PARAGON PAINT
AND VARNISH CORP.

QUEENS, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C241108

Prepared for:

CSC 4540 Property Co, LLC
757 Third Avenue, 17th Floor
New York, New York 10017

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.
209 Shafter Street
Islandia, New York 11749
631-232-2600

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
1	2/15/18	Reduction in groundwater sampling frequency, shutdown of LNAPL recovery system, monthly progress reports modified to quarterly.	1/12/18
2	4/1/21	Modified groundwater sampling analyses to include Tentatively Identified Compounds (TICs), PFAS, and 1,4 dioxane	12/15/22
3	12/15/22	Added TICs to EPA TO-15 analysis for Soil Vapor Intrusion Monitoring.	12/15/22

DECEMBER 2022

CERTIFICATION STATEMENT

I, Omar Ramotar, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Omar Ramotar, P.E.	December 15, 2022	
NYS Professional Engineer #077995	Date	Signature

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

LIST OF ACRONYMS

Apex	Apex Companies, LLC
AST	Above Ground Storage Tank
AWQSGVS	Ambient Water Quality Standards and Guidance Values
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
DER-10	DER-10 Technical Guidance for Site Investigation and Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ESA	Environmental Site Assessment
EWP	Excavation Work Plan
FER	Final Engineering Report
Ft bls	Feet below land surface
HASP	Health and Safety Plan
IC	Institutional Control
ISCO	In-situ Chemical Oxidation
LNAPL	Light Non-Aqueous Phase Liquid
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector
PoG	Protection of Groundwater
Ppm	Parts Per Million
PRR	Periodic Review Report

QAPP	Quality Assurance Project Plan
RA	Remedial Alternative
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RIR	Remedial Investigation Report
RRSCO	Restricted Residential Use Soil Cleanup Standard
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOE	Support of Excavation
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TIC	Tentatively Identified Compounds
TRC	TRC Engineers, Inc.
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: Site Identification No. C241108
Paragon Paint and Varnish Corp.

5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard,
Long Island City, Queens, New York

Institutional Controls:	1. The property may be used for restricted residential, commercial and/or industrial use only.
	2. Environmental Easement
	3. Performance of soil vapor intrusion evaluation in event of redevelopment.
	4. All ECs must be inspected at a frequency and in a manner defined in the SMP.
Engineering Controls:	1. Cover system
	2. Light Non-Aqueous Phase Liquid (LNAPL) Recovery System
	3. *In-situ* Chemical Oxidation (ISCO) Injections
Inspections:	Frequency
1. Cover inspection	Annually
2. LNAPL recovery system inspection	As Needed
Monitoring:	Frequency
1. Gauging of LNAPL Recovery Wells	Quarterly
2. Gauging of Monitoring Wells - Groundwater	Quarterly
3. Sampling of Monitoring Wells – Groundwater	Annually (Can be increased if groundwater results support need to adjust frequency)
Maintenance:	Frequency
1. LNAPL pump maintenance	As Needed
2. LNAPL recovery drum change-out	As Needed

Site Identification:	Site Identification No. C241108 Paragon Paint and Varnish Corp. 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, Queens, New York

Reporting:	Frequency
1. Quarterly Progress Report (Ongoing)	Quarterly
2. Groundwater Monitoring Results	Annually
3. Periodic Review Report	Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Paragon Paint and Varnish Corp. site located in Long Island City, Queens, New York (hereinafter referred to as the “Site”). A Site location map is attached as Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C241108, which is administered by New York State Department of Environmental Conservation (NYSDEC).

On June 29, 2007, 549 46th Avenue LLC applied to the BCP as a Volunteer. Subsequent key dates related to the Volunteer’s application to the BCP are listed below:

- On September 4, 2008: The NYSDEC signed the Brownfield Cleanup Agreement (“BCA”) with 549 46th Avenue LLC as Volunteer.
- September 4, 2008: The NYSDEC signs the Brownfield Cleanup Agreement (“BCA”) with 549 46th Avenue LLC as Volunteer.
- July 6, 2010: Anable Beach Inc. applied to amend the BCA to be added as a Volunteer.
- August 17, 2010: The NYSDEC approved BCA Amendment #1.
- July 18, 2011: Vernon 4540 Realty LLC applied to amend the BCA a second time to be added as a third Volunteer (“BCA Amendment #2).
- July 29, 2011: The NYSDEC approved BCA Amendment #2.
- January 13, 2017: The NYSDEC issues BCP Certificate of Completion.
- April 24, 2019: The NYSDEC issues Modification to Certificate of Completion - Revised

A figure showing the Site boundaries is provided in Figure 2. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as “remaining contamination.” Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Queens County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site. Figure 3 and Figure 4 show the location of the ECs for the Site.

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

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the

Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the BCA Index #W2-1119-08-03, Site #C241108 for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix B of this SMP.

This SMP was prepared by Remedial Engineering P.C., on behalf of Vernon 4540, in accordance with the requirements of the NYSDEC's Division of Environmental Remediation (DER)-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions

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

1.3 Notifications

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

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan (Appendix C).
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, along with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

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

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

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

Table 1: Notifications*

Name	Contact Information
NYSDEC, DER, Bureau of Technical Support Site Control Section	Chief, Site Control Section New York State Department of Environmental Conservation Division of Environmental Remediation 625 Broadway Albany, NY 12233-7020
Sondra Martinkat	(718) 482-4891 sondra.martinkat@dec.ny.gov
Jane O'Connell	(718) 482-4599 jane.oconnell@dec.ny.gov

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

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Long Island City, Queens County, New York and is identified as Block 26 and Lot 4 on the Long Island City Tax Map. The Site is an approximately 0.76-acre area and is bounded by a one-story commercial property and Anable Basin to the north, 46th Avenue to the south, Vernon Boulevard and multi-story residential/commercial buildings to the east, and a two-story warehouse to the west (see Figure 2 – Site Layout Map). The boundaries of the Site are more fully described in the Environmental Easement, which is included as Appendix A. The owner of the Site at the time of issuance of this SMP is:

- Vernon 4540 Realty, LLC

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: an approximately 33,150 square foot lot improved by a four-story former paint factory (the "Paint Factory"), a three-story former garage and office (the "Garage"), a three-story former warehouse (the "Warehouse"), a concrete access road off 46th Avenue and a concrete rear courtyard that fronts approximately 50 feet of Anable Basin. The Site is zoned industrial and is currently vacant.

The properties adjoining the Site and, in the neighborhood, surrounding the Site primarily include commercial and residential properties. The properties immediately south of the Site include commercial and light industrial properties; the properties immediately north of the Site include commercial properties; the properties immediately east of the Site include commercial and residential properties; and the properties to the west of the Site include commercial properties.

2.2.2 Geology

The geology in the area of the Site consists of Cambrian-Ordovician granitic rock of the Ravenswood Granodiorite Formation (Baskerville, 1994). Approximate depth to bedrock based on borings completed at the Site is 12 to 28 feet below land surface (ft bls). The unconsolidated overburden consists of an unsorted heterogeneous mix of Pleistocene and Recent glacial material (i.e., glacial till) including, silt, sands, and gravel. An intermittent Peat layer was observed at approximately 10 ft bls. This overburden is overlain with approximately 10-feet of historic urban fill used to reclaim land from the East River.

Geologic cross sections are shown in Figure 5 and Figure 6. Site-specific boring logs are provided in Appendix D.

2.2.3 Hydrogeology

Groundwater is present at approximately 6 to 10 ft bls and, based on the proximity of Anable Basin, subject to tidal fluctuations. The water level data collected during the gauging events were used to prepare Site groundwater elevation contour and flow pattern maps to determine the groundwater flow direction. Based on the data collected, Figure 7 provides a representative groundwater elevation and contour map. Results indicate that groundwater flow is predominantly to the west towards the East River. It is important to note that there is a tidal influence that can be seen in monitoring wells MW-10 and MW-11, which are closest to Anable Basin.

A groundwater contour map as observed in January 2015 is shown in Figure 7. The elevation datum used is the North American Vertical Datum of 1988 (NAVD 88). Groundwater elevation data through October 2016 is provided in Table 2 (attached). Groundwater monitoring well construction logs are provided in Appendix D.

Monitoring wells located in the basement of the Warehouse were not used while constructing the groundwater contours due to anomalous data likely associated with the building's foundation structure altering groundwater flow. Additionally, LNAPL thickness as observed on the January 2015 event is graphically provided on Figure 8. When appropriate the groundwater elevations were corrected for the presence of LNAPL using a laboratory-derived specific gravity of 0.75, of which the formula and calculation results are provided in Table 2.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

2.3.1 TRC Phase I

In September 2005, TRC Engineers, Inc. (TRC) prepared a Phase I Environmental Site Assessment (ESA) for Paragon Paint Company. The Phase I report indicated that the Site has been used for industrial purposes for over 100 years, primarily as a paint manufacturing company. Multiple storage tanks, including 24 known underground storage tanks (USTs), 53 known above ground storage tanks (ASTs), and 400 drums were located on the Site (since removed). Most of the ASTs and drums were empty, but the tanks could have included mineral spirits, Stoddard solvents, number 2 fuel oil, kerosene, varnoline, linseed oil, fish oil, alkyd resin in mineral spirits, cycled mineral spirits, "direr" and propylene glycol.

2.3.2 AKRF Subsurface Investigation Report

AKRF conducted a subsurface investigation at the Site in 2006 on behalf of 549 46th Ave LLC. AKRF's subsurface investigation included the advancement of five soil borings, which were retrofitted with groundwater monitoring wells (MW-1 through MW-5) and the collection of soil, and groundwater samples for laboratory analysis. Light non-aqueous phase liquid (LNAPL) was observed in two of the monitoring wells (MW-2 and MW-3).

2.3.3 AKRF Additional Subsurface Investigation Report

AKRF conducted an additional subsurface investigation at the Site in 2007 on behalf of 549 46th Ave LLC. AKRF's additional subsurface investigation included the advancement of eight soil borings which were retrofitted with groundwater monitoring wells (MW-6 through MW-13), the installation of three soil-vapor sampling points inside the Paint Factory, and the collection of soil, groundwater, and soil-vapor samples for laboratory analysis. LNAPL was observed in monitoring wells MW-1 (near Anable basin), MW-2 (driveway), MW-3 (sidewalk along 46th Avenue), MW-6 (beneath the historical varnish pot area in the northern end of shed), MW-8 (center of courtyard, next to USTs), MW-9 (southern end of the driveway), MW-12 (western property boundary), and MW-13 (western property boundary). The LNAPL was identified as primarily a petroleum-based paint thinner. A second LNAPL, identified as weathered fuel oil, was documented in the sample collected from monitoring well MW-3.

2.3.4 Interim Remedial Measure Quarterly Reports

On February 11, 2010, the NYSDEC approved a December 18, 2009, *Revised Interim Remedial Measure Work Plan* prepared by Apex Companies, LLC (Apex) for the Site. The December 18, 2009 Work Plan prescribed the use of vacuum extraction on a monthly basis to recover LNAPL, contaminated groundwater, and soil vapor. Apex documented each extraction event in a monthly report (a total of six extraction events were completed by Apex).

A review of available monthly reports indicated one gauging and sampling event occurred in March 2010 followed by six vacuum extraction events which occurred on a monthly basis; the last reported event occurred in August 2010. Apex reports that in total, 434 gallons of total fluid and 224 gallons of LNAPL were recovered during the extraction events. Vacuum extraction occurred only at the monitoring wells which exhibited LNAPL on the day of the event, which most often included monitoring wells: MW-6, MW-8, MW-9, MW-12, MW-13, and occasionally other wells. Thirty-five-percent of the total LNAPL recovered (78 gallons) was recovered from monitoring well MW-8. Also, of note, monitoring well MW-3, which typically contained less than one foot of LNAPL thickness, on the last vacuum extraction event, contained more than seven feet of LNAPL.

2.3.5 Off-Site Soil Vapor Intrusion Investigation Report

Apex completed an off-Site soil vapor intrusion investigation within one off-Site building adjacent to the southwest Site boundaries. Apex collected two soil vapor samples and one sub-slab vapor sample from locations inside one off-Site building. Additionally, one sub-slab vapor sample was collected from the sidewalk directly south of the Site boundaries. One outdoor ambient air sample was collected from the southwest of the Site.

In the Soil Vapor Intrusion Investigation Report, Apex noted that none of the volatile organic compounds (VOCs) assigned specific thresholds by the New York State Department of Health (NYSDOH) were present exceeding concentrations of concern during the soil vapor intrusion investigation and no mitigative action was recommended.

EnviroTrac was retained by NYSDEC to conduct an off-Site soil vapor intrusion investigation within four off-Site buildings adjacent to the west, north and east Site boundaries. EnviroTrac collected sub-slab soil vapor samples and indoor air samples from within four off-Site buildings. Additionally, two outdoor ambient air samples were collected to the west and southwest of the Site.

In the Summary and Conclusion Section of the Final Report, EnviroTrac noted that the NYSDOH evaluated the analytical data to determine if vapor mitigation is warranted within any of the sampled structures. In July of 2010, the NYSDOH determined that no additional soil vapor intrusion investigation was warranted at this time for those structures sampled.

2.3.6 Remedial Investigation Report

Soil and groundwater were characterized in the Remedial Investigation (RI) conducted by Roux Associates on behalf of 549 46th Ave LLC. This investigation provided a thorough analysis of soil borings and monitoring wells, test pitting, LNAPL fingerprinting, and UST characterization. The results of the RI were presented in the Roux Associates *Remedial Investigation Report* (RIR) dated May 15, 2015. Results indicate that soil and groundwater exceedances of NYSDEC Part 375 Restricted Residential Use Soil Cleanup Standards (RRSCOs) are limited and are largely restricted to polycyclic aromatic hydrocarbons (PAHs) and metals commonly associated with historic fill. In addition, four VOCs (benzene, ethylbenzene, isopropylbenzene and xylenes) commonly associated with petroleum derivatives were found to be in exceedance of NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objective (SCOs). The potential for vapor intrusion will be addressed as part of the redevelopment of the Site; therefore, grossly impacted soil, LNAPL and the four VOCs (benzene, ethylbenzene, isopropylbenzene and xylenes) were the primary concerns at the Site. Based on the good condition of the six USTs from the courtyard and two USTs from the driveway that were removed in January through March of 2015, the primary source of LNAPL was likely subsurface piping.

The soil investigation included 37 soil borings and 122 soil samples. No samples exceeded the RRSCOs for VOCs, polychlorinated biphenyls (PCBs) or pesticides. Four VOCs exceeded Protection of Groundwater (PoG) SCOs and were also found in Site groundwater in one or more well locations. These four VOCs detected above the PoG SCOs included:

- Benzene exceeded the PoG SCO (60 μg/kg) in 1 sample at 1 location from 14-15 ft bls.
- Ethylbenzene exceeded the PoG SCO (1,000 μg/kg) in 11 samples at 6 locations at depths ranging from 4-6 ft bls to 16-18 ft bls.
- Isopropylbenzene exceeded the SCO in NYSDEC Commissioner Policy (CP)-51 Table 1 Supplemental Cleanup Objectives for Protection of Groundwater (2,300 μg/kg) in 28 samples at 20 locations at depths ranging from 0-2 ft bls to 18-19 ft bls.
- Xylenes (total) exceeded the PoG SCO (1600 μg/kg) in 11 samples at 7 locations at depths ranging from 5-7 ft bls to 16-18 ft bls.

Semivolatile organic compounds (SVOCs) exceeded the RRSCOs for 49 (out of 122) soil samples at 27 locations. All exceedances ranged in depth from 0-2 ft bls to 10-12 ft bls. Therefore, these SVOC exceedances are likely a result of historic fill and are not indicative of a prior release. Six metals were detected above the RRSCOs. The exceedances for metals were only present in the 0-2 ft bls interval.

The general direction of groundwater flow across the Site is to the west; ranging in elevation from 6 to 10 ft bls. The groundwater laboratory analytical results were compared to NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs) for Class GA groundwater (even though the groundwater at the Site is not used for drinking since the area is connected to the public water supply and the majority of the Site exhibits saline conditions). There were no exceedances of NYSDEC AWQSGVs for PCBs or pesticides. LNAPL was detected in 15 out of 36 groundwater monitoring wells, including MW-2R, MW-3, MW-6/6R, MW-7/7R, MW-8, MW-9, MW-12, MW-13, MW-17, MW-19, MW-23, MW-31, MW-33, MW-34 and MW-35. Two distinct LNAPL plumes were located on Site; one plume was centered in the courtyard and the other at the southwestern edge of the Site located within the driveway (Figure 8). A total of 26 groundwater samples were collected and analyzed for VOCs. Analytical data for VOCs indicated detections above AWQSGV for seven (7) compounds. Groundwater samples collected from 17 locations were analyzed for SVOCs. SVOCs exceeded their respective AWQSGVs at six locations. Groundwater samples collected from 17 locations were analyzed for Target Analyte List (TAL) metals. Metals were found in concentrations that exceed their respective AWQSGVs at 13 locations. The exceedances of PAHs and metals in many of the groundwater samples are likely attributable to historic fill and/or may be the result of a turbid sample.

2.3.7 Remedial Action Work Plan

The Remedial Action Work Plan (RAWP) proposed a Track 4 cleanup consisting of the following remedial components:

- Implementation of erosion and sediment controls;
- Site Monitoring of potentially airborne VOCs and particulates in accordance with a NYSDEC approved Community Air Monitoring Plan (CAMP) during all ground intrusive and soil handling activities;
- Implementation of proper dust and odor suppression techniques during all ground intrusive and soil handling activities, including use of an odor control tent enclosure for excavation work;
- Closure of USTs by removal or, as a contingency, closure in place;
- Excavation and disposal of subsurface piping;
- Excavation and off-Site disposal of grossly contaminated soil in the courtyard LNAPL source area, including:
    - Grossly contaminated soil as defined in 6NYCRR Part 375-1.2(u);
    - Soil containing LNAPL;
    - Soil containing total SVOCs exceeding 500 parts per million (ppm);
    - Soils which exceeded the PoG SCOs as defined by 6 NYCRR Part 375-6.8 for those contaminants found in Site groundwater above standards; and
    - Soils that created a nuisance condition, as defined in NYSDEC Commissioner Policy CP-51 Section G.
- Screened for indications of contamination (by visual means, odor, and monitoring with a photoionization detector (PID)) of all excavated soil during all ground intrusive Site work;
- Excavated unsaturated soil free from gross contamination was stockpiled for reuse on Site (Assuming it meets soil re-use criteria as noted in NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation [DER-10]);
- Appropriate off-Site disposal of all material that was removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport and disposal;
- Backfilled excavated areas with recycled concrete aggregate (RCA) or clean stone to 1 foot above groundwater table, backfilled one-foot above the water table to two-feet below proposed development grade with fill reused from the excavation (as available), and backfilled the top two-feet with RCA as a temporary cover prior to redevelopment. RCA met NYSDEC Part 360-1.15 requirements and will be free of asphalt.
- Dewatered and off-Site disposal of groundwater as needed to facilitate excavation.
- *In situ* chemical oxidation (ISCO) injections completed for treatment of VOCs in soil and groundwater underneath the three-story brick Warehouse building on-Site;
- Installation of five automatic LNAPL recovery pumps at property boundary areas where the LNAPL plume extends off-Site, and underneath the brick Warehouse building on-Site;
- Installation of a Site cover system consisting of building slabs (the existing Paint Factory, the Warehouse and the Garage), pavement or 24-inches minimum of RCA as a temporary cover in the courtyard area. Following Site redevelopment, the Site cover system will consist of new concrete building slabs, pavement or a minimum of two feet of clean fill meeting RRSCOs in new landscaped areas as detailed in the SMP.
- Recording of an Environmental Easement, including ICs and ECs, to prevent future exposure to any residual contamination remaining at the Site; and

- Preparation of an SMP for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) ICs and ECs, (2) monitoring, (3) operation and maintenance (O&M) and (4) reporting.

2.4 Remedial Action Objectives

The remedial goals for soil at the Site were to meet the PoG SCOs for VOCs in soil and to limit exposure to contaminated soil and groundwater through use of an engineered composite cap system for areas above RRSCOs. Groundwater beneath the Site was addressed through source removal and treatment; excavation and disposal of UST-associated piping and grossly impacted soil. Consistent with Part 375, the proposed remedies for the Site were fully protective of public health and the environment, taking into account the current, intended and potential future land use.

The Remedial Action Objectives (RAOs) for the Site as listed in the RAWP dated October 7, 2015 are as follows:

2.4.1 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.4.2 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

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

2.4.3 Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

The Remedial Alternative (RA) was designed to reduce the concentration of Site contaminants through excavation of grossly contaminated soil in the LNAPL source area within the courtyard followed by product recovery at the edges of the LNAPL plumes that extended off-site from the courtyard area and the driveway.

Due to limits of the Support of Excavation (SOE), structural engineering concerns associated with the onsite buildings and other Site constraints, all soil contamination was not removed as part of the performance of the remedial action. As a result, soil contamination remains at several locations across the Site that exceeds the NYSDEC PoG SCOs for one or more of the four VOCs of concern (benzene, ethylbenzene isopropylbenzene and total xylenes) (Figures 9 and 10). This residual contamination will be addressed by the completion of an additional ISCO injection treatment plan, further discussed in Section 4.4.3.

2.5.1 Soil

The RA addressed grossly contaminated soil in the LNAPL source areas within the courtyard and driveway through excavation, low-level VOCs underneath the Warehouse through ISCO, and limiting contact with potentially-contaminated soil by installing a composite cover over the rest of the Site. Though the grossly contaminated soil was removed from the LNAPL source areas in the courtyard and driveway, soil contamination remains to the east of the excavation towards the four-story paint factory building and within the driveway excavation (Figure 9). This material, which potentially extends beneath Site buildings, could not be removed due to the SOE limitations.

The south extent of the excavation in the courtyard was extended to as near the warehouse and garage as a 1:1 slope would allow. Excavation and post-excavation sampling determined the presence of grossly contaminated material towards the three-story building and beneath the concrete slab where former 20,000 USTs had been staged on. The bottom sample collected from the middle of the driveway excavation at 17.5 ft showed evidence of gross contamination.

A total of 11 USTs were encountered during the RA, with five (5) in the southeast corner of the courtyard excavation and the remaining six (6) located inside the garage excavation footprint. All 11 tanks and their chambers encountered during the RA were emptied, cleaned and were either removed (the five (5) courtyard excavation USTs) or abandoned in place (the six (6) garage excavation USTs). Compliance UST samples were collected from the soil surrounding the courtyard and garage. USTs post-cleaning and samples that exceed the NYSDEC PoG SCOs are shown on Figure 10. This material could not be removed due to SOE limitations.

The results of soil sampling data, post-RA, are respectively presented in Table 3.

2.5.2 Groundwater

The RA addressed groundwater through removal and/or treatment of soil with VOCs above PoG SCOs. A component of the RAWP was an ISCO injection program to treat VOCs in groundwater and soil where excavation could not be completed during the RA, namely the soils under the basement of the Warehouse. The most recent round of post-injection groundwater monitoring indicated detections above NYSDEC AWQSGV for seven (7) compounds, excluding the exceedances in acetone that were most likely caused by laboratory preservative methods:

- 1,3,5-Trimethylbenzene concentrations ranged from 5.5 µg/L (a laboratory diluted sample) to 21 µg/L with the highest concentration detected in MW-33;
- 2-Butanone (MEK) was detected only in MW-38 with a diluted concentration of 65 µg/L;
- Benzene was detected in MW-34, but was not a recorded exceedance;
- Isopropylbenzene concentrations ranged from 5.2 µg/L (a laboratory diluted and estimated value) to 23 µg/L (a laboratory diluted sample) with the highest concentration detected in MW-19;

- n-Propylbenzene concentrations ranged from 5.2 µg/L (a laboratory diluted and estimated value) to 37 µg/L (a laboratory diluted sample) with the highest concentration detected in MW-19;
- sec-Butylbenzene concentrations ranged from 6.9 µg/L to 18 µg/L (a laboratory diluted sample) with the highest concentration detected in MW-19; and
- tert-Butylbenzene concentrations ranged from 6.0 µg/L (a laboratory diluted sample) to 9.6 µg/L (a laboratory diluted sample) with the highest concentration detected in MW-19.

Of the compounds detected, only two (2) were previous identified VOCs of concern, benzene, and isopropylbenzene. Table 4 and Figure 11 summarize the results of all samples of groundwater that exceed the SCGs after completion of the remedial action.

Based upon the presence of residual VOCs in groundwater following the initial injection treatment event in the warehouse area and residual VOCs in soil after excavation of impacted soil in the courtyard, additional treatment utilizing ISCO will be completed to address these residual contaminants. Further details concerning the performance of these planned injections are discussed further in Section 4.4.3.

2.5.3 Soil Vapor

The RA addressed soil vapor through removal and/or treatment of soil containing VOCs above the PoG SCOs. During redevelopment, the need for soil vapor mitigation in new structures will be evaluated. New buildings with occupancy and slab-on-grade design may require a vapor barrier and a sub-slab depressurization system. See section 4.6 of this SMP for the procedures to be followed for that evaluation.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

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

3.2 Institutional Controls

A series of ICs is required by the RAWP and Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and (3) limit the use and development of the Site to Restricted Residential, Commercial and/or Industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are described in the Appendix A-Environmental Easement. These ICs are:

- The property may be used for: restricted residential, commercial or industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;

- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted in the Appendix A - Environmental Easement, and any potential impacts that are identified must be monitored or mitigated; and
- Vegetable gardens and farming on the Site are prohibited.

3.3 Engineering Controls

Procedures for operating and maintaining the Site cap and LNAPL recovery system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a professional engineer, are included in Appendix E. Figure 3 and Figure 4 show the locations of the ECs for the Site. Based on the presence of LNAPL and residual VOCs in groundwater and soil after excavation of impacted soil, ISCO treatment and groundwater monitoring will be completed.

3.3.1 Cover (or Cap)

Exposure to remaining contamination in soil/fill at the site is prevented by a composite cover system placed over the Site. The composite cover system consists of the concrete building slabs for the Paint Factory, the 1-Story Brick Building and the 3-Story Warehouse, concrete pavement, asphalt, or a minimum of 2-feet of RCA. The asphalt cap was installed in the driveway of the Site and also installed within the courtyard footprint along the western and northern perimeter and in an area approximately 20 feet adjacent to the warehouse building. Figure 3 shows where the various covers are installed at the Site following the Remedial Action. Appendix C outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix F.

3.3.2 LNAPL Recovery System

To recover LNAPL that may be present at the water table that could not be removed during the RA, an LNAPL recovery system was installed at locations that were specific to removing residual LNAPL. The LNAPL recovery system currently onsite was installed during the RA implementation and is comprised of five (5) automated compressor-powered pumps (Geotech AC Sipper) and a 55-gallon LNAPL storage drum. These pumps are located at Recovery Wells RW-1 through RW-5 as shown on Figure 2. Any LNAPL that is observed in monitoring wells at the Site during routine gauging events that are not within the capture zone of these existing recovery wells will be manually recovered, to the extent practical, on a quarterly basis.

In a letter received on January 12, 2018, the NYSDEC approved a request to shut down the LNAPL recovery system. The system will remain in place in the event that future monitoring events identify recoverable LNAPL. The system can be decommissioned upon redevelopment of the site. Modification and/or expansion of the LNAPL Recovery Systems will be performed, if required by the Department, to address LNAPL at these locations.

The Geotech AC Sipper is a Single-Phase, 110-220V AC, powered remediation system, designed for recovery applications where electrical power is available. The AC Sipper uses a unique downwell pump to recover hydrocarbons through a floating oleophilic/hydrophobic intake filter. Once the pump canister is filled via the vacuum cycle, the pump reverses, pressurizes the system and pumps the recovered fluid to the surface and into a storage vessel.

The Geotech AC Sipper recovers LNAPL from recovery wells using an AC powered pressure/vacuum pump. The A/C Sipper features a product intake assembly that incorporates both a density float and an oleophilic/hydrophobic filter that differentiates between floating hydrocarbons and water. The skimmer floats just above the oil/water interface to collect and remove hydrocarbons from the well into an optional above ground storage tank.

The density float assembly mounted above the skimmer attachment is designed to adjust the pump intake depth as LNAPL is recovered from the well. The controller can be used to adjust the pump cycle duration to set the average pump flow rate at a recovery rate that is less than the observed recharge rate of LNAPL into the well. The operator’s manual for the Geotech A/C Sipper Pump is provided in Appendix A of the O&M Manual (Appendix J).

Procedures for operating, maintaining and troubleshooting the LNAPL recovery system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings, signed and sealed by a professional engineer, are included in Appendix E. Figure 4 shows the location of this EC for the site.

3.3.3 ISCO Injections

An ISCO injection program will be implemented based on the presence of residual VOCs in groundwater and soil after excavation of impacted soil. The chemical oxidant that will be used is RegenOx™ manufactured by Regenesis, Inc. RegenOx™ is a solid alkaline oxidant that consists of two parts: Part A is a sodium percarbonate complex (oxidant complex); and Part B is a multi-part catalytic formula (micro-scale ferrous salt in a catalyst gel). The two parts are combined and mixed with water to produce an effective oxidant that is then injected into groundwater. VOCs are destroyed leaving carbon dioxide and water. The injected solution that does not react with the volatilized solvent will leave very little residue (e.g., innocuous carbonate ions) and will not detrimentally impact the quality of the treated groundwater.

To distribute the RegenOx™ in the subsurface while minimizing displacement of groundwater, the RegenOx™ will be delivered to the subsurface at a controlled rate as a 5 percent (by weight) solution. A 5 percent solution will require 66 gallons of water to be mixed with a five-gallon bucket of Part A and a five-gallon bucket of Part B (each bucket constitutes approximately 30 pounds of material) in a holding tank and then injected using a Geoprobe®.

Following the mixture of water and Parts A and B in the holding tank, the oxidant solution will be injected using an injection pump and ancillary equipment. The injections will be completed utilizing typical Geoprobe® drilling and injection methods.

During Geoprobe® injections, a 1.5-inch hollow steel rod with an end cap in place will be driven to the desired depths and a deployable 2-foot screened interval will be opened by pulling back on the rod. The injection solution will be pumped through the screened interval, and then the entire rod assembly will be raised to the next higher specified injection depth.

Details pertaining to the ISCO injection plan are summarized in Section 4.4.3.

3.3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the RAOs identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.4.1 Cover (or Cap)

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

3.3.4.2 LNAPL Recovery System

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

4.0 MONITORING AND SAMPLING PLAN

4.1 General

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

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

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC SCGs, particularly 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 and sampling activities.

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

- Monitoring and 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);
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the periods specified for Table 5, below. The frequency thereafter will be determined in consultation with NYSDEC and based on reports submitted showing contaminant trends. Trends in contaminant levels in groundwater will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are outlined in detail in Section 4.0 below.

Table 5: Post-Remediation Inspection and Monitoring Schedule

Inspection/ Monitoring Task	Goal of Inspection/Monitoring Task	Frequency of Inspection/Monitoring Task[1]
Inspection		
Site-wide Cover System	Confirm Site-Wide Cover System has not been compromised	Annually. First inspection no more than 15 months after issuance of the COC.

Inspection/ Monitoring Task	Goal of Inspection/Monitoring Task	Frequency of Inspection/Monitoring Task[1]
LNAPL Recovery System	Confirm Proper Operation of System	As needed.
Monitoring		
Groundwater (MW-2R, MW-3, MW-4, MW-7, MW-10, MW-11, MW-19, MW-21, MW-33, MW-34, MW-37, MW-38, MW-40, MW-41, MW-42, MW-43, MW-44, MW-45, MW-46, MW-47 and MW-48)	Gauge Monitoring Wells to assess effectiveness of remedy[3]	Quarterly for a minimum of four Quarters following issuance of the COC - All Monitoring Wells
	Obtain VOC data from Monitoring Wells per USEPA Method 8260 for NYSDEC (TCL) compounds and Tentatively Identified compounds (TICs)	Annual (Can be increased if groundwater results support need to adjust frequency) – All Monitoring Wells
	Obtain Emerging Contaminant (PFAS and 1,4-dioxane) data from Monitoring Wells per USEPA Method 537 Modified for NYSDEC 21-compound list and USEPA Method 8270 SIM	Annual (Two years maximum, will discuss adjusting frequency in 2023 if groundwater results support) – One monitoring well selected from four representative locations. See QAPP Section 2.1
	Obtain field groundwater parameters	Annual (Can be increased if groundwater results support need to adjust frequency) – All Monitoring Wells
	Obtain Field Groundwater Parameters (PH, ORP, DO, Temperature & Conductivity) to assess effectiveness of ISCO injections	Bi-weekly for two months following completion of ISCO injections - Selected Monitoring Wells Per ISCO Injection Design Plan[2]
Free-Product (MW-2R, MW-3, MW-4, MW-7, MW-7R, MW-9, MW-10, MW-11, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-33, MW-34, MW-36, MW-37, MW-38, MW-40, MW-41, MW-42, MW-43, MW-44, MW-45, MW-46, MW-47 and MW-48; and RW-1, RW-2, RW-3, RW-4 and RW-5)	Check for presence of LNAPL and confirm thickness of LNAPL, if applicable[3]; Manual recovery of free-product where present and practical	Quarterly – All Monitoring Wells

1. The frequency of events will be conducted as specified above until otherwise approved by NYSDEC and NYSDOH.
2. An area-specific ISCO Design Injection Plan, which will target residual contamination that could not be removed during the RAWP, will be submitted to the NYSDEC prior to implementation for approval, as necessary.
3. Monitoring wells that have LNAPL present will not be analyzed for VOCs.

A record of the findings of each monitoring/ inspection event and resulting maintenance activity performed, where applicable, will be kept in a dedicated log book and also documented on the Site Inspection Checklist (Appendix H). If at any time during the reporting period the Volunteer identifies a failure of one or more of the engineering controls or non-compliance with one or more of the institutional controls, the remedial party must notify the Department and implement corrective measures in accordance with a Corrective Measures Work Plan (CMWP) that will be submitted to and approved by NYSDEC and provide a periodic certification of the IC/ECs. Confirmation of the completion of maintenance activities will be documented in the subsequent Periodic Review Report.

4.2 Cover System Monitoring

Exposure to residual contaminated soil remaining at the site is prevented by an engineered site cover system that consists of:

- Building foundations (concrete slab/footings/basement walls);
- Preexisting concrete pavement;
- RCA sub-base; and
- Asphalt.

The location and details of the site cover system are shown on Figure 3.

Disturbance of the concrete floor slab and/or any of the underlying demarcation layers or EC components is governed by the Environmental Easement. In the unlikely event of an unanticipated accidental or required disturbance of the site cover system, the response procedure is outlined in Appendix C.

Monitoring of the site cover system will occur on an annual basis as long as the Environmental Easement is in effect to ensure the system’s integrity. Monitoring will consist of visual inspection, which shall evaluate the structural integrity of the concrete floor slab, support columns into the floors and the wall joints. If any penetrating cracks or openings are identified, they shall be screened for organic vapors with a PID and any readings shall be noted. In addition, any penetrating cracks or openings in the floor shall then be properly sealed. The results of the inspection will be included in the Periodic Review Report. In addition, the site cover system must be inspected and recertified any time a disturbance in the system occurs. The inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the site cover system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

4.3 Site-Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

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

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

Inspections of all remedial components installed at the Site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report (PRR). The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If Site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.4 Groundwater Monitoring and Sampling

Groundwater monitoring of monitoring wells shall be conducted quarterly and samples shall be collected from groundwater monitoring wells annually to evaluate performance of the ISCO used to treat VOCs in groundwater underneath the Warehouse and the LNAPL recovery systems to address recoverable LNAPL, the effectiveness of grossly contaminated soil removal, and to evaluate if remaining contamination continues to impact groundwater. Sampling locations, the required analytical parameters and schedule are provided in Table 5. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Detailed sample collection and analytical procedures and protocols are provided in Appendix I – Field Sampling Plan.

4.4.1 Groundwater Gauging Protocol

Prior to sample collection, an electronic oil/water interface-probe indicator will be utilized to gauge the water level and to determine the presence of free-product within the monitoring and recovery wells. The depth to free-product and depth to water will be measured from the top of the well casing at each monitoring well or recovery well to an accuracy of 0.01 feet. The free-product and water levels, where applicable, will be recorded in a field book and on the groundwater well sampling log (Appendix H).

4.4.2 Groundwater Sampling

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

Samples will be collected from monitoring wells that are within the specified monitoring well network (as identified in Table 6 below). The monitoring wells will be sampled for Target Compound List (TCL) plus Tentatively Identified Compounds (TICs) of VOCs using United States Environmental Protection Agency (USEPA) SW846 Method 8260. In addition, four monitoring wells within the sampling network will be sampled for Emerging Contaminants including PFAS (NYSDEC 21-compound list) using USEPA Method 537 Modified and 1,4 dioxane using USEPA Method 8270 SIM.

Purge water and decontamination wastewater generated during groundwater sampling will be containerized, properly labeled, and disposed of. The sampling, sample handling, decontamination, and field instrument calibration procedures will be performed in accordance with established procedures for the Site (Appendix I).

Table 6 shown below summarizes the wells identification number, as well as the purpose, location, depths, and diameter and screened intervals of the wells within the monitoring network. As part of the groundwater monitoring, four (4) upgradient wells (MW-3, MW-4, MW-21, and MW-34), 15 on-site wells (MW-2R, MW-7, MW-19, MW-33, MW-38, MW-40, MW-41, MW-42, MW-43, MW-44, MW-45, MW-46, MW-47 and MW-48) and two (2) downgradient wells (MW-10, and MW-11) will be sampled to evaluate the effectiveness of the remedial system. See Figure 2 for monitoring well and recovery well locations.

Table 6 – Monitoring Well and Recovery Well Construction Details

Monitoring / Recovery Well ID	Well Location		Well Diameter (inches)	Elevation (above mean sea level)			
	Coordinates (longitude)	Coordinates (latitude)		Casing	Surface	Screen Top	Screen Bottom
MW-2R	-73.9534336	40.7473128	4	9.46	9.97	5.7	-4.3
MW-3	-73.9532420	40.7470515	2	8.44	8.93	1.44	-15.56
MW-4	-73.9529002	40.7473088	2	11.57	11.87	11.57	11.57
MW-7	-73.9532640	40.7472658	1	4.48	4.79	4.48	4.48
MW-10	-73.9532969	40.7476959	2	7.82	7.82	5.32	-7.18
MW-11	-73.9532948	40.7476836	2	7.82	7.84	-6.68	-31.18
MW-15	-73.9530254	40.7474008	2	11.51	11.96	9.5	-0.5
MW-19	-73.9533178	40.7472016	2	4.41	4.77	4.8	-1.7
MW-21	-73.9528258	40.7469560	4	8.17	8.53	3.5	-6.5
MW-33	-73.9534680	40.7472370	4	9.49	9.81	5.4	-4.6
MW-34	-73.9534240	40.7470850	4	8.3	8.53	4.7	-5.3
MW-38	-73.9534334	40.7471243	2	4.44	4.77	3.8	-0.2

Monitoring / Recovery Well ID	Well Location		Well Diameter (inches)	Elevation (above mean sea level)			
	Coordinates (longitude)	Coordinates (latitude)		Casing	Surface	Screen Top	Screen Bottom
MW-40	-73.9532080	40.7470940	2	8.49	8.88	4.49	-6.51
MW-41	-73.9531890	40.7471420	2	8.51	8.9	3.51	-1.49
MW-42	-73.9531530	40.7472580	2	9.37	9.76	5.37	-1.63
MW-43	-73.9530667	40.7475750	4	7.81	8.39	2.81	-12.19
MW-44	-73.9532500	40.7475139	4	9.15	9.51	5.15	-9.85
MW-45	-73.9531917	40.7475778	4	8.69	8.87	4.69	-9.31
MW-46	-73.9531306	40.7476556	4	7.69	8.19	3.19	-11.81
MW-47	-73.9533306	40.7475778	4	8.03	8.21	3.03	-11.97
MW-48	-73.9529139	40.7473250	2	11.43	11.80	6.43	-8.57
RW-1	-73.9534944	40.7471611	4	8.26	8.85	3.26	-6.74
RW-2	-73.9534778	40.7472028	4	9.81	9.58	5.81	-4.19
RW-3	-73.9534028	40.7474472	4	9.83	10.42	3.83	-6.17
RW-4	-73.9530472	40.7475444	4	10.20	8.43	3.2	-6.80
RW-5	-73.9530167	40.7475944	4	10.27	8.27	3.27	-6.73

Monitoring well and recovery well construction logs are included in Appendix D of this document.

