400cc, this would result in a 1:20 dilution. Further dilutions require a dilution into a secondary vessel.

12.6.2 To manually draw a volume out of a canister, positive canister pressure is required.

12.6.3 To perform a secondary dilution, the canister vacuum at the time must be recorded. This vacuum varies from the received vacuum if sample has already been drawn.

12.6.4 Record the vacuum in the “Canister Secondary Dilution” log. Refer to table 7.

12.6.5 When pressurizing the canister for a manual sample draw, the volume of a 6-Liter canister must not exceed 6.5-Liters. Refer to Table 8 for the proper pressurization.

12.6.6 A measured volume of the newly pressurized original canister is drawn out with a gas-tight syringe and introduced into a secondary vessel (6-Liter, 1-Liter canister or 1-Liter tedlar bag). The secondary vessel is diluted with zero grade air.

12.6.7 The final sample dilution factor (DF) is calculated by (original canister dilution factor) x (secondary vessel dilution factor) x (instrument dilution factor). The instrument dilution factor is the nominal volume of 400cc/ amount of sample introduced by the auto sampler. An example calculation of a final sample multiplier is as follows;

12.6.7.1.1 Original canister is pressurized to a factor of 1.2

12.6.7.1.2 The amount introduced to the dilution vessel results in an additional factor of 10

12.6.7.1.3 The autosampler introduces 40cc from the secondary vessel for an additional factor of 400/40 = 10

12.6.7.1.4 Final sample multiplier = 1.2 x 10 x 10 = 120

13.0 QUALITY CONTROL

QC Requirements Summary:

BFB.	Every 24 hrs.
Initial Calibration(IC)	As needed
Calibration Check Std(CCV).	Every 24 hrs.
Initial Calibration Verification (ICV)	After every IC
Batch blank	Every 24 hrs.
Matrix Duplicate	one per 20 samples
Blank Spike (BS)	one per 20 samples
Blank Spike Duplicate (BSD)	one per 20 samples
Surrogate	every sample and standard.
Internal Standard	every sample and standard.

13.1 Daily GC/MS Performance Check - refer to section 11.5.

13.2 Initial Calibration - Refer to section 11.6.

13.3 Continuing Calibration Check - refer to section 11.7.

13.4 Method Blank (zero grade air) at 400 cc - refer to section 12.2.

13.5 Blank Spike (BS)) - refer to section 12.3.

13.6 Matrix Duplicate.

13.6.1 One sample is selected at random. Calculate the Relative Percent Difference for all hits.

13.6.2 Evaluate the RPD's versus the limits in LIMS. If the RPD does not meet the limits, matrix interference is suspected. No further action is required.

13.7 Surrogate

13.7.1 All blanks, samples, and matrix spikes contain surrogate compounds that are used to monitor method performance. All samples are spiked with 100cc of the internal/surrogate standard that is equivalent to 5ppbv of 4-Bromofluorobenzene.

13.7.2 If the % recovery of 4-Bromofluorobenzene does not meet the control limits generated in house, the recovery must be flagged and:

13.7.2.1 The calculation must be checked.

13.7.2.2 The sample must be reanalyzed to verify recovery of the surrogate is out of control limits due to apparent matrix interference.

13.7.3 If surrogate recoveries are acceptable upon reanalysis, the data from the reanalysis is reported. If the reanalysis date did not meet the hold time, then both sets of data are submitted with the reanalysis reported.

13.7.4 If surrogates are still outside control limits upon reanalysis, then both sets of data must be submitted for confirmation with the first analysis reported.

13.8 Internal Standard.

13.8.1 Retention time for all internal standards must be within ± 0.33 minutes (20 seconds) of the corresponding internal standard in the latest continuing calibration or 10ppbv standard of initial calibration.

13.8.2 The area (Extracted Ion Current Profile) of the internal standard in all analyses must be within +/-40 % of the corresponding area in the latest calibration standard (24 hr. time period).

13.8.3 If area of internal standard does not meet control limits, the calculations must be checked. If a problem is not discovered, the sample must be reanalyzed at the same concentration unless matrix interferences are visibly present in the chromatogram, then a smaller volume is analyzed.

13.8.4 If areas are acceptable upon reanalysis, the reanalysis data is reported.

13.8.5 If areas are unacceptable upon reanalysis, then both sets of data are submitted with the original analysis reported.

14.0 CALCULATIONS

14.1 Concentration (Conc.)

$$C_x = \frac{A_x C_{is} DF}{A_{is} \overline{RRF}}$$

where: C_x = Compound concentration, ppbv.

A_x = Area of the characteristic ion for the compound to be measured, counts.

A_{is} = Area of the characteristic ion for the specific internal standard, counts.

C_{is} = Concentration of the internal standard spiking mixture, ppbv

$\overline{RRF}$ = Mean relative response factor from the initial calibration.

DF is the dilution factor as described in 12.6.7

14.2 Percent Recovery (% R)

$$\% R = \frac{\text{Concentration found}}{\text{Concentration spiked}} \times 100$$

14.3 Relative Percent Difference (RPD)

$$RPD = \frac{|SC - SDC|}{(1/2)(SC+SDC)} \times 100$$

Where: SC = Sample Concentration
SDC = Sample Duplicate Concentration

14.4 Relative response factor (RRF)

$$RRF = \frac{As \times Cis}{Ais \times Cs}$$

Where: As = Area of the characteristic ion for the compound being measured.

Ais = Area of the characteristic ion for the specific internal standard.

Cs = Concentration of the compound being measured (ppbv).

Cis = Concentration of the specific internal standard (ppbv).