The five (5) monitoring wells within the proposed SMP monitoring network that were destroyed within the courtyard during the RA were replaced with five (5) monitoring wells (MW-43 through MW-47). These monitoring wells will be installed in close proximity to areas within the courtyard where residual impacts were observed, as mentioned previously in Section 2.5.1. In addition, a new monitoring well, MW-48, was installed in close proximity to MW-4 and MW-22 to facilitate continued monitoring of free-product present below the Paint Factory Building. This new monitoring well was installed because the existing monitoring wells (MW-4 and MW-22) that are in close proximity to MW-48 were not installed with well screens that did not cover the entire column of groundwater above bedrock. Locations of all newly installed monitoring wells are shown on Figure 2. Following replacement, the wells were developed to ensure hydraulic connectivity with the aquifer and allowed to equilibrate for no less than one week. The replacement wells were constructed in the same manner as the monitoring wells that were destroyed.

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

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

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

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

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

4.4.3 ISCO Injection Plan, Monitoring and Sampling

Based on the presence of LNAPL and residual VOCs in groundwater and soil after excavation of impacted soil and following review of the baseline groundwater quality and gauging data, an additional round of treatment using ISCO will be completed. Where LNAPL is present, the additional round of ISCO treatment, if required, would not occur until LNAPL recovery efforts have been completed to the extent practical as discussed in Section 3.3.3.2. Volume and density application rates for the chemical oxidant or alternative bioremediation reagent used in the injections will be based on the manufacturer's recommendations and baseline groundwater monitoring results. The depth of injection will be based on exceedances of PoG SCOs for benzene, ethylbenzene, isopropylbenzene and xylenes in soil encountered during the RA or additional information to be collected when the site is being redeveloped. A Design Plan, which would show approximate injection point locations and material volume to be injected, will be submitted to NYSDEC prior to implementation for approval, as necessary.

ISCO performance monitoring will be conducted bi-weekly for approximately two months following the completion of the injections. Field parameters (e.g., pH, oxidation-reduction potential, and dissolved oxygen) will be measured at the monitoring wells within the monitoring well network (detailed below) immediately prior to (i.e., baseline), during, and once every two weeks for two months following ISCO injections. When the field parameters indicate groundwater conditions have nearly returned to baseline, groundwater samples will be collected and analyzed for TCL VOCs using United States Environmental Protection Agency (USEPA) SW846 Method 8260.

4.5 LNAPL Recovery System Monitoring

Monitoring of the LNAPL recovery system will be performed on a routine basis, as identified in Table 5, shown in Section 4.1. Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the LNAPL recovery system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The LNAPL recovery system components to be monitored include, but are not limited to, the components included in Table 5 in Section 4.1. See Figure 2 for monitoring well and recovery well locations.

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix H- Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the O&M Plan, is required immediately.

4.6 Soil Vapor Intrusion Monitoring

New buildings with occupancy and slab-on-grade design may require a vapor barrier and a sub-slab depressurization system. Soil vapor intrusion sampling will be performed during redevelopment to assess the potential for soil vapor intrusion in the new building. Samples will be collected as per a NYSDOH approved plan and will be analyzed by Environmental Protection Agency (EPA) Method TO-15 plus TICs. TO-15 was developed for the sampling and analytical procedures for the measurement of subsets of the 97 VOCs that are included in the 189 hazardous air pollutants (HAPs) listed in Title III of the Clean Air Act Amendments of 1990.

The network of on-site soil vapor intrusion sample locations will be designed based on the following criteria:

- Redevelopment of buildings where soil is disturbed within the Institutional Control Boundaries (shown on Figure 2 as “Site Boundary”);
- Proximity to RAWP sampling locations; and
- Locations where soil vapor is likely to exist (i.e., not located in bedrock or beneath the water table).

The frequency and sampling requirements will be determined following evaluation of the data obtained during the initial round of soil vapor intrusion sampling, and will require approval from the NYSDEC.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the Site to operate and maintain the LNAPL recovery system;
- Includes troubleshooting as referenced in the equipment manual(s); and
- Will be updated periodically to reflect changes in Site conditions or the manner in which the LNAPL recovery system are operated and maintained.

Further detail regarding the O&M of the LNAPL recovery system is provided in Appendix J - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System (or other Engineering Control) Performance Criteria

This section describes the performance criteria for the engineering controls at the Site. Minimum operating requirements for each system are outlined below:

- LNAPL Recovery System
    - Product is present within recovery well

5.3 Operation and Maintenance of LNAPL Recovery System

The following sections provide a description of the O&M of the LNAPL recovery system. The LNAPL recovery system consists of five recovery wells (RW-1 through RW-5). The locations are shown on Figure 2. The as-built drawing for the LNAPL recovery system is provided in Appendix E.

5.3.1 System Start-Up and Testing

The system will be inspected prior to system start-up to ensure all piping is in place and secure. Startup includes:

- Inspect system to ensure system is connected to power source, including the control box, probe ,and autoseeker (as applicable);
- Power on and allow system to cycle (typically within 5 seconds of power on);
- Use the “test system” button to cause the pump to run for 5 seconds prior to lowering the probe into the well. After testing, press STOP to prevent the system from beginning to cycle or AUTO to leave the system operating; and
- Test all high level alarms for functionality.

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

5.3.2 Routine System Operation and Maintenance

All mechanical aspects of the product recovery system will be visibly inspected to ensure proper function. Inspection activities include making sure that power supply is functioning, verifying no leaks are present in any of the recovery tubing, hoses or connections. The 55-gallon product storage tank should also be checked during each visit in order to determine if disposal arrangements need to be made.

Free-product levels within the wells located in the area should be monitored and recorded to determine if the system is operating at optimal conditions. Wells would be gauged approximately every quarter. As noted in Section 3.3.2, any LNAPL that is observed in monitoring wells at the Site during routine gauging events that are not within the capture zone of these existing recovery wells will be manually recovered, to the extent practical, on a quarterly basis. Modification and/or expansion of the LNAPL Recovery System can and will be performed, if necessary, to address LNAPL at these locations.

The in-well probe/product pump will be cleaned on a monthly basis or on a more frequent basis depending on Site conditions. The probe will be cleaned when fouled with a soft brush and the pump intake holes sprayed with WD 40 or equivalent lubricant.

The tank level sensor probes will be inspected every visit to ensure that they are functioning correctly.

5.3.3 Non-Routine Operation and Maintenance

Non-routine equipment maintenance consists of maintenance activities that will be performed with less frequency than the routine (i.e., semi-annually) on several system components. Non-routine equipment maintenance will be performed in accordance with manufacturer’s instructions. Specific non-routine maintenance tasks include replacement of level sensor probes and the product pumps.

5.3.4 System Monitoring Devices and Alarms

The LNAPL recovery system has a product tank override probe that acts as an emergency shutoff switch to keep the product tank or drum from overflowing. In the event that the tank or drum is nearly full, the product tank override probe will shut off power to the pumps. A second product override probe will be located in the secondary containment pallet. In the event that the tank or drum leaks, the product tank override probe will detect the spill and shutoff power to the pumps.

6.0 PERIODIC ASSESSMENT/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

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

Vulnerability of the remedial systems is analyzed in this section. The vulnerability assessment is based on the remedial systems as shown in the RAWP, and is subject to change based upon the Site conditions following the implementation of the Remedial Action and subsequent Site redevelopment.

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

6.1.1 Flood Plain

The northwest corner of the Site is bounded by a bulkhead at Anable Basin. The Site is within the 100-year flood zone (Roux, 2011 Phase I). The Site's current development plan shows Site grade will be raised approximately four feet. The LNAPL recovery system is unlikely to be affected by typical flood events, however, the 100-year flood could cause temporary shutdown of equipment located within the courtyard and driveway inside the recovery wells (i.e., the probe).

6.1.2 Site Drainage and Stormwater Management

Prior to the RA, the Site was covered by impervious material. Following completion of the RA, the Site will be temporarily capped with RCA and asphalt, and graded away from Site buildings. Site drainage will be modified by redevelopment; however, there will still be no increase in impermeable area from pre-development conditions.

6.1.3 Erosion

The Site will be covered by RCA or buildings for temporary cover, and primarily buildings, concrete, asphalt and landscaped areas following completion of redevelopment. As the Site will be covered, erosion is not likely to be an issue.

6.1.4 Electricity

In the event of an electricity outage, the LNAPL recovery system will not function. The LNAPL recovery system is not considered critical for short term emergency periods and will remain inactive until power comes back on.

6.1.5 Spill/Containment Release

The LNAPL recovery system drums have been installed inside the former Paint Factory Building with an overflow float valve that will trigger the system to turn off if the drums are at capacity. The LNAPL recovery system drums are placed on a secondary containment pad to prevent any leaks or spills from affecting the environment. Due to the drums being located inside a building, the drums should not be affected by the 100-year flood.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during site management, and as reported in the PRR.

The assessment will include a discussion of several components of sustainability, including waste generation, energy usage, emissions, water usage, and land and/or ecosystems. A preliminary summary of each component as it relates to the Site is provided below:

- Waste Generation
    - The LNAPL recovery system will generate drums of LNAPL as a waste product. To minimize the amount of drums disposed of product may be transferred between drums (i.e., if two drums are half full and combined into one drum – only one drum needs to be disposed of and replaced).
- Energy Usage
    - Remedial system energy usage is primarily for the LNAPL recovery system product recovery pumps.
- Emissions
    - Emissions from the LNAPL recovery system cannot be quantified at this time.
- Water Usage
    - No water is expected to be used by the remedial system.
- Land/Ecosystems
    - Prior to the RA, the Site was covered by buildings and a concrete courtyard. Land restoration and habitat creation will occur as part of the redevelopment to be implemented after the completion of the RA. Current plans include new landscaping and creation of a tidal marsh area.

Methods proposed to reduce energy consumption, resource usage, waste generation, and water usage will be included in the PRR.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, i.e., during significant maintenance events or in conjunction with storm recovery activities.

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

6.2.2 Remedial System

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

Components of the remedial system to be evaluated are the LNAPL recovery pump system.

6.2.3 Frequency of System Checks, Sampling and Other Periodic Activities

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

Consideration shall be given to:

- Reduced sampling frequencies;
- Reduced Site visits and system checks;
- Installation of remote sensing/operations and telemetry;
- Coordination/consolidation of activities to maximize foreman/labor time; and
- Use of mass transit for Site visits, when feasible.

6.3 Remedial System Optimization

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

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

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

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

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate Site Management Forms provided in Appendix H. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7 below and summarized in the PRR.

Table 7: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Quarterly Progress Report (Ongoing)	Quarterly
Groundwater Monitoring Results	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department

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

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater samples, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system; and

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed; and
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet).

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

7.2 Quarterly Reports

Quarterly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the quarter of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

7.3 Periodic Review Report

A PRR submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial PRR, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- All applicable Site Management Forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted;
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends; and

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.
- A Site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific RAWP, Record of Decision (ROD) or Decision Document;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
    - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document; and
    - The overall performance and effectiveness of the remedy.
- A performance summary for all treatment systems at the Site during the calendar year, including information such as:
    - The contaminant mass removed;
    - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
    - A description of the resolution of performance problems;
    - Alarm conditions;
    - A summary of the performance and/or effectiveness monitoring; and
    - Comments, conclusions, and recommendations based on data evaluation.

7.3.1 Certification of Institutional and Engineering Controls

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

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

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*

- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assess*ment of off-site contamination are no longer valid; and

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Omar Ramotar, of Remedial Engineering, P.C., 209 Shafter St. Islandia, NY 11749, am certifying as Owner's Designated Site Representative for the site."

Every five years the following certification will be added:

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

The signed certification will be included in the PRR.

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

7.4 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an IC or EC, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.5 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. The RSO report will document the research/investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, Health and Safety Plans (HASPs) etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A FER and update to the SMP may also be required.

The RSO report will be submitted in electronic format to the NYSDEC Central Office, Regional Office in which the Site is located; Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

Roux Associates, Inc., 2011. Phase I Environmental Site Assessment. July 21, 2011.

TRC Engineers, Inc., 2005. Phase I Environmental Site Assessment. September 2005.

AKRF, 2006. Subsurface Investigation Report.

AKRF, 2007. Additional Subsurface Investigation Report.

Apex, 2009. Soil Intrusion Investigation Report. May 11, 2009.

Apex, 2009. Revised Interim Remedial Measure Work Plan. December 18, 2009.

EnviroTrac, 2010. Off-Site Soil Vapor Intrusion Investigation Report.

Roux Associates, 2015. Remedial Investigation Report. May 2015.

Remedial Engineering, P.C., 2015. Remedial Action Work Plan. October 2015.

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

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

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

TABLES

Table 2. Summary of Water Level Elevations and LNAPL Thickness
Former Paragon Paint Manufacturing Facility, Long Island City, New York

		March 20, 2013				March 14, 2014				January 9, 2015				October 13, 2016*				October 26, 2016			
Well ID	MPE (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)
Monitoring Wells																					
MW-1/1R	7.55	--	6.37	1.18	--	--	6.76	0.79	--	--	6.62	0.93	--	N/A				N/A			
MW-2R	9.23	7.11	7.12	2.12	0.01	--	7.84	1.39	--	--	7.14	2.09	--	7.65	8.3	1.42	0.65	7.69	8.24	1.40	0.55
MW-3	8.40	6.31	6.62	2.01	0.31	7	7.12	1.37	0.12	6.67	6.74	1.71	0.07	7.08	7.81	1.14	0.73	7.18	7.9	1.04	0.72
MW-4	11.57	--	9.68	1.89	--	--	9.73	1.84	--	--	9.62	1.95	--	10.13	10.21	1.42	0.08	10.05	10.12	1.50	0.07
MW-5	8.35	--	5.75	2.6	--	--	6.1	2.25	--	--	6.1	2.25	--	--	6.57	1.78	--	--	6.68	1.67	--
MW-6	NR	10.00	13.60	NC	3.6	--	--	NC	--	10.04	13.72	NC	3.68	N/A				N/A			
MW-6R	11.73	--	--	--	--	10.27	13.04	2.21	2.77	9.87	11.93	1.35	2.06	N/A				N/A			
MW-7	4.48	1.07	1.63	3.27	0.56	2.39	2.66	2.02	0.27	1.78	2.14	2.61	0.36	2.80	3.20	1.58	0.4	3.11	3.19	1.35	0.08
MW-7R	4.48	--	--	--	--	--	1.36	3.12	--	--	1.06	3.42	--	--	2.95	1.53	--	--	3.02	1.46	--
MW-8	8.00	5.95	10.63	0.88	4.68	6.84	9.46	0.51	2.62	6.08	10.45	0.83	4.37	N/A				N/A			
MW-9	8.81	6.91	8.76	1.44	1.85	7.39	9.88	0.80	2.49	6.94	7.93	1.62	0.99	N/A				N/A			
MW-10	7.82	--	7.53	0.29	--	--	6.38	1.44	--	--	7.55	0.27	--	--	5.03	2.79	--	--	2.37	5.45	--
MW-11	7.82	--	6.36	1.46	--	--	6.7	1.12	--	--	6.52	1.30	--	--	6.05	1.77	--	--	6.78	1.04	--
MW-12	9.12	7.81	9.16	0.97	1.35	8.31	9.69	0.46	1.38	9.13	10.81	0.43	1.68	N/A				N/A			
MW-13	9.13	7.30	10.87	0.94	3.57	7.98	11.02	0.39	3.04	7.90	9.49	0.83	1.59	N/A				N/A			
MW-14	11.63	N/A				--	9.55	2.08	--	--	9.35	2.28	--	--	10.09	1.54	--	--	9.95	1.68	--
MW-15	11.51	N/A				--	9.46	2.05	--	--	9.26	2.25	--	--	9.99	1.52	--	--	NM	NM	--
MW-16	8.55	N/A				--	7.4	1.15	--	--	6.12	2.43	--	N/A				N/A			
MW-17	8.78	N/A				7.03	11.02	0.75	3.99	6.86	6.89	1.91	0.03	--	7.00	1.78	--	--	6.98	1.8	--
MW-18	8.40	N/A				--	6.81	1.59	--	--	6.68	1.72	--	--	6.69	1.71	--	--	7.03	1.37	--
MW-19	4.41	N/A				1.96	2.01	2.44	0.05	--	1.02	3.39	--	2.9	2.93	1.50	0.03	3.29	3.44	1.08	0.15
MW-20	11.69	N/A				--	9.85	1.84	--	--	9.74	1.95	--	--	10.26	1.43	--	--	10.19	1.5	--
MW-21	8.17	N/A				--	6.44	1.73	--	--	6.11	2.06	--	--	6.28	1.89		--	6.19	1.98	
MW-22	11.63	N/A				--	9.79	1.84	--	--	9.66	1.97	--	10.18	10.32	1.42	0.14	10.08	10.22	1.52	0.14
MW-23	8.27	N/A				7.02	10.13	0.47	3.11	6.46	8.41	1.32	1.95	N/A				N/A			
MW-24	8.86	N/A				N/A				--	6.36	2.50	--	N/A				N/A			
MW-25	9.29	N/A				N/A				--	6.88	2.41	--	N/A				N/A			
MW-27	9.55	N/A				N/A				--	7.29	2.26	--	N/A				N/A			
MW-28	9.10	N/A				N/A				--	6.75	2.35	--	N/A				N/A			
MW-30	8.70	N/A				N/A				--	7.06	1.64	--	N/A				N/A			
MW-31	9.27	N/A				N/A				8.00	8.21	1.22	0.21	N/A				N/A			
MW-32	7.76	N/A				N/A					6.18	1.58	--	N/A				N/A			
MW-33	9.49	N/A				N/A				7.39	8.20	1.90	0.81	7.55	7.60	1.93	0.05		7.55	7.60	7.55
MW-34	8.30	N/A				N/A				--	6.76	1.54	--	--	7.43	0.87	--	--	7.55	0.75	--
MW-35	NR	N/A				N/A				7.68	7.79	NC	0.11	N/A				N/A			
MW-36	9.11	N/A				N/A				--	7.07	2.04	--	--	7.42	1.69	--	--	1.07	8.04	--
MW-37	4.45	N/A				N/A				--	1.02	3.43	--	N/A				--	2.98	1.47	--
MW-38	4.44	N/A				N/A				--	NM	NM	--	--	3.00	1.44	--	--	3.17	1.27	--
MW-40	8.49	N/A				N/A				N/A				7.23	7.26	1.25	0.03	7.30	7.32	1.19	0.02
MW-41	8.51	N/A				N/A				N/A				--	7.04	1.47	--	--	6.98	1.53	--
MW-42	9.37	N/A				N/A				N/A				--	7.92	1.45	--	--	7.88	1.49	--
MW-43	7.81	N/A				N/A				N/A				--	6.22	1.59	--	--	6.22	1.59	--
MW-44	9.15	N/A				N/A				N/A				--	7.51	1.64	--	--	7.51	1.64	--
MW-45	8.69	N/A				N/A				N/A				7.07	7.13	1.61	0.06	7.07	7.13	1.61	0.06
MW-46	7.69	N/A				N/A				N/A				--	6.70	0.99	--	--	6.70	0.99	--
MW-47	8.03	N/A				N/A				N/A				--	6.45	1.58	--	--	6.45	1.58	--
MW-48	11.43	N/A				N/A				N/A				--	9.87	1.56	--	--	9.87	1.56	--

Table 2. Summary of Water Level Elevations and LNAPL Thickness
Former Paragon Paint Manufacturing Facility, Long Island City, New York

		March 20, 2013				March 14, 2014				January 9, 2015				October 13, 2016*				October 26, 2016			
Well ID	MPE (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)	DTP (ft)	DTW (ft)	GWE (ft)	FPT (ft)
Recovery Wells																					
RW-1	8.26	N/A				N/A				N/A				--	6.71	1.55	--	--	6.84	1.42	--
RW-2	9.81	N/A				N/A				N/A				--	7.34	2.47	--	--	7.4	2.41	--
RW-3	9.83	N/A				N/A				N/A				8.36	8.38	1.47	0.02	--	8.04	1.79	--
RW-4	10.2	N/A				N/A				N/A				8.65	8.66	1.55	0.01	--	8.3	1.9	--
RW-5	10.27	N/A				N/A				N/A				--	8.45	1.82	--	8.1	8.12	2.15	--

Notes:

LNAPL - Light Non-Aqueous Phase Liquid
MPE - Measuring Point Elevation (top of well casing)
DTW - Depth to Water
DTP - Depth to Product
GWE - Groundwater Elevation (corrected for presence of LNAPL when applicable[1,2])
FPT - Free Product Thickness
NR - Not Recorded
NC - Not Calculated[2]
NM - Not Measured

N/A - No data as monitoring/ recovery well was either not constructed (March 2013 to January 2015 monitoring period) or destroyed (October 2016 monitoring event) when monitoring event was performed.
* - Measurement data collected for monitoring wells MW-43 to MW-48 were collected on 10/17/2016; following installation

1. The elevation datum used for the MPE is NAVD 88.
2. For monitoring wells that contained LNAPL the following formula was used to calculate the corrected water table elevation:
   Corrected GWE = MPE - DTW + (LNAPL thickness * LNAPL specific gravity)
   Assumes a specific gravity of 0.75

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	Driveway-B-17_5	Driveway-E-SW-6-8	Driveway-W-SW-6-8
			Sample Date:	1/21/2016	1/21/2016	1/21/2016
			Sample Depth (ft bls):	17.5 - 17.5	6 - 8	6 - 8
1,1,1-Trichloroethane	100000	680		1600 U	31 U	33 U
1,1,2,2-Tetrachloroethane	--	--		1600 U	31 U	33 U
1,1,2-Trichloroethane	--	--		1600 U	31 U	33 U
1,1-Dichloroethane	26000	270		1600 U	31 U	33 U
1,1-Dichloroethene	100000	330		1600 U	31 U	33 U
1,2,3-Trichlorobenzene	--	--		1600 U	31 U	33 U
1,2,4-Trichlorobenzene	--	--		1600 U	31 U	33 U
1,2-Dibromoethane	--	--		1600 U	31 U	33 U
1,2-Dichlorobenzene	100000	1100		1600 U	31 U	33 U
1,2-Dichloroethane	3100	20		1600 U	31 U	33 U
1,2-Dichloropropane	--	--		1600 U	31 U	33 U
1,3,5-Trimethylbenzene	52000	8400		NA	NA	NA
1,3-Dichlorobenzene	49000	2400		1600 U	31 U	33 U
1,4-Dichlorobenzene	13000	1800		1600 U	31 U	33 U
1,4-Dioxane	13000	100		32000 U	630 U	650 U
2-Butanone (MEK)	100000	120		1600 U	31 U	45 JV
2-Hexanone	--	--		1600 U	61 JV	33 U
4-Methyl-2-pentanone (MIBK)	--	--		1600 U	31 U	33 U
Acetone	100000	50		3200 U	81 JV	190 JV
Benzene	4800	60		1600 U	31 U	33 U
Bromochloromethane	--	--		1600 U	31 U	33 U
Bromodichloromethane	--	--		1600 U	31 U	33 U
Bromoform	--	--		1600 U	31 U	33 U
Bromomethane	--	--		1600 U	31 U	33 U
Carbon disulfide	--	--		1600 U	31 U	33 U
Carbon tetrachloride	2400	760		1600 U	31 U	33 U
Chlorobenzene	100000	1100		1600 U	31 U	33 U
Chloroethane	--	--		1600 U	31 U	33 U
Chloroform	49000	370		1600 U	31 U	33 U
Chloromethane	--	--		1600 U	31 U	33 U
cis-1,2-Dichloroethene	100000	250		1600 U	31 U	33 U
cis-1,3-Dichloropropene	--	--		1600 U	31 U	33 U
Cyclohexane	--	--		6700 D	31 U	33 U
Dibromochloromethane	--	--		1600 U	31 U	33 U
Dibromochloropropane	--	--		1600 U	31 U	33 U
Dichlorodifluoromethane	--	--		1600 U	31 U	33 U
Ethylbenzene	41000	1000		24000 D	31 U	33 U
Freon 113	--	--		1600 U	31 U	33 U
Isopropylbenzene	--	--		22000 D	31 U	33 U

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	Driveway-B-17_5	Driveway-E-SW-6-8	Driveway-W-SW-6-8
			Sample Date:	1/21/2016	1/21/2016	1/21/2016
			Sample Depth (ft bls):	17.5 - 17.5	6 - 8	6 - 8
m+p-Xylene	--	--		69000 D	63 U	65 U
Methyl acetate	--	--		1600 U	31 U	33 U
Methylcyclohexane	--	--		45000 D	31 U	33 U
Methylene chloride	100000	50		3200 U	63 U	65 U
MTBE	100000	930		1600 U	31 U	33 U
n-Propylbenzene	100000	3900		NA	NA	NA
o-Xylene	--	--		32000 D	31 U	33 U
sec-Butylbenzene	100000	11000		NA	NA	NA
Styrene	--	--		1600 U	31 U	33 U
tert-Butylbenzene	100000	5900		NA	NA	NA
Tetrachloroethene	19000	1300		1600 U	31 U	33 U
Toluene	100000	700		1600 U	31 U	33 U
trans-1,2-Dichloroethene	100000	190		1600 U	31 U	33 U
trans-1,3-Dichloropropene	--	--		1600 U	31 U	33 U
Trichloroethene	21000	470		1600 U	31 U	33 U
Trichlorofluoromethane	--	--		1600 U	31 U	33 U
Vinyl chloride	900	20		1600 U	31 U	33 U
Xylenes (total)	100000	1600		100000 D	94 U	98 U

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

	NYSDEC Part 375	NYSDEC Part 375	**Sample Designation:**	PD-01	PD-05	PD-08	PD-10	PD-11
Parameter	Restricted	Protection of	**Sample Date:**	12/7/2015	9/30/2015	9/30/2015	12/21/2015	12/7/2015
(Concentrations in µg/kg)	Residential SCO	Groundwater SCO	**Sample Depth (ft bls):**	4 - 6	4 - 6	12 - 14	4 - 6	4 - 6
1,1,1-Trichloroethane	100000	680		530 UD	2900 UD	760 UD	1200 UD	990 UD
1,1,2,2-Tetrachloroethane	--	--		530 UD	2900 UD	760 UD	1200 UD	990 UD
1,1,2-Trichloroethane	--	--		790 UD	4400 UD	1100 UD	1800 UD	1500 UD
1,1-Dichloroethane	26000	270		790 UD	4400 UD	1100 UD	1800 UD	1500 UD
1,1-Dichloroethene	100000	330		530 UD	2900 UD	760 UD	1200 UD	990 UD
1,2,3-Trichlorobenzene	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
1,2,4-Trichlorobenzene	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
1,2-Dibromoethane	--	--		2100 UD	12000 UD	3000 UD	4800 UD	4000 UD
1,2-Dichlorobenzene	100000	1100		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
1,2-Dichloroethane	3100	20		530 UD	2900 UD	760 UD	1200 UD	990 UD
1,2-Dichloropropane	--	--		1800 UD	10000 UD	2700 UD	4200 UD	3500 UD
1,3,5-Trimethylbenzene	52000	8400		2600 UD	14000 UD	31000 D	15000 D	**130000 D**
1,3-Dichlorobenzene	49000	2400		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
1,4-Dichlorobenzene	13000	1800		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
1,4-Dioxane	13000	100		53000 UD	290000 UD	76000 UD	120000 UD	99000 UD
2-Butanone (MEK)	100000	120		5300 UD	29000 UD	7600 UD	12000 UD	9900 UD
2-Hexanone	--	--		5300 UD	29000 UD	7600 UD	12000 UD	9900 UD
4-Methyl-2-pentanone (MIBK)	--	--		5300 UD	29000 UD	7600 UD	12000 UD	9900 UD
Acetone	100000	50		5300 UD	29000 UVD	7600 UVD	12000 UD	9900 UD
Benzene	4800	60		530 UD	2900 UD	760 UD	1200 UD	150 JD
Bromochloromethane	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
Bromodichloromethane	--	--		530 UD	2900 UD	760 UD	1200 UD	990 UD
Bromoform	--	--		2100 UD	12000 UD	3000 UD	4800 UD	4000 UD
Bromomethane	--	--		1000 UD	5800 UD	1500 UD	2400 UD	2000 UD
Carbon disulfide	--	--		1200 JD	29000 UD	7600 UD	12000 UD	9900 UD
Carbon tetrachloride	2400	760		530 UD	2900 UD	760 UD	1200 UD	990 UD
Chlorobenzene	100000	1100		530 UD	2900 UD	760 UD	1200 UD	990 UD
Chloroethane	--	--		1000 UD	5800 UD	1500 UD	2400 UD	2000 UD
Chloroform	49000	370		790 UD	4400 UD	1100 UD	1800 UD	1500 UD
Chloromethane	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
cis-1,2-Dichloroethene	100000	250		530 UD	2900 UD	760 UD	1200 UD	990 UD
cis-1,3-Dichloropropene	--	--		530 UD	2900 UD	760 UD	1200 UD	990 UD
Cyclohexane	--	--		NA	NA	NA	NA	NA
Dibromochloromethane	--	--		530 UD	2900 UD	760 UD	1200 UD	990 UD
Dibromochloropropane	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
Dichlorodifluoromethane	--	--		5300 UD	29000 UD	7600 UD	12000 UD	9900 UD
Ethylbenzene	41000	1000		530 UD	2900 UD	350 JD	760 JD	9600 D
Freon 113	--	--		10000 UD	58000 UD	15000 UD	24000 UD	20000 UD
Isopropylbenzene	--	--		5600 D	2300 JD	2300 D	6300 D	28000 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	PD-01	PD-05	PD-08	PD-10	PD-11
			Sample Date:	12/7/2015	9/30/2015	9/30/2015	12/21/2015	12/7/2015
			Sample Depth (ft bls):	4 - 6	4 - 6	12 - 14	4 - 6	4 - 6
m+p-Xylene	--	--		1000 UD	5800 UD	1400 JD	760 JD	27000 D
Methyl acetate	--	--		NA	NA	NA	NA	NA
Methylcyclohexane	--	--		NA	NA	NA	NA	NA
Methylene chloride	100000	50		5300 UD	29000 UD	7600 UD	12000 UD	9900 UD
MTBE	100000	930		1000 UD	5800 UD	1500 UD	2400 UD	2000 UD
n-Propylbenzene	100000	3900		11000 D	4200 D	6400 D	16000 D	68000 D
o-Xylene	--	--		1000 UD	5800 UD	220 JD	2400 UD	2000 UD
sec-Butylbenzene	100000	11000		5800 D	10000 D	6000 D	6200 D	14000 D
Styrene	--	--		1000 UD	5800 UD	1500 UD	2400 UD	2000 UD
tert-Butylbenzene	100000	5900		1300 JD	14000 UD	810 JD	6000 UD	5000 UD
Tetrachloroethene	19000	1300		530 UD	2900 UD	760 UD	1200 UD	990 UD
Toluene	100000	700		790 UD	4400 UD	1100 UD	1800 UD	1500 UD
trans-1,2-Dichloroethene	100000	190		790 UD	4400 UD	1100 UD	1800 UD	1500 UD
trans-1,3-Dichloropropene	--	--		530 UD	2900 UD	760 UD	1200 UD	990 UD
Trichloroethene	21000	470		530 UD	2900 UD	760 UD	1200 UD	990 UD
Trichlorofluoromethane	--	--		2600 UD	14000 UD	3800 UD	6000 UD	5000 UD
Vinyl chloride	900	20		1000 UD	5800 UD	1500 UD	2400 UD	2000 UD
Xylenes (total)	100000	1600		1000 UD	5800 UD	1600 JD	760 JD	27000 D

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

	NYSDEC Part 375	NYSDEC Part 375	**Sample Designation:**	PD-12-E-SW-4-6	PD-12-S-B-11-13	PD-12-S-SW-4-6
Parameter	Restricted	Protection of	**Sample Date:**	1/21/2016	1/21/2016	1/21/2016
(Concentrations in µg/kg)	Residential SCO	Groundwater SCO	**Sample Depth (ft bls):**	4 - 6	11 - 13	4 - 6
1,1,1-Trichloroethane	100000	680		2400 UD	2900 UD	3000 UD
1,1,2,2-Tetrachloroethane	--	--		2400 UD	2900 UD	3000 UD
1,1,2-Trichloroethane	--	--		3500 UD	4400 UD	4600 UD
1,1-Dichloroethane	26000	270		3500 UD	4400 UD	4600 UD
1,1-Dichloroethene	100000	330		2400 UD	2900 UD	3000 UD
1,2,3-Trichlorobenzene	--	--		12000 UD	15000 UD	15000 UD
1,2,4-Trichlorobenzene	--	--		12000 UD	15000 UD	15000 UD
1,2-Dibromoethane	--	--		9400 UD	12000 UD	12000 UD
1,2-Dichlorobenzene	100000	1100		12000 UD	15000 UD	15000 UD
1,2-Dichloroethane	3100	20		2400 UD	2900 UD	3000 UD
1,2-Dichloropropane	--	--		8300 UD	10000 UD	11000 UD
1,3,5-Trimethylbenzene	52000	8400		12000 UD	15000 UD	15000 UD
1,3-Dichlorobenzene	49000	2400		12000 UD	15000 UD	15000 UD
1,4-Dichlorobenzene	13000	1800		12000 UD	15000 UD	15000 UD
1,4-Dioxane	13000	100		240000 UD	290000 UD	300000 UD
2-Butanone (MEK)	100000	120		3700 JD	4600 JD	4200 JD
2-Hexanone	--	--		24000 UD	29000 UD	30000 UD
4-Methyl-2-pentanone (MIBK)	--	--		24000 UD	29000 UD	30000 UD
Acetone	100000	50		5500 JD	6300 JD	6500 JD
Benzene	4800	60		2400 UD	2900 UD	3000 UD
Bromochloromethane	--	--		12000 UD	15000 UD	15000 UD
Bromodichloromethane	--	--		2400 UD	2900 UD	3000 UD
Bromoform	--	--		9400 UD	12000 UD	12000 UD
Bromomethane	--	--		4700 UD	5900 UD	6100 UD
Carbon disulfide	--	--		24000 UD	29000 UD	30000 UD
Carbon tetrachloride	2400	760		2400 UD	2900 UD	3000 UD
Chlorobenzene	100000	1100		2400 UD	2900 UD	3000 UD
Chloroethane	--	--		4700 UD	5900 UD	6100 UD
Chloroform	49000	370		3500 UD	4400 UD	4600 UD
Chloromethane	--	--		12000 UD	15000 UD	15000 UD
cis-1,2-Dichloroethene	100000	250		2400 UD	2900 UD	3000 UD
cis-1,3-Dichloropropene	--	--		2400 UD	2900 UD	3000 UD
Cyclohexane	--	--		NA	NA	NA
Dibromochloromethane	--	--		2400 UD	2900 UD	3000 UD
Dibromochloropropane	--	--		12000 UD	15000 UD	15000 UD
Dichlorodifluoromethane	--	--		24000 UD	29000 UD	30000 UD
Ethylbenzene	41000	1000		2400 UD	2900 UD	3000 UD
Freon 113	--	--		47000 UD	59000 UD	61000 UD
Isopropylbenzene	--	--		15000 D	18000 D	8500 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

	NYSDEC Part 375	NYSDEC Part 375	**Sample Designation:**	PD-12-E-SW-4-6	PD-12-S-B-11-13	PD-12-S-SW-4-6
Parameter	Restricted	Protection of	**Sample Date:**	1/21/2016	1/21/2016	1/21/2016
(Concentrations in µg/kg)	Residential SCO	Groundwater SCO	**Sample Depth (ft bls):**	4 - 6	11 - 13	4 - 6
m+p-Xylene	--	--		4700 UD	5900 UD	6100 UD
Methyl acetate	--	--		NA	NA	NA
Methylcyclohexane	--	--		NA	NA	NA
Methylene chloride	100000	50		24000 UD	29000 UD	30000 UD
MTBE	100000	930		4700 UD	5900 UD	6100 UD
n-Propylbenzene	100000	3900		33000 D	41000 D	18000 D
o-Xylene	--	--		4700 UD	5900 UD	6100 UD
sec-Butylbenzene	100000	11000		19000 D	29000 D	14000 D
Styrene	--	--		4700 UD	5900 UD	6100 UD
tert-Butylbenzene	100000	5900		3900 JD	6400 JD	2500 JD
Tetrachloroethene	19000	1300		2400 UD	2900 UD	3000 UD
Toluene	100000	700		3500 UD	4400 UD	4600 UD
trans-1,2-Dichloroethene	100000	190		3500 UD	4400 UD	4600 UD
trans-1,3-Dichloropropene	--	--		2400 UD	2900 UD	3000 UD
Trichloroethene	21000	470		2400 UD	2900 UD	3000 UD
Trichlorofluoromethane	--	--		12000 UD	15000 UD	15000 UD
Vinyl chloride	900	20		4700 UD	5900 UD	6100 UD
Xylenes (total)	100000	1600		4700 UD	5900 UD	6100 UD

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	SC-04-NE-B-14R	SC-04-SW-B-13SR	SC-05-NW-B-15	D-1 EAST
			Sample Date:	12/3/2015	12/28/2015	12/9/2015	10/29/2015
			Sample Depth (ft bls):	14 - 14	13 - 13	15 - 15	6 - 7
1,1,1-Trichloroethane	100000	680		280 U	1600 U	4.4 U	1200 UD
1,1,2,2-Tetrachloroethane	--	--		280 U	1600 U	4.4 U	1200 UD
1,1,2-Trichloroethane	--	--		280 U	1600 U	4.4 U	1800 UD
1,1-Dichloroethane	26000	270		280 U	1600 U	4.4 U	1800 UD
1,1-Dichloroethene	100000	330		280 U	1600 U	4.4 U	1200 UD
1,2,3-Trichlorobenzene	--	--		280 U	1600 U	4.4 U	6100 UD
1,2,4-Trichlorobenzene	--	--		280 U	1600 U	4.4 U	6100 UD
1,2-Dibromoethane	--	--		280 U	1600 U	4.4 U	4900 UD
1,2-Dichlorobenzene	100000	1100		280 U	1600 U	4.4 U	6100 UD
1,2-Dichloroethane	3100	20		280 U	1600 U	4.4 U	1200 UD
1,2-Dichloropropane	--	--		280 U	1600 U	4.4 U	4300 UD
1,3,5-Trimethylbenzene	52000	8400		NA	NA	NA	5400 JD
1,3-Dichlorobenzene	49000	2400		280 U	1600 U	4.4 U	6100 UD
1,4-Dichlorobenzene	13000	1800		280 U	1600 U	4.4 U	6100 UD
1,4-Dioxane	13000	100		5600 U	32000 U	87 U	120000 UD
2-Butanone (MEK)	100000	120		280 U	1600 U	4.4 U	12000 UD
2-Hexanone	--	--		280 U	1600 U	4.4 U	12000 UD
4-Methyl-2-pentanone (MIBK)	--	--		280 U	1600 U	4.4 U	12000 UD
Acetone	100000	50		560 U	3200 UJV	53 JV	12000 UD
Benzene	4800	60		280 U	1600 U	4.4 U	1200 UD
Bromochloromethane	--	--		280 U	1600 U	4.4 U	6100 UD
Bromodichloromethane	--	--		280 U	1600 U	4.4 U	1200 UD
Bromoform	--	--		280 U	1600 U	4.4 U	4900 UD
Bromomethane	--	--		280 U	1600 U	4.4 U	2400 UD
Carbon disulfide	--	--		280 U	1600 U	4.4 U	12000 UD
Carbon tetrachloride	2400	760		280 U	1600 U	4.4 U	1200 UD
Chlorobenzene	100000	1100		280 U	1600 U	4.4 U	1200 UD
Chloroethane	--	--		280 U	1600 U	4.4 U	2400 UD
Chloroform	49000	370		280 U	1600 U	4.4 U	1800 UD
Chloromethane	--	--		280 U	1600 U	4.4 U	6100 UD
cis-1,2-Dichloroethene	100000	250		280 U	1600 U	4.4 U	1200 UD
cis-1,3-Dichloropropene	--	--		280 U	1600 U	4.4 U	1200 UD
Cyclohexane	--	--		280 U	1600 UJV	4.4 U	NA
Dibromochloromethane	--	--		280 U	1600 U	4.4 U	1200 UD
Dibromochloropropane	--	--		280 U	1600 U	4.4 U	6100 UD
Dichlorodifluoromethane	--	--		280 U	1600 U	4.4 U	12000 UD
Ethylbenzene	41000	1000		840 D	2600 JV	4.4 U	1200 UD
Freon 113	--	--		280 U	1600 U	4.4 U	24000 UD
Isopropylbenzene	--	--		1600 D	6000 JV	4.4 U	5300 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	SC-04-NE-B-14R	SC-04-SW-B-13SR	SC-05-NW-B-15	D-1 EAST
			Sample Date:	12/3/2015	12/28/2015	12/9/2015	10/29/2015
			Sample Depth (ft bls):	14 - 14	13 - 13	15 - 15	6 - 7
m+p-Xylene	--	--		1900 D	5600 JV	8.7 U	2400 UD
Methyl acetate	--	--		280 U	1600 U	4.4 U	NA
Methylcyclohexane	--	--		680 D	3200 JV	4.4 U	NA
Methylene chloride	100000	50		560 U	3200 UJV	8.7 U	12000 UD
MTBE	100000	930		280 U	1600 U	4.4 UJV	2400 UD
n-Propylbenzene	100000	3900		NA	NA	NA	12000 D
o-Xylene	--	--		360 JD	2500 JV	4.4 U	2400 UD
sec-Butylbenzene	100000	11000		NA	NA	NA	4400 D
Styrene	--	--		280 U	1600 U	4.4 U	2400 UD
tert-Butylbenzene	100000	5900		NA	NA	NA	6100 UD
Tetrachloroethene	19000	1300		280 U	1600 U	4.4 U	1200 UD
Toluene	100000	700		280 U	1600 U	4.4 U	1800 UD
trans-1,2-Dichloroethene	100000	190		280 U	1600 U	4.4 UJV	1800 UD
trans-1,3-Dichloropropene	--	--		280 U	1600 U	4.4 U	1200 UD
Trichloroethene	21000	470		280 U	1600 U	4.4 U	1200 UD
Trichlorofluoromethane	--	--		280 U	1600 U	4.4 U	6100 UD
Vinyl chloride	900	20		280 U	1600 U	4.4 U	2400 UD
Xylenes (total)	100000	1600		2200 D	8100 JD	13 U	2400 UD

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	D-1B	D-2 EAST	D-2B	D-3 EAST	D-3B
			Sample Date:	1/13/2016	10/29/2015	1/13/2016	10/29/2015	1/13/2016
			Sample Depth (ft bls):	11 - 13	6 - 7	10 - 12	6 - 7	10 - 12
1,1,1-Trichloroethane	100000	680		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
1,1,2,2-Tetrachloroethane	--	--		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
1,1,2-Trichloroethane	--	--		730 UD	1600 UD	2800 UD	1800 UD	3100 UD
1,1-Dichloroethane	26000	270		730 UD	1600 UD	2800 UD	1800 UD	3100 UD
1,1-Dichloroethene	100000	330		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
1,2,3-Trichlorobenzene	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
1,2,4-Trichlorobenzene	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
1,2-Dibromoethane	--	--		2000 UD	4400 UD	7500 UD	4700 UD	8200 UD
1,2-Dichlorobenzene	100000	1100		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
1,2-Dichloroethane	3100	20		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
1,2-Dichloropropane	--	--		1700 UD	3800 UD	6600 UD	4100 UD	7200 UD
1,3,5-Trimethylbenzene	52000	8400		480 JD	5500 UD	16000 D	5900 UD	1300 JD
1,3-Dichlorobenzene	49000	2400		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
1,4-Dichlorobenzene	13000	1800		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
1,4-Dioxane	13000	100		49000 UD	110000 UD	190000 UD	120000 UD	200000 UD
2-Butanone (MEK)	100000	120		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
2-Hexanone	--	--		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
4-Methyl-2-pentanone (MIBK)	--	--		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
Acetone	100000	50		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
Benzene	4800	60		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Bromochloromethane	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
Bromodichloromethane	--	--		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Bromoform	--	--		2000 UD	4400 UD	7500 UD	4700 UD	8200 UD
Bromomethane	--	--		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
Carbon disulfide	--	--		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
Carbon tetrachloride	2400	760		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Chlorobenzene	100000	1100		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Chloroethane	--	--		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
Chloroform	49000	370		730 UD	1600 UD	2800 UD	1800 UD	3100 UD
Chloromethane	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
cis-1,2-Dichloroethene	100000	250		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
cis-1,3-Dichloropropene	--	--		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Cyclohexane	--	--		NA	NA	NA	NA	NA
Dibromochloromethane	--	--		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Dibromochloropropane	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
Dichlorodifluoromethane	--	--		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
Ethylbenzene	41000	1000		490 UD	1100 UD	2400 D	1200 UD	1800 JD
Freon 113	--	--		9800 UD	22000 UD	38000 UD	24000 UD	41000 UD
Isopropylbenzene	--	--		8400 D	6800 D	24000 D	18000 D	16000 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	D-1B	D-2 EAST	D-2B	D-3 EAST	D-3B
			Sample Date:	1/13/2016	10/29/2015	1/13/2016	10/29/2015	1/13/2016
			Sample Depth (ft bls):	11 - 13	6 - 7	10 - 12	6 - 7	10 - 12
m+p-Xylene	--	--		980 UVD	2200 UD	3800 UVD	2400 UD	4100 UVD
Methyl acetate	--	--		NA	NA	NA	NA	NA
Methylcyclohexane	--	--		NA	NA	NA	NA	NA
Methylene chloride	100000	50		4900 UD	11000 UD	19000 UD	12000 UD	20000 UD
MTBE	100000	930		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
n-Propylbenzene	100000	3900		20000 D	16000 D	56000 D	40000 D	37000 D
o-Xylene	--	--		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
sec-Butylbenzene	100000	11000		7000 D	5500 D	16000 D	12000 D	12000 D
Styrene	--	--		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
tert-Butylbenzene	100000	5900		1300 JD	5500 UD	3000 JD	2200 JD	2600 JD
Tetrachloroethene	19000	1300		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Toluene	100000	700		730 UD	1600 UD	2800 UD	1800 UD	3100 UD
trans-1,2-Dichloroethene	100000	190		730 UD	1600 UD	2800 UD	1800 UD	3100 UD
trans-1,3-Dichloropropene	--	--		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Trichloroethene	21000	470		490 UD	1100 UD	1900 UD	1200 UD	2000 UD
Trichlorofluoromethane	--	--		2400 UD	5500 UD	9400 UD	5900 UD	10000 UD
Vinyl chloride	900	20		980 UD	2200 UD	3800 UD	2400 UD	4100 UD
Xylenes (total)	100000	1600		980 UVD	2200 UD	3800 UVD	2400 UD	4100 UVD

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:**	D-4B	D-5B	GT-2-N-SW-9	GT-5C-W-B	GT-6-E-SW
			Sample Date:	1/13/2016	1/13/2016	12/14/2015	1/11/2016	1/13/2016
			Sample Depth (ft bls):	10 - 12	10 - 12	9 - 9	15 - 17	7 - 9
1,1,1-Trichloroethane	100000	680		3100 UD	5300 UD	1200 UD	260 UD	67 UD
1,1,2,2-Tetrachloroethane	--	--		3100 UD	5300 UD	1200 UD	260 UD	67 UD
1,1,2-Trichloroethane	--	--		4700 UD	8000 UD	1800 UD	390 UD	100 UD
1,1-Dichloroethane	26000	270		4700 UD	8000 UD	1800 UD	390 UD	100 UD
1,1-Dichloroethene	100000	330		3100 UD	5300 UD	1200 UD	260 UD	67 UD
1,2,3-Trichlorobenzene	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
1,2,4-Trichlorobenzene	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
1,2-Dibromoethane	--	--		12000 UD	21000 UD	4800 UD	1000 UD	270 UD
1,2-Dichlorobenzene	100000	1100		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
1,2-Dichloroethane	3100	20		3100 UD	5300 UD	1200 UD	260 UD	67 UD
1,2-Dichloropropane	--	--		11000 UD	19000 UD	4200 UD	920 UD	230 UD
1,3,5-Trimethylbenzene	52000	8400		2700 JD	27000 UD	5900 UD	1300 UD	50 JD
1,3-Dichlorobenzene	49000	2400		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
1,4-Dichlorobenzene	13000	1800		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
1,4-Dioxane	13000	100		310000 UD	530000 UD	120000 UD	26000 UD	6700 UD
2-Butanone (MEK)	100000	120		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
2-Hexanone	--	--		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
4-Methyl-2-pentanone (MIBK)	--	--		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
Acetone	100000	50		31000 UD	53000 UD	12000 UD	2600 UD	160 JD
Benzene	4800	60		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Bromochloromethane	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
Bromodichloromethane	--	--		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Bromoform	--	--		12000 UD	21000 UD	4800 UD	1000 UD	270 UD
Bromomethane	--	--		6200 UD	11000 UD	2400 UD	530 UD	130 UD
Carbon disulfide	--	--		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
Carbon tetrachloride	2400	760		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Chlorobenzene	100000	1100		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Chloroethane	--	--		6200 UD	11000 UD	2400 UD	530 UD	130 UD
Chloroform	49000	370		4700 UD	8000 UD	1800 UD	390 UD	100 UD
Chloromethane	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
cis-1,2-Dichloroethene	100000	250		3100 UD	5300 UD	1200 UD	260 UD	67 UD
cis-1,3-Dichloropropene	--	--		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Cyclohexane	--	--		NA	NA	NA	NA	NA
Dibromochloromethane	--	--		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Dibromochloropropane	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
Dichlorodifluoromethane	--	--		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
Ethylbenzene	41000	1000		1800 JD	5300 UD	1200 UD	67 JD	67 UD
Freon 113	--	--		62000 UD	110000 UD	24000 UD	5300 UD	1300 UD
Isopropylbenzene	--	--		9300 D	7500 D	3100 D	1600 D	200 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

	NYSDEC Part 375	NYSDEC Part 375	**Sample Designation:**	D-4B	D-5B	GT-2-N-SW-9	GT-5C-W-B	GT-6-E-SW
Parameter	Restricted	Protection of	**Sample Date:**	1/13/2016	1/13/2016	12/14/2015	1/11/2016	1/13/2016
(Concentrations in µg/kg)	Residential SCO	Groundwater SCO	**Sample Depth (ft bls):**	10 - 12	10 - 12	9 - 9	15 - 17	7 - 9
m+p-Xylene	--	--		6200 UVD	11000 UD	2400 UD	130 JD	130 UVD
Methyl acetate	--	--		NA	NA	NA	NA	NA
Methylcyclohexane	--	--		NA	NA	NA	NA	NA
Methylene chloride	100000	50		31000 UD	53000 UD	12000 UD	2600 UD	670 UD
MTBE	100000	930		6200 UD	11000 UD	2400 UD	530 UD	130 UD
n-Propylbenzene	100000	3900		23000 D	18000 D	4300 D	4200 D	370 D
o-Xylene	--	--		6200 UD	11000 UD	2400 UD	530 UD	37 JD
sec-Butylbenzene	100000	11000		14000 D	8900 D	6900 D	2800 D	570 D
Styrene	--	--		6200 UD	11000 UD	2400 UD	530 UD	130 UD
tert-Butylbenzene	100000	5900		3100 JD	1800 JD	2300 JD	360 JD	130 JD
Tetrachloroethene	19000	1300		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Toluene	100000	700		4700 UD	8000 UD	1800 UD	81 JD	28 JD
trans-1,2-Dichloroethene	100000	190		4700 UD	8000 UD	1800 UD	390 UD	100 UD
trans-1,3-Dichloropropene	--	--		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Trichloroethene	21000	470		3100 UD	5300 UD	1200 UD	260 UD	67 UD
Trichlorofluoromethane	--	--		16000 UD	27000 UD	5900 UD	1300 UD	330 UD
Vinyl chloride	900	20		6200 UD	11000 UD	2400 UD	530 UD	130 UD
Xylenes (total)	100000	1600		6200 UVD	11000 UD	2400 UD	130 JD	110 JD

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

	NYSDEC Part 375	NYSDEC Part 375	**Sample Designation:**	GT-6-N-SW	GT-6-W-SW-9
Parameter	Restricted	Protection of	**Sample Date:**	1/13/2016	1/21/2016
(Concentrations in µg/kg)	Residential SCO	Groundwater SCO	**Sample Depth (ft bls):**	6.5 - 8.5	9 - 9
1,1,1-Trichloroethane	100000	680		68 UD	110 UD
1,1,2,2-Tetrachloroethane	--	--		68 UD	110 UD
1,1,2-Trichloroethane	--	--		100 UD	160 UD
1,1-Dichloroethane	26000	270		100 UD	160 UD
1,1-Dichloroethene	100000	330		68 UD	110 UD
1,2,3-Trichlorobenzene	--	--		340 UD	530 UD
1,2,4-Trichlorobenzene	--	--		340 UD	530 UD
1,2-Dibromoethane	--	--		270 UD	430 UD
1,2-Dichlorobenzene	100000	1100		340 UD	530 UD
1,2-Dichloroethane	3100	20		68 UD	110 UD
1,2-Dichloropropane	--	--		240 UD	370 UD
1,3,5-Trimethylbenzene	52000	8400		22 JD	530 UD
1,3-Dichlorobenzene	49000	2400		340 UD	530 UD
1,4-Dichlorobenzene	13000	1800		340 UD	530 UD
1,4-Dioxane	13000	100		6800 UD	11000 UD
2-Butanone (MEK)	100000	120		92 JD	200 JD
2-Hexanone	--	--		680 UD	1100 UD
4-Methyl-2-pentanone (MIBK)	--	--		680 UD	1100 UD
Acetone	100000	50		200 JD	320 JD
Benzene	4800	60		68 UD	110 UD
Bromochloromethane	--	--		340 UD	530 UD
Bromodichloromethane	--	--		68 UD	110 UD
Bromoform	--	--		270 UD	430 UD
Bromomethane	--	--		140 UD	210 UD
Carbon disulfide	--	--		680 UD	1100 UD
Carbon tetrachloride	2400	760		68 UD	110 UD
Chlorobenzene	100000	1100		68 UD	110 UD
Chloroethane	--	--		140 UD	210 UD
Chloroform	49000	370		100 UD	160 UD
Chloromethane	--	--		340 UD	530 UD
cis-1,2-Dichloroethene	100000	250		68 UD	110 UD
cis-1,3-Dichloropropene	--	--		68 UD	110 UD
Cyclohexane	--	--		NA	NA
Dibromochloromethane	--	--		68 UD	110 UD
Dibromochloropropane	--	--		340 UD	530 UD
Dichlorodifluoromethane	--	--		680 UD	1100 UD
Ethylbenzene	41000	1000		68 UD	160 D
Freon 113	--	--		1400 UD	2100 UD
Isopropylbenzene	--	--		68 UD	300 D

Table 3. Remaining Soil Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/kg)	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	**Sample Designation:** **Sample Date:** **Sample Depth (ft bls):**	GT-6-N-SW 1/13/2016 6.5 - 8.5	GT-6-W-SW-9 1/21/2016 9 - 9
m+p-Xylene	--	--		140 UVD	580 D
Methyl acetate	--	--		NA	NA
Methylcyclohexane	--	--		NA	NA
Methylene chloride	100000	50		680 UD	1100 UD
MTBE	100000	930		140 UD	210 UD
n-Propylbenzene	100000	3900		58 JD	1200 D
o-Xylene	--	--		15 JD	44 JD
sec-Butylbenzene	100000	11000		65 JD	1300 D
Styrene	--	--		140 UD	210 UD
tert-Butylbenzene	100000	5900		27 JD	550 D
Tetrachloroethene	19000	1300		68 UD	110 UD
Toluene	100000	700		16 JD	160 UD
trans-1,2-Dichloroethene	100000	190		100 UD	160 UD
trans-1,3-Dichloropropene	--	--		68 UD	110 UD
Trichloroethene	21000	470		68 UD	110 UD
Trichlorofluoromethane	--	--		340 UD	530 UD
Vinyl chloride	900	20		140 UD	210 UD
Xylenes (total)	100000	1600		110 JD	620 JD

J - Estimated value
U - Indicates that the compound was analyzed for but not detected
D - A secondary analysis after dilution due to exceedance of the calibration range in the original sample
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate sample
NA - Compound was not analyzed by laboratory
µg/kg - Micrograms per kilogram
ft bls - Feet below land surface
NYSDEC - New York State Department of Environmental Conservation
SCO - Soil Cleanup Objectives
-- No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

Table 4. Remaining Groundwater Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:**	MW-19	MW-19	MW-2R	MW-2R	MW-33	MW-34	MW-34
		Sample Date:	11/24/2015	1/26/2016	11/24/2015	1/26/2016	1/26/2016	11/24/2015	1/26/2016
1,1,1-Trichloroethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1		7.5 UD	3 UD	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trichlorobenzene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane	--		10 UD	4 UD	2 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	3		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1		5 UD	2 UD	1 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene	5		**19 D**	**5.5 D**	2.5 U	2.5 U	**21**	2.7	1.8 J
1,3-Dichlorobenzene	3		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	3		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dioxane	--		1200 UD	500 UD	250 U	250 U	250 U	250 U	250 U
2-Butanone (MEK)	50		12 JD	10 UD	5 U	5 U	5.8	5 U	6.9
2-Hexanone	50		25 UD	10 UD	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone (MIBK)	--		25 UD	10 UD	5 U	5 U	5 U	5 U	5 U
Acetone	50		**52 D**	10 UD	11	1.8 J	5 U	9.4	4.6 J
Benzene	1		2.5 UD	1 UD	0.5 U	0.5 U	0.40 J	**1.2**	0.22 J
Bromochloromethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromodichloromethane	50		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	50		10 UD	4 UD	2 U	2 U	2 U	2 U	2 U
Bromomethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Carbon disulfide	60		25 UD	10 UD	5 U	5 U	5 U	5 U	5 U
Carbon tetrachloride	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroform	7		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloromethane	--		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
cis-1,2-Dichloroethene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
cis-1,3-Dichloropropene	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	--		NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	50		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloropropane	0.04		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dichlorodifluoromethane	5		25 UD	10 UD	5 U	5 U	5 U	5 U	5 U

Table 4. Remaining Groundwater Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	MW-19 11/24/2015	MW-19 1/26/2016	MW-2R 11/24/2015	MW-2R 1/26/2016	MW-33 1/26/2016	MW-34 11/24/2015	MW-34 1/26/2016
Ethylbenzene	5		12 UD	5 UD	2.5 U	2.5 U	2.9	4.3	1.0 J
Freon 113	--		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene	5		**57 D**	**23 D**	1.4 J	1.2 J	4.7	**58**	**16**
m+p-Xylene	5		12 UD	5 UD	2.5 U	2.5 U	2.1 J	2.5 U	2.5 U
Methyl acetate	--		NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--		NA	NA	NA	NA	NA	NA	NA
Methylene chloride	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
MTBE	10		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
n-Propylbenzene	5		**93 D**	**37 D**	2 J	1.4 J	**10**	**78**	**21**
o-Xylene	5		12 UD	5 UD	2.5 U	2.5 U	1.9 J	2.5 U	2.5 U
sec-Butylbenzene	5		**34 D**	**18 D**	2 J	1.3 J	**6.9**	**26**	**11**
Styrene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	5		**15 D**	**9.6 D**	1.4 J	0.88 J	3.4	**11**	**6.2**
Tetrachloroethene	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
trans-1,2-Dichloroethene	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
trans-1,3-Dichloropropene	--		2.5 UD	1 UD	0.5 U	0.5 U	5	0.5 U	0.5 U
Trichloroethene	5		2.5 UD	1 UD	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	5		12 UD	5 UD	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl chloride	2		5 UD	2 UD	1 U	1 U	1 U	1 U	1 U
Xylenes (total)	5		12 UD	5 UD	2.5 U	2.5 U	4.0 J	2.5 U	2.5 U

NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
µg/L -Micrograms per liter
J - Estimated Value
U - Compound was analyzed for but not detected
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate
- - No NYSDEC AWQSGV available
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs
NA - Compound was not analyzed by laboratory

Table 4. Remaining Groundwater Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

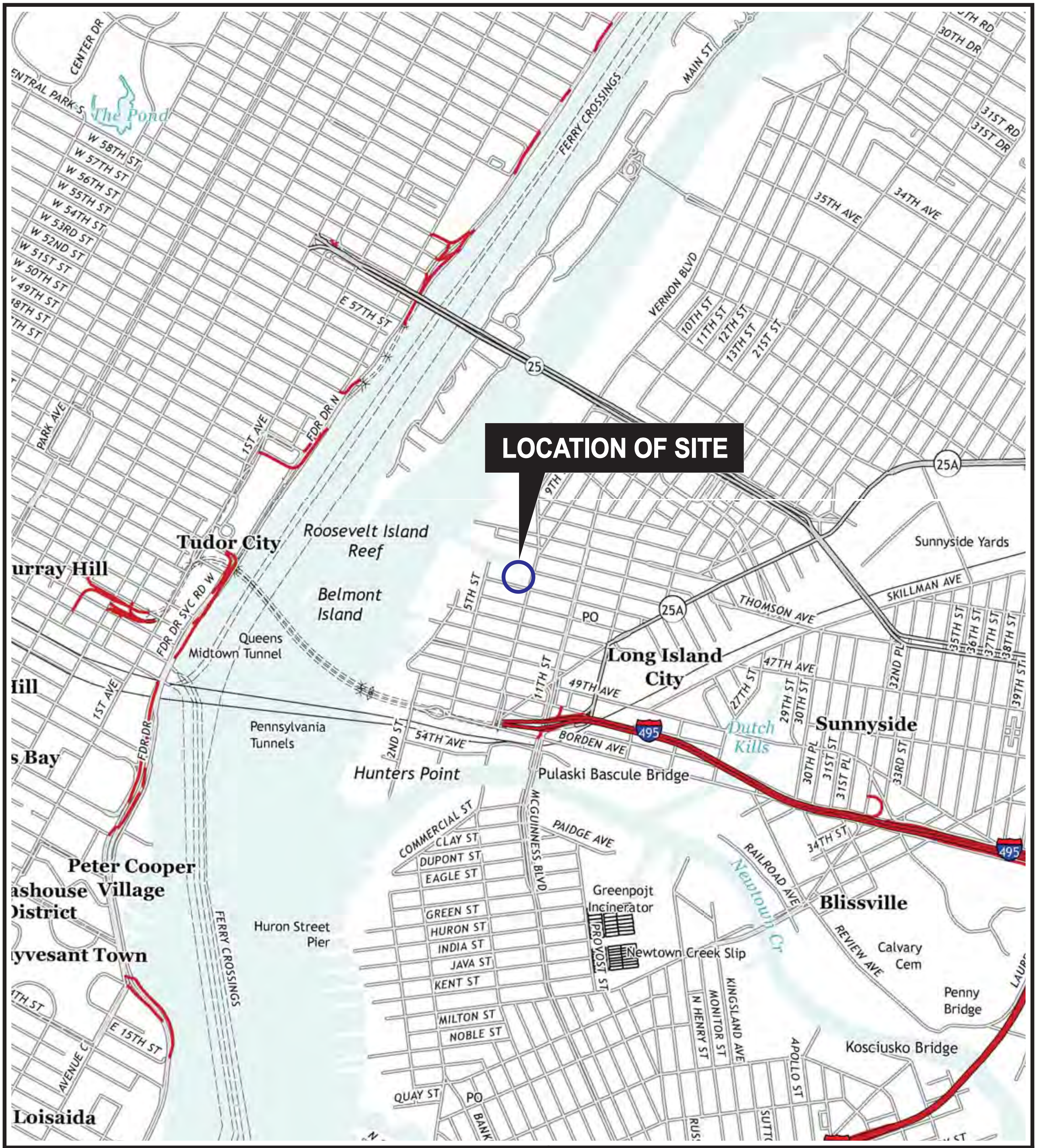
	NYSDEC	**Sample Designation:**	MW-37	MW-37	MW-38	MW-38	MW-38 DUP	MW-7R	MW-7R
Parameter	AWQSGVs	**Sample Date:**	11/24/2015	1/26/2016	11/24/2015	1/26/2016	11/24/2015	11/24/2015	1/26/2016
(Concentrations in µg/L)	(µg/L)								
1,1,1-Trichloroethane	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,1,2,2-Tetrachloroethane	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
1,1,2-Trichloroethane	1		3.8 UD	1.5 U	1.5 U	7.5 UD	1.5 U	3.8 UD	3 UD
1,1-Dichloroethane	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,1-Dichloroethene	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
1,2,3-Trichlorobenzene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,2,4-Trichlorobenzene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,2-Dibromoethane	--		5 UD	2 U	2 U	10 UD	2 U	5 UD	4 UD
1,2-Dichlorobenzene	3		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,2-Dichloroethane	0.6		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
1,2-Dichloropropane	1		2.5 UD	1 U	1 U	5 UD	1 U	2.5 UD	2 UD
1,3,5-Trimethylbenzene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,3-Dichlorobenzene	3		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,4-Dichlorobenzene	3		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
1,4-Dioxane	--		620 UD	250 U	250 U	1200 UD	250 U	620 UD	500 UD
2-Butanone (MEK)	50		8.9 JD	10	**97**	**65 D**	**88**	7.4 JD	6.7 JD
2-Hexanone	50		12 UD	5 U	5 U	25 UD	5 U	12 UD	10 UD
4-Methyl-2-pentanone (MIBK)	--		12 UD	5 U	5 U	25 UD	5 U	12 UD	10 UD
Acetone	50		42 D	5	6.6	25 UD	6	**110 D**	27 D
Benzene	1		1.2 UD	0.5 U	0.16 J	2.5 UD	0.16 J	1.2 UD	1 UD
Bromochloromethane	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Bromodichloromethane	50		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Bromoform	50		5 UD	2 U	2 U	10 UD	2 U	5 UD	4 UD
Bromomethane	5		6.2 UD	2.5 U	2.5 UJV	12 UD	2.5 U	6.2 UD	5 UD
Carbon disulfide	60		12 UD	5 U	5 U	25 UD	5 U	12 UD	10 UD
Carbon tetrachloride	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Chlorobenzene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Chloroethane	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Chloroform	7		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Chloromethane	--		6.2 UD	2.5 U	2.5 UJV	12 UD	2.5 U	6.2 UD	5 UD
cis-1,2-Dichloroethene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
cis-1,3-Dichloropropene	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Cyclohexane	--		NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	50		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Dibromochloropropane	0.04		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Dichlorodifluoromethane	5		12 UD	5 U	5 U	25 UD	5 U	12 UD	10 UD

Table 4. Remaining Groundwater Sample Exceedances, Paragon Paint and Varnish Corp. Site, Long Island City, New York

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	**Sample Designation:** **Sample Date:**	MW-37 11/24/2015	MW-37 1/26/2016	MW-38 11/24/2015	MW-38 1/26/2016	MW-38 DUP 11/24/2015	MW-7R 11/24/2015	MW-7R 1/26/2016
Ethylbenzene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Freon 113	--		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Isopropylbenzene	5		**26 D**	**13**	**16**	**5.2 JD**	**17**	**9.1 D**	**14 D**
m+p-Xylene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Methyl acetate	--		NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--		NA	NA	NA	NA	NA	NA	NA
Methylene chloride	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
MTBE	10		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
n-Propylbenzene	5		**38 D**	**17**	**16 JV**	**5.2 JD**	**16**	**11 D**	**24 D**
o-Xylene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
sec-Butylbenzene	5		**10 D**	2.7	**8.9**	12 UD	**9.3**	**7.2 D**	**11 D**
Styrene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
tert-Butylbenzene	5		**5.3 JD**	2.2 J	**5.5**	12 UD	**5.8**	**5.6 JD**	**6.0 D**
Tetrachloroethene	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Toluene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
trans-1,2-Dichloroethene	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
trans-1,3-Dichloropropene	--		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Trichloroethene	5		1.2 UD	0.5 U	0.5 U	2.5 UD	0.5 U	1.2 UD	1 UD
Trichlorofluoromethane	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD
Vinyl chloride	2		2.5 UD	1 U	1 U	5 UD	1 U	2.5 UD	2 UD
Xylenes (total)	5		6.2 UD	2.5 U	2.5 U	12 UD	2.5 U	6.2 UD	5 UD

NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
µg/L -Micrograms per liter
J - Estimated Value
U - Compound was analyzed for but not detected
V - Value altered or qualifier added during data validation
R - Sample results rejected by validator
UJ - Analyte was not detected. The associated reported quantitation limit is an estimate
NJ - Detection is tentative in identification and estimated in value
DUP - Duplicate
- - No NYSDEC AWQSGV available
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs
NA - Compound was not analyzed by laboratory

FIGURES



QUADRANGLE LOCATION

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

Title:

SITE LOCATION MAP

SITE MANAGEMENT PLAN
PARAGON PAINT AND VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

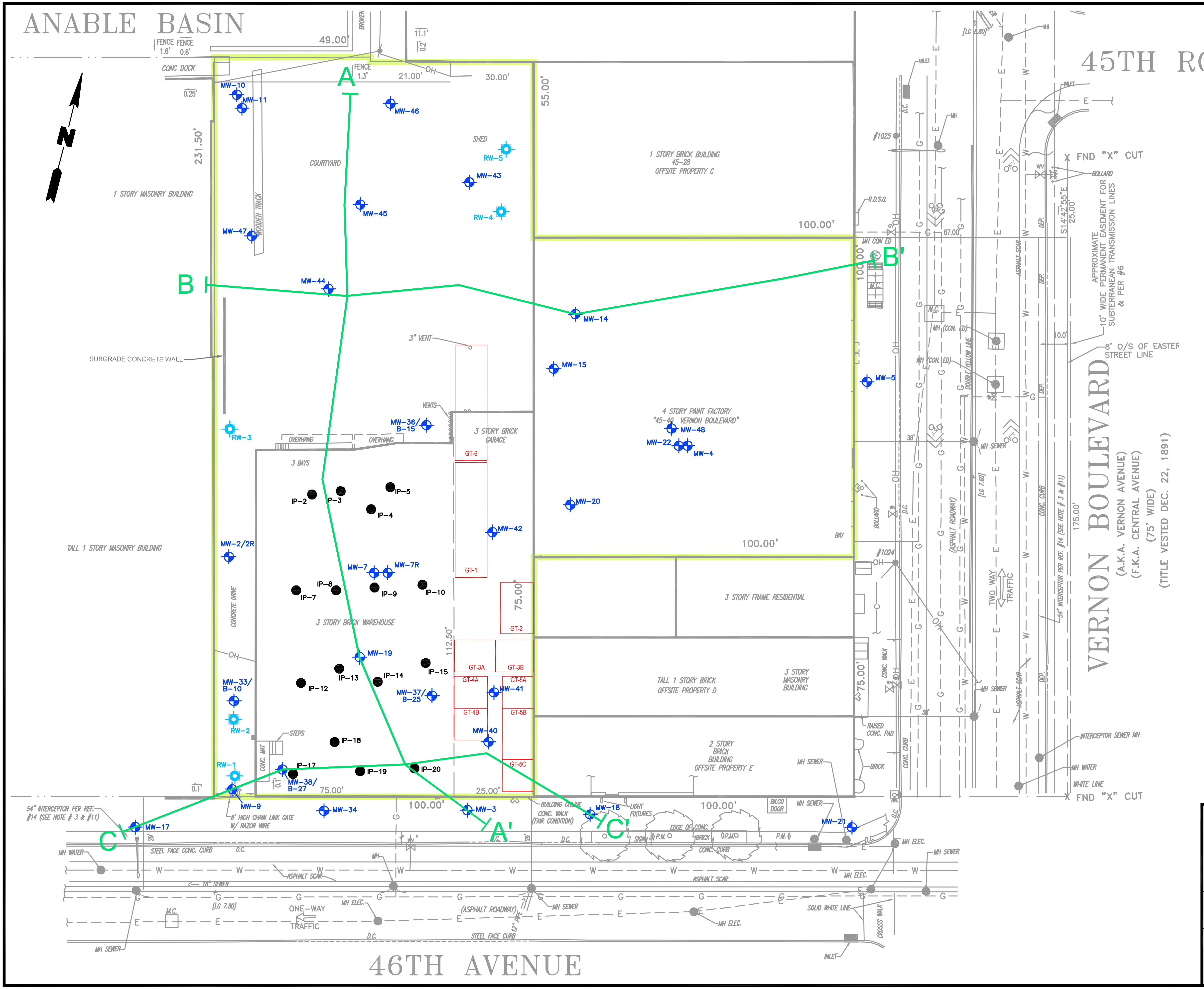
Prepared for:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: R.M.	Project No.: 2051.0001Y000	
File: 2051.0001Y204R.07.CDR		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.07.CDR



LEGEND

MW-5	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
🟩	PROPERTY BOUNDARY
GT-5	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
A ⊢⊣ A'	LINE OF GEOLOGIC CROSS SECTION

Title:

SITE LAYOUT MAP

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

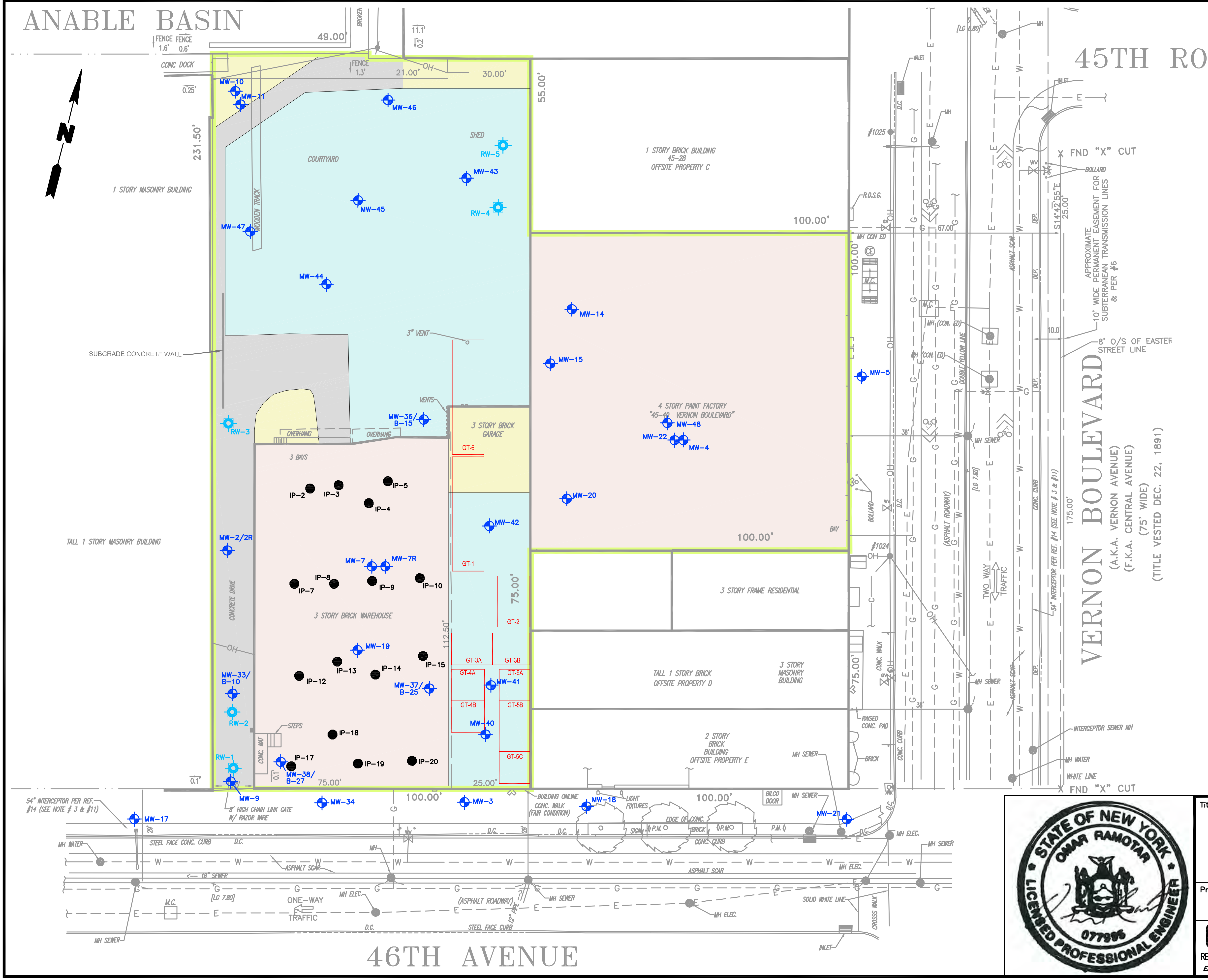
Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	2
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.01.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.01.DWG



LEGEND

MW-5 ⌖	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1 ⌖	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
▬	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
▨	INSTALLED ASPHALT CAP
▨	EXISTING CONCRETE PAVEMENT
▨	INSTALLED RECYCLED CONCRETE AGGREGATE (MIN. 2 FT)
▨	EXISTING BUILDING SLAB

NOTE

REFER TO AS-BUILT DRAWINGS FOR ELEVATION INFORMATION OF INSTALLED PORTIONS OF COVER SYSTEM.