14.5 Mean Relative Response Factor

$$\overline{RRF} = \sum_{i=1}^{n} \frac{x_i}{n}$$

where:

$\overline{RRF}$ = Mean relative response factor.
x_i = RRF of the compound at concentration i.
n = Number of concentration values, (5 to 7 points in curve).

14.6 Percent relative Standard Deviation (%RSD)

$$\%RSD = \frac{SD_{RRF}}{\overline{RRF}} \times 100$$

and

$$SD_{RRF} = \sqrt{\sum_{i=1}^{N} \frac{(RRF_i - \overline{RRF})^2}{N - 1}}$$

where: SD_{RRF} = Standard deviation of initial response factors (per compound).
RRF_i = Relative response factor at a concentration level i.
$\overline{RRF}$ = Mean of initial relative response factors (per compound).

14.7 Relative Retention Time (RRT)

$$RRT = \frac{RT_c}{RT_{is}}$$

where: RT_c = Retention time of the target compound, seconds
RT_{is} = Retention time of the internal standard, seconds.

14.8 Mean Relative Retention Time

$$\overline{RRT} = \sum_{i=1}^{n} \frac{RRT}{n}$$

where: $\overline{RRT}$ = Mean relative retention time for the target compound for each initial calibration standard.
RRT = Relative retention time for the target compound at each calibration level.

14.9 Percent Difference (%D)

$$\%D = \frac{RRF_c - \overline{RRF_i}}{\overline{RRF_i}} \times 100$$

where: RRF_c = RRF of the compound in the continuing calibration standard.
$\overline{RRF_i}$ = Mean RRF of the compound in the most recent initial calibration.

15.0 DOCUMENTATION

15.1 The Analytical Logbooks records the analysis sequence; the logbook must be completed daily. Each instrument has a separate logbook.

15.1.1 If samples require reanalysis, a brief explanation of the reason must be documented in the comment section.

15.2 The Standards Preparation Logbook must be completed for all standard preparations. All information must be completed. The page must be signed and dated by the appropriate person.

15.2.1 The Accutest lot number must be cross-referenced on the standard canister.

15.3 Instrument Maintenance Logbook must be completed when any type of maintenance is performed on the instrument. Each instrument has a separate log.

15.4 Canister Shipping and Receiving Logbook must be completed.

16.0 DATA REVIEW & INTERPRETATION

16.1 Qualitative identification

16.1.1 Analyst shall identify the targeted compounds by comparison of the sample mass spectrum to the mass spectrum of a standard of the suspected compound. The criteria required for a positive identification are:

16.1.2 The sample component must elute at the same relative retention time (RRT) as the daily standard. Criteria are the RRT of sample component must be within ± 0.06 RRT units of the standard.

16.1.3 All ions present in the standard mass spectra at a relative intensity greater than 10 % (major abundant ion in the spectrum equals 100 %) must be present in the sample spectrum.

16.1.4 The relative intensities of these ions must agree within ± 30 % between the daily standard and sample spectra. (Example: For an ion with an abundance of 50 % in the standard spectra, the corresponding sample abundance must be between 20 and 80 %. Matrix interferences may skew ion ratios where criteria are exceeded. In this case, analyst's judgment with supervisor's approval is required.

16.1.5 Structural isomers (dichlorobenzenes, trimethylbenzenes, and o-xylene) that produce very similar mass spectra are identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25 % of sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs (m,p-xylene).

16.2 Quantitative analysis

16.2.1 When a target compound has been identified, concentration (see section 16.1) is based on the integrated area of the primary quantitation ion (see Table 4).

16.2.2 If the sample produces interference for the primary ion, use a secondary ion to quantitate (see Table 4). This is characterized by an excessive background signal of the same ion, which distorts the peak shape beyond a definitive integration. Also interference could severely inhibit the response of the internal standard ion. If a secondary ion is used for quantitation, new calibration response factors must be generated for this secondary ion.

16.3 Library search for tentatively identified compounds.

If a library search is requested, the analyst performs a forward library search of NIST mass spectral library to tentatively identify 15 non-reported compounds. Guidelines for making tentative identification are listed below.

16.3.1 These compounds must have a response greater than 10 % of the nearest internal standard. The response is obtained from the integration for peak area of the Total Ion Chromatogram (TIC).

16.3.2 The search is to include a spectral printout of the 3 best library matches for a particular substance. The results are to be interpreted by analyst.

16.3.3 Molecular ions present in the reference spectrum must be present in the sample spectrum.

16.3.4 Relative intensities of major ions in the reference spectrum (ions > 10 % of the most abundant ion) must be present in the sample spectrum.

16.3.5 The relative intensities the major ions must agree within ± 20 %.

16.3.6 Ions present in the sample spectrum but not in the reference spectrum are reviewed for possible background contamination or presence of co-eluting compounds.

16.3.7 Ions present in the reference spectrum but not in the sample spectrum are verified by performing further manual background subtraction to eliminate the interference created by co-eluting peaks and/or matrix interference.

16.3.8 Quantitation of the tentatively identified compounds is obtained from the total ion chromatogram based on a response factor of 1 and is to be tabulated on the library search summary data sheet.

16.3.9 Quantitation is performed on the nearest internal standard.

17.0 POLLUTION PREVENTION & WASTE MANAGEMENT

17.1 Users of this method must perform all procedural steps in a manner that controls the creation and/or escape of wastes or hazardous materials to the environment. The amounts of standards, reagents, and solvents must be limited to the amounts specified in this SOP. All safety practices designed to limit the escape of vapors, liquids or solids to the environment must be followed. All method users must be familiar with the waste management practices described in section 17.2.

17.2 Waste Management. All laboratory waste must be managed, accumulated, and disposed in accordance with all federal or state laws and regulations. Individuals performing this method must follow established waste management procedures as described in the waste management SOP, EHS004. This document describes the proper disposal of all waste materials generated during the testing of samples as follows:

17.2.1 Non hazardous aqueous wastes.

17.2.2 Hazardous aqueous wastes

17.2.3 Chlorinated organic solvents

17.2.4 Non-chlorinated organic solvents

17.2.5 Hazardous solid wastes

17.2.6 Non-hazardous solid wastes

18.0 METHOD and other SOP REFERENCES

18.1 USEPA METHOD TO-15, 2nd edition, 03/18/1999 "Methods for the Determination of Toxic Organic Compounds in Air"

18.2 Accutest SOP EAT002 – "Canister Cleaning and Certification SOP"

18.3 TO15 NJDEP LowLevel

Table 1

BFB KEY IONS AND ION ABUNDANCE CRITERIA

Mass	Ion Abundance Criteria
50	8-40% of mass 95
75	30-66% of mass 95
95	Base peak, 100% relative abundance
96	5-9% of mass 95
173	< 2% of mass 174
174	> 50% and <120% of mass 95
175	4-9% of mass 174
176	>93% and <101% of mass 174
177	5-9% of mass 176

Table 2

INTERNAL STANDARD IONS

Internal Standard	Prim/Sec. Ions
Bromochloromethane	128 / 49, 130, 51
1,4-Difluorobenzene	114 / 63,88
Chlorobenzene-d5	117 / 82, 119

Table 3
omitted

Table 4

TARGET COMPOUND IONS

Analyte	Primary Characteristic Ion	Secondary Characteristic Ion (s)
Acetone	58	43
Benzene	78	77, 52
Benzyl chloride	91	126, 65
1,3-Butadiene	39	54, 53
Bromodichloromethane	83	85, 122
Bromoform	173	175, 254
Bromoethene (1)	106	108, 81
Bromomethane	94	96, 95
Carbon disulfide	76	78, 44
Carbon tetrachloride	117	119, 121
Chlorobenzene	112	77, 114
Cyclohexane	84	56, 69
Chloroethane	64	66, 49
Chloroform	83	85, 47
Chloromethane	50	52, 32
3-Chloropropene (1)	76	41, 39, 78
2-Chlorotoluene	91	126, 63
Dibromochloromethane	129	127, 31
1,2-Dibromoethane	107	109, 88
1,2-Dichlorobenzene	146	111, 148
1,3-Dichlorobenzene	146	111, 148
1,4-Dichlorobenzene	146	111, 148
Dichlorodifluoromethane	85	87, 50
1,1-Dichlorethane	63	65, 83
1,2-Dichloroethane	62	64, 98
1,1-Dichloroethene	96	61, 63
cis-1,2-Dichloroethene	96	61,98
Trans-1,2-Dichloroethene	96	61, 98
1,2-Dichloropropane	63	65
1,4-Dioxane	88	57, 58, 43
cis-1,3-Dichloropropene	75	77, 39
Trans-1,3-Dichloropropene	75	77, 39
Ethanol	45	46, 42
Ethyl Acetate	43	61,88
4-Ethyltoluene	105	120, 91
Ethylbenzene	91	106, 77
Freon 113 (1)	151	101, 103
Freon 114 (1)	85	135, 87
Hexachlorobutadiene	225	223, 227
Heptane	43	71, 57
Hexane	57	47, 41

Table 4 -continued

TARGET COMPOUND IONS

Analyte	Primary Characteristic Ion	Secondary Characteristic Ion (s)
2-Hexanone	43	58, 100
Isopropyl Alcohol	45	43, 59
Methyl-t-butyl ether	73	57, 43
Methylene chloride	84	86, 49
Methyl ethyl ketone	72	43, 57
Propylene	41	39, 42
Styrene	104	78, 103
Tetrahydrofuran	42	71, 72
1,2,4-Trichlorobenzene	180	182, 145
1,1,2,2-Tetrachloroethane	83	85, 131
Tetrachloroethene	164	129, 131, 166
Toluene	92	91, 65
1,1,1-Trichloroethane	97	99, 61
1,1,2-Trichloroethane	83	97, 85
Trichloroethene	95	97, 130, 132
Trichlorofluoromethane	101	103, 105
1,2,4-Trimethylbenzene	105	120, 119
1,3,5-Trimethylbenzene	105	120, 119
2,2,4-Trimethylpentane	57	56, 99
Vinyl acetate	43	86, 44
Vinyl chloride	62	64, 61
o-Xylene	106	91, 77
m-Xylene	106	91, 77
p-Xylene	106	91, 77
Pentane (1)	42	41, 57
Nonane (1)	43	71, 128
Isopropylbenzene(Cumene)	105	120, 77
Tertiary Butyl Alcohol	59	41, 43
Naphthalene	128	127,129
Total Volatiles as Pentane	Total Peak Area	
Total Volatiles as Heptane	Total Peak Area	

(1) NELAC accreditation is not offered for this compound.