OMAR RAMOTAR
077995

Title:

ENGINEERING CONTROL LOCATION - COMPOSITE COVER SYSTEM

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

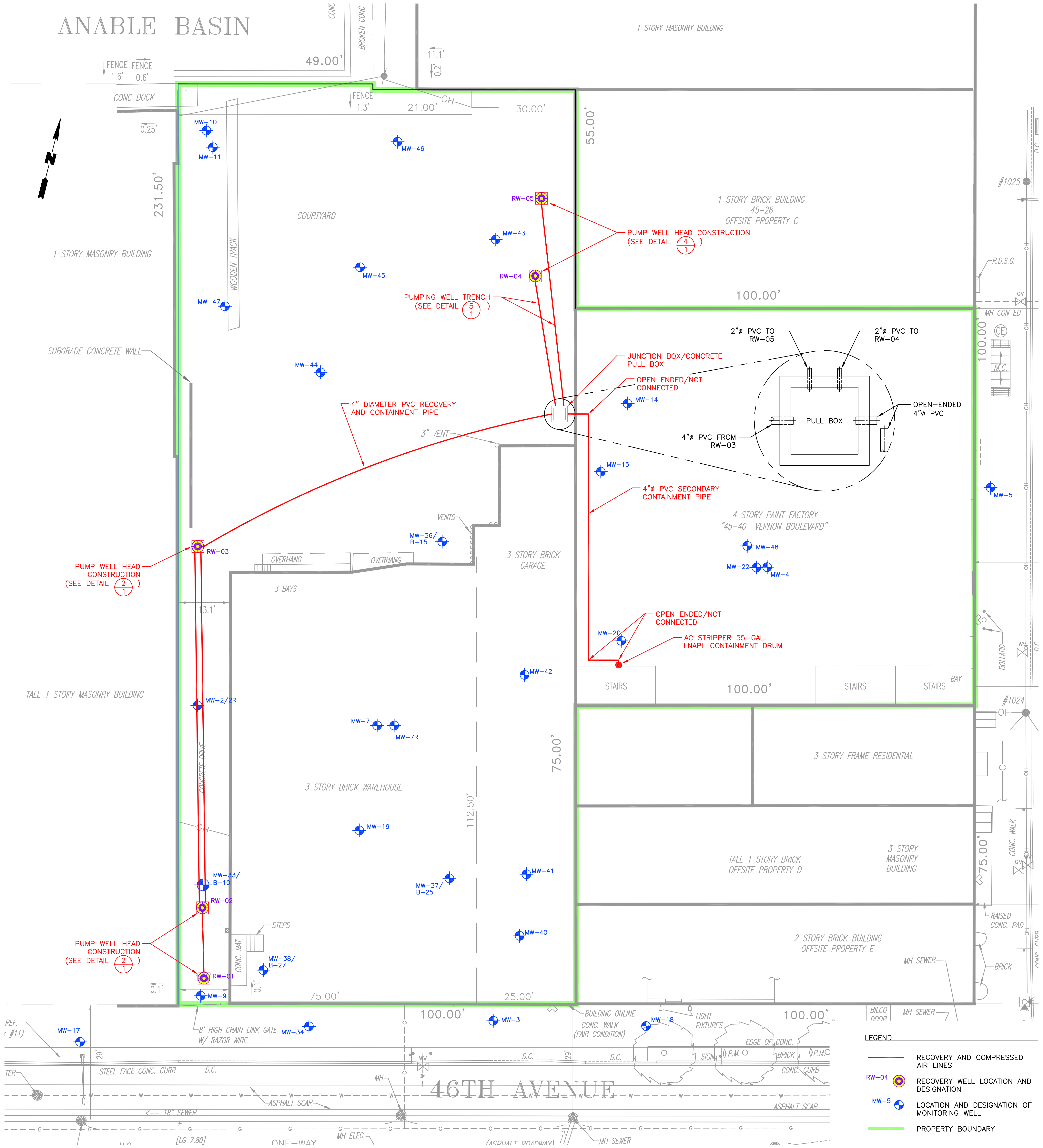
Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

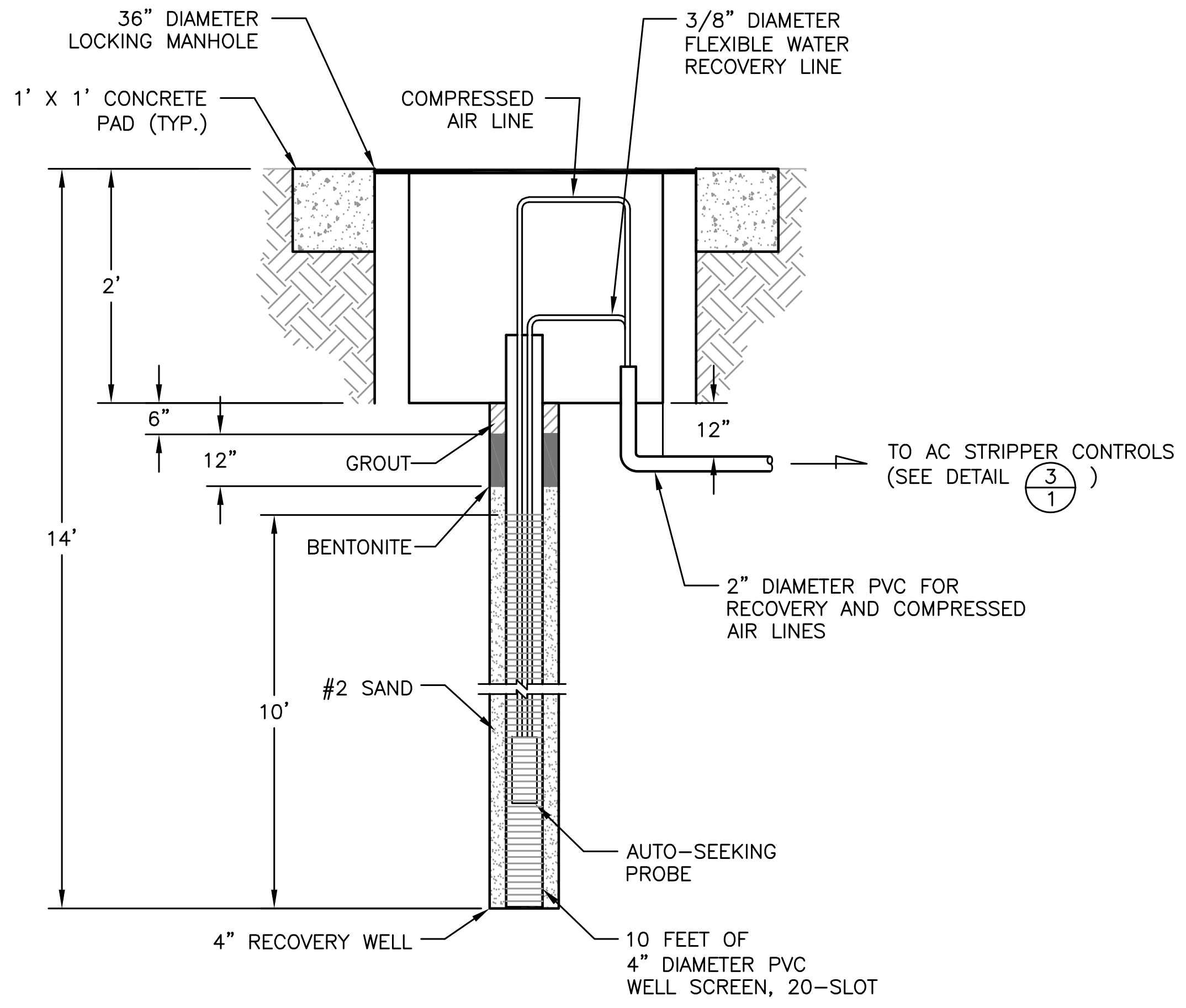
Compiled by: R.M.	Date: 19SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	3
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.01.DWG		

V:\CAD\PROJECTS\2051\0001\Y204R\2051.0001Y204R.01.DWG



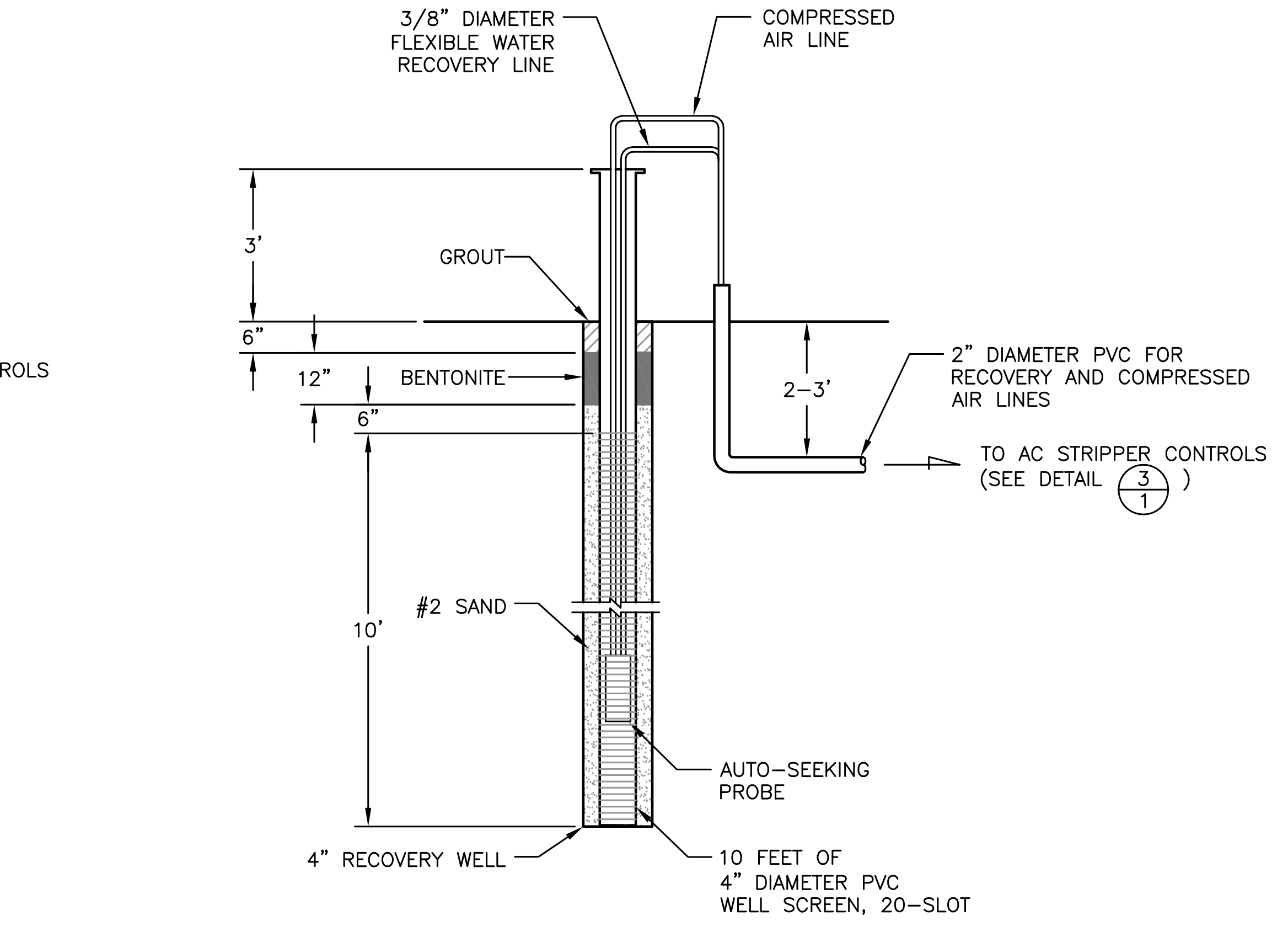
1/1 REMEDIAL SYSTEM–PLAN VIEW

SCALE: 1" = 15'



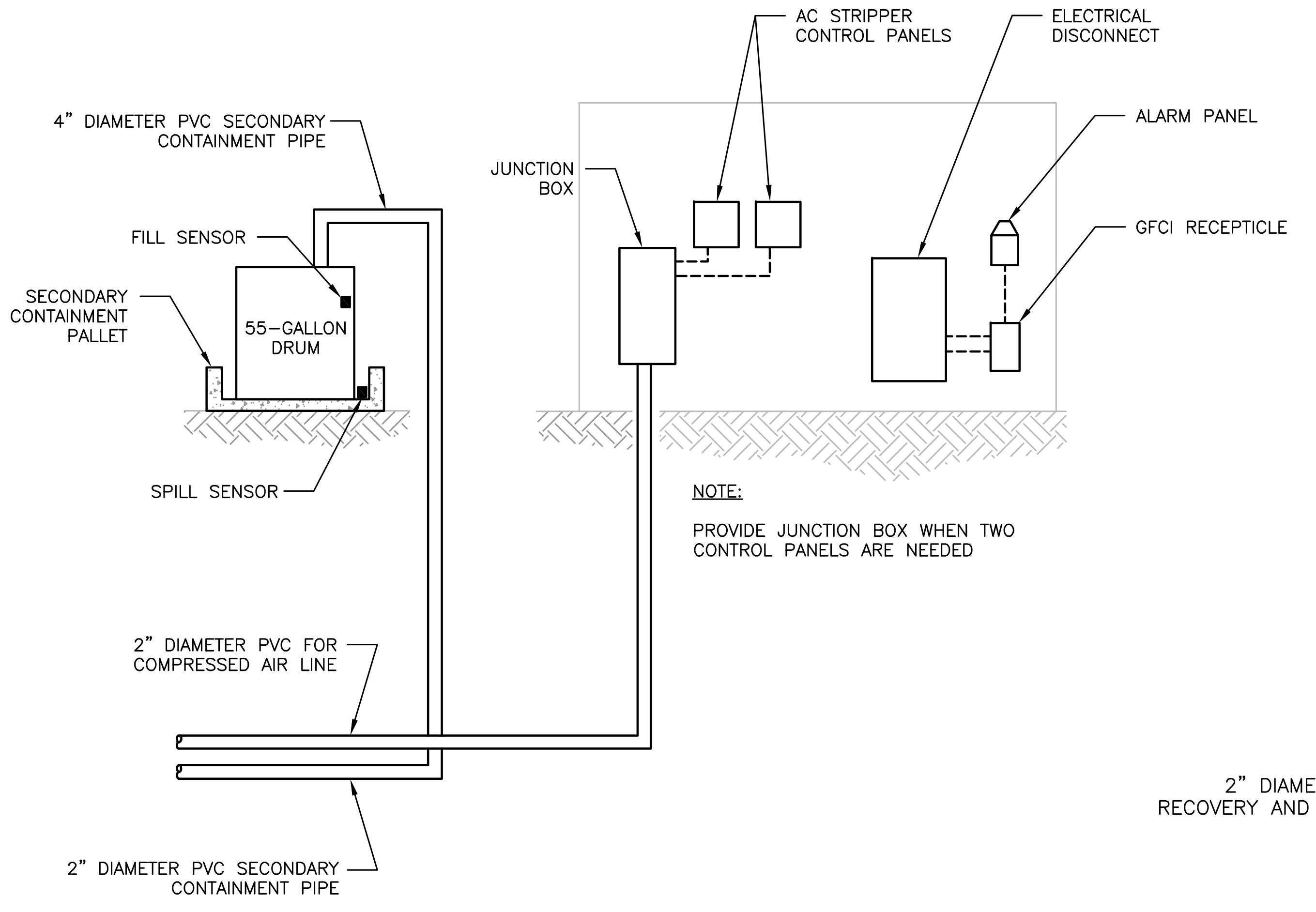
2/1 TYPICAL FLUSH MOUNT RECOVERY WELL CONSTRUCTION

NOT TO SCALE



4/1 TYPICAL ABOVE GRADE RECOVERY WELL CONSTRUCTION

NOT TO SCALE

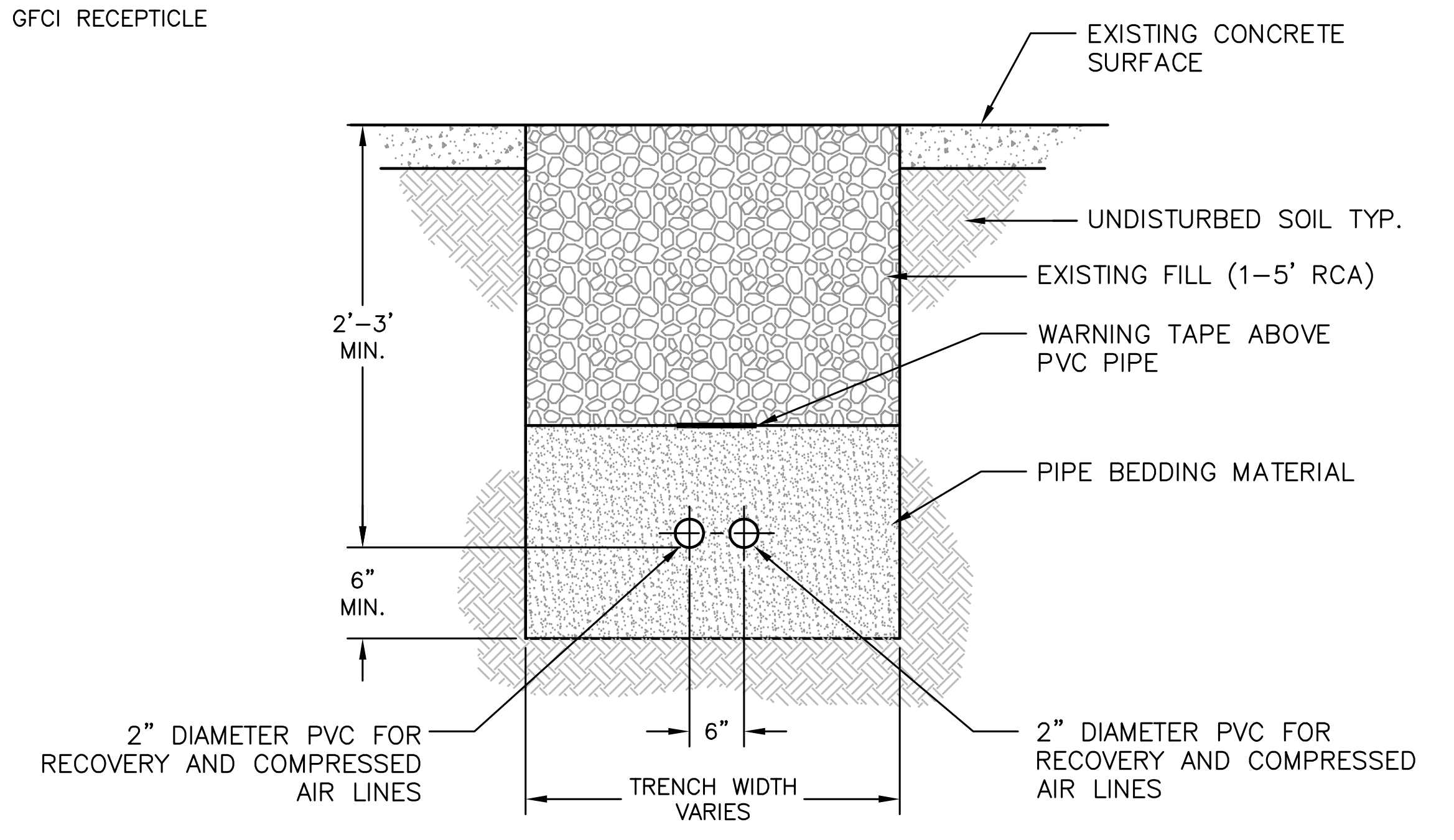


NOTE:

PROVIDE JUNCTION BOX WHEN TWO CONTROL PANELS ARE NEEDED

3/1 TYPICAL AC SIPPER CONTROLS

NOT TO SCALE



5/1 TRENCH DETAIL

NOT TO SCALE

OMAR RAMOTAR
077995

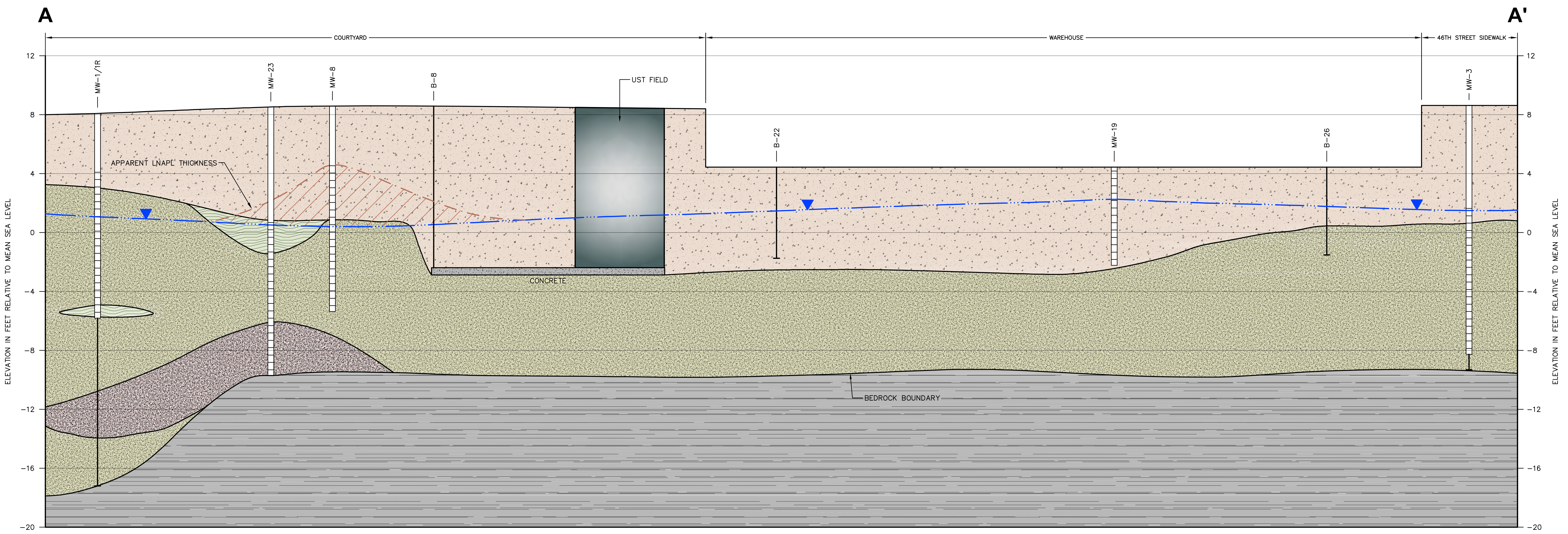
Title: **ENGINEERING CONTROL LOCATION -**
"LNAPL RECOVERY SYSTEM
WITH DESIGN DETAILS"
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

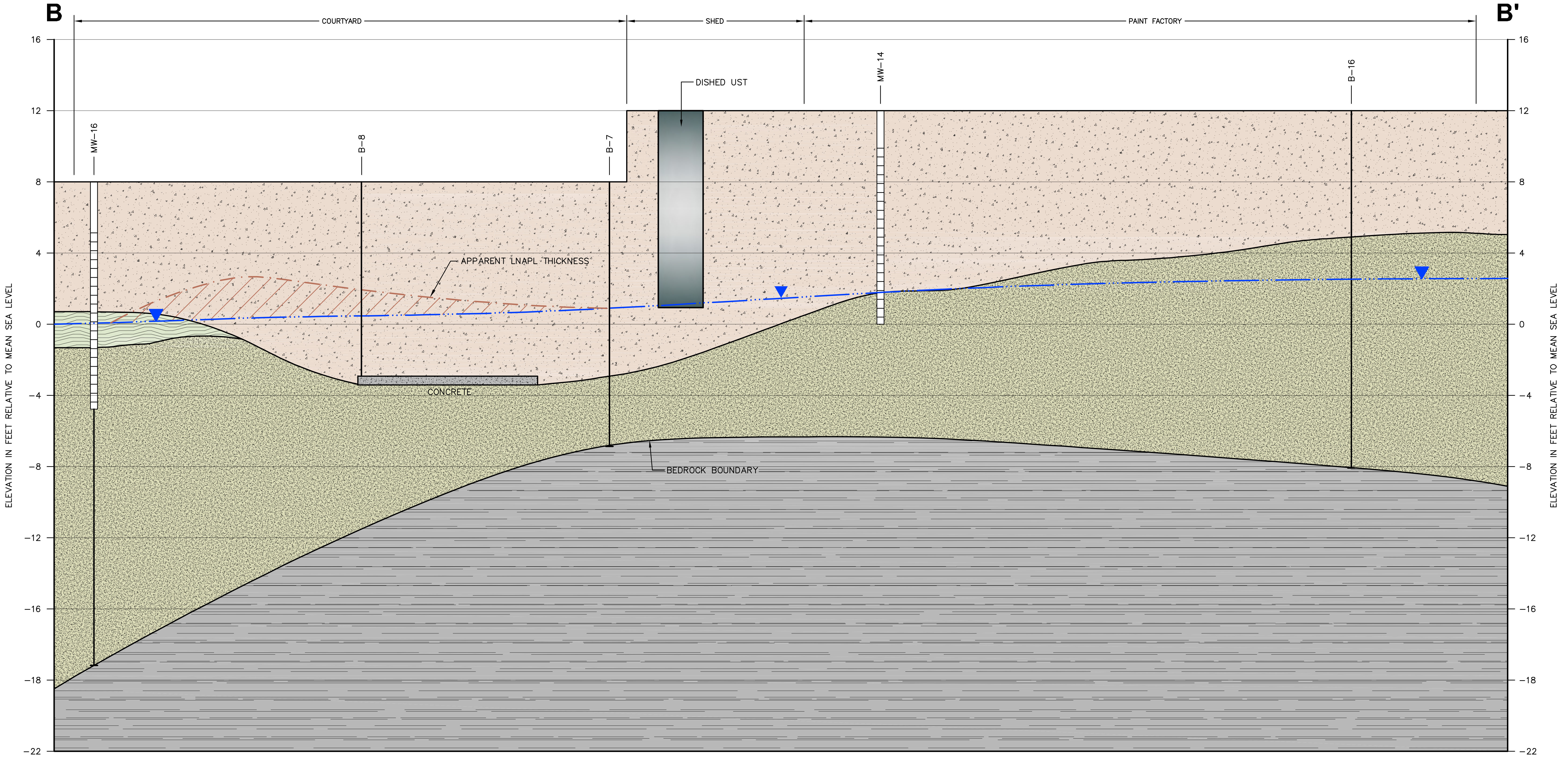
Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 19SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	4
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.02.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.02.DWG



SECTION A–A'
HORIZONTAL SCALE: 1:10
VERTICAL SCALE: 1:4



SECTION B–B'
HORIZONTAL SCALE: 1:10
VERTICAL SCALE: 1:4

LEGEND

▨	FILL MATERIAL (FINE TO MEDIUM SAND, SOME SILT AND GRAVEL, LITTLE CONCRETE, BRICK, ASH OR SLAG)
▨	SILTY PEAT
▨	PRIMARILY FINE TO MEDIUM SAND WITH VARYING AMOUNTS OF SILT AND LITTLE TO TRACE AMOUNTS OF GRAVEL AND COARSE SAND
▨	SAND AND GRAVEL
▨	BEDROCK
▼	INFERRED GROUNDWATER ELEVATION (MARCH 2014)
	LAND SURFACE
	SCREENED INTERVAL
	SOIL BORING

NOTES

1. LNAPL – LIGHT NON– AQUEOUS PHASE LIQUID
2. LNAPL THICKNESS BASED ON JANUARY 9, 2015 GAUGING DATA.

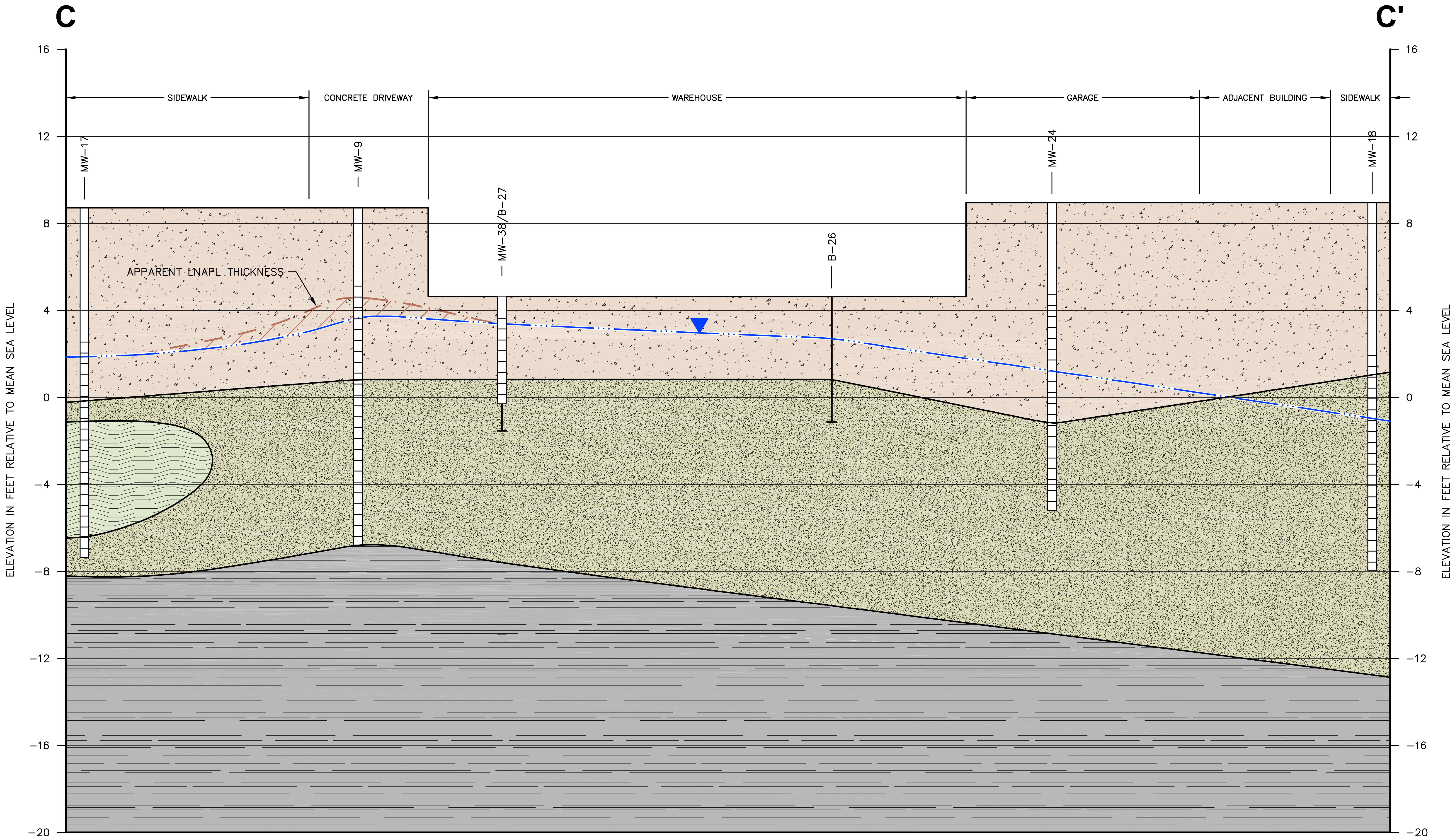
Title:
GENERALIZED HYDROGEOLOGIC
CROSS SECTIONS A-A' AND B-B'
- PRE-REMEDIATION
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE **5**
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.06.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.06.DWG



SECTION C–C'
HORIZONTAL SCALE: 1:10
VERTICAL SCALE: 1:4

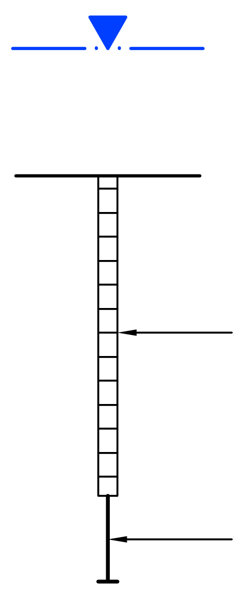
LEGEND

▨ FILL MATERIAL (FINE TO MEDIUM SAND, SOME SILT AND GRAVEL, LITTLE CONCRETE, BRICK, ASH OR SLAG)

▨ SILTY PEAT

▨ PRIMARILY FINE TO MEDIUM SAND WITH VARYING AMOUNTS OF SILT AND LITTLE TO TRACE AMOUNTS OF GRAVEL AND COARSE SAND

▨ BEDROCK



INFERRED GROUNDWATER ELEVATION (MARCH 2014)

LAND SURFACE

SCREENED INTERVAL

SOIL BORING

NOTES

1. LNAPL – LIGHT NON– AQUEOUS PHASE LIQUID
2. LNAPL THICKNESS BASED ON JANUARY 9, 2015 GAUGING DATA.

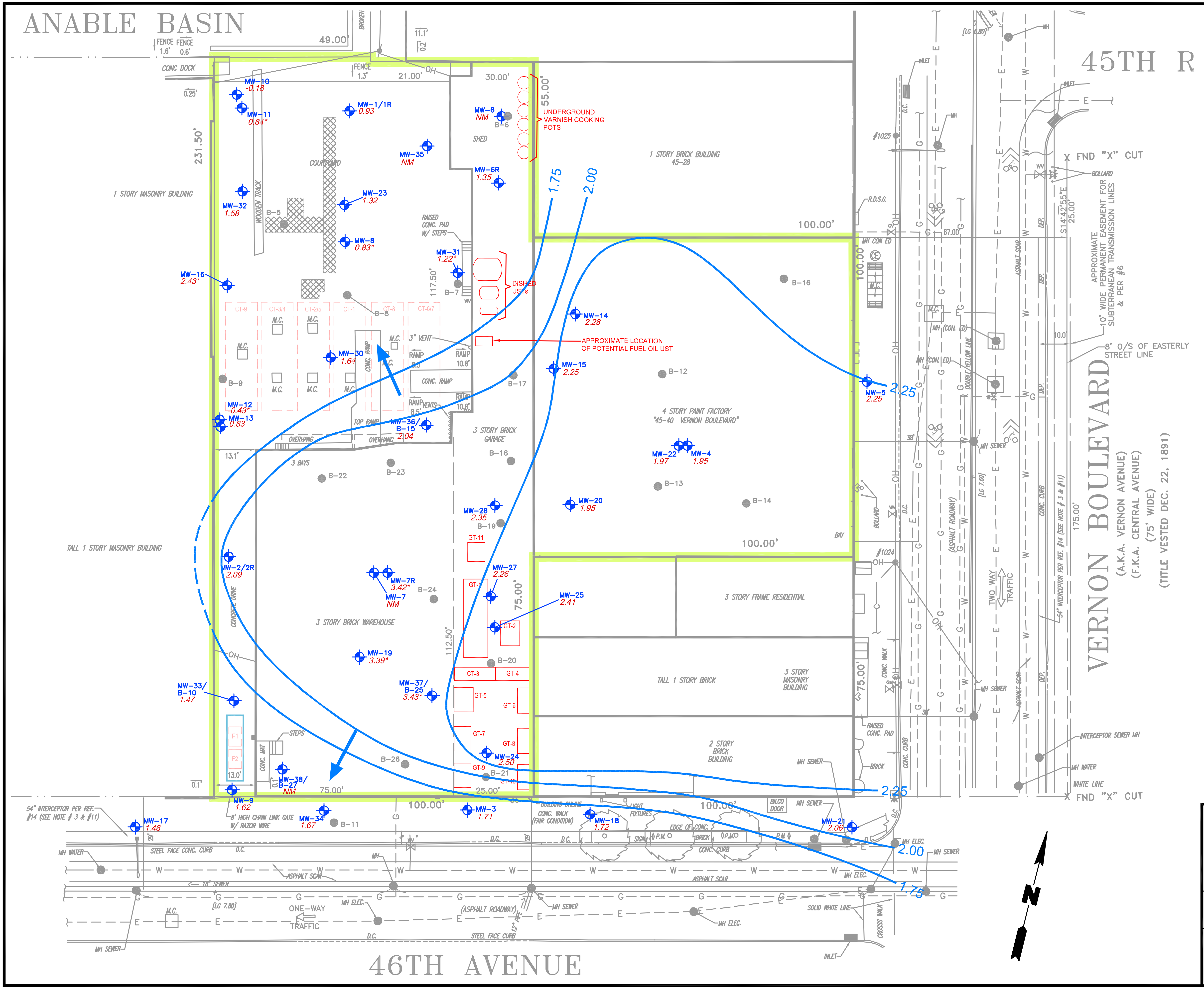
Title:
GENERALIZED HYDROGEOLOGIC
CROSS SECTION C-C'
- PRE-REMEDIATION
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	6
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.06.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.06.DWG



LEGEND

B-6 ●	SOIL BORING LOCATION AND DESIGNATION
MW-5 ⊕	MONITORING WELL LOCATION AND DESIGNATION
0.93	CORRECTED GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
0.83*	MEASUREMENT NOT USED IN CONTOURING
NM	NOT MEASURED
—0.5—	LINE OF EQUAL GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)(DASHED WHERE INFERRED)
🟩	PROPERTY BOUNDARY
🟥	APPROXIMATE LOCATION OF UNDERGROUND STORAGE TANK (UST)
☐	APPROXIMATE FORMER LOCATION OF UNDERGROUND STORAGE TANK (UST)
⬭	APPROXIMATE LOCATION OF DISHED UNDERGROUND STORAGE TANK
○	APPROXIMATE LOCATION OF UNDERGROUND VARNISH COOKING POT
▨	APPROXIMATE TEST PIT LOCATIONS
▭	CONCRETE VAULT

NOTE

GROUNDWATER ELEVATIONS WERE CORRECTED FOR THE PRESENCE OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) WHERE APPLICABLE.

30' 0 30'

Title:

GROUNDWATER ELEVATION AND CONTOUR MAP (INCOMING TIDE) - JANUARY 9, 2015

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

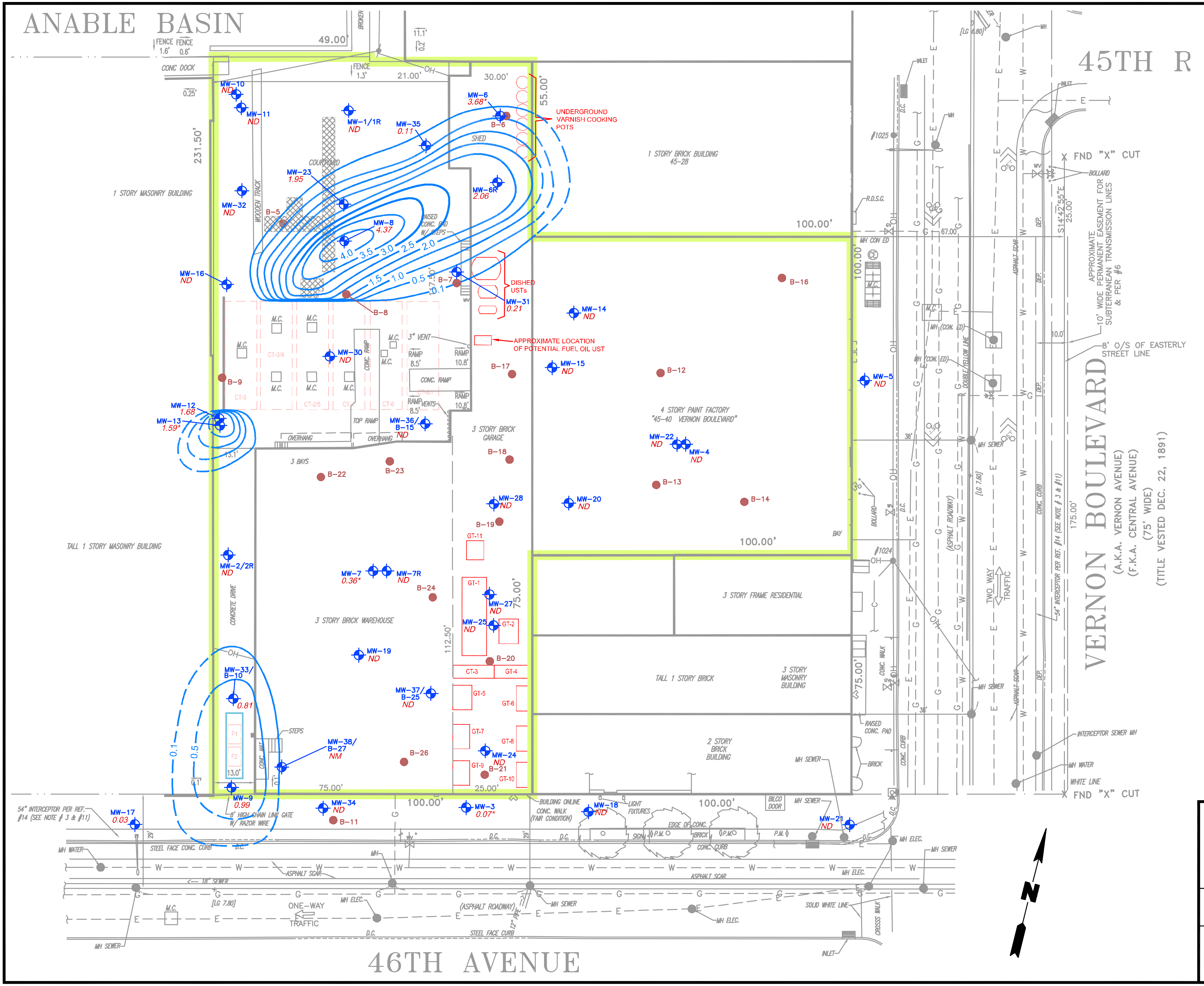
Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	7
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.04.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.04.DWG



LEGEND

B-6 ●	SOIL BORING LOCATION AND DESIGNATION
MW-5 ⌖	MONITORING WELL LOCATION AND DESIGNATION
0.12	LNAPL THICKNESS (FEET)
3.68*	MEASUREMENT NOT USED IN CONTOURING
ND	LNAPL NOT DETECTED
NM	NOT MEASURED
—0.5—	APPROXIMATE LINE OF EQUAL LNAPL THICKNESS (FEET) (DASHED WHERE INFERRED)
🟩	PROPERTY BOUNDARY
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
□	APPROXIMATE LOCATION OF UNDERGROUND STORAGE TANK (UST)
⬚	APPROXIMATE FORMER LOCATION OF UNDERGROUND STORAGE TANK (UST)
⬭	APPROXIMATE LOCATION OF DISHED UNDERGROUND STORAGE TANK
○	APPROXIMATE LOCATION OF UNDERGROUND VARNISH COOKING POT
▨	APPROXIMATE TEST PIT LOCATIONS
□	CONCRETE VAULT

NOTES

1. MW-6 AND MW-7 ARE ONE-INCH DIAMETER MONITORING WELLS AND WERE THEREFORE NOT USED TO GENERATE LNAPL CONTOURS.
2. ALTHOUGH MONITORING WELL MW-38 WAS NOT GAUGED DURING THE JANUARY 9, 2015 GAUGING EVENT LNAPL HAS NOT BEEN DETECTED IN MW-38 DURING SUBSEQUENT GAUGING EVENTS.

Title:

MEASURED OR APPARENT LNAPL THICKNESS - JANUARY 9, 2015

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

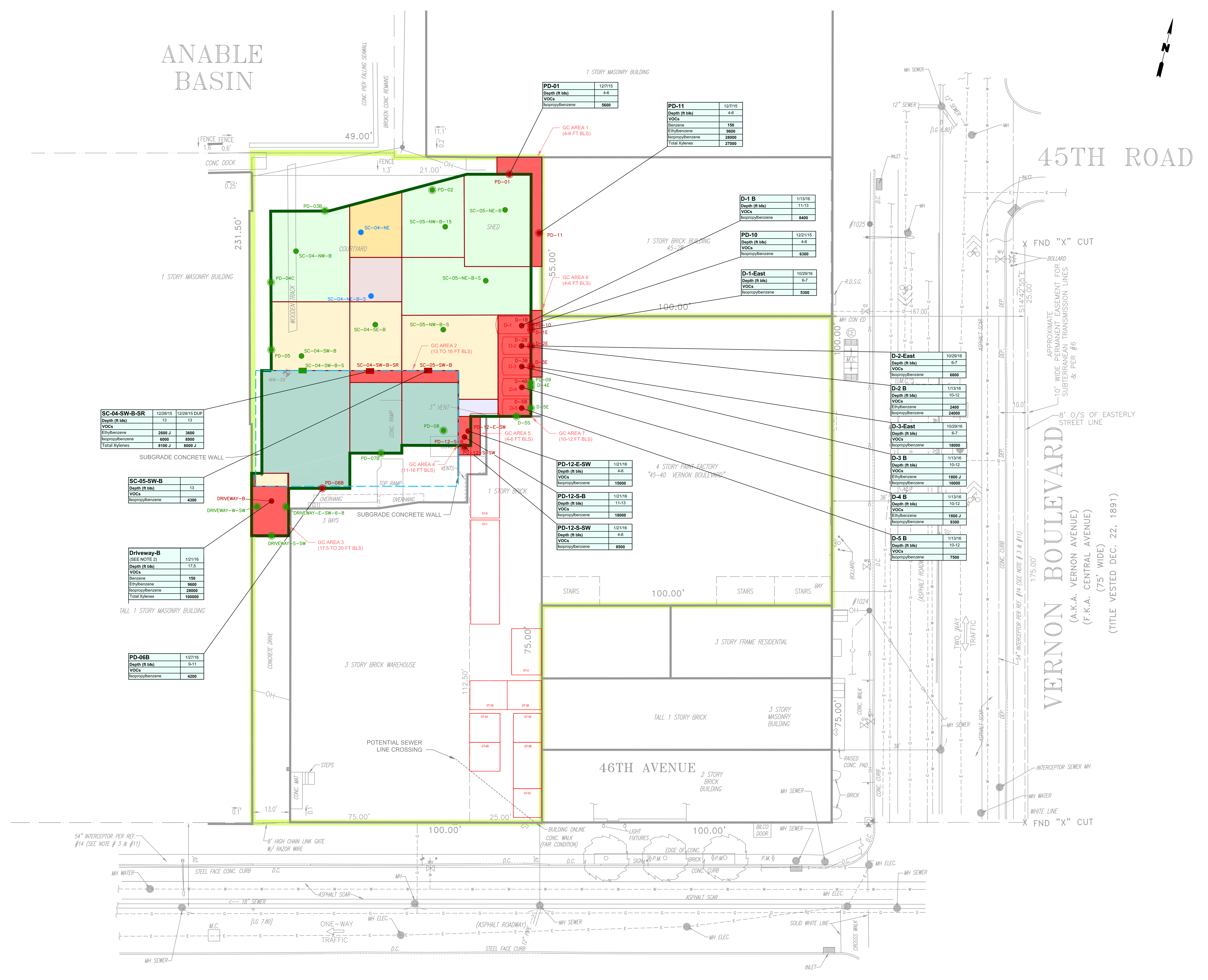
Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	
Project Mgr: R.M.	Project: 2051.0001Y000	8
File: 2051.0001Y204R.05.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.05.DWG



PD-01	12/7/15
Depth (ft bls)	4-6
VOCs	
Isopropylbenzene	**5600**

PD-11	12/7/15
Depth (ft bls)	4-6
VOCs	
Benzene	**150**
Ethylbenzene	**9600**
Isopropylbenzene	**28000**
Total Xylenes	**27000**

D-1 B	1/13/16
Depth (ft bls)	11-13
VOCs	
Isopropylbenzene	**8400**

PD-10	12/21/15
Depth (ft bls)	4-6
VOCs	
Isopropylbenzene	**6300**

D-1-East	10/29/16
Depth (ft bls)	6-7
VOCs	
Isopropylbenzene	**5300**

D-2-East	10/29/16
Depth (ft bls)	6-7
VOCs	
Isopropylbenzene	**6800**

D-2 B	1/13/16
Depth (ft bls)	10-12
VOCs	
Ethylbenzene	**2400**
Isopropylbenzene	**24000**

D-3-East	10/29/16
Depth (ft bls)	6-7
VOCs	
Isopropylbenzene	**18000**

D-3 B	1/13/16
Depth (ft bls)	10-12
VOCs	
Ethylbenzene	**1800 J**
Isopropylbenzene	**16000**

D-4 B	1/13/16
Depth (ft bls)	10-12
VOCs	
Ethylbenzene	**1800 J**
Isopropylbenzene	**9300**

D-5 B	1/13/16
Depth (ft bls)	10-12
VOCs	
Isopropylbenzene	**7500**

SC-04-SW-B-SR	12/28/15	12/28/15 DUP
Depth (ft bls)	13	13
VOCs		
Ethylbenzene	**2600 J**	**3600**
Isopropylbenzene	**6000**	**8900**
Total Xylenes	**8100 J**	**8600 J**

SC-05-SW-B	
Depth (ft bls)	13
VOCs	
Isopropylbenzene	**4300**

PD-12-E-SW	1/21/16
Depth (ft bls)	4-6
VOCs	
Isopropylbenzene	**15000**

PD-12-S-B	1/21/16
Depth (ft bls)	11-13
VOCs	
Isopropylbenzene	**18000**

PD-12-S-SW	1/21/16
Depth (ft bls)	4-6
VOCs	
Isopropylbenzene	**8500**

Driveway-B (SEE NOTE 2)	1/21/16
Depth (ft bls)	17.5
VOCs	
Benzene	**150**
Ethylbenzene	**9600**
Isopropylbenzene	**28000**
Total Xylenes	**100000**

PD-06B	1/27/16
Depth (ft bls)	9-11
VOCs	
Isopropylbenzene	**4200**

LEGEND

PD-12-S-B ●	EXCAVATION BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN EXCEEDANCES OF CLEANUP STANDARDS
PD-10 ◉	EXCAVATION SIDWEWALL SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN EXCEEDANCES OF CLEANUP STANDARDS
SC-04-SW-B-SR 🟥	CONCRETE SLAB BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN EXCEEDANCES OF CLEANUP STANDARDS
SC-05-NW-B-S ●	EXCAVATION BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN DETECTIONS BELOW CLEANUP STANDARDS
D-5S ◉	EXCAVATION SIDEWALL SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN DETECTIONS BELOW CLEANUP STANDARDS
SC-04-SW-B-S 🟩	CONCRETE SLAB BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN DETECTIONS BELOW CLEANUP STANDARDS (SEE NOTE 1)
SC-04-NE ●	POTENTIAL SAMPLE LOCATION AND DESIGNATION ABANDONED DUE TO REFUSAL
▬	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
D-5	APPROXIMATE LOCATION AND DESIGNATION OF DISHED UNDERGROUND STORAGE TANK (REMOVED)
▬	REMEDIAL ACTION EXCAVATION LIMITS
☐	CONCRETE SLAB
▭	9 FT BLS EXCAVATION FOOTPRINT
▭	11 FT BLS EXCAVATION FOOTPRINT (TOPOGRAPHY OF CONCRETE SLAB)
▭	13 FT BLS EXCAVATION FOOTPRINT
▭	15 FT-15.5 FT BLS EXCAVATION FOOTPRINT
▭	16 FT BLS EXCAVATION FOOTPRINT
▭	17 FT BLS EXCAVATION FOOTPRINT
▭	18 FT BLS EXCAVATION FOOTPRINT
GC AREA 1 (4-6 FT BLS) 🟥	DESIGNATION AND INFERRED HORIZONTAL AND VERTICAL LIMITS OF REMAINING GROSSLY CONTAMINATED MATERIAL BASED ON FIELD OBSERVATION AND RESULTS OF POST-EXCAVATION SAMPLING AND FIELD SCREENING

Parameter	Standards* (µg/kg)
VOCs	
Benzene	**60**
Ethylbenzene	**1000**
Isopropylbenzene	****2300**
Total Xylenes	**1600**

CONCENTRATIONS IN µg/kg

µg/kg – MICROGRAMS PER KILOGRAM
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
* – NYSDEC PART 375 PROTECTION OF GROUNDWATER
** – NYSDEC CP-51 PROTECTION OF GROUNDWATER STANDARDS
VOCS – VOLATILE ORGANIC COMPOUNDS
J – ESTIMATED VALUE
FT BLS – FEET BELOW LAND SURFACE

NOTE

1. CONCRETE SLAB LOCATED IN COURTYARD AT APPROXIMATELY 11 TO 13 FT BLS WAS NOT REMOVED DURING REMEDIAL ACTION DUE TO SIZE. POST EXCAVATION SOIL SAMPLES WERE COLLECTED AT ACCESSIBLE EDGE BENEATH CONCRETE SLAB AS SHOWN DURING THE PERFORMANCE OF THE REMEDIAL ACTION.
2. GROSS CONTAMINATION PRESENT FROM 17.5' TO 20' BLS. ADDITIONAL EXCAVATION NOT PERFORMED DUE TO LIMITATIONS OF SHORING METHOD USED.

ABANDONED IN PLACE UNDERGROUND STORAGE TANK INFORMATION

TANK ID	ESTIMATED DIAMETER (FT)	ESTIMATED LENGTH (FT)	ESTIMATED CAPACITY (GAL)
GT-1	10	36	21,000
GT-2	10	13	7,500
GT-3A	10	11.5	6,700
GT-3B	10	11.5	6,700
GT-4A	10	9	5,000
GT-4B	10	9	5,000
GT-5A	10	12	7,000
GT-5B	10	12	7,000
GT-5C	10	12	7,000
GT-6	10	36	21,000
REMOVED UNDERGROUND STORAGE TANK INFORMATION			
D-1	6	12	2,500
D-2	6	10	2,000
D-3	6	10	2,000
D-4	6	10	2,000
D-5	6	10	2,000

15' 0 15'

Title:
CONTAMINATION REMAINING IN SOIL AFTER THE REMEDIAL ACTION WITHIN COURTYARD

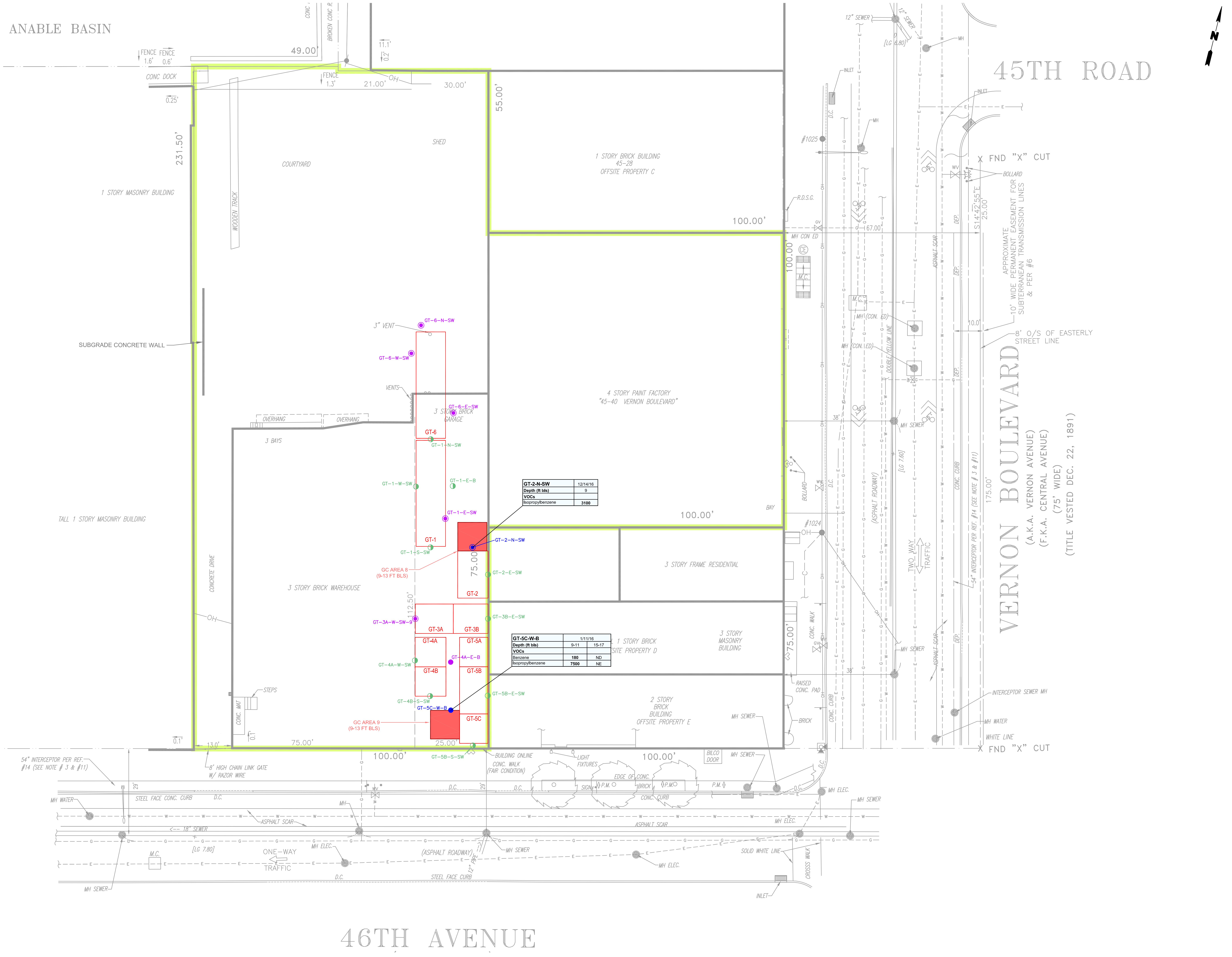
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 15JUN16	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	9
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.09.DWG		

V:\CAD\PROJECTS\2051\2051.0001Y\204R\2051.0001Y204R.09.DWG



GT-2-N-SW	12/14/16
Depth (ft bls)	9
VOCs	
Isopropylbenzene	**3100**

GT-5C-W-B	1/11/16	
Depth (ft bls)	9-11	15-17
VOCs		
Benzene	**180**	ND
Isopropylbenzene	**7500**	NE

LEGEND

GT-1-E-B ◑	POTENTIAL CONFIRMATORY SOIL SAMPLE LOCATION AND DESIGNATION WHERE CONCRETE REFUSAL ENCOUNTERED
GT-6-N-SW ◉	UNDERGROUND STORAGE TANK BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION BENEATH CONCRETE SLAB WITH COMPOUND OF CONCERN DETECTIONS BELOW CLEANUP STANDARDS
GT-4A-E-B ●	UNDERGROUND STORAGE TANK SIDEWALL SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN DETECTIONS BELOW CLEANUP STANDARDS
GT-5C-W-B ●	UNDERGROUND STORAGE TANK BOTTOM SOIL SAMPLE LOCATION AND DESIGNATION BENEATH CONCRETE SLAB WITH COMPOUND OF CONCERN EXCEEDANCES OF CLEANUP STANDARDS
GT-2-N-SW ◉	UNDERGROUND STORAGE TANK SIDEWALL SOIL SAMPLE LOCATION AND DESIGNATION WITH COMPOUND OF CONCERN EXCEEDANCES OF CLEANUP STANDARDS
🟩	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
GC AREA 8 (9-13 FT BLS) 🟥	DESIGNATION AND INFERRED HORIZONTAL AND VERTICAL LIMITS OF REMAINING GROSSLY CONTAMINATED MATERIAL BASED ON FIELD OBSERVATION AND RESULTS OF POST-EXCAVATION SAMPLING AND FIELD SCREENING

Parameter	Standards* (µg/kg)
VOCs	
Benzene	**60**
Isopropylbenzene	****2300**

CONCENTRATIONS IN µg/kg

µg/kg – MICROGRAMS PER KILOGRAM
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
* – NYSDEC PART 375 PROTECTION OF GROUNDWATER
** – NYSDEC CP-51 PROTECTION OF GROUNDWATER STANDARDS
VOCS – VOLATILE ORGANIC COMPOUNDS
ND – NO DETECTION
NE – NO EXCEEDANCE
FT BLS – FEET BELOW LAND SURFACE

15' 0 15'

Title:
CONTAMINATION REMAINING IN SOIL AFTER THE REMEDIAL ACTION WITHIN THE GARAGE

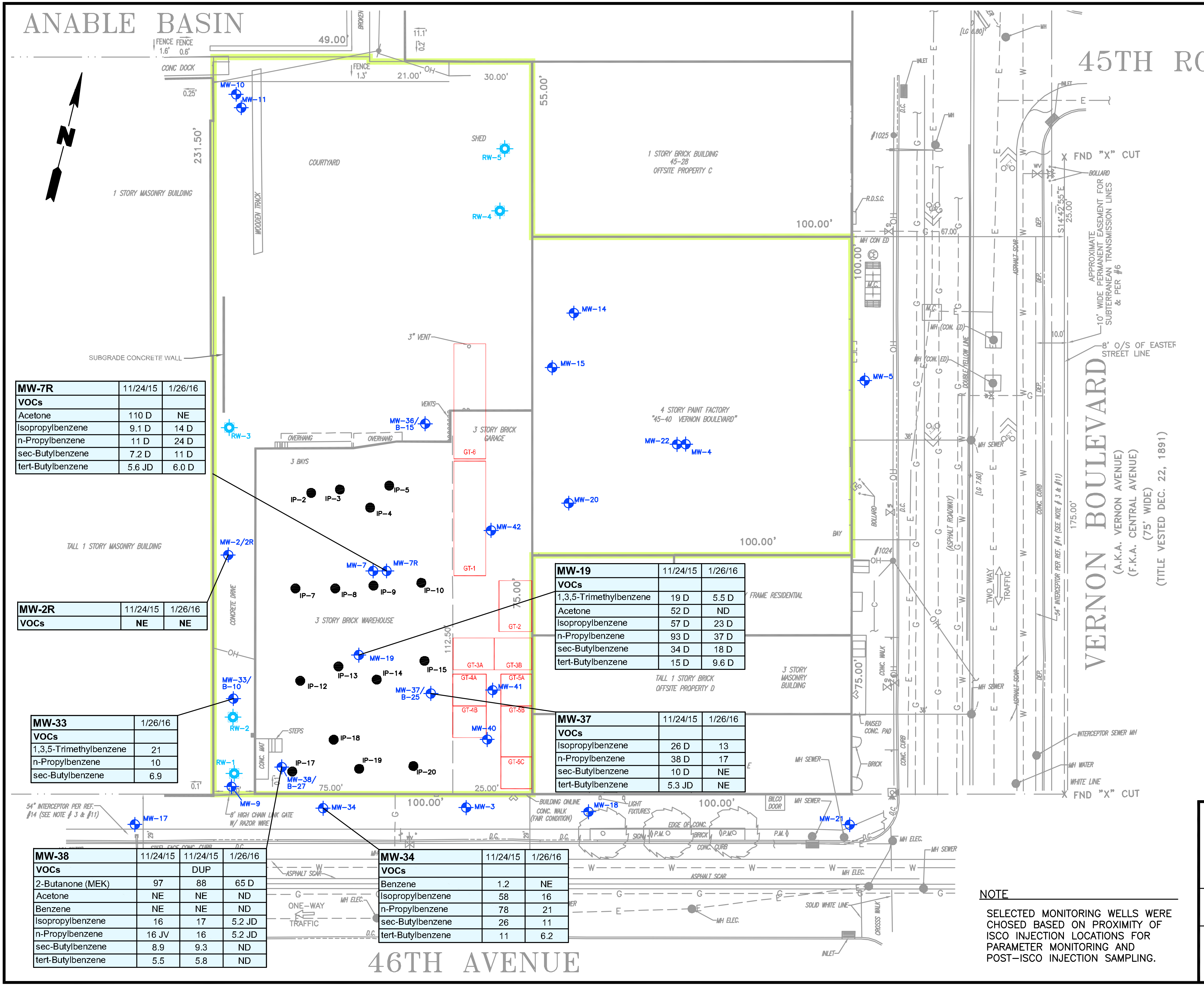
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 15JUN16	PLATE
Prepared by: G.M.	Scale: AS SHOWN	**10**
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.10.DWG		

V:\CAD\PROJECTS\2051\Y0001Y\204R\2051.0001Y204R.10.DWG



MW-7R	11/24/15	1/26/16
VOCs		
Acetone	110 D	NE
Isopropylbenzene	9.1 D	14 D
n-Propylbenzene	11 D	24 D
sec-Butylbenzene	7.2 D	11 D
tert-Butylbenzene	5.6 JD	6.0 D

MW-2R	11/24/15	1/26/16
VOCs	**NE**	**NE**

MW-33	1/26/16
VOCs	
1,3,5-Trimethylbenzene	21
n-Propylbenzene	10
sec-Butylbenzene	6.9

MW-19	11/24/15	1/26/16
VOCs		
1,3,5-Trimethylbenzene	19 D	5.5 D
Acetone	52 D	ND
Isopropylbenzene	57 D	23 D
n-Propylbenzene	93 D	37 D
sec-Butylbenzene	34 D	18 D
tert-Butylbenzene	15 D	9.6 D

MW-37	11/24/15	1/26/16
VOCs		
Isopropylbenzene	26 D	13
n-Propylbenzene	38 D	17
sec-Butylbenzene	10 D	NE
tert-Butylbenzene	5.3 JD	NE

MW-38	11/24/15	11/24/15	1/26/16
VOCs		DUP	
2-Butanone (MEK)	97	88	65 D
Acetone	NE	NE	ND
Benzene	NE	NE	ND
Isopropylbenzene	16	17	5.2 JD
n-Propylbenzene	16 JV	16	5.2 JD
sec-Butylbenzene	8.9	9.3	ND
tert-Butylbenzene	5.5	5.8	ND

MW-34	11/24/15	1/26/16
VOCs		
Benzene	1.2	NE
Isopropylbenzene	58	16
n-Propylbenzene	78	21
sec-Butylbenzene	26	11
tert-Butylbenzene	11	6.2

LEGEND

MW-5 ⌖	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1 ⌖	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
🟩	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)

Parameter	Standards* (µg/L)
VOCs	
1,3,5-Trimethylbenzene	5
2-Butanone (MEK)	50
Acetone	50
Benzene	1
Isopropylbenzene	5
n-Propylbenzene	5
sec-Butylbenzene	5
tert-Butylbenzene	5

CONCENTRATIONS IN µg/L

µg/L – MICROGRAMS PER LITER

*NYSDEC AWQSGVS

NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

AWQSGVS – AMBIENT WATER-QUALITY STANDARDS AND GUIDANCE VALUES

-- – NOT DETECTED ABOVE NYSDEC AWQSGV

D – DILUTION

J – ESTIMATED VALUE

V – VALUE ALTERED OR QUALIFIER ADDED DURING DATA VALIDATION

DUP – DUPLICATE SAMPLE

VOCS – VOLATILE ORGANIC COMPOUNDS

NE – NO EXCEEDANCES

ND – NO DETECTION

NOTE

SELECTED MONITORING WELLS WERE CHOSED BASED ON PROXIMITY OF ISCO INJECTION LOCATIONS FOR PARAMETER MONITORING AND POST-ISCO INJECTION SAMPLING.

Title:

REMAINING GROUNDWATER SAMPLE EXCEEDANCES - POST-ISCO INJECTIONS

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	11
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.08.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.08.DWG

APPENDICES

A. Environmental Easement
B. List of Site Contacts
C. Excavation Work Plan
D. Monitoring Well Boring and Construction Logs
E. As-Built Drawings
F. Health and Safety Plan and Site-Specific Community Air Monitoring Plan
G. Quality Assurance Project Plan
H. Site Management Forms
I. Field Sampling Plan
J. O&M Manual

APPENDIX A

Environmental Easement

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument. The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2015110500678001001E92CF

RECORDING AND ENDORSEMENT COVER PAGE

PAGE 1 OF 10

Document ID: 2015110500678001
Document Date: 10-27-2015
Preparation Date: 11-05-2015
Document Type: EASEMENT
Document Page Count: 9

PRESENTER:

FIRST AMERICAN TITLE INSURANCE (FIRSTAM PICKUP)
666 THIRD AVENUE-5TH FLOOR
TITLE# 3020-761464-CQ
NEW YORK, NY 10017
212-850-0670

RETURN TO:

SIVET PAGET & RIESEL P.C.
460 PARK AVENUE
NEW YORK, NY 10022
KARRY TORRES

PROPERTY DATA

Borough	Block	Lot	Unit	Address
QUEENS	26	4 Entire Lot		45-40 VERNON BOULEVARD

Property Type: INDUSTRIAL BUILDING

CROSS REFERENCE DATA

CRFN_______ *or* DocumentID________ *or* _______ Year_____ Reel____ Page_____ *or* File Number__________

PARTIES

GRANTOR/SELLER:

CSC 4540 PROPERTY CO, LLC
757 THIRD AVENUE, SUTIE 1701
NEW YORK, NY 10017

GRANTEE/BUYER:

PEOPLE OF STATE OF NEW YORK BY COMMISSIONER
DEPT OF ENVIRONMENTAL CONSERVATION,, 625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	82.00
Affidavit Fee:	$	0.00

Filing Fee:	$	100.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK

Recorded/Filed 11-10-2015 09:25
City Register File No.(CRFN):
2015000400038

1625

Annette M Hill

City Register Official Signature

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

THIS INDENTURE made this 27th day of October, 2015, between Owner(s) CSC 4540 Property CO, LLC, having an office at c/o Simon Development, 230 Park Avenue, Suite 539, New York, New York 10169, County of New York, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 45-40 Vernon Boulevard (a/k/a 5-49 46th Avenue) in the City of New York, County of Queens and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 26 Lot 4, being the same as that property conveyed to Grantor by deed dated November 14, 2013 and recorded in the City Register of the City of New York as CRFN # 2013000487764. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.759 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 29, 2010 last revised September 15, 2015 prepared by James C. Weed, NYSPLS of Control Point Associates, Inc., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: W2-1119-08-03 as last amended July 18, 2011, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

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

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

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

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

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

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

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

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

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

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

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

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved b the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C241108
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC

625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

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

CSC 4540 Property CO, LLC:

By: ______________________

Print Name: Matthew Baron

Title: Authorized Signatory Date: 9/30/15

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 30th day of September, in the year 20 15, before me, the undersigned, personally appeared Matthew Baron, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

____
Notary Public - State of New York

BRIAN S HART
NOTARY PUBLIC-STATE OF NEW YORK
No. 01HA6257074
Qualified in New York County
My Commission Expires March 05, 2016

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

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

Grantee's Acknowledgment

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

On the 27th day of October, in the year 2015, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT CERTAIN plot, piece or parcel of land, together with the buildings and improvements thereon erected, situate, lying and being at Long Island City in the County of Queens, City of New York, known as Lot Numbers 4, 5, 6, 7, 13 14, 15 and 16, in Block 21"Map of Hunter Van Alst and Debevoise Farms" situate in the 1st, 2nd and 3rd Wards, Long Island, Queens County, surveyed by Peter Van Alst for the Trustees of Union College bounded and described as follows:

BEGINNING at a point on the westerly side of Vernon Boulevard, distant 75 feet northerly from the corner formed by the intersection of the westerly side of Vernon Boulevard and the northerly side of 46th Avenue;

RUNNING THENCE south 75 degrees 17 minutes 05 seconds west and parallel with 46th Avenue, 100 feet;

THENCE south 14 degrees 42 minutes 55 seconds east and parallel with Vernon Boulevard, 75 feet to the northerly side of 46th Avenue;

THENCE south 75 degrees 17 minutes 05 seconds west along the northerly side of 46th Avenue, 100 feet to the easterly line of Lot 17 on the aforesaid map;

THENCE north 14 degrees 42 minutes 55 seconds west along the easterly line of Lot 17 and parallel to Vernon Boulevard, 231 feet, 6 inches to the southerly line of the 11th Street Basin;

THENCE north 75 degrees 17 minutes 05 minutes east along the southerly line of the 11th Street Basin and parallel to 46th A venue, 49 feet to the westerly line of Lot 10;

THENCE south 14 degrees 42 minutes 55 seconds east along the westerly line of Lot 10 and parallel to Vernon Boulevard, 1 foot 6 inches;

THENCE north 75 degrees 17 minutes 05 seconds east along said southerly side of Lot 10 and parallel with 46th Avenue, 51 feet to the westerly side of Lot 9 on said map;

THENCE south 14 degrees 42 minutes 55 seconds east and parallel with Vernon Boulevard and along the westerly sides of Lots 9 and 8, 55 feet to the northerly side of Lot 7 on said map;

THENCE north 75 degrees 17 minutes 05 seconds east and along the northerly side of Lot 7 and parallel with the northerly side of 46th Avenue, 100 feet to the westerly side of Vernon Boulevard;

THENCE south 14 degrees 42 minutes 55 seconds east and along the westerly side of Vernon Boulevard, 100 feet to the point or place of BEGINNING.

Together with all rights, title and interest of, in and to any streets and roads abutting the above described premises, to the center line thereof.
(Vernon Boulevard a/k/a Vernon Avenue f/k/a Central Avenue)
(46th Avenue a/k/a 10th Street f/k/a West 10th Street)
(11th Street Basin f/k/a The Canal)

APPENDIX B

List of Site Contacts

APPENDIX B

LIST OF SITE CONTACTS

Name	Phone/Email Address
Site Owner: Brent Carrier (4540 Vernon LLC)	(917) 847-9876 (mobile) bcarrier@credevelopment.com (email)
Owner Representative: Ravi Reddy (4540 Vernon LLC)	(201) 798-4470 (office) (917) 575-9370 (mobile) rreddy@citistructure.com (email)
Remedial Party: 4540 Vernon Realty, LLC	(917) 847-9876 (mobile) bcarrier@credevelopment.com (email)
Project Director: Joseph Duminuco (Roux Associates):	(631) 232-2600 (office) (631) 921-6279 (mobile) jduminuco@rouxinc.com (email)
Qualified Environmental Professional: Omar Ramotar, P.E. (Remedial Engineering, P.C.)	(631) 232-2600 (office) (631) 553-9274 (mobile) oramotar@rouxinc.com (email)
Project Manager: Omar Ramotar, P.E. (Remedial Engineering, P.C.)	(631) 232-2600 (office) (631) 553-9274 (mobile) oramotar@rouxinc.com (email)
NYSDEC DER Project Manager: Sondra Martinkat	(718) 482-4891 (office) sondra.martinkat@dec.ny.gov (email)
NYSDEC Regional Remediation Engineer: Jane O'Connell	(718) 482-4995 (office) jane.oconnell@dec.ny.gov (email)
NYSDEC Site Control: Kelly Lewandowski	(518) 402-9553 (office) kelly.lewandowski@dec.ny.gov (email)
Remedial Party Attorney: Sive, Paget & Riesel P.C. % Michael Bogin	(212) 421-2150 ext. 210 (office) mbogin@sprlaw.com (email)

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

APPENDIX C

Excavation Work Plan

APPENDIX C

EXCAVATION WORK PLAN (EWP)

C-1 Notification

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table C-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table C-1: Notifications*

Central Office NYSDEC Representative: Jane O'Connell	Phone: 718-482-4995 Email: jane.oconnell@dec.ny.gov
Regional Office NYSDEC Representative: Sondra Martinkat	Phone: 718-482-4891 Email: sondra.martinkat@dec.ny.gov
NYSDEC Site Control: Kelly Lewandowski	Phone: 518-402-9553 Email: kelly.lewandowski@dec.ny.gov

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

This notification will include:

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

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

C-2 Soil Screening Methods

Visual, olfactory and instrument-based (i.e., photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Field screening tests (hydrophobic dye test or similar) will be used to screen soil for NAPL. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections C-6 and C-7 of this Appendix.

C-3 Soil Staging Methods

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

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

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

C-4 Materials Excavation and Load-Out

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

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

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

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

A truck wash will be operated on-Site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks are washed at the truck wash before leaving the Site. Until the activities performed under this section are complete, truck wash waters will be collected and disposed of off-Site in an appropriate manner.

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

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

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 loaded with Site materials will exit the vicinity of the Site using 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 material excavated and removed from the Site will be treated as contaminated and regulated material, and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this Site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the

NYSDEC. Unregulated off-site management of materials from this Site will not occur without formal NYSDEC approval.

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

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-7 Materials Reuse On-Site

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

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

C-8 Fluids Management

All liquids to be removed from the Site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

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

C-9 Cover System Restoration

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the RAWP. The existing cover system will be a temporary cover system comprised of a minimum of 24 inches of RCA and buildings and their associated concrete slabs (which will be left in place). If excavation is required below the demarcation layer, consisting of orange snow fencing material, the demarcation layer will be replaced to provide a visual reference to the top of the remaining contamination zone. The demarcation zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

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. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

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). Soils shall meet the lower of PoG or RRSCOs. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

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

C-11 Excavation Contingency Plan

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

Sampling will be performed on product, sediment and surrounding soils, etc., as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and 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 Report.

C-12 Community Air Monitoring Plan

The location of air sampling stations based on generally prevailing wind conditions at the Site. 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-13 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include use of odor suppressants and controlled excavation procedures as discussed below. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

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

C-14 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-15 Other Nuisances

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

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

APPENDIX D

Monitoring Well Boring and Construction Logs

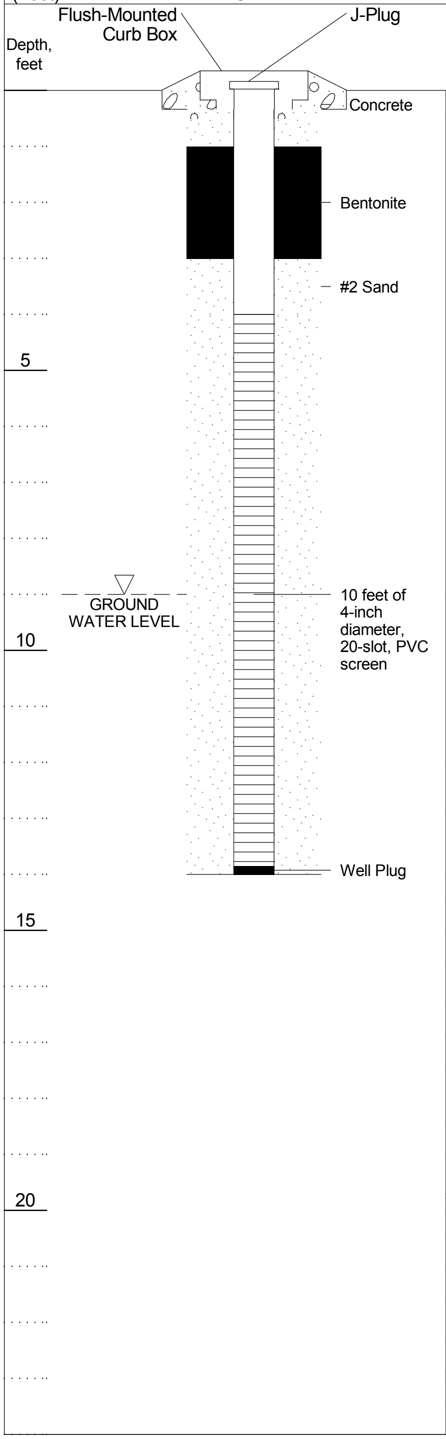
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

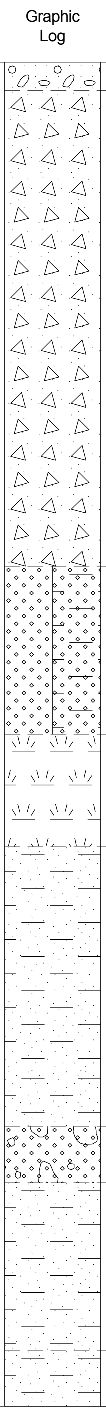
209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-2/2R**	NORTHING **211546.3**	EASTING **997152.8**		
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **R.Maxwell**	LOGGED BY **J.Wills**			
DRILLING CONTRACTOR/DRILLER **Zebra Environmental / Evan M**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **3-in. / Drive Sampler**	BOREHOLE DIAMETER **3-inches**	DRILLING EQUIPMENT/METHOD **6620 DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **6/10/13-12/16/13**
CASING MAT./DIA. **PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **PVC** TOTAL LENGTH **10.0**ft	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE **9.74**	TOP OF WELL CASING **9.23**	TOP & BOTTOM SCREEN **5.7 / -4.3**	GRAVEL PACK SIZES **Morie #2**





Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
Reinforced CONCRETE			Hand cleared to 5 feet bls.
FILL (Dark brown, fine to medium SAND, little coarse Sand, Gravel and Silt; moist)		0.4	Sample MW-2/2R/0-2 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
FILL (Dark brown, fine to medium SAND, little Brick, Silt and Gravel, trace clay; moist)		0.1	
		0.1	
		5.8	3.7 feet recovery.
			Sample MW-2/2R/6-8 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
Dark grey, fine to coarse SAND, little Silt and Gravel; wet		115	4 feet recovery.
Dark brown, fine SAND, little Silt and Peat; wet		494	
Dark brown, fine SAND, little Silt; wet		537	Sample MW-2/2R/14-15 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
		42	4 feet recovery.
Dark brown, fine SAND, little Silt and Cobble; wet		40.6	
Brown to dark brown, fine to coarse SAND, some Gravel, little Silt, trace clay; wet		136.7	
Dark brown, fine SAND, little Silt, trace cobble; wet		10.2	3.5 feet recovery.
		16.3	Sample MW-2/2R/23-24 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides. Refusal encountered at 24 feet bls.
Dark brown, fine SAND, little Gravel and medium Sand, trace cobble; wet		20.1	

SOIL BORING LOG

Paragon Paint Company
AKRF Project Number: 10643

Boring No. **MW-3**
Sheet 1 **of 1**

AKRF
440 Park Avenue South, New York, NY 10016
Phone (212) 696-0670 Fax (212) 726-0942

Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Driller : ADT, Inc
Weather: Clear 80°
Sampler: AKRF/Bryan Zieroff

Drilling			
Start		**Finish**	
Time	8:30	**Time**	12:30
Date	5/25/06	**Date**	5/25/06

Depth (feet)	**Blow Counts**	**Recovery (Inches)**	**Surface Condition:** Concrete sidewalk	**Odor**	**Moisture**	**PID**	**NAPL**	**Samples Collected for Lab Analysis**
1 2 3 4			Concrete sidewalk: 10 inches Hand dig with post hole digger to 4 feet below grade to clear borehole for utilities SAND, medium to coarse; little fine Gravel; little silt; trace brick, wood and ash; dark brown; loose (FILL).	petroleum odor	moist	14 56	none	
5 6	3 9 6 3	0	No recovery in split spoon due to loose soils (FILL)				none	
7 8	4 5 6 5	0	No recovery in split spoon due to loose soils (FILL)				none	
9 10	6 10 7 8	13	SAND, fine to medium; little Silt; trace coarse Sand; dark brown, wet at 9 ft bg.	degraded petroleum odor	v.moist wet	153	none	
11 12	7 12 10 11	16	SAND, fine to medium; little Silt; trace coarse Sand; dark brown, wet at 9 ft bg.	degraded petroleum odor	saturated	234	none	MW-3 (10-12)
13 14	10 11 11 11	24	SAND, fine, and SILT; little medium Sand; dark brown	degraded petroleum odor	saturated	181	none	
15 16	1 5 6 7	14	SAND, fine, and SILT; little medium Sand; dark brown	no odor	saturated	6	none	
17 18			Auguered to 17 feet below grade. End of boring at 17 feet below grade.					
19 20								

Notes:

Groundwater encountered at 10' below grade.