Table 5

Reporting Limits

Compound	TO15 Canister RDL(ppbv)
Propylene	0.5
Freon-12 (Dichlorodifluoromethane)	0.2
Chloromethane	0.2
Freon-114 (1)	0.2
Vinyl Chloride	0.2
1,3-Butadiene	0.2
Bromomethane	0.2
Chloroethane	0.2
Carbon Disulfide	0.2
Ethanol	0.5
Acetone	0.2
Freon-11 (Trichlorofluoromethane)	0.2
Isopropyl Alcohol	0.2
1,1-Dichloroethene	0.2
Methylene Chloride	0.2
Freon-113 (1)	0.2
Trans-1,2-Dichloroethene	0.2
1,1-Dichloroethane	0.2
Methyl Tertiary Butyl Ether	0.2
Tetrahydrofuran	0.2
Methyl Ethyl Ketone (2-Butanone)	0.2
Cis-1,2-Dichloroethene	0.2
Hexane	0.2
Chloroform	0.2
Ethyl Acetate	0.2
Vinyl Acetate	0.2
1,2-Dichloroethane	0.2
1,1,1-Trichloroethane	0.2
Benzene	0.2
Carbon Tetrachloride	0.2
Cyclohexane	0.2
1,2-Dichloropropane	0.2
Trichloroethylene	0.04
Bromodichloromethane	0.2
1,4-Dioxane	0.2

Table 5 (cont'd)

Compound	TO15 Canister RDL(ppbv)
Heptane	0.2
Cis-1,3-Dichloropropene	0.2
Trans-1,3-Dichloropropene	0.2
1,1,2-Trichloroethane	0.2
Toluene	0.2
Methyl IsoButyl Ketone (2-Hexanone)	0.2
Dibromochloromethane	0.2
1,2-Dibromomethane (EDB)	0.2
Tetrachloroethylene	0.04
Chlorobenzene	0.2
Ethylbenzene	0.2
M,p-Xylene	0.2
o-xylene	0.2
1,1,2,2-Tetrachloroethane	0.2
Bromoform	0.2
Styrene	0.2
4-Ethyltoluene	0.2
1,3,5-Trimethylbenzene	0.2
1,2,4-Trimethylbenzene	0.2
1,3-Dichlorobenzene(m)	0.2
1,4-Dichlorobenzene(p)	0.2
1,2-Dichlorobenzene(o)	0.2
Benzyl Chloride (a-Chlorotoluene)	0.2
1,2,4-Trichlorobenzene	0.2
Hexachloro-1,3-butadiene	0.2
Bromoethene (1)	0.2
3-Chloropropene (1)	0.2
2-Chlorotoluene	0.2
2,2,4-Trimethylpentane	0.2
Pentane (1)	0.2

Table 5 (cont'd)

Compound	TO15 Canister RDL(ppbv)
Nonane (1)	0.2
Isopropylbenzene(Cumene)	0.2
Tertiary Butyl Alcohol	0.2
Naphthalene	0.2
Total Volatiles as Pentane	10
Total Volatiles as Heptane	10

(1) – NELAC does not offer accreditation for this compound.

Table 6

Canister Pressurization Calculations													
Canister Pressure Received						**Canister Final Pressure**					Dilution	Sampling	
"Hg (vac)	"Hg	Atm	psia	Vol. (L)		"Hg	psia	Vol. (L)	psig		Factor	Volume (cc)	
0.0	29.92	1.00	14.7	6.0		29.92	14.7	6.0	0.0		1	**400**	
0.5	29.42	0.98	14.5	5.9		29.42	14.5	5.9	-0.2		1	**400**	
1.0	28.92	0.97	14.2	5.8		28.92	14.2	5.8	-0.5		1	**400**	
1.5	28.42	0.95	14.0	5.7		28.42	14.0	5.7	-0.7		1	**400**	
2.0	27.92	0.93	13.7	5.6		27.92	13.7	5.6	-1.0		1	**400**	
2.5	27.42	0.92	13.5	5.5		27.42	13.5	5.5	-1.2		1	**400**	
3.0	26.92	0.90	13.2	5.4		26.92	13.2	5.4	-1.5		1	**400**	
3.5	26.42	0.88	13.0	5.3		26.42	13.0	5.3	-1.7		1	**400**	
4.0	25.92	0.87	12.7	5.2		25.92	12.7	5.2	-2.0		1	**400**	
4.5	25.42	0.85	12.5	5.1		25.42	12.5	5.1	-2.2		1	**400**	
5.0	24.92	0.83	12.2	5.0		24.92	12.2	5.0	-2.5		1	**400**	
5.5	24.42	0.82	12.0	4.9		24.42	12.0	4.9	-2.7		1	**400**	
6.0	23.92	0.80	11.7	4.8		23.92	11.7	4.8	-3.0		1	**400**	
6.5	23.42	0.78	11.5	4.7		23.42	11.5	4.7	-3.2		1	**400**	
7.0	22.92	0.77	11.3	4.6		22.92	11.3	4.6	-3.4		1	**400**	
7.5	22.42	0.75	11.0	4.5		22.42	11.0	4.5	-3.7		1	**400**	"Hg(vac)
8.0	21.92	0.73	10.8	4.4		32.33	15.9	6.5	1.2		1.48	**590**	**8.0**
8.5	21.42	0.72	10.5	4.3		32.67	16.0	6.5	1.3		1.53	**610**	**8.5**
9.0	20.92	0.70	10.3	4.2		32.43	15.9	6.5	1.2		1.55	**620**	**9.0**
9.5	20.42	0.68	10.0	4.1		32.16	15.8	6.4	1.1		1.58	**630**	**9.5**
10.0	19.92	0.67	9.8	4.0		31.87	15.7	6.4	1.0		1.60	**640**	**10.0**
10.5	19.42	0.65	9.5	3.9		32.04	15.7	6.4	1.0		1.65	**660**	**10.5**
11.0	18.92	0.63	9.3	3.8		32.16	15.8	6.4	1.1		1.70	**680**	**11.0**
11.5	18.42	0.62	9.0	3.7		32.24	15.8	6.5	1.1		1.75	**700**	**11.5**
12.0	17.92	0.60	8.8	3.6		32.26	15.8	6.5	1.1		1.80	**720**	**12.0**
12.5	17.42	0.58	8.6	3.5		32.23	15.8	6.5	1.1		1.85	**740**	**12.5**
13.0	16.92	0.57	8.3	3.4		32.15	15.8	6.4	1.1		1.90	**760**	**13.0**
13.5	16.42	0.55	8.1	3.3		32.02	15.7	6.4	1.0		1.95	**780**	**13.5**
14.0	15.92	0.53	7.8	3.2		32.64	16.0	6.5	1.3		2.05	**820**	**14.0**
14.5	15.42	0.52	7.6	3.1		32.38	15.9	6.5	1.2		2.10	**840**	**14.5**
15.0	14.92	0.50	7.3	3.0		32.08	15.8	6.4	1.1		2.15	**860**	**15.0**