Three inch split spoon used for sampling between 8 and 16 feet below grade

SOIL BORING LOG

Paragon Paint Company

AKRF Project Number: 10643

Boring No. MW-4

Sheet 1 **of 1**

AKRF
440 Park Avenue South, New York, NY 10016
Phone (212) 696-0670 Fax (212) 726-0942

Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Driller : ADT, Inc
Weather: Clear 70°
Sampler: AKRF/Eric Kutter

Drilling			
Start		**Finish**	
Time	11:30	**Time**	18:00
Date	5/23/06	**Date**	5/23/06

Depth (feet)	Blow Counts	Recovery (Inches)	Surface Condition:	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1 2			Concrete floor: 6 inches Process gravel					
3 4	5 2 1 2	0	No recovery					
5 6	5 3 1 1	3	SAND and SILT; little Gravel, trace glass; brown (FILL).	none	moist	0	none	
7 8	5 8 8 15	0.5	SAND and SILT; little Gravel, reddish brown (FILL).	none	moist	0	none	
9 10	11 10 10 15	14	(0-8") SAND and SILT, some Gravel; reddish brown (FILL). (8-14") SAND and SILT, dark brown (FILL).	none	moist v. moist	0	none	
11 12	15 10 9 9	12	SAND and SILT; trace slag; gray (FILL). SAND and SILT; brown/grey.	none	wet saturated	0	none	
13 14	10 11 11 10	8	SAND and SILT; trace Gravel; gray.	mild odor	saturated	0	none	
15 16	8 4 11 16	18	SAND and SILT; trace Gravel; gray.	solvent odor	saturated	600 864	none	MW-2 (14-16)
17 18	12 30 18 22	16	SAND and SILT; trace Gravel; gray.	solvent odor	saturated	188 850	none	
19 20	8 4 4 8	19	SAND and SILT; trace Gravel; gray. End of boring at 20 feet below grade.	strong solvent odor	saturated	60 956	none	

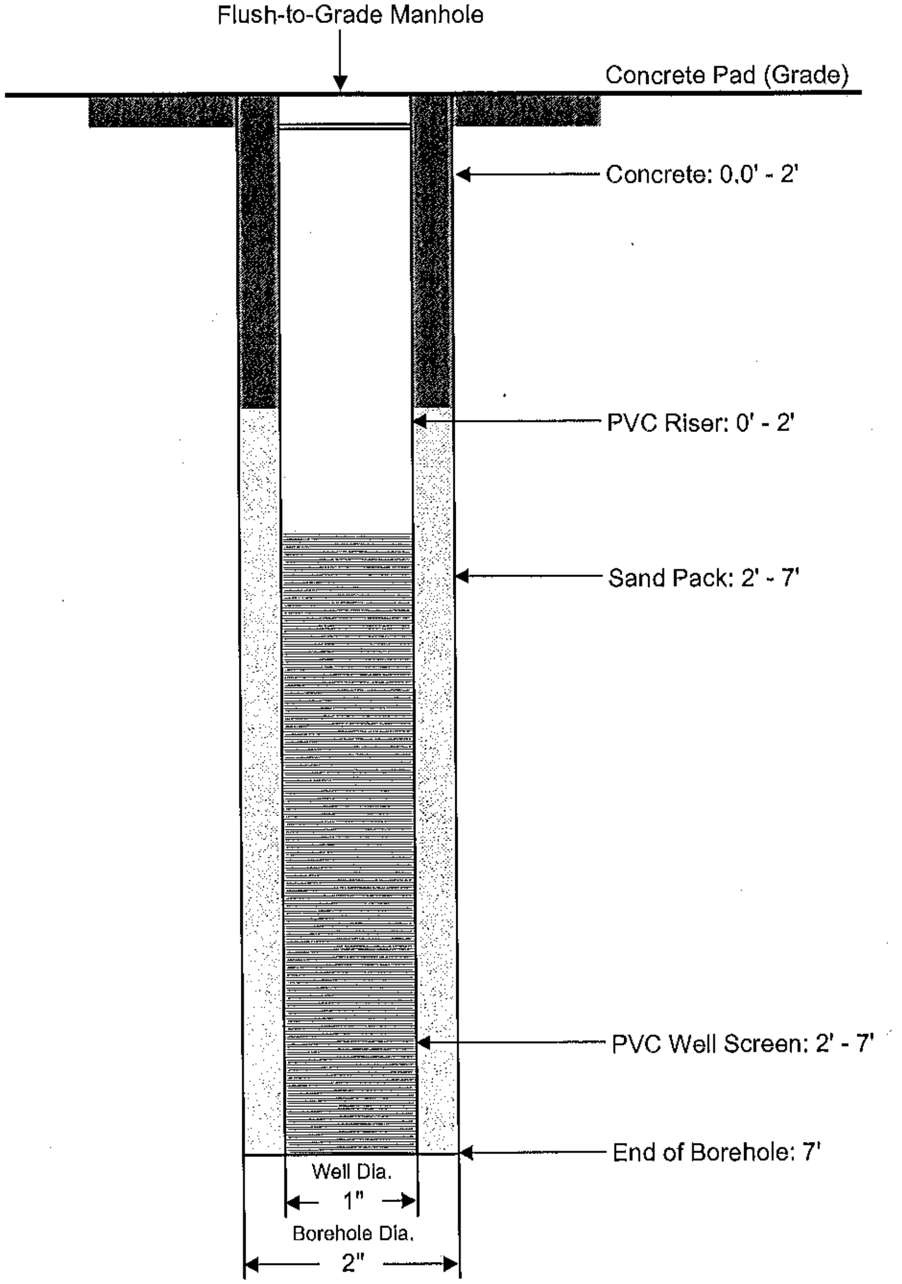
Notes:

Groundwater encountered at 10' below grade.

AKRF
Environmental Consultants

Well Construction Log

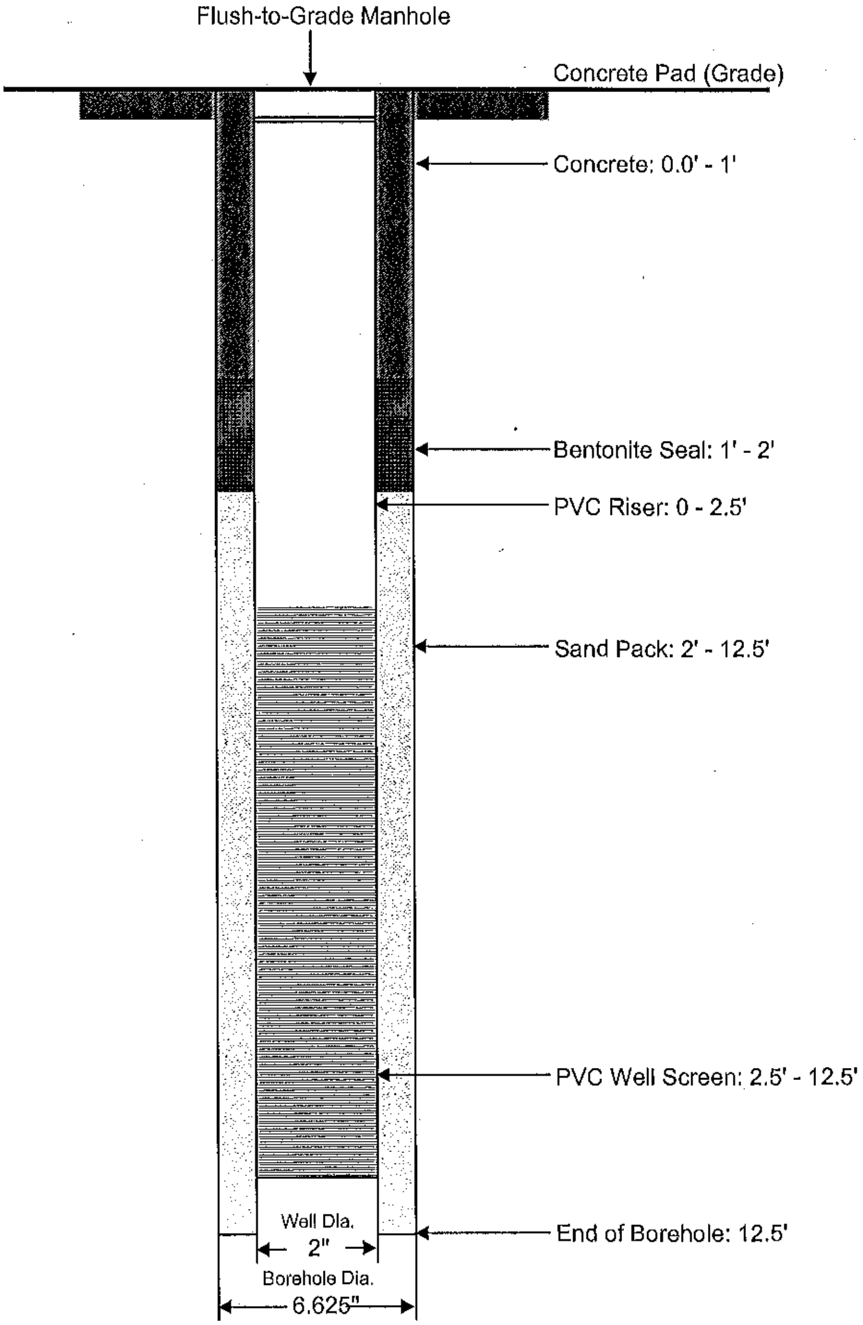
Well No: **MW-7**	**Job Number:** 10702	**Client:** Paragon Paint	
	Location: Paragon Paint, LIC, NY	**Driller:** Fleet	
	Date Start: 4/17/2007	**Drilling Method:** Direct Push Probe	
	Date Finish: 4/17/2007	**Logged By:** Eric Park/AKRF	



AKRF
Environmental Consultants

Well Construction Log

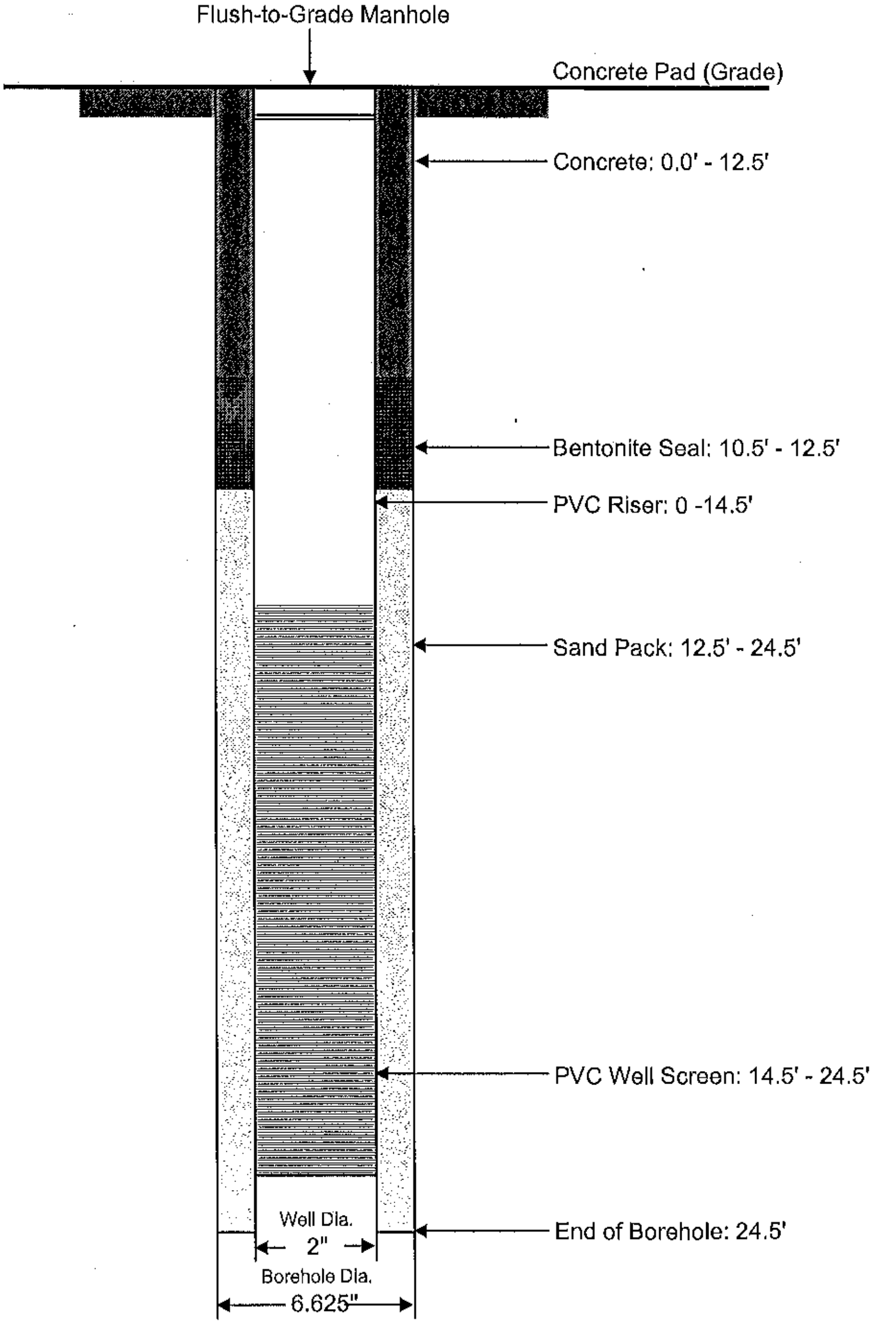
Well No: **MW-10**	**Job Number:**	10702	**Client:** Paragon Paint
	Location:	Paragon Paint, LIC, NY	**Driller:** Paragon/SDS
	Date Start:	4/24/2007	**Drilling Method:** Hollow Stem Auger
	Date Finish:	4/24/2007	**Logged By:** Eric Park/AKRF



AKRF
Environmental Consultants

Well Construction Log

Well No: **MW-11**	**Job Number:** 10702		**Client:** Paragon Paint
	Location: Paragon Paint, LIC, NY		**Driller:** Paragon/SDS
	Date Start: 4/24/2007		**Drilling Method:** Hollow Stem Auger
	Date Finish: 4/24/2007		**Logged By:** Eric Park/AKRF



ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

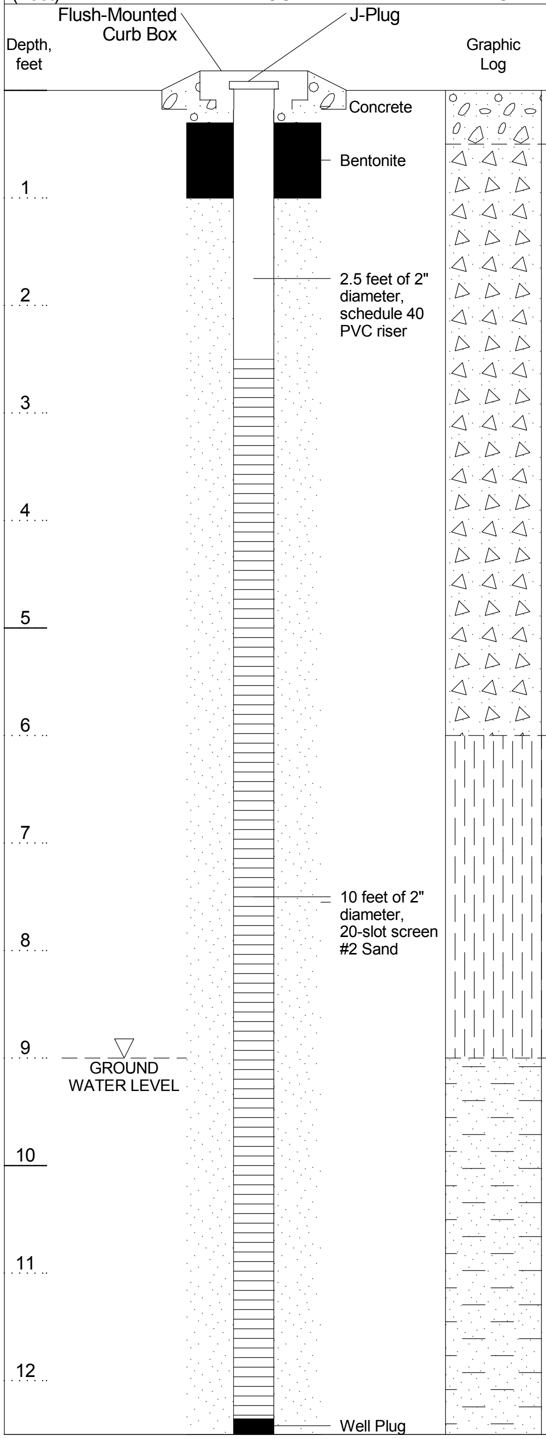
WELL CONSTRUCTION LOG

WELL NO. **MW-15**	NORTHING **211578.4**	EASTING **997265.9**
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**
APPROVED BY **R.Maxwell**	LOGGED BY **R.Lombino**	
DRILLING CONTRACTOR/DRILLER **Zebra Environmental / Evan M**		GEOGRAPHIC AREA **Queens County**

DRILL BIT DIAMETER/TYPE **3-in. / Drive Sampler**	BOREHOLE DIAMETER **3-inches**	DRILLING EQUIPMENT/METHOD **6620 DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **12/31/13-1/20/14**

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

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
	11.96	**11.51**	**9.5 / -0.5**	**Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0	Reinforced CONCRETE			Hand cleared to 6 feet bls. Sample MW-15/0-2 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
0.5	FILL (Dark brown, medium to coarse SAND, some fine Sand and Silt, little Gravel, trace brick and concrete; dry)		12.7	
2			0.2	
4			0.2	
6	Dark brown, CLAYEY SILT, some fine Sand; moist		2.7	2 foot recovery. Sample MW-15/6-8 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
9	Dark brown, fine SAND and SILT; wet		670	2 foot recovery.
10				Sample MW-15/10-12 collected for TCL VOCs, TCL SVOCs, TAL Metals, PCBs and TCL Pesticides.
12			261.4	Refusal (possible bedrock) encountered at 12.5 feet bls.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

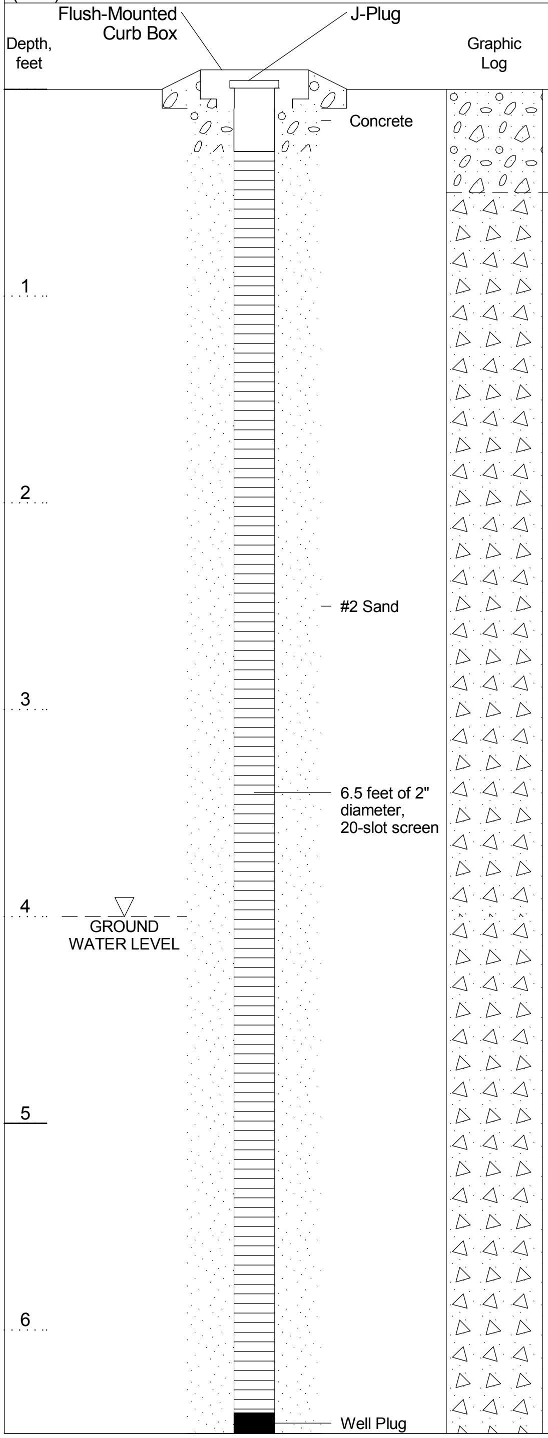
WELL NO. **MW-19**	NORTHING **211505.8**	EASTING **997184.9**
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**
APPROVED BY **R.Maxwell**	LOGGED BY **R.Lombino**	
DRILLING CONTRACTOR/DRILLER **Zebra Environmental / Evan M**		GEOGRAPHIC AREA **Queens County**

DRILL BIT DIAMETER/TYPE **3-in. / Hand Auger**	BOREHOLE DIAMETER **3-inches**	DRILLING EQUIPMENT/METHOD **Hand Auger / Hand Auger**	SAMPLING METHOD **3" Hand Auger**	START-FINISH DATE **1/14/14-1/14/14**

CASING MAT./DIA.: **PVC / 2-inch**

SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **6.5** ft DIA. **2-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN	GRAVEL PACK SIZES
	4.77	**4.41**	**4.8 / -1.7**	**Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"		PID Values (ppm)	REMARKS
0	Reinforced CONCRETE			451.1	Hand cleared to 6 feet bls. Sample MW-19/0-2 collected for TCL VOCs, TCL SVOCs and TAL Metals.
0.5	FILL (Dark brown, fine SAND and SILT, little Gravel, trace brick; moist)				
1			G		
2				745	
3			G		
4	FILL (Dark brown, fine SAND and SILT, trace brick and gravel; wet)			758	Sample MW-19/4-6 collected for TCL VOCs, TCL SVOCs and TAL Metals.
5			G		
6.5					Bottom of boring at 6.5 feet bls.

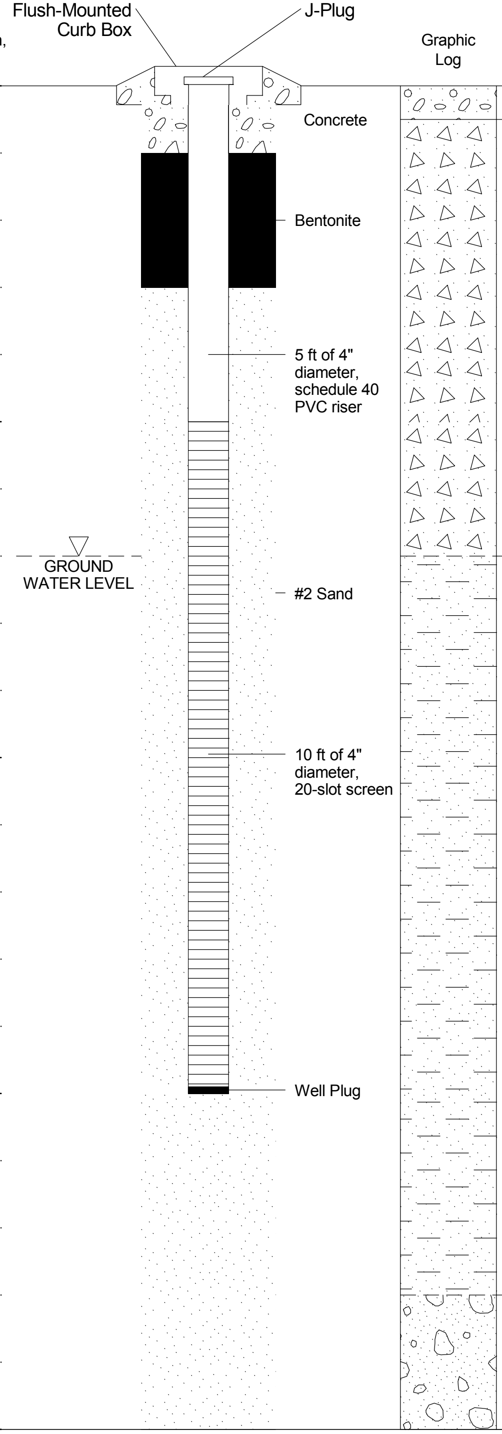
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO.: **MW-21**
NORTHING: **211416.4**
EASTING: **997321.3**
PROJECT NO./NAME: **2051.0001Y000 / Former Paragon Paint & Varnish**
LOCATION: **5-49 46th Avenue**
Long Island City, New York
APPROVED BY: **R.Maxwell**
LOGGED BY: **R.Lombino**
DRILLING CONTRACTOR/DRILLER: **Zebra Environmental / Evan M**
GEOGRAPHIC AREA: **Queens County**
DRILL BIT DIAMETER/TYPE: **6.25-in. / Drive Sampler**
BOREHOLE DIAMETER: **10-inches**
DRILLING EQUIPMENT/METHOD: **6620 DT / Geoprobe/HSA**
SAMPLING METHOD: **2" Macro-Core**
START-FINISH DATE: **1/6/14-1/9/14**
CASING MAT./DIA.: **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE **8.53** TOP OF WELL CASING **8.17** TOP & BOTTOM SCREEN **3.5 / -6.5**
GRAVEL PACK SIZES: **Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Reinforced CONCRETE		0.0	Hand cleared to 5 feet bls. Sample MW-21/0-2 collected for TCL VOCs, TCL SVOCs and TAL Metals.
	FILL (Dark brown, fine SAND, some Silt, little Gravel, trace medium to coarse sand; dry)		0.0	
	FILL (Dark brown, fine SAND & SILT, little Gravel, trace organic material; moist)		1.8	
5	FILL (Dark brown, fine SAND, some Silt, little Brick & Gravel; dry)		309.5	5 foot recovery. Sample MW-21/5-7 collected for TCL VOCs, TCL SVOCs and TAL Metals.
	Dark brown, fine SAND & SILT, trace gravel; wet		11.8	Odor. Sample MW-21/7-8 collected for TCL VOCs, TCL SVOCs and TAL Metals.
			6.5	
10	Dark brown, fine SAND, some Silt; wet		3.5	5 foot recovery.
			0.0	
15	Dark brown, fine SAND & SILT, wet		0.0	5 foot recovery. Sample MW-21/18-20 collected for TCL VOCs, TCL SVOCs and TAL Metals.
	Dark brown, fine SAND & SILT, little Gravel, trace bedrock (schist); wet		1.5	
20				Refusal (possible bedrock) encountered at 20 ft bls.

ROUX

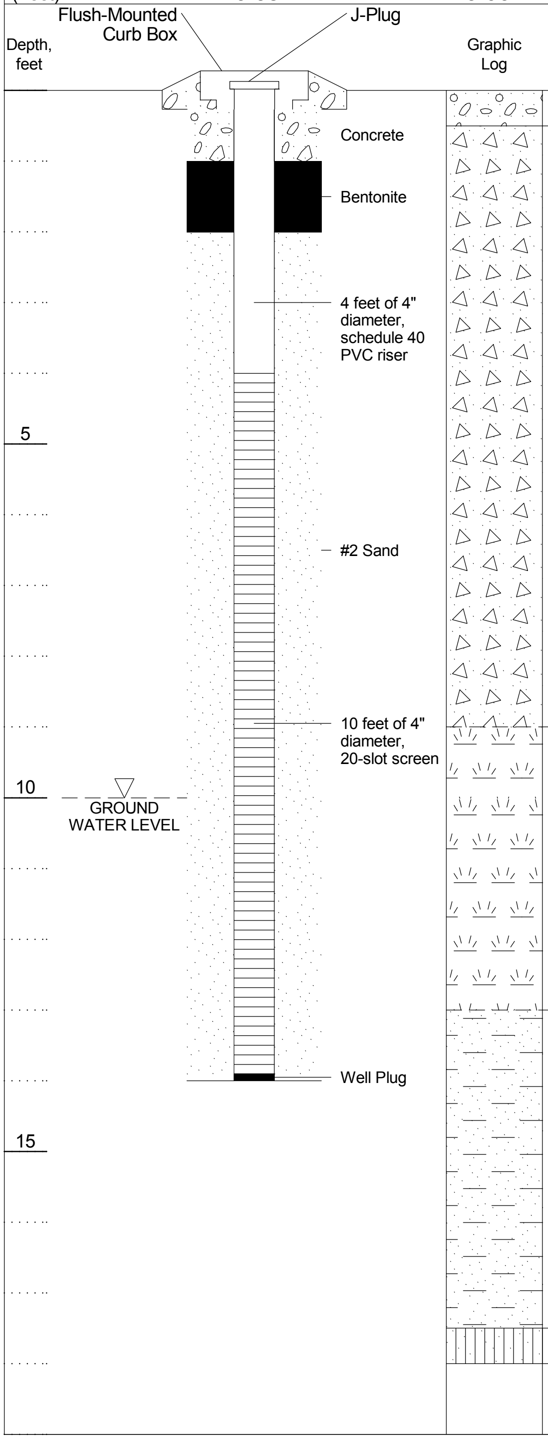
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **B-10/ MW-33**
NORTHING **211493.6**
EASTING **997141.3**
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **R.Maxwell**
LOGGED BY **J.Wills**
DRILLING CONTRACTOR/DRILLER **Zebra Environmental / Evan M**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **2-in. / Drive Sampler**
BOREHOLE DIAMETER **3-inches**
DRILLING EQUIPMENT/METHOD **6620 DT / Geoprobe**
SAMPLING METHOD **2" Macro-Core**
START-FINISH DATE **12/20/13-12/20/13**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE **9.38** TOP OF WELL CASING **9.06** TOP & BOTTOM SCREEN **5.4 / -4.6**
GRAVEL PACK SIZES **Morie #2**



Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
Reinforced CONCRETE			Hand cleared to 5 feet bls. Sample B-10/0-2 collected for TCL VOCs, TCL SVOCs and TAL Metals.
FILL (Dark brown, fine to medium SAND, some Silt and Gravel, little coarse Sand, Brick and Metal; moist)		0.2	
		7.1	
		5.5	
		150	3.2 foot recovery. Sample B-10/5-7 collected for TCL VOCs, TCL SVOCs and TAL Metals.
FILL (Dark grey, fine to medium SAND, some Silt and Gravel, little coarse Sand, and Brick; moist)		70	
Dark brown, SILTY PEAT; very moist		133	
Dark grey, fine SAND, some Silt, little Peat, trace medium to coarse sand; wet		1200	4 foot recovery. Sample B-10/10-12 collected for TCL VOCs, TCL SVOCs and TAL Metals.
Dark reddish brown, fine SAND, little Silt; wet		1094	
		602	3 foot recovery.
		712	Sample B-10/17.5-18 collected for TCL VOCs, TCL SVOCs and TAL Metals.
Brown to dark brown, SILT, some fine to medium Sand, little coarse Sand and Gravel; wet		20	Refusal (possible bedrock) encountered at 18 feet bls.

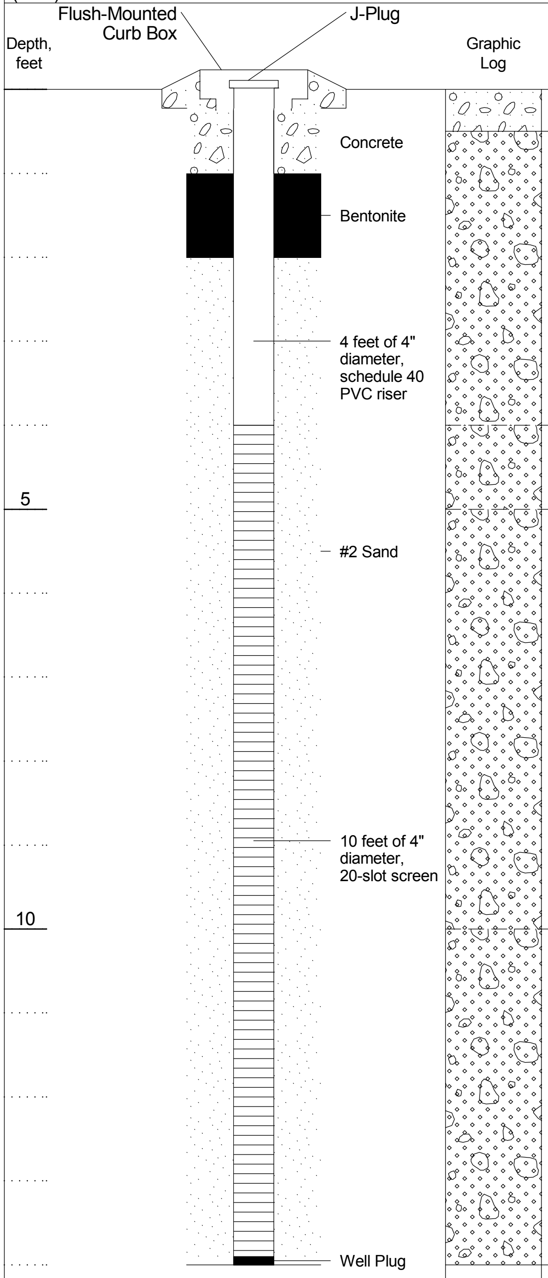
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-34**	NORTHING **211456.217**	EASTING **997154.2073**		
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **R.Maxwell**	LOGGED BY **G.Lozefski/ R. Henke**			
DRILLING CONTRACTOR/DRILLER **ADT / Brian**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **3.5-in. / Sonic Casing**	BOREHOLE DIAMETER **8-inches**	DRILLING EQUIPMENT/METHOD **LRS SF250 / Rotosonic**	SAMPLING METHOD **Shelby Tube**	START-FINISH DATE **12/22/14-12/22/14**
CASING MAT./DIA. **PVC / 4-inch**	SCREEN: TYPE **Slotted** MAT. **PVC**	TOTAL LENGTH **10.0**ft	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE **8.66**	TOP OF WELL CASING **8.43**	TOP & BOTTOM SCREEN **4.7 / -5.3**	GRAVEL PACK SIZES **Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	CONCRETE with little Sand and Gravel			60 inch recovery.
	Blackish brown, fine to coarse SAND with some Gravel; trace silt/cobbles; dry		0.7 0.9 2.5 310.7	
	Blackish brown, fine to coarse SAND with some Gravel; trace silt/cobbles; wet		235.2	
5	Blackish brown, fine to coarse SAND with some Gravel; trace silt/cobbles; organic material; odor; moist		855.9	10 inch recovery.
10	Blackish brown, fine to coarse SAND with some Gravel; trace silt/cobbles; odor; moist		545.5	
15				

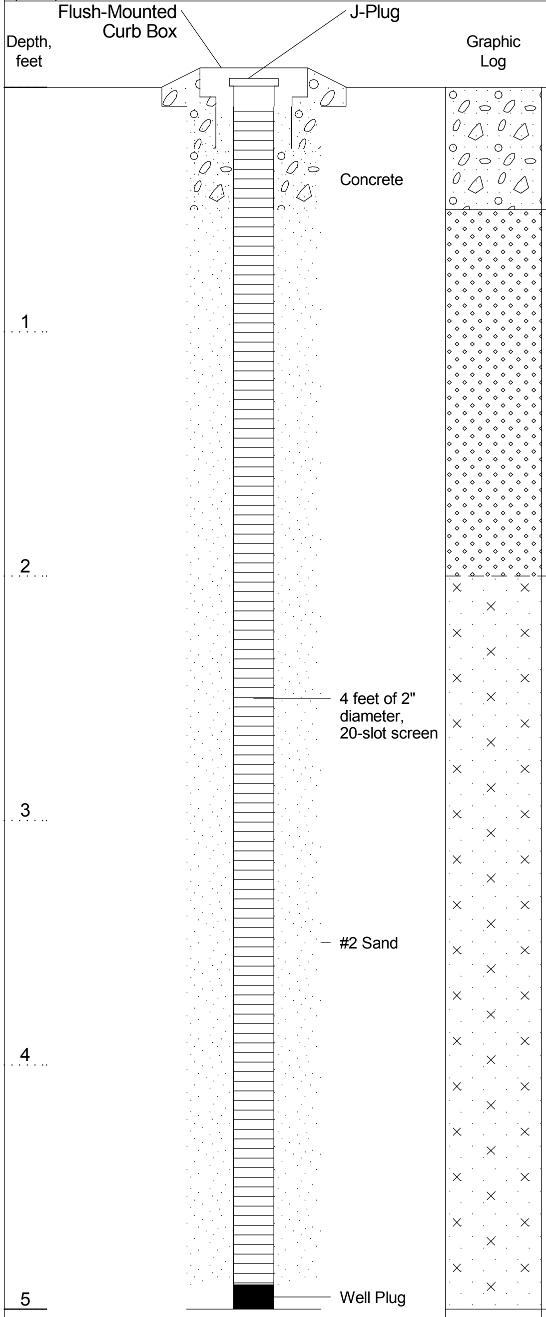
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-38**
NORTHING **211477.633**
EASTING **997152.6494**
PROJECT NO./NAME **2051.0001Y000 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **R.Maxwell**
LOGGED BY **G.Lozefski/ R. Henke**
DRILLING CONTRACTOR/DRILLER **ADT / Tommy**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **3-in. / Hand Auger**
BOREHOLE DIAMETER **3-inches**
DRILLING EQUIPMENT/METHOD **Hand Auger / Hand Auger**
SAMPLING METHOD **3" Hand Auger**
START-FINISH DATE **12/22/14-12/22/14**
CASING MAT./DIA. **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **4.0** ft DIA. **2-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE **4.77** TOP OF WELL CASING **4.44** TOP & BOTTOM SCREEN **3.8 / -0.2**
GRAVEL PACK SIZES **Morie #2**



Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
Reinforced CONCRETE with little Sand and Gravel			60 inch recovery.
Greyish brown, fine SAND with little Gravel/Cobble; trace greyish white clay; odor; moist		1237 937	
Greyish brown, fine SAND with some silt, little medium to coarse Sand; trace greyish white clay; trace grave/cobbles; odor; moist		775 514 185	

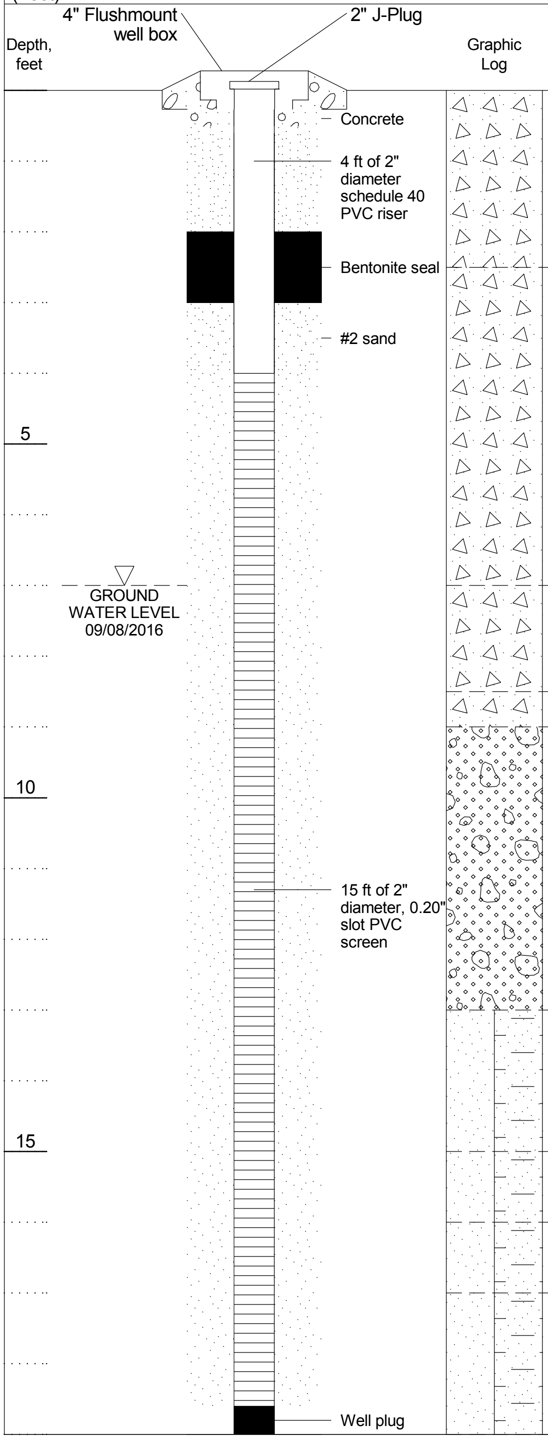
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-40**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **3-in. / Direct push**
BOREHOLE DIAMETER **3-inches**
DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**
SAMPLING METHOD **2" Macro-Core**
START-FINISH DATE **1/11/16-1/11/16**
CASING MAT./DIA. **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **2-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN /
GRAVEL PACK SIZES **Morie #2**



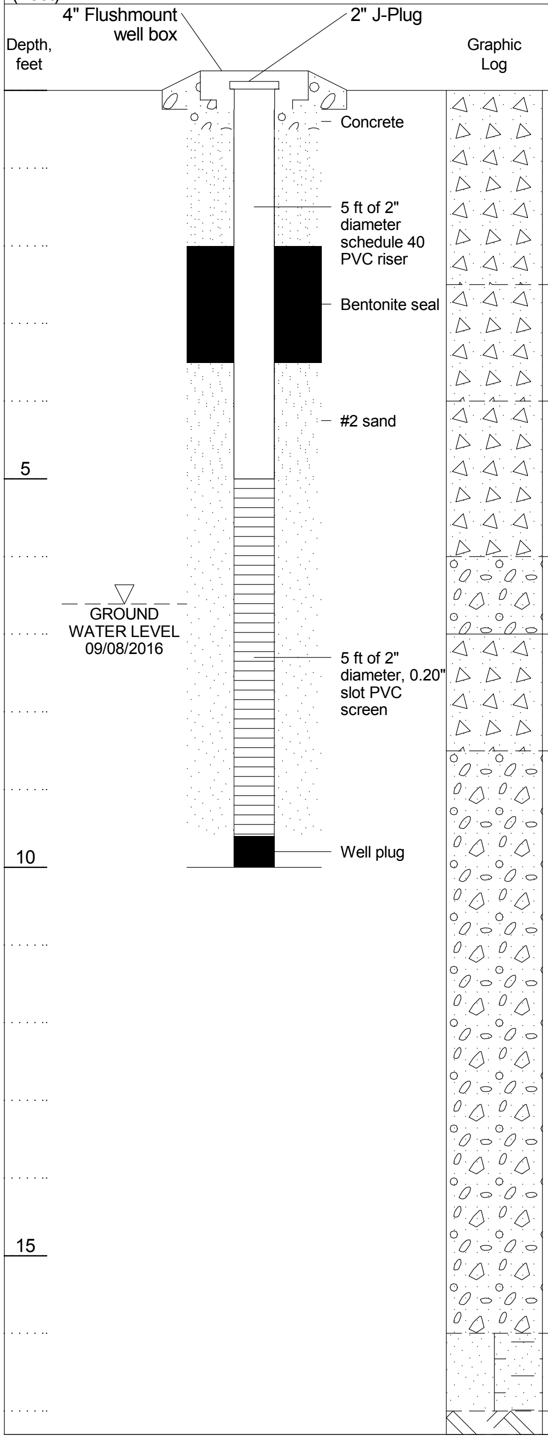
Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
RECYCLED CONCRETE AGGREGATE (FILL); dry.			2.5 ft recovery.
Brown, fine SAND, some Silt, trace brick (FILL); dry.			3 ft recovery.
Brown, fine to medium SAND, some coarse Gravel; trace silt (FILL); moist.			
Light brown, CONCRETE, some fine Gravel (FILL); moist.			
Dark brown, fine to coarse SAND, little medium to coarse Gravel, trace fine gravel; wet.			3.5 ft recovery.
Dark brown, fine SAND, some Silt; wet.			
Dark brown, fine SAND, some Silt, little fine to medium Gravel; wet.			4 ft recovery.
Dark brown, fine to medium SAND, some Silt and fine to medium Gravel; wet.			
Light brown, fine to medium SAND, some Silt and fine to medium Gravel; wet.			Bedrock refusal at 19 ft bls.

ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

WELL CONSTRUCTION LOG

WELL NO. **MW-41**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **3-in. / Air Rotary**
BOREHOLE DIAMETER **3-inches**
DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**
SAMPLING METHOD **2" Macro-Core**
START-FINISH DATE **1/12/16-1/12/16**
CASING MAT./DIA. **PVC / 2-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **5.0** ft DIA. **2-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN **/**
GRAVEL PACK SIZES **Morie #2**



Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
RECYCLED CONCRETE AGGREGATE (FILL); dry.			
Brown, fine to medium SAND, some coarse Gravel, little Silt (FILL); dry.			
Brown, fine SAND, some Silt, little crushed Cobble (FILL); moist.			
CONCRETE SLAB.			
Dark brown, fine to coarse SAND, some medium to coarse Gravel (FILL); wet.			Odor from 7 to 8.5 ft bls. Concrete refusal at 8.5 ft bls.
CONCRETE STRUCTURE.			Drilled through concrete with air rotary attachment.
Brown; fine to medium SAND, some Silt, trace fine gravel; wet.			End of boring at 17.3 ft bls.
Weathered BEDROCK; wet.			

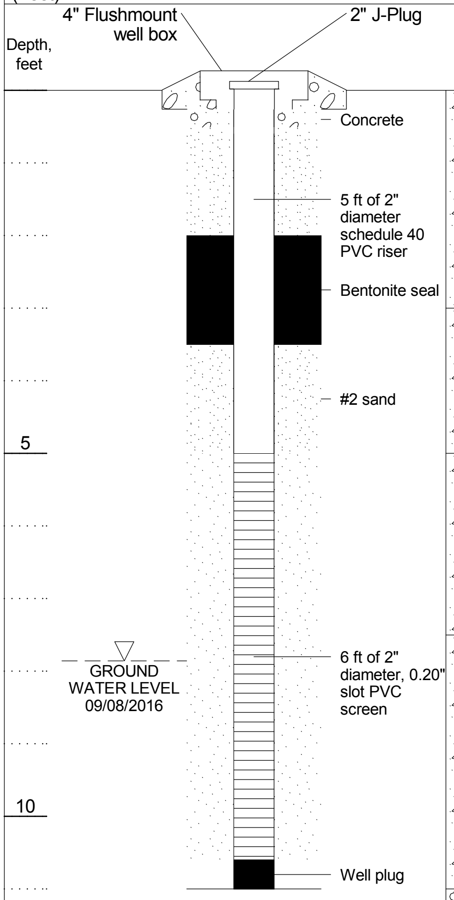
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-42**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **J. Duminuco**	LOGGED BY **R. Henke**			
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **3-in. / Air Rotary**	BOREHOLE DIAMETER **3-inches**	DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**	SAMPLING METHOD **2" Hand Auger**	START-FINISH DATE **1/12/16-1/12/16**
CASING MAT./DIA. **PVC / 2-inch**	SCREEN: TYPE **Slotted**	MAT. **PVC** TOTAL LENGTH **5.0** ft	DIA. **2-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GRAVEL PACK SIZES **Morie #2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		RECYCLED CONCRETE AGGREGATE (FILL); dry.			1.5 ft recovery.
		Light brown, fine to medium SAND, some fine Gravel, trace silt (FILL); dry.			
5		Brown, fine SAND, some Silt, little medium to coarse Sand (FILL); moist.			3.5 ft recovery.
		Brown, fine SAND, some Silt, little medium to coarse Sand (FILL); wet.			Odor from 7.5 ft bls to 11 ft bls.
10					1 ft recovery.
		CONCRETE STRUCTURE.			Concrete refusal at 11 ft bls. Drilled through concrete with air rotary attachment. Did not encounter soil beneath the concrete slab.
15					
					Bedrock encountered at 18.5 ft bls.
		BEDROCK.			

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

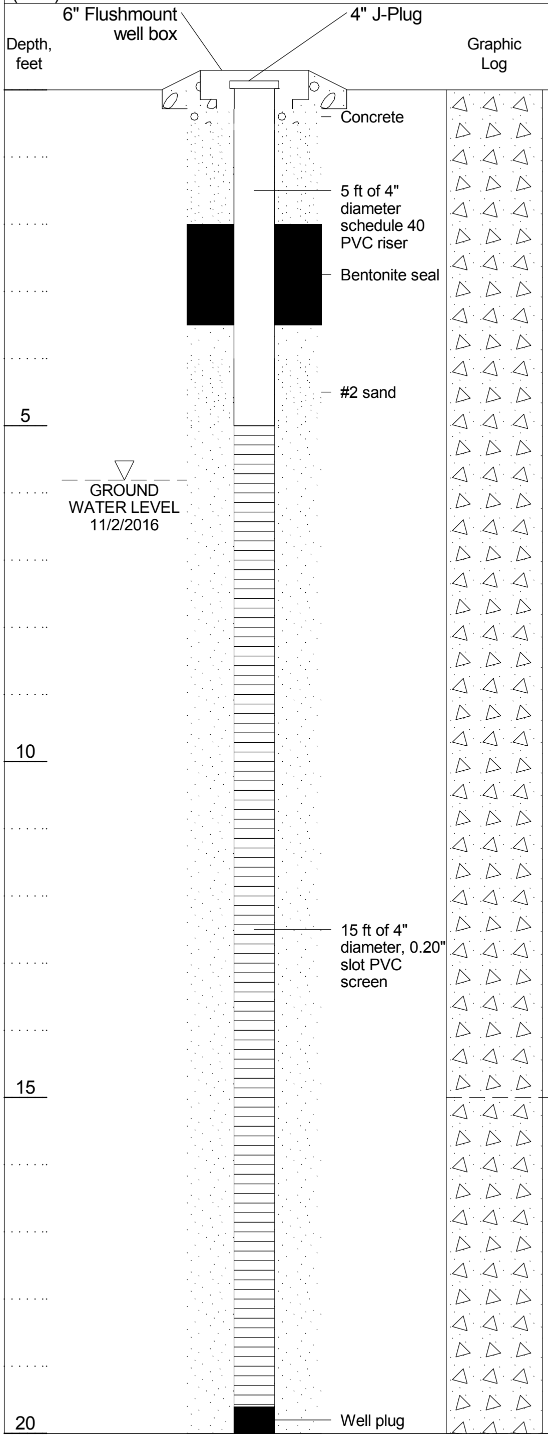
WELL NO. **MW-43**	NORTHING **211641.5**	EASTING **997254.5**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**
APPROVED BY **J. Duminuco**	LOGGED BY **R. Crockett**	
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**

DRILL BIT DIAMETER/TYPE **4-in. / Auger**	BOREHOLE DIAMETER **6-inches**	DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **10/13/16-10/13/16**

CASING MAT./DIA. **PVC / 4-inch**

SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**

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



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0	RECYCLED CONCRETE AGGREGATE (FILL).		0.4	2 ft recovery.
5			140.1	2 ft recovery.
10			654	2 ft recovery. Odor.
15	Dark brown, coarse SAND, some medium Sand, little Gravel, trace brick, concrete, fine sand and silt (FILL); wet.		371.1	1 ft recovery. Odor and staining.
20				End of boring at 20 ft bls.

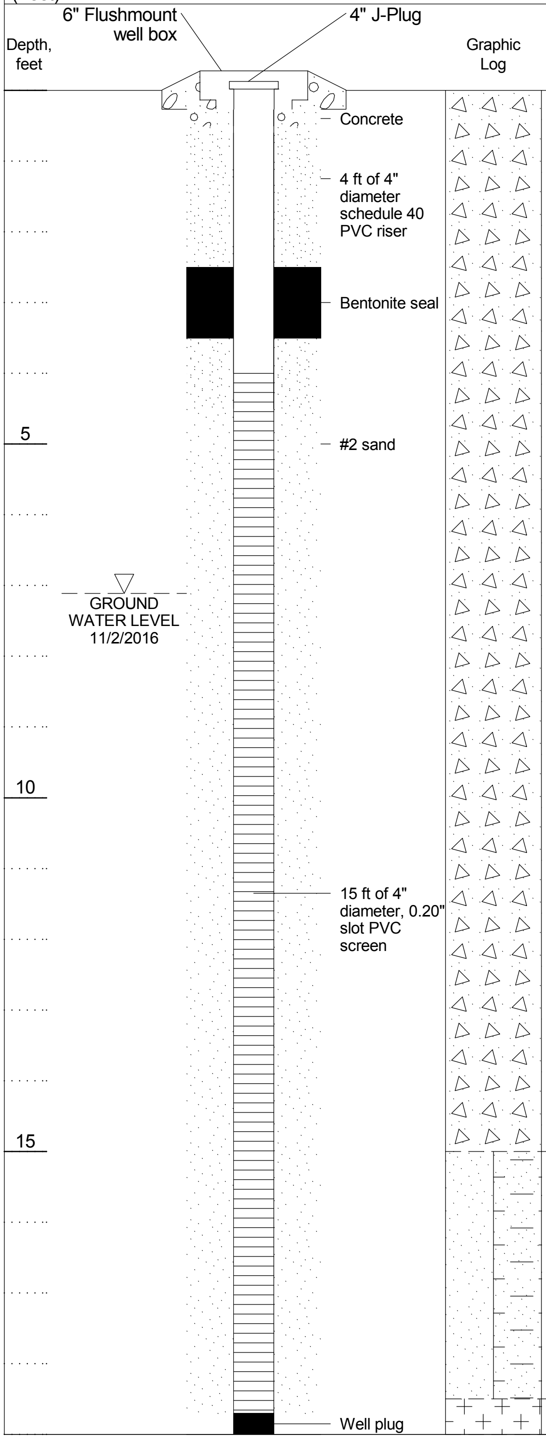
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-44**
NORTHING **211619.9**
EASTING **997203.6**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Crockett**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Auger**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**
SAMPLING METHOD **2" Macro-Core**
START-FINISH DATE **10/14/16-10/14/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN /
GRAVEL PACK SIZES **Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	RECYCLED CONCRETE AGGREGATE (FILL).		11.1	2 ft recovery.
5			377.1	2 ft recovery. Odor.
10			13.7	5 ft recovery.
			152.1	Odor.
15	Brown, fine SAND, some Silt, little medium Sand, trace coarse sand and gravel; wet.		176.9	2.5 ft recovery. Odor.
				Bedrock encountered at 18.5 ft.
	BEDROCK.			End of boring at 19 ft bls.

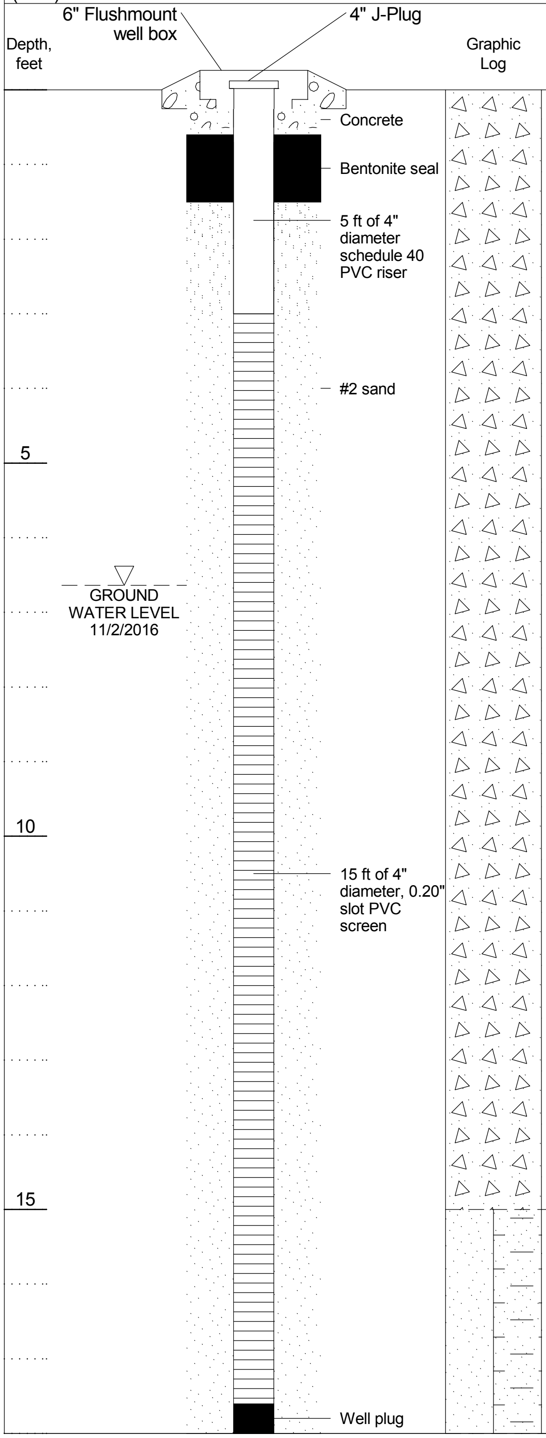
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-45**	NORTHING **211643.1**	EASTING **997219.7**		
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **J. Duminuco**	LOGGED BY **R. Crockett**			
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **4-in. / Auger**	BOREHOLE DIAMETER **6-inches**	DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **10/13/16-10/14/16**
CASING MAT./DIA. **PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **PVC** TOTAL LENGTH **14.0**ft	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GRAVEL PACK SIZES **Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0	RECYCLED CONCRETE AGGREGATE (FILL).		6.3	2.4 ft recovery. Odor.
5			437.7	2.0 ft recovery. Odor and staining.
10			108.4	1.9 ft recovery. Odor and staining.
15	Brown, fine SAND, some Silt, little medium Sand, trace coarse sand, gravel and weathered bedrock; wet.		116.3	2.2 ft recovery. Odor and staining. Bedrock at 18 ft bls.
				End of boring at 18 ft bls.

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

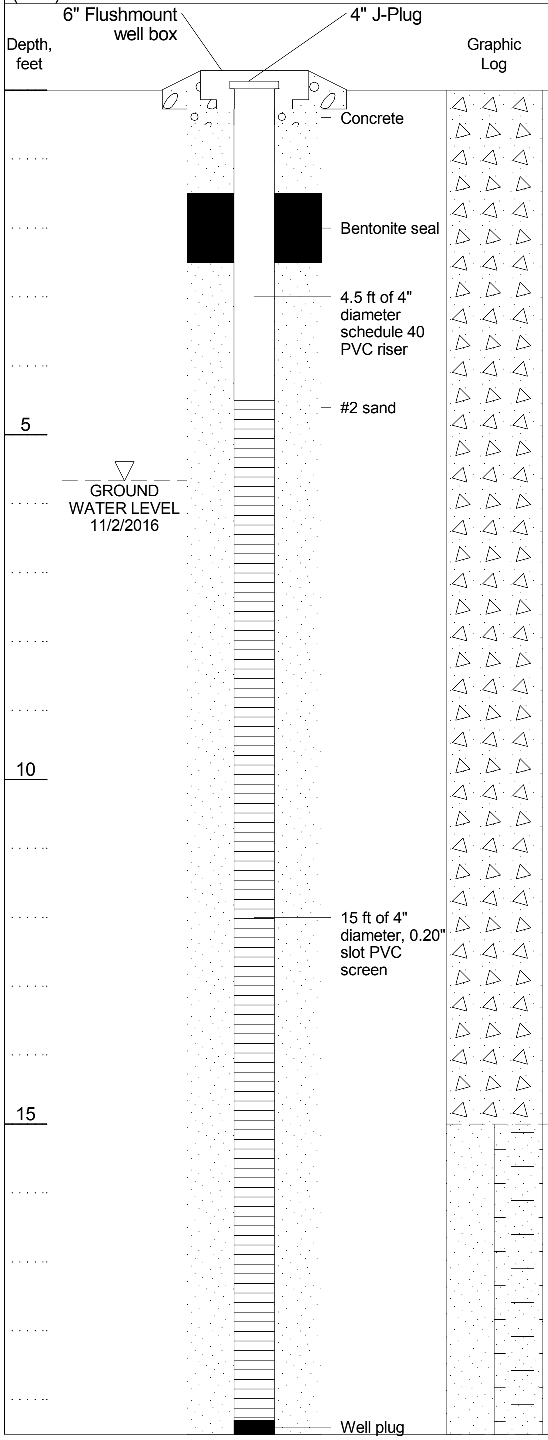
WELL NO. **MW-46**	NORTHING **211671.4**	EASTING **997236.6**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**
APPROVED BY **J. Duminuco**	LOGGED BY **R. Crockett**	
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**

DRILL BIT DIAMETER/TYPE **4-in. / Auger**	BOREHOLE DIAMETER **6-inches**	DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **10/13/16-10/13/16**

CASING MAT./DIA. **PVC / 4-inch**

SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**

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



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0	RECYCLED CONCRETE AGGREGATE (FILL).		26.5	1.1 ft recovery. Odor.
5			37.6	1.4 ft recovery. Odor.
10			36.8	2.5 ft recovery. Odor, staining and sheen.
15	Brown, fine SAND, some Silt, little medium Sand, trace coarse sand, gravel and bedrock; wet.		13.8	3.5 ft recovery. Bedrock at 19.5 ft bls.
				End of boring at 19.5 ft bls.

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

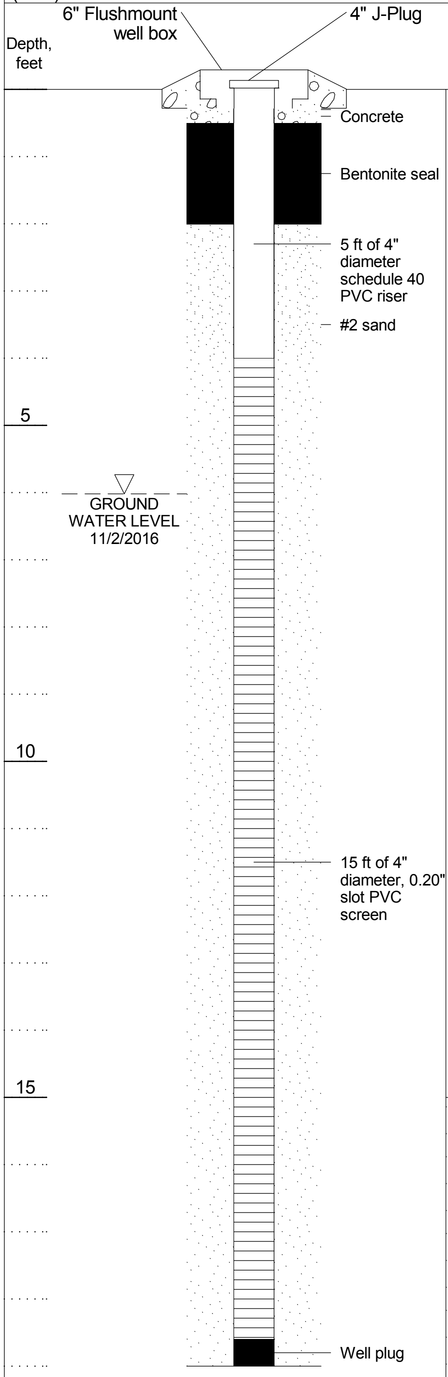
WELL NO. **MW-47**	NORTHING **211643.2**	EASTING **997181.2**		
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **J. Duminuco**	LOGGED BY **R. Crockett**			
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **4-in. / Auger**	BOREHOLE DIAMETER **6-inches**	DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**	SAMPLING METHOD **2" Macro-Core**	START-FINISH DATE **10/14/16-10/14/16**

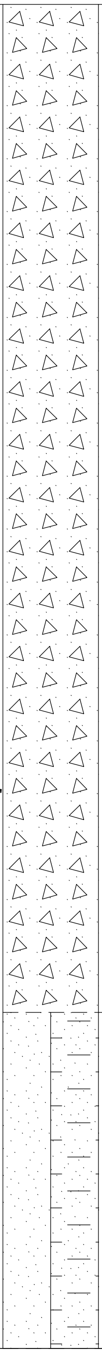
CASING MAT./DIA. **PVC / 4-inch**

SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**

ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN /

GRAVEL PACK SIZES **Morie #2**





Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0	RECYCLED CONCRETE AGGREGATE (FILL).		12.3	2 ft recovery.
5			4.9	2 ft recovery. Odor.
10			85.5	2 ft recovery. Odor.
15	Brown, fine SAND, some Silt, little medium Sand, trace coarse sand and gravel; wet.		9.2	3 ft recovery. Odor and staining.
20				End of boring at 20 ft bls.

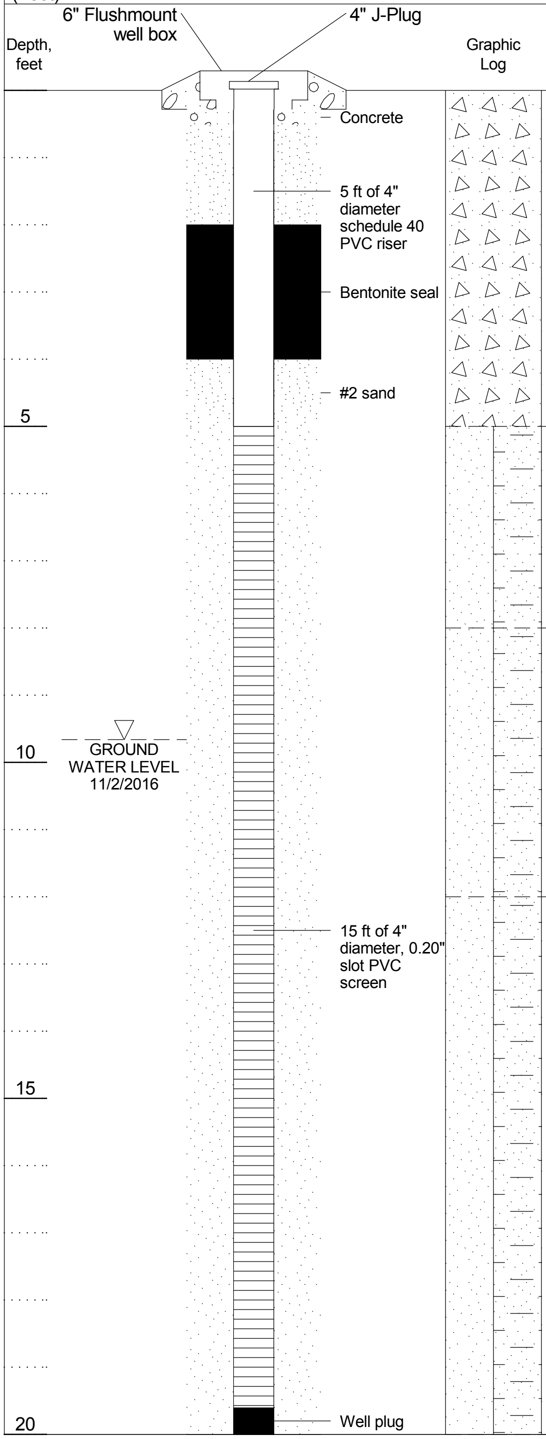
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **MW-48**
NORTHING **211551.3**
EASTING **997297**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue**
Long Island City, New York
APPROVED BY **J. Duminuco**
LOGGED BY **R. Crockett**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Auger**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **7822DT / Geoprobe**
SAMPLING METHOD **2" Macro-Core**
START-FINISH DATE **10/17/16-10/17/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **15.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN **/**
GRAVEL PACK SIZES **Morie #2**



Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
RECYCLED CONCRETE AGGREGATE (FILL).		12.3	1.5 ft recovery.
		1.2	2 ft recovery.
Brown, fine SAND, some Silt, little medium Sand, trace coarse sand and gravel; moist.			
Brown, fine SAND, some Silt, little medium Sand, trace coarse and and gravel; wet.		1.4	3 ft recovery.
Grey to Brown, fine SAND, some Silt, little medium Sand, trace coarse sand and gravel; wet.		146.6	3.5 ft recovery. Odor and staining.
		137.7	4 ft recovery. Odor and staining.
			End of boring at 20 ft bls.

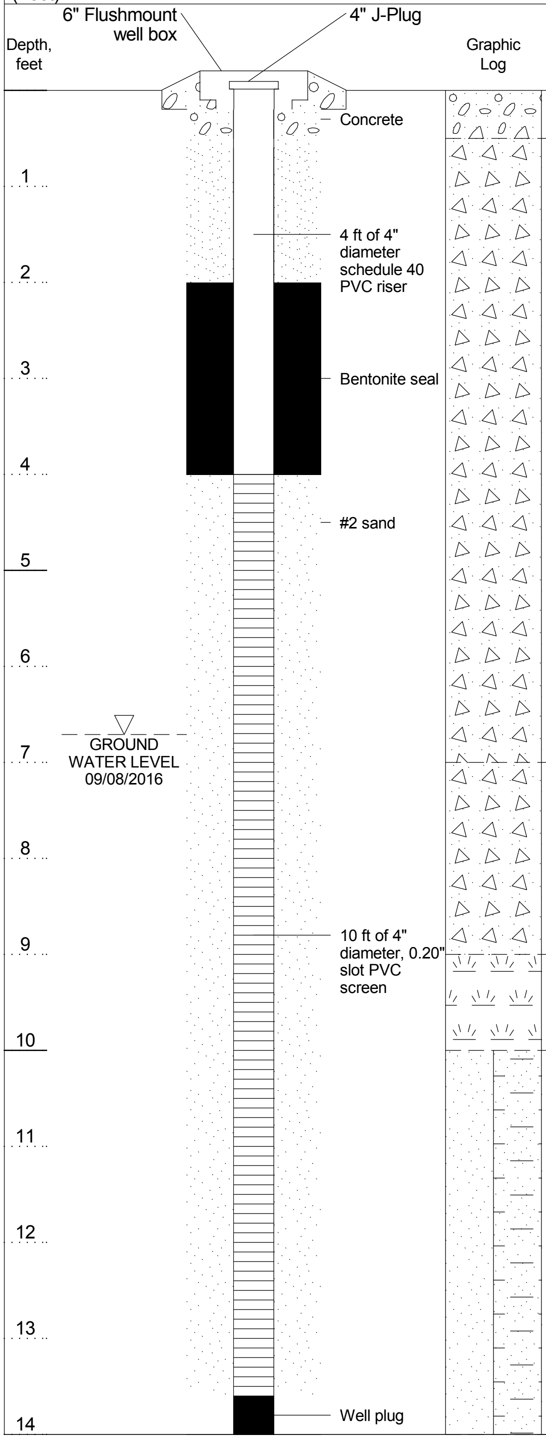
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **RW-1**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **ADT / German T.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Sonic**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **CRS-17-C / Sonic**
SAMPLING METHOD **Sonic**
START-FINISH DATE **12/14/16-12/14/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN **/**
GRAVEL PACK SIZES **Morie #2**



Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
CONCRETE.			
Dark brown, fine to medium SAND, some Silt and Gravel, little coarse Sand, trace Brick (FILL); moist.			Recovery well installed into area of known lithology with plugged auger. No samples collected.
Dark brown, fine to medium SAND, some Silt and Gravel, little coarse Sand, trace Brick (FILL); wet.			
Dark brown, PEAT, some silt; wet.			
Dark brown, fine SAND, some Silt, little Peat, trace medium to coarse sand; wet.			

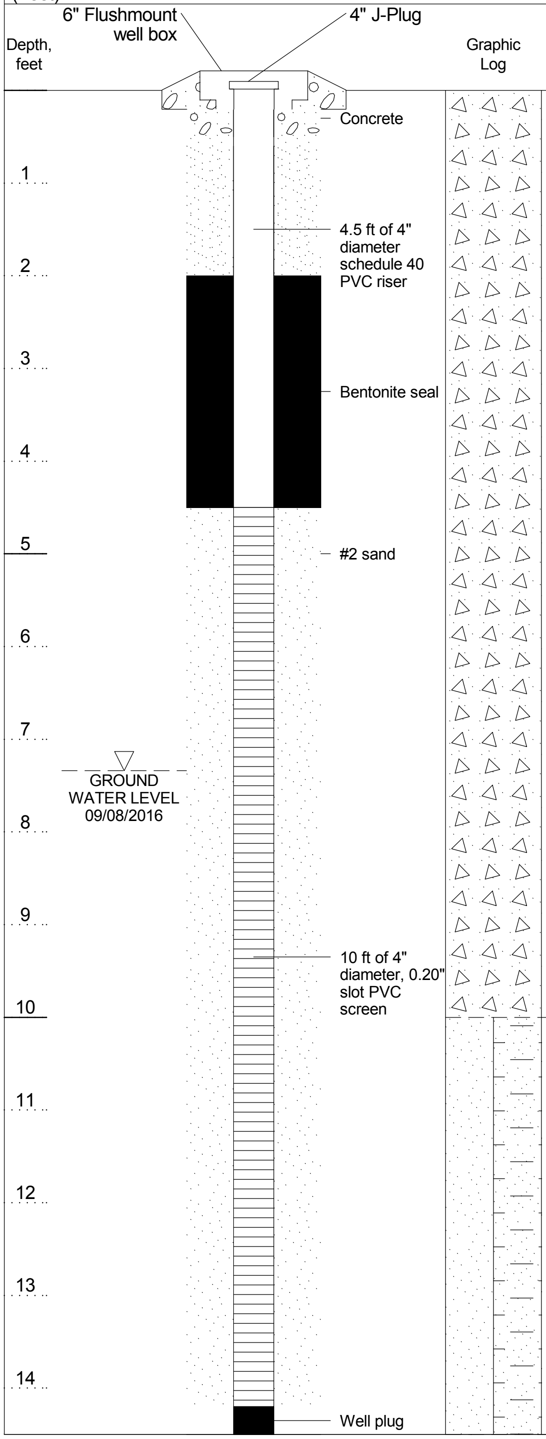
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **RW-2**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **ADT / German T.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Sonic**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **CRS-17-C / Sonic**
SAMPLING METHOD **Sonic**
START-FINISH DATE **12/14/16-12/14/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN **/**
GRAVEL PACK SIZES **Morie #2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0–10	Dark brown, fine to medium SAND, some Silt and Gravel, little coarse Sand, trace Brick (FILL); moist.			Recovery well installed into area of known lithology with plugged auger. No samples collected.
10–14.5	Dark brown, fine SAND, some Silt, trace medium to coarse sand; wet.			

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

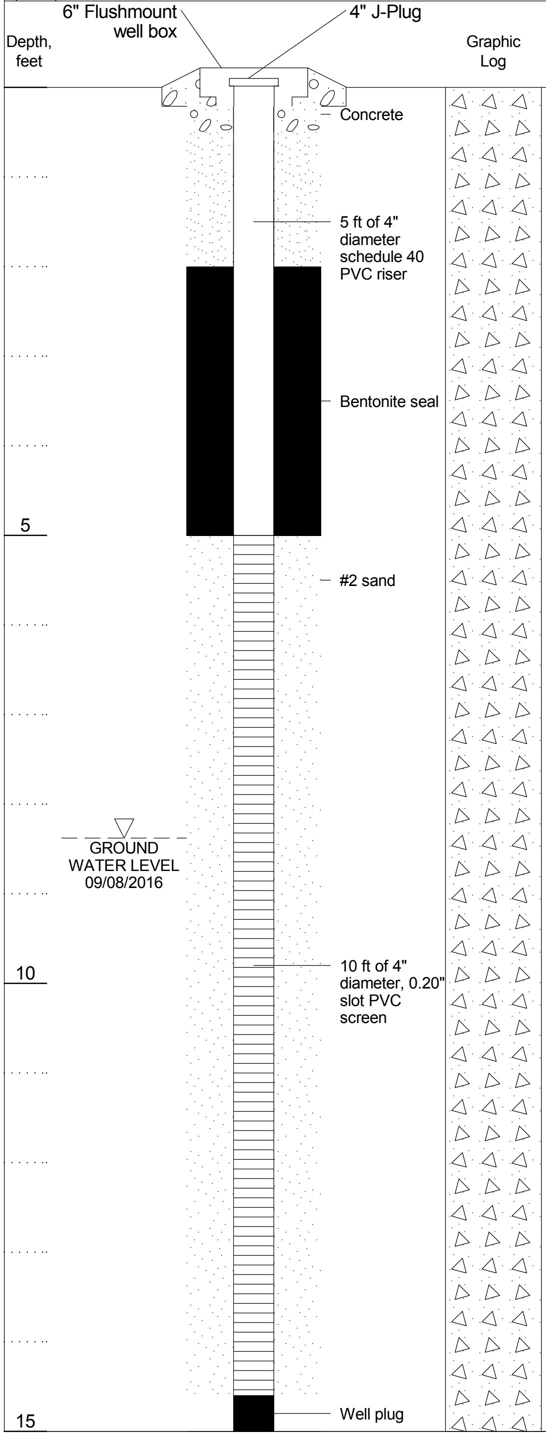
209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **RW-3**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Auger**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **7820DT / Geoprobe**
SAMPLING METHOD **Not used.**
START-FINISH DATE **2/11/16-2/11/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN **/**
GRAVEL PACK SIZES **Morie #2**

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0		RECYCLED CONCRETE AGGREGATE (FILL).			Recovery well installed into area of known lithology with plugged auger. No samples collected.