Note: Dilution factors are typically compensated for by concentrating more sample volume. This results in a quantitation factor of 1.

Calculations: psia(rec) x DF = psia(final)

DF x Volume(rec) = Volume(final) in cc

psia(final) - 14.7 = psig(final)

DF x 400 = Volume(cc) introduced into concentrator for a quant factor of 1

Conversion Equivalents

0"Hg(vac) = 29.9"Hg = 1atm = 14.7psia = 0psig

Table 7

Canister Secondary Dilution Log

Original Canister Dilution								Secondary Canister Dilution							
Date	Initials	Accutest Sample ID	Canister ID	Vacuum in "Hg at time of Dilution	Final Pressure Psig	Dilution Factor		Canister ID	Canister Volume CC	Sample Volume Added CC	Final Pressure psig	Equiv Total Volume CC	Dilution Factor		Final Canister Dilution Factor

Comments:

Note: For secondary dilutions into 375cc mincans, a 1psig final pressure is equivalent to a 400cc final volume

Definition: Final DF = (Original Canister DF) x (Secondary Canister DF)

Dilution Factor at Instrument = (Final Canister Dilution Factor) x (Normal Sampling Volume in cc) / (Sample Volume in cc Injected)

Example: Original Canister is diluted 1.2x for manual sample draw due to the 3" Hg(vac). 40cc from this canister is added to a 375cc minican and brought to 1.0 psig or 400cc equiv volume. This results in an additional dilution of 400/40 or 10. The final canister dilution factor is 1.2 x 10 = 12. From the dilution canister 40cc is injected at the instrument where normal volume is 400cc. This is an additional instrument dilution factor of 10. The final dilution multiplier is 12(from canister dilution) x 10(from instrument dilution) = 120

Table 8

Seconday Dilution Conversion Chart For 6-Liter Canisters

Initial				Final					Initial				Final			
"Hg (vac)	"Hg	Psia	Vol. (L)	psia	psig	Vol (L)	DF		"Hg (vac)	"Hg	psia	Vol. (L)	psia	psig	Vol (L)	DF
0.0	29.9	14.7	6.0	15.4	0.7	6.30	**1.05**		**7.6**	22.3	11.0	4.5	15.9	1.2	6.49	**1.45**
0.2	29.7	14.6	6.0	15.3	0.6	6.26	**1.05**		**7.8**	22.1	10.9	4.4	15.8	1.1	6.43	**1.45**
0.4	29.5	14.5	5.9	15.2	0.5	6.21	**1.05**		**8.0**	21.9	10.8	4.4	15.6	0.9	6.37	**1.45**
0.6	29.3	14.4	5.9	15.8	1.1	6.47	**1.10**		**8.2**	21.7	10.7	4.4	15.5	0.8	6.31	**1.45**
0.8	29.1	14.3	5.8	15.7	1.0	6.42	**1.10**		**8.4**	21.5	10.6	4.3	15.9	1.2	6.47	**1.50**
1.0	28.9	14.2	5.8	15.6	0.9	6.38	**1.10**		**8.6**	21.3	10.5	4.3	15.7	1.0	6.41	**1.50**
1.2	28.7	14.1	5.8	15.5	0.8	6.33	**1.10**		**8.8**	21.1	10.4	4.2	15.6	0.9	6.35	**1.50**
1.4	28.5	14.0	5.7	15.4	0.7	6.29	**1.10**		**9.0**	20.9	10.3	4.2	15.9	1.2	6.50	**1.55**
1.6	28.3	13.9	5.7	15.3	0.6	6.25	**1.10**		**9.2**	20.7	10.2	4.2	15.8	1.1	6.44	**1.55**
1.8	28.1	13.8	5.6	15.9	1.2	6.48	**1.15**		**9.4**	20.5	10.1	4.1	15.6	0.9	6.38	**1.55**
2.0	27.9	13.7	5.6	15.8	1.1	6.44	**1.15**		**9.6**	20.3	10.0	4.1	15.5	0.8	6.31	**1.55**
2.2	27.7	13.6	5.6	15.7	1.0	6.39	**1.15**		**9.8**	20.1	9.9	4.0	15.8	1.1	6.45	**1.60**
2.4	27.5	13.5	5.5	15.5	0.8	6.35	**1.15**		**10.0**	19.9	9.8	4.0	15.7	1.0	6.39	**1.60**
2.6	27.3	13.4	5.5	15.4	0.7	6.30	**1.15**		**10.2**	19.7	9.7	4.0	15.5	0.8	6.33	**1.60**
2.8	27.1	13.3	5.4	15.3	0.6	6.25	**1.15**		**10.4**	19.5	9.6	3.9	15.8	1.1	6.46	**1.65**
3.0	26.9	13.2	5.4	15.9	1.2	6.48	**1.20**		**10.6**	19.3	9.5	3.9	15.7	1.0	6.39	**1.65**
3.2	26.7	13.1	5.4	15.7	1.0	6.43	**1.20**		**10.8**	19.1	9.4	3.8	15.5	0.8	6.33	**1.65**
3.4	26.5	13.0	5.3	15.6	0.9	6.38	**1.20**		**11.0**	18.9	9.3	3.8	15.8	1.1	6.45	**1.70**
3.6	26.3	12.9	5.3	15.5	0.8	6.33	**1.20**		**11.2**	18.7	9.2	3.8	15.6	0.9	6.38	**1.70**
3.8	26.1	12.8	5.2	15.4	0.7	6.28	**1.20**		**11.4**	18.5	9.1	3.7	15.9	1.2	6.50	**1.75**
4.0	25.9	12.7	5.2	15.9	1.2	6.50	**1.25**		**11.6**	18.3	9.0	3.7	15.7	1.0	6.43	**1.75**
4.2	25.7	12.6	5.2	15.8	1.1	6.45	**1.25**		**11.8**	18.1	8.9	3.6	15.6	0.9	6.36	**1.75**
4.4	25.5	12.5	5.1	15.7	1.0	6.40	**1.25**		**12.0**	17.9	8.8	3.6	15.8	1.1	6.47	**1.80**
4.6	25.3	12.4	5.1	15.5	0.8	6.35	**1.25**		**12.2**	17.7	8.7	3.6	15.7	1.0	6.39	**1.80**
4.8	25.1	12.3	5.0	15.4	0.7	6.30	**1.25**		**12.4**	17.5	8.6	3.5	15.9	1.2	6.50	**1.85**
5.0	24.9	12.2	5.0	15.9	1.2	6.50	**1.30**		**12.6**	17.3	8.5	3.5	15.7	1.0	6.42	**1.85**
5.2	24.7	12.1	5.0	15.8	1.1	6.44	**1.30**		**12.8**	17.1	8.4	3.4	15.6	0.9	6.35	**1.85**
5.4	24.5	12.0	4.9	15.7	1.0	6.39	**1.30**		**13.0**	16.9	8.3	3.4	15.8	1.1	6.45	**1.90**
5.6	24.3	11.9	4.9	15.5	0.8	6.34	**1.30**		**13.2**	16.7	8.2	3.4	15.6	0.9	6.37	**1.90**
5.8	24.1	11.8	4.8	15.4	0.7	6.29	**1.30**		**13.4**	16.5	8.1	3.3	15.8	1.1	6.46	**1.95**
6.0	23.9	11.7	4.8	15.9	1.2	6.47	**1.35**		**13.6**	16.3	8.0	3.3	15.6	0.9	6.38	**1.95**
6.2	23.7	11.7	4.8	15.7	1.0	6.42	**1.35**		**13.8**	16.1	7.9	3.2	15.8	1.1	6.46	**2.00**
6.4	23.5	11.6	4.7	15.6	0.9	6.37	**1.35**		**14.0**	15.9	7.8	3.2	15.6	0.9	6.38	**2.00**
6.6	23.3	11.5	4.7	15.5	0.8	6.31	**1.35**		**14.2**	15.7	7.7	3.2	15.4	0.7	6.30	**2.00**
6.8	23.1	11.4	4.6	15.9	1.2	6.49	**1.40**		**14.4**	15.5	7.6	3.1	15.2	0.5	6.22	**2.00**
7.0	22.9	11.3	4.6	15.8	1.1	6.43	**1.40**		**14.6**	15.3	7.5	3.1	15.1	0.4	6.14	**2.00**
7.2	22.7	11.2	4.6	15.6	0.9	6.38	**1.40**		**14.8**	15.1	7.4	3.0	14.9	0.2	6.06	**2.00**
7.4	22.5	11.1	4.5	15.5	0.8	6.32	**1.40**		**15.0**	14.9	7.3	3.0	14.7	0.0	5.98	**2.00**

Calculations: Psia(rec) x DF = psia(final)
Psia(final) - 14.7 = psig(final)

Conversion Equivalents

0"Hg(vac) = 29.9"Hg = 1atm = 14.7psia = 0psig

Table 9

Entech 4560SL Dynamic Standards Diluter

Mass Flow Controller Calibration

MFC #1 - Dilution Gas			MFC #2 - Standard Gas Mix						MFC #3 - Standard Gas Mix							
Target Flow	Flow Measured	Software Readout	Target Flow	Flow Measured	Software Readout	Target Flow	Flow Measured	Software Readout	Target Flow	Flow Measured	Software Readout	Target Flow	Flow Measured	Software Readout		
cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	cc/min	Date	Init.
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				
1000			40			5.0			40			5.0				

Comments:

Table 10 A

Flow Controller
Calibration Table
80% Capacity

Restrictor Type	Restrictor Orifice ID (inches)	Sampling Time	6-Liter Canister Flow Rate (CC/MIN)	1-Liter Canister Flow Rate (CC/MIN)
#1	0.0080	5 Minutes	NA	167.0
#1	0.0080	30 Minutes	167.0	26.7
#1	0.0080	1 Hour	83.0	13.3
#2	0.0050	2 Hour	41.0	6.7
#2	0.0050	3 Hour	27.7	4.4
#2	0.0050	4 Hour	20.8	3.4
#3	0.0035	6 Hour	13.8	NA
#3	0.0035	8 Hour	10.4	NA
#3	0.0035	12 Hour	6.9	NA
#4	0.0020	24 Hour	3.4	NA

Table 10 B

Flow Controller
Calibration Table
90% Capacity

Restrictor Type	Restrictor Orifice ID (inches)	Sampling Time	6-Liter Canister Flow Rate (CC/MIN)	1-Liter Canister Flow Rate (CC/MIN)
#1	0.0080	5 Minutes	NA	180.0
#1	0.0080	30 Minutes	180.0	30.0
#1	0.0080	1 Hour	90.0	15.0
#2	0.0050	2 Hour	45.0	7.5
#2	0.0050	3 Hour	30.0	5.0
#2	0.0050	4 Hour	22.5	3.8
#3	0.0035	6 Hour	15.0	NA
#3	0.0035	8 Hour	11.3	NA
#3	0.0035	12 Hour	7.5	NA
#4	0.0020	24 Hour	3.8	NA

Compound List Report
Product: VTO15STD Volatile Organics
Matrix: AIR Air

Jul 16, 2014 12:59 pm

Method List: VTO14/15 AIR
Report List: VTO15 AIR
RL/MDL Factor: 1

Method Ref: TO-15
VOA TO15 List

LJ44143
LJ40976

Compound	CAS No.	RL	MDL	Units
Acetone	67-64-1	0.2	0.11	ppbv
1,3-Butadiene	106-99-0	0.2	0.034	ppbv
Benzene	71-43-2	0.2	0.025	ppbv
Bromodichloromethane	75-27-4	0.2	0.029	ppbv
Bromoform	75-25-2	0.2	0.035	ppbv
Bromomethane	74-83-9	0.2	0.033	ppbv
Bromoethene	593-60-2	0.2	0.035	ppbv
Benzyl Chloride	100-44-7	0.2	0.047	ppbv
Carbon disulfide	75-15-0	0.2	0.031	ppbv
Chlorobenzene	108-90-7	0.2	0.034	ppbv
Chloroethane	75-00-3	0.2	0.042	ppbv
Chloroform	67-66-3	0.2	0.024	ppbv
Chloromethane	74-87-3	0.2	0.079	ppbv
3-Chloropropene	107-05-1	0.2	0.037	ppbv
2-Chlorotoluene	95-49-8	0.2	0.032	ppbv
Carbon tetrachloride	56-23-5	0.2	0.025	ppbv
Cyclohexane	110-82-7	0.2	0.027	ppbv
1,1-Dichloroethane	75-34-3	0.2	0.027	ppbv
1,1-Dichloroethylene	75-35-4	0.2	0.052	ppbv
1,2-Dibromoethane	106-93-4	0.2	0.027	ppbv
1,2-Dichloroethane	107-06-2	0.2	0.023	ppbv
1,2-Dichloropropane	78-87-5	0.2	0.029	ppbv
1,4-Dioxane	123-91-1	0.2	0.12	ppbv
Dichlorodifluoromethane	75-71-8	0.2	0.03	ppbv
Dibromochloromethane	124-48-1	0.2	0.038	ppbv
trans-1,2-Dichloroethylene	156-60-5	0.2	0.07	ppbv
cis-1,2-Dichloroethylene	156-59-2	0.2	0.023	ppbv
cis-1,3-Dichloropropene	10061-01-5	0.2	0.025	ppbv
m-Dichlorobenzene	541-73-1	0.2	0.033	ppbv
o-Dichlorobenzene	95-50-1	0.2	0.029	ppbv
p-Dichlorobenzene	106-46-7	0.2	0.037	ppbv
trans-1,3-Dichloropropene	10061-02-6	0.2	0.025	ppbv
Ethanol	64-17-5	0.5	0.17	ppbv
Ethylbenzene	100-41-4	0.2	0.035	ppbv
Ethyl Acetate	141-78-6	0.2	0.061	ppbv
4-Ethyltoluene	622-96-8	0.2	0.032	ppbv
Freon 113	76-13-1	0.2	0.04	ppbv
Freon 114	76-14-2	0.2	0.031	ppbv
Heptane	142-82-5	0.2	0.021	ppbv
Hexachlorobutadiene	87-68-3	0.2	0.051	ppbv
Hexane	110-54-3	0.2	0.042	ppbv
2-Hexanone	591-78-6	0.2	0.064	ppbv
Isopropyl Alcohol	67-63-0	0.2	0.066	ppbv
Methylene chloride	75-09-2	0.2	0.13	ppbv
Methyl ethyl ketone	78-93-3	0.2	0.04	ppbv
Methyl Isobutyl Ketone	108-10-1	0.2	0.042	ppbv
Methyl Tert Butyl Ether	1634-04-4	0.2	0.041	ppbv
Methylmethacrylate	80-62-6	0.2	0.036	ppbv
Propylene	115-07-1	0.5	0.048	ppbv
Styrene	100-42-5	0.2	0.033	ppbv
1,1,1-Trichloroethane	71-55-6	0.2	0.024	ppbv
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.04	ppbv
1,1,2-Trichloroethane	79-00-5	0.2	0.035	ppbv
1,2,4-Trichlorobenzene	120-82-1	0.2	0.061	ppbv
1,2,4-Trimethylbenzene	95-63-6	0.2	0.029	ppbv
1,3,5-Trimethylbenzene	108-67-8	0.2	0.029	ppbv
2,2,4-Trimethylpentane	540-84-1	0.2	0.025	ppbv
Tertiary Butyl Alcohol	75-65-0	0.2	0.044	ppbv
Tetrachloroethylene	127-18-4	0.04	0.037	ppbv
Tetrahydrofuran	109-99-9	0.2	0.049	ppbv
Toluene	108-88-3	0.2	0.03	ppbv
Trichloroethylene	79-01-6	0.04	0.03	ppbv
Trichlorofluoromethane	75-69-4	0.2	0.029	ppbv
Vinyl chloride	75-01-4	0.2	0.031	ppbv
Vinyl Acetate	108-05-4	0.2	0.095	ppbv
m,p-Xylene		0.2	0.069	ppbv
o-Xylene	95-47-6	0.2	0.034	ppbv
Xylenes (total)	1330-20-7	0.2	0.034	ppbv

68 compounds reported in list VTO15

APPENDIX C

SAMPLING VISIT PROCEDURES

GENERAL PROCEDURES CHECKLIST

Date:
_____

The following equipment will be requisitioned and inspected prior to the commencement of field activities at the Westchester County Airport Hangar D1 Bay 1B site located in Harrison, New York.

Equipment Information	Y	N	N/A
1. PID with an 10.2 eV lamp (or equivalent) available:			
• Unit in working order			
• Unit calibrated according to manufacturer's specification			
2a. Water level probe available:			
• Unit is in working order			
• Unit has been decontaminated			
2b. pH/Conductivity/eH probe available:			
• Unit is in working order			
• Unit has been decontaminated			
2c. Temperature probe available:			
• Unit is in working order			
• Unit has been decontaminated			
2d. Turbidity meter available:			
• Unit is in working order			
• Unit has been decontaminated			
2e. Disposable bailers and filters:			
• Units have been ordered and received			

• Spare parts are on hand			
Equipment Information	**Y**	**N**	**N/A**
3. Proper drilling/sampling tools available:			
• Equipment is in good shape			
• Equipment has been decontaminated			
4. All instruments successfully calibrated daily as required:			
5. Pry bar available for removing man way covers (if needed):			
6. Clean plastic sheeting available:			
7. Coolers available:			
8. Proper preservatives as listed in Section 4.0 of the QAPP:			
9. Proper sample containers as listed in Section 4.0 of the QAPP Work Scope available:			
10. Field log book and writing utensils available:			
11. Chain-of-Custody forms are available			
12. Sample labels and custody seals are available			
13. Decontamination equipment/supplies are available:			
• Liqui-Nox			
12. Sample labels and custody seals are available			
13. Decontamination equipment/supplies are available:			
• Liqui-Nox			
• Distilled water			
• Methanol			
• Nitric Acid			
• Cow trough & other buckets			

• Steam cleaner			
• Containers for waste water available			
Equipment Information	**Y**	**N**	**N/A**
14. Work gloves are available:			
15. Latex sampling gloves are available:			
16. Tools, spare fittings, fuses, batteries, etc.:			
17. Trip blanks and water for field blanks sent from the lab:			
18. Aluminum foil for head space analysis:			

N = No **Y = Yes** **N/A = Not Applicable**

SOIL SAMPLING PROCEDURES CHECKLIST

Date:
_____

The following procedures will be followed during the collection of soil samples from Westchester County Airport Hangar D1 Bay 1B located in Harrison, New York.

Equipment Information	Y	N	N/A
1. Equipment decontaminated:			
• Decontaminate area prepared			
• Cow trough & re-usable buckets steam cleaned			
• Clean plastic used			
• Equipment steam cleaned properly			
• Equipment reloaded or staged to prevent contamination			
2. PID properly calibrated :			
3. Pre-sampling information logged in field log book (location, personnel, etc.):			
4. Sampling gloves worn prior to collecting the samples:			
5. Samples preserved and secured properly:			
6. Blanks and duplicates collected when required:			
7. Blanks with proper ID and clearly indicated in field log book:			
8. All field screening information logged for each boring location:			
9. All instruments successfully calibrated daily as required:			
10. "Hot Zone" sample determined for each boring location:			
11. Samples properly labeled and shipped to the lab:			
12. Disposable sampling equipment collected in a plastic bag for disposal:			

13. Decontamination procedures repeated when necessary:			
Equipment Information	**Y**	**N**	**N/A**
14. Holding times and shipment times for samples known:			
15. Samples, with Chain-of-Custody, shipped when necessary and proper cooler temperature confirmed immediately prior to shipment:			
16. Confirm that lab received the samples:			

Y = Yes N = No N/A = Not Applicable

GROUNDWATER SAMPLING PROCEDURES CHECKLIST

Date:
_____

The following procedures will be followed during the collection of groundwater samples from Westchester County Airport Hangar D1 Bay 1B located in Harrison, New York.

Equipment Information	Y	N	N/A
1. Equipment decontaminated:			
• Decontaminate area prepared			
• Cow trough steam cleaned			
• Clean plastic used			
• Equipment steam cleaned properly			
• Equipment reloaded or staged to prevent contamination			
2. PID properly calibrated			
3. Pre-sampling information logged in field log book (location, personnel, etc.):			
4. Sampling gloves worn prior to collecting the samples:			
5. Samples preserved and secured properly: Note: If turbidity does not stabilize, collect additional sample if requested by the CPM. Field filter using field filters. Preserve and ship to lab. Sample ID should be XX-XF (for filtered).			
6. Blanks and duplicates collected when required:			
7. Blanks with proper ID and clearly indicated in field log book:			
8. All field screening information logged for each sampling location:			
9. All instruments successfully calibrated daily as required:			
10. Samples properly labeled and shipped to the lab:			

11. All disposable sampling equipment collected in a plastic bag for disposal:			
Equipment Information	**Y**	**N**	**N/A**
12. Decontamination procedures repeated when necessary:			
13. Holding times and shipment times for samples known:			
14. Samples, with Chain-of-Custody, shipped when necessary and proper cooler temperature confirmed immediately prior to shipment:			
15. Confirm that lab received the samples:			

Y = Yes **N = No** **N/A = Not Applicable** **F = Filtered**