BORING/FEET 2051.000Y002.GPJ ROUX.GDT 11/3/16

ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

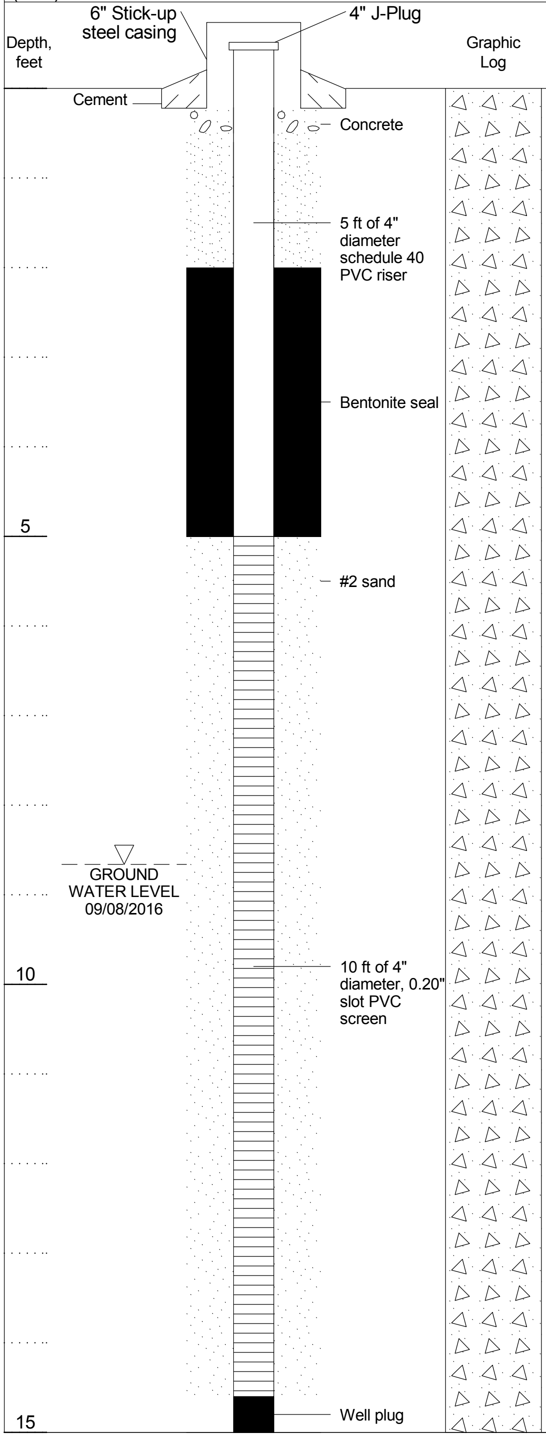
209 Shafter Street
Islandia, NY 11749
Telephone: (631) 232-2600
Fax: (631) 232-9898

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **RW-4**
NORTHING **Not Measured**
EASTING **Not Measured**
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**
LOCATION **5-49 46th Avenue Long Island City, New York**
APPROVED BY **J. Duminuco**
LOGGED BY **R. Henke**
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**
GEOGRAPHIC AREA **Queens County**
DRILL BIT DIAMETER/TYPE **4-in. / Auger**
BOREHOLE DIAMETER **6-inches**
DRILLING EQUIPMENT/METHOD **7820DT / Geoprobe**
SAMPLING METHOD **Not used.**
START-FINISH DATE **2/11/16-2/12/16**
CASING MAT./DIA. **PVC / 4-inch**
SCREEN: TYPE **Slotted** MAT. **PVC** TOTAL LENGTH **10.0**ft DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (Feet) GROUND SURFACE TOP OF WELL CASING TOP & BOTTOM SCREEN /
GRAVEL PACK SIZES **Morie #2**

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
0		RECYCLED CONCRETE AGGREGATE (FILL).			Recovery well installed into area of known lithology with plugged auger. No samples collected.



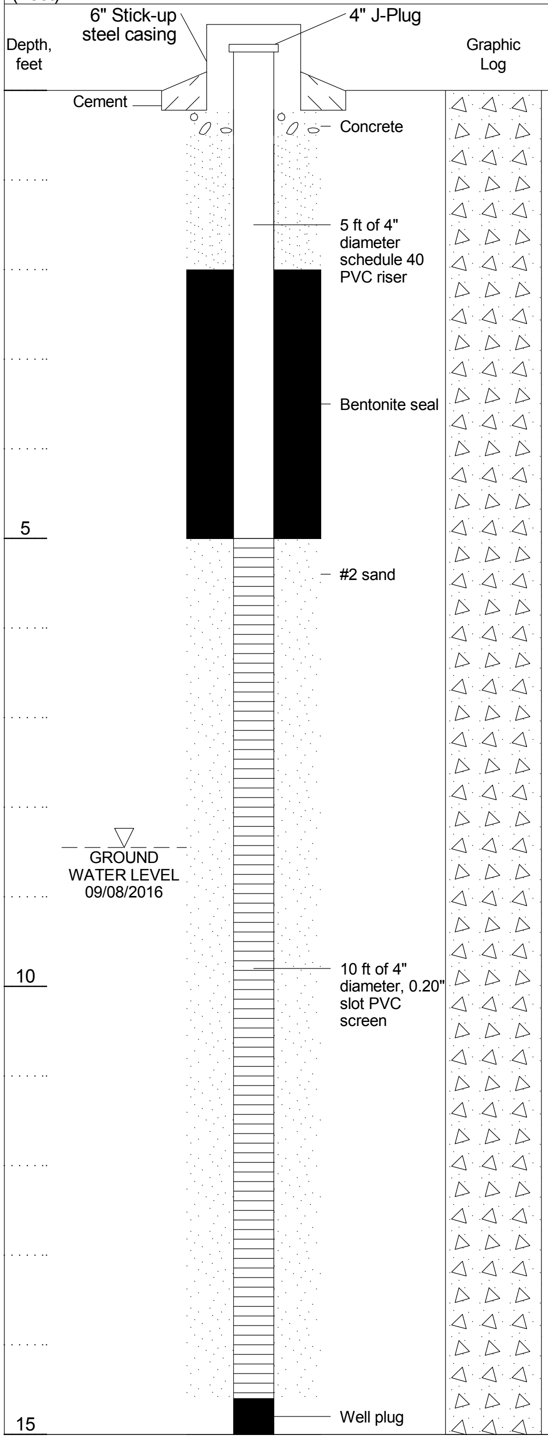
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

Page **1** of **1**

WELL CONSTRUCTION LOG

WELL NO. **RW-5**	NORTHING **Not Measured**	EASTING **Not Measured**		
PROJECT NO./NAME **2051.0001Y002 / Former Paragon Paint & Varnish**		LOCATION **5-49 46th Avenue** **Long Island City, New York**		
APPROVED BY **J. Duminuco**	LOGGED BY **R. Henke**			
DRILLING CONTRACTOR/DRILLER **Zebra / Evan M.**		GEOGRAPHIC AREA **Queens County**		
DRILL BIT DIAMETER/TYPE **4-in. / Auger**	BOREHOLE DIAMETER **6-inches**	DRILLING EQUIPMENT/METHOD **7820DT / Geoprobe**	SAMPLING METHOD **Not used.**	START-FINISH DATE **2/11/16-2/12/16**
CASING MAT./DIA. **PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **PVC** TOTAL LENGTH **9.0** ft	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (Feet)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GRAVEL PACK SIZES **Morie #2**

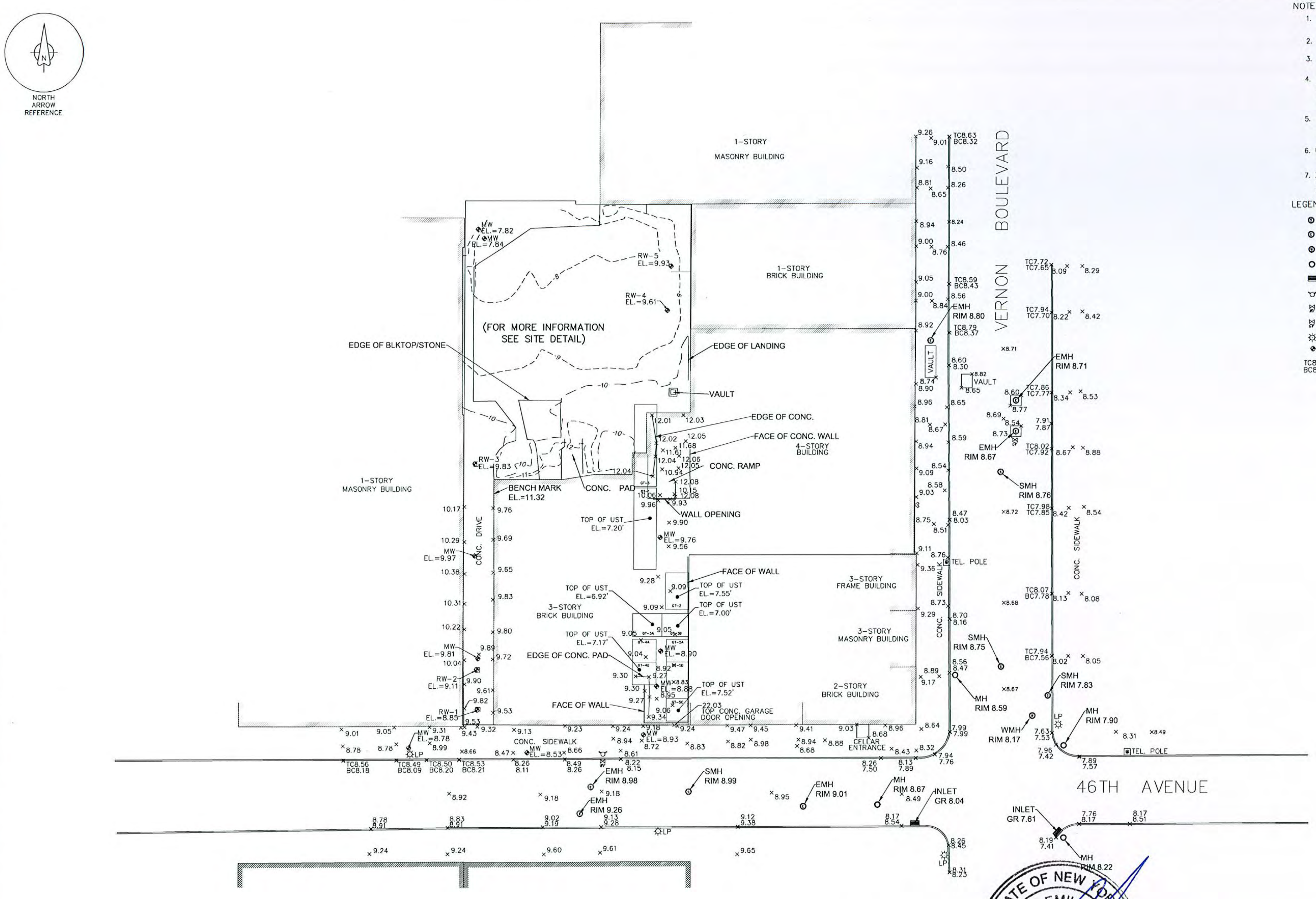


Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
RECYCLED CONCRETE AGGREGATE (FILL).			Recovery well installed into area of known lithology with plugged auger. No samples collected.

Site Management Plan
Former Paragon Paint Manufacturing Facility
5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard
Long Island City, New York - Site No. C241108

APPENDIX E

As-Built Drawings



NOTES:

1. HORIZONTAL CONTROL IS IN LOCAL SYSTEM. VERTICAL SYSTEM IS NAVD88.
2. CONTOUR INTERVAL = 1 FOOT
3. FIELD SURVEY CONDUCTED ON 2/4/16, 3/17/16, 3/28/16, AND 4/08/16.
4. VOLUMES OF REUSE SOIL FROM EACH AREA ARE PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
5. BOUNDARIES OF SOIL REUSE AREAS ARE PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
6. UST TANK LOCATIONS ARE PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
7. ZERO BENCHMARK AT EL. 8.35' USED IN COURTYARD LOCATED ON SHEET PILING BY SCE ENVIRONMENTAL GROUP, INC.

LEGEND:

ⓢ	– SEWER MANHOLE
ⓔ	– ELECTRICAL MANHOLE
ⓦ	– WATER MANHOLE
○	– UNKNOWN MANHOLE
▬	– CATCH BASIN
♉	– FIRE HYDRANT
⋈	– WATER VALVE
⋈	– GAS VALVE
☼LP	– LIGHT POLE
●MW	– MONITORING WELL (NOT THE CASING, NOT AT GRADE)
TC8.63	– TOP OF CURB ELEVATION
BC8.32	– BOTTOM OF CURB ELEVATION

Rev. No.	Date	Revision
3	6/8/16	REVISED PER CLIENTS 6/7/16 COMMENTS
2	5/24/16	REVISED PER CLIENTS 5/20/16 COMMENTS
1	5/20/16	REVISED PER CLIENTS 5/18/16 COMMENTS

PAUL J. EMILIUS JR.
50203

Paul J. Emilius Jr.
Professional Land Surveyor
N.Y. License No. 050203-1

0 20 40 60
(IN FEET)
1 inch = 20 ft.

Layout Inc.
PROFESSIONAL LAND SURVEYORS · LASER SCANNING
CONSTRUCTION SURVEYING SPECIALISTS
N.Y. Certificate of Authorization #3542768
24 Kanouse Road
Newfoundland, N.J. 07435
Ph: 973-249-0900 Fax: 973-838-6433

OVERALL FINAL SURVEY

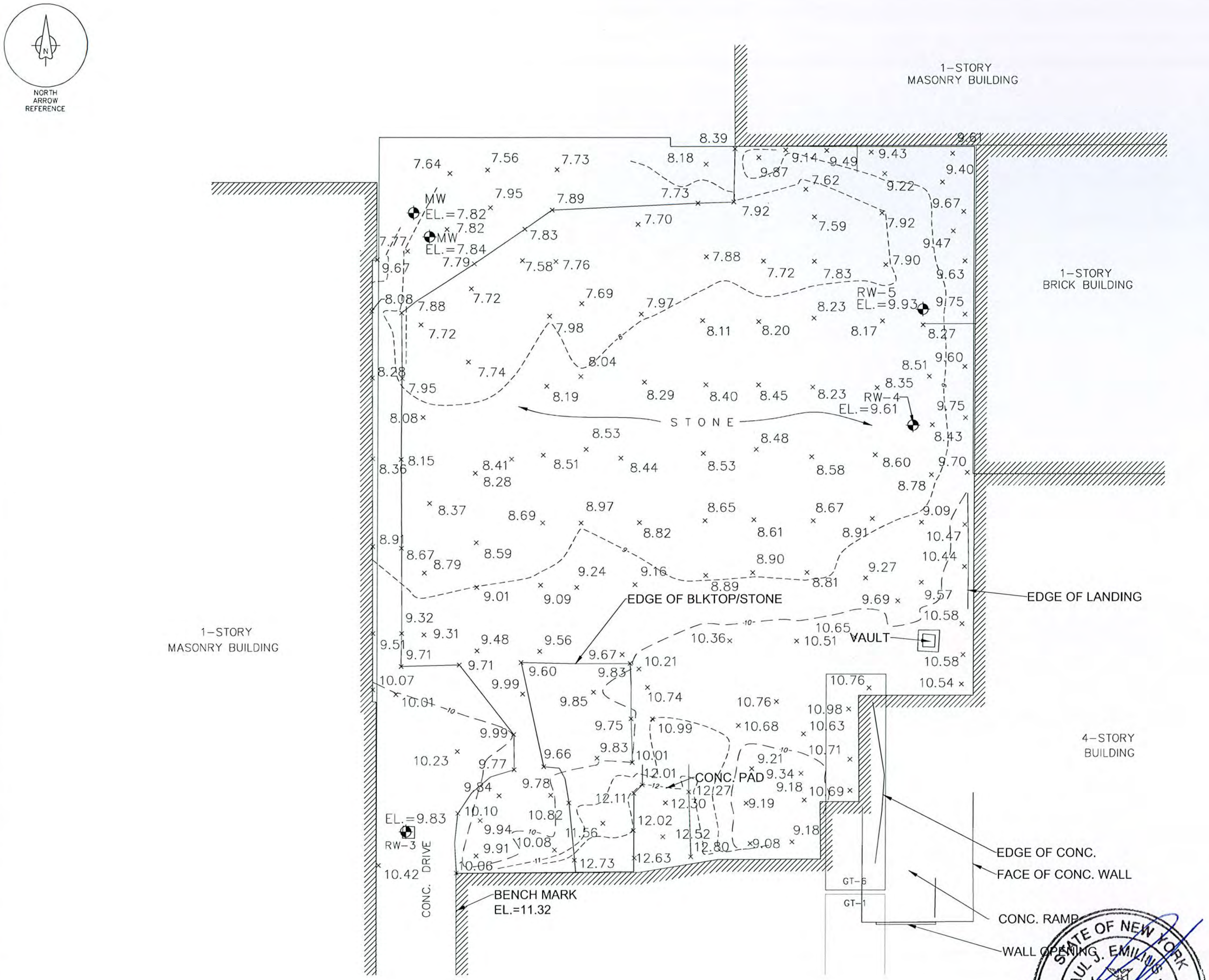
Located At:

4540 VERNON BLVD.
LONG ISLAND CITY, NY

Prepared For:

SCE Environmental Group, Inc.
1380 Mt. Cobb Road
Lake Ariel, PA 18436

Drawn By:	CD
Checked:	BMD
Scale:	1" = 20'
Date:	5/18/16
Proj. No.:	3702
Page:	1 of 1



NOTES:

1. HORIZONTAL CONTROL IS IN LOCAL SYSTEM. VERTICAL SYSTEM IS NAVD88
2. CONTOUR INTERVAL = 1 FOOT
3. FIELD SURVEY CONDUCTED ON 4/08/16.
4. ELEVATIONS OF BOTTOM OF SOIL SAMPLES IS PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
5. VOLUMES OF REUSE SOIL FROM EACH AREA ARE PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
6. BOUNDARIES OF SOIL REUSE AREAS ARE PER CLIENT CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
7. UST TANK LOCATIONS ARE PER CLIENT INFORMATION. NOT LOCATED BY LAYOUT INC.
8. ZERO BENCHMARK AT EL. 8.35' USED IN COURTYARD LOCATED ON SHEET PILING BY SCE ENVIRONMENTAL GROUP, INC.

LEGEND:

Ⓢ – SEWER MANHOLE
Ⓔ – ELECTRICAL MANHOLE
◉ – WATER MANHOLE
○ – UNKNOWN MANHOLE
▬ – CATCH BASIN
– FIRE HYDRANT
⋈ – WATER VALVE
⋈ – GAS VALVE
☼LP – LIGHT POLE
MW – MONITORING WELL (NOT THE CASING, NOT AT GRADE)
TC8.63 – TOP OF CURB ELEVATION
BC8.32 – BOTTOM OF CURB ELEVATION
○ SC-05-NW-B-15 BOT EXCAV=-3.67' – BOTTOM OF SOIL SAMPLE EXCAV. (PER CLIENT)

Rev. No.	Date	Revision
3	6/8/16	REVISED PER CLIENTS 6/7/16 COMMENTS
2	5/24/16	REVISED PER CLIENTS 5/20/16 COMMENTS
1	5/20/16	REVISED PER CLIENTS 5/18/16 COMMENTS

50203
PAUL J. EMILIUS JR.

Paul J. Emilius Jr.
Professional Land Surveyor
N.Y. License No. 050203-1

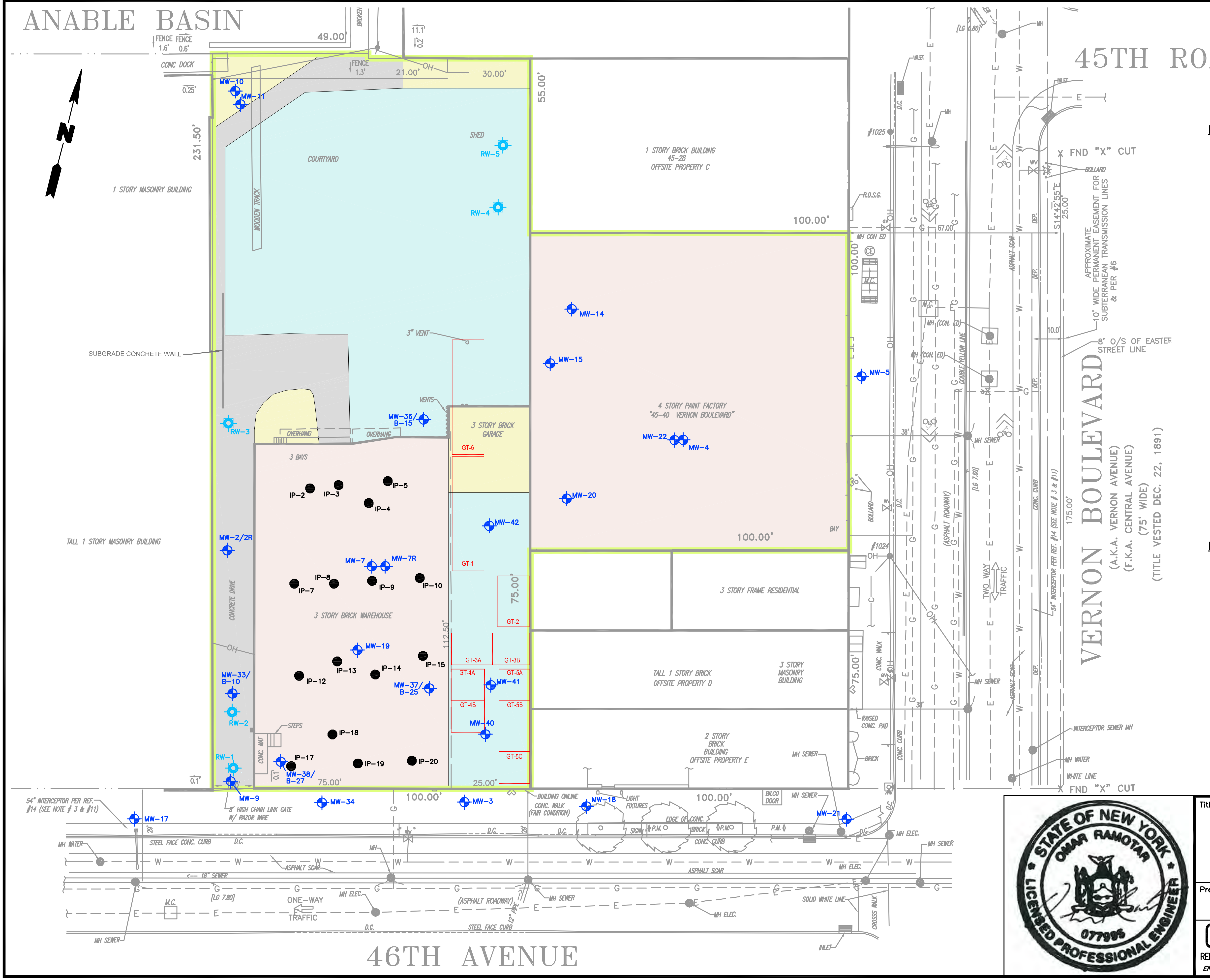
0 8 16 24
(IN FEET)
1 inch = 8 ft.

Layout Inc.
PROFESSIONAL LAND SURVEYORS · LASER SCANNING
CONSTRUCTION SURVEYING SPECIALISTS
N.Y. Certificate of Authorization #3542768
24 Kanouse Road
Newfoundland, N.J. 07435
Ph: 973-249-0900 Fax: 973-838-6433

SITE DETAIL FINAL SURVEY
Located At:
4540 VERNON BLVD.
LONG ISLAND CITY, NY

Prepared For:
SCE Environmental Group, Inc.
1380 Mt. Cobb Road
Lake Ariel, PA 18436

Drawn By:	CD
Checked:	BMD
Scale:	1" = 8'
Date:	5/18/16
Proj. No.:	3702
Page:	1 of 1



LEGEND

MW-5	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
▬	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
▨	INSTALLED ASPHALT CAP
▨	EXISTING CONCRETE PAVEMENT
▨	INSTALLED RECYCLED CONCRETE AGGREGATE (MIN. 2 FT)
▨	EXISTING BUILDING SLAB

NOTE

REFER TO AS-BUILT DRAWINGS FOR ELEVATION INFORMATION OF INSTALLED PORTIONS OF COVER SYSTEM.

OMAR RAMOTAR
077995

Title:

ENGINEERING CONTROL LOCATION - COMPOSITE COVER SYSTEM

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

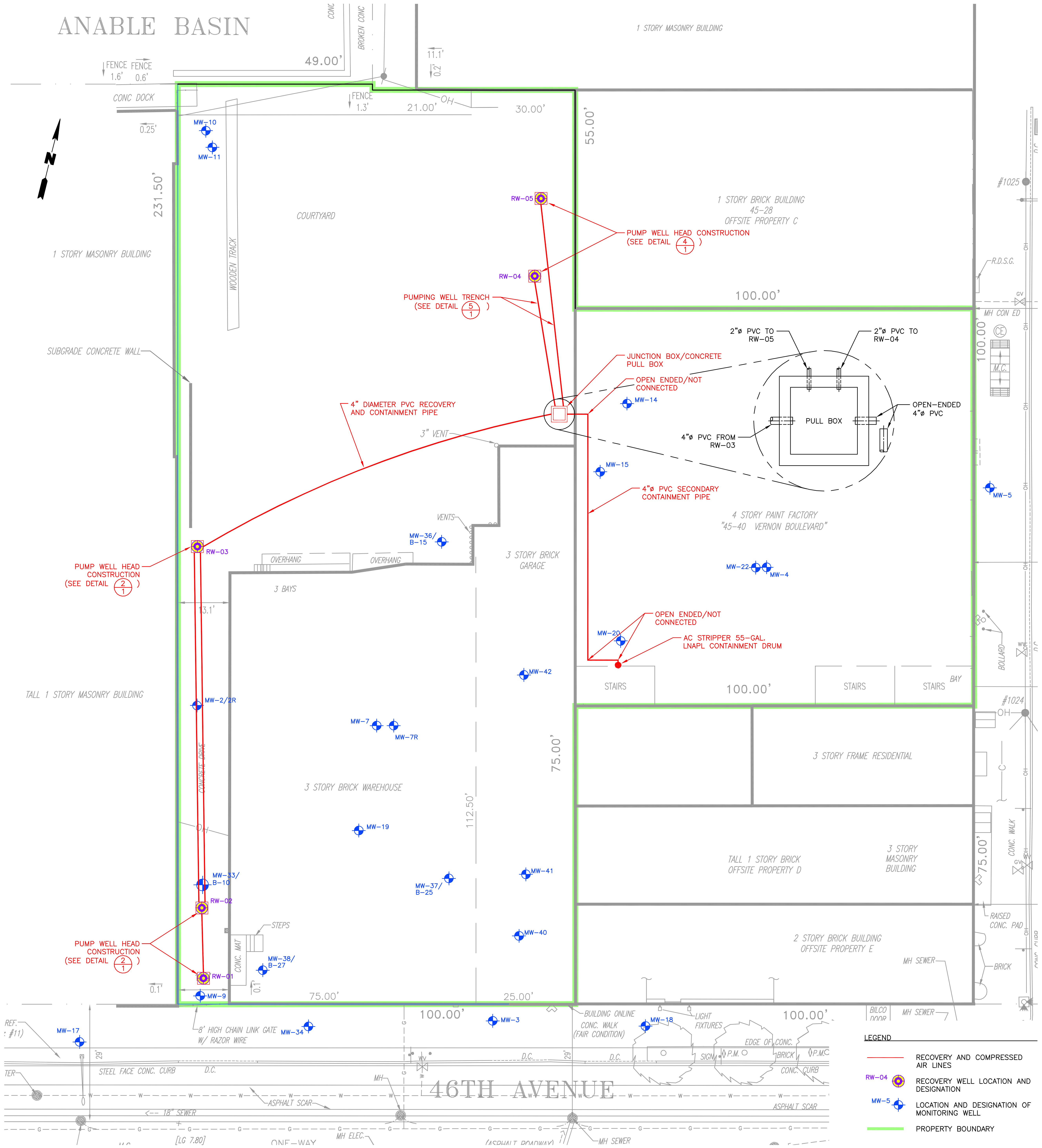
Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 19SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	3
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.01.DWG		

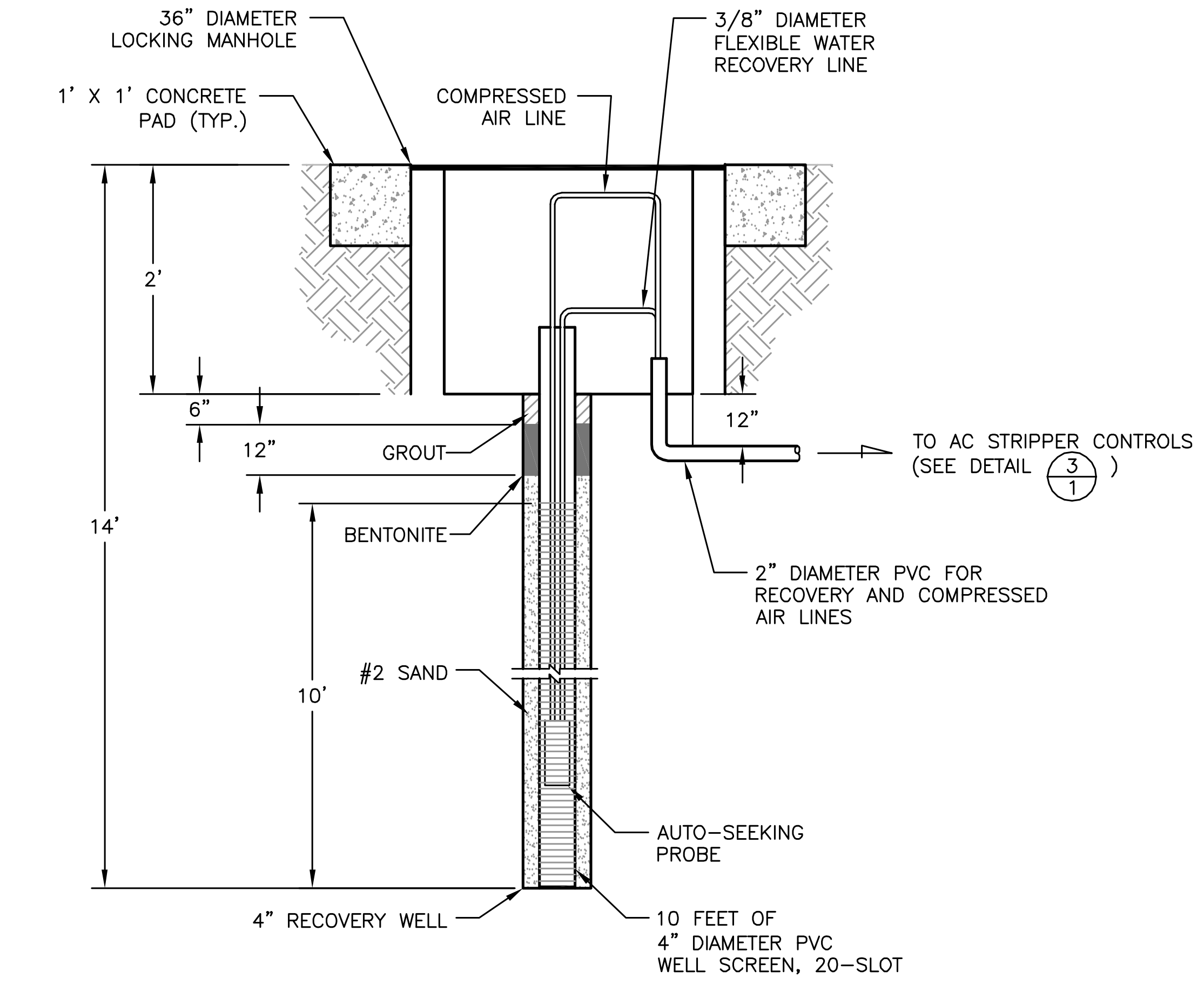
V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.01.DWG



15' 0 15'

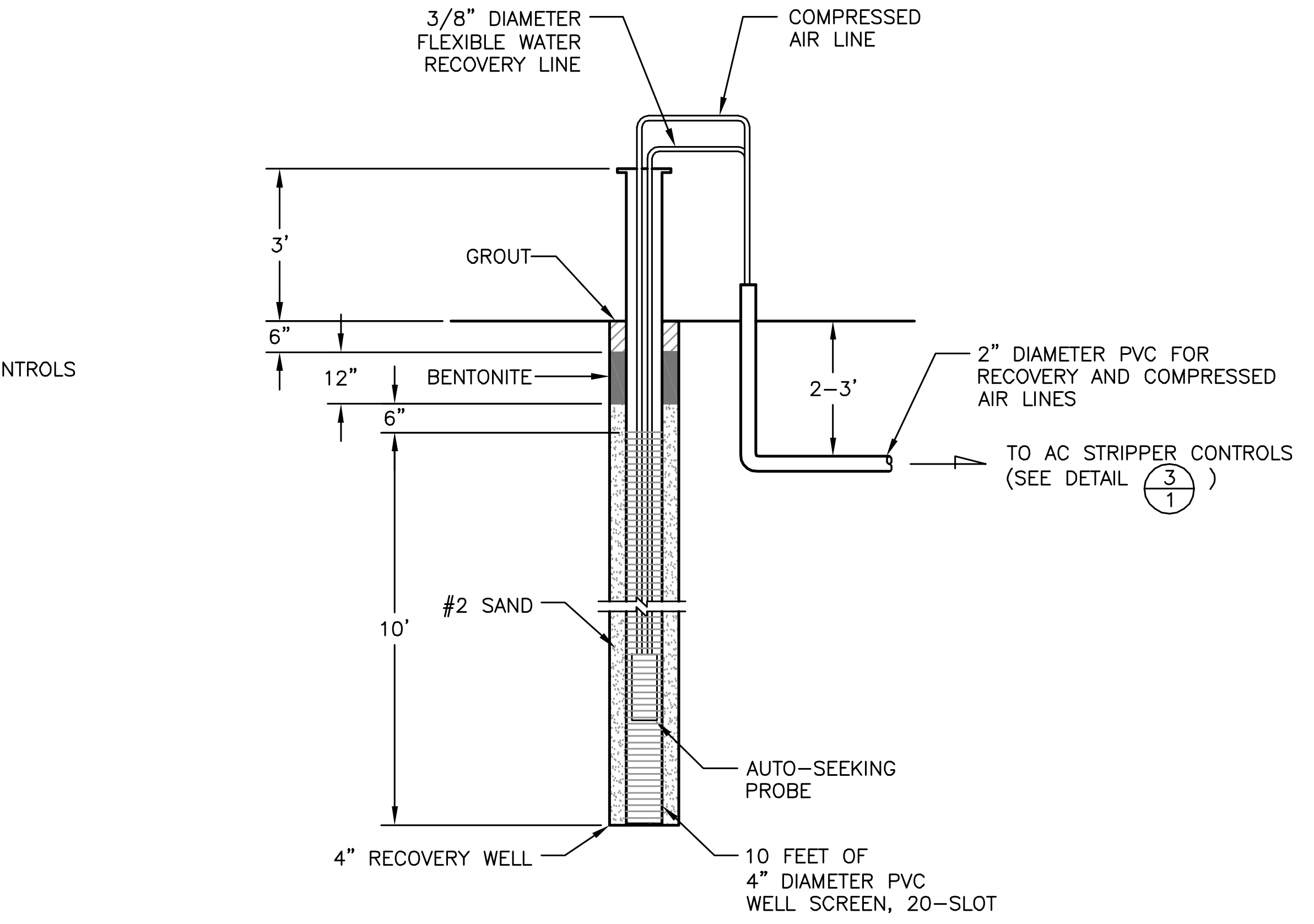
1/1 REMEDIAL SYSTEM-PLAN VIEW

SCALE: 1" = 15'



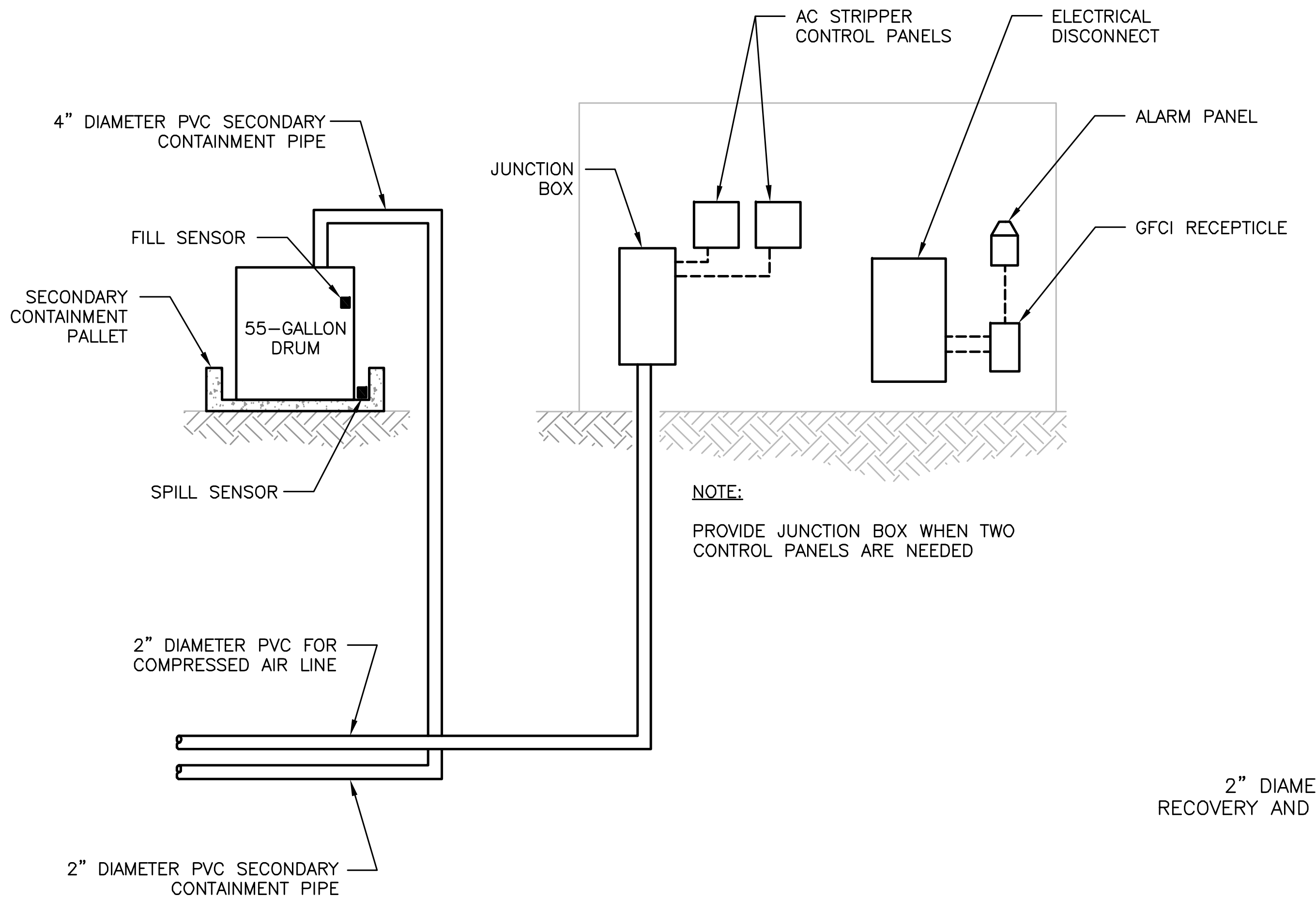
2/1 TYPICAL FLUSH MOUNT RECOVERY WELL CONSTRUCTION

NOT TO SCALE



4/1 TYPICAL ABOVE GRADE RECOVERY WELL CONSTRUCTION

NOT TO SCALE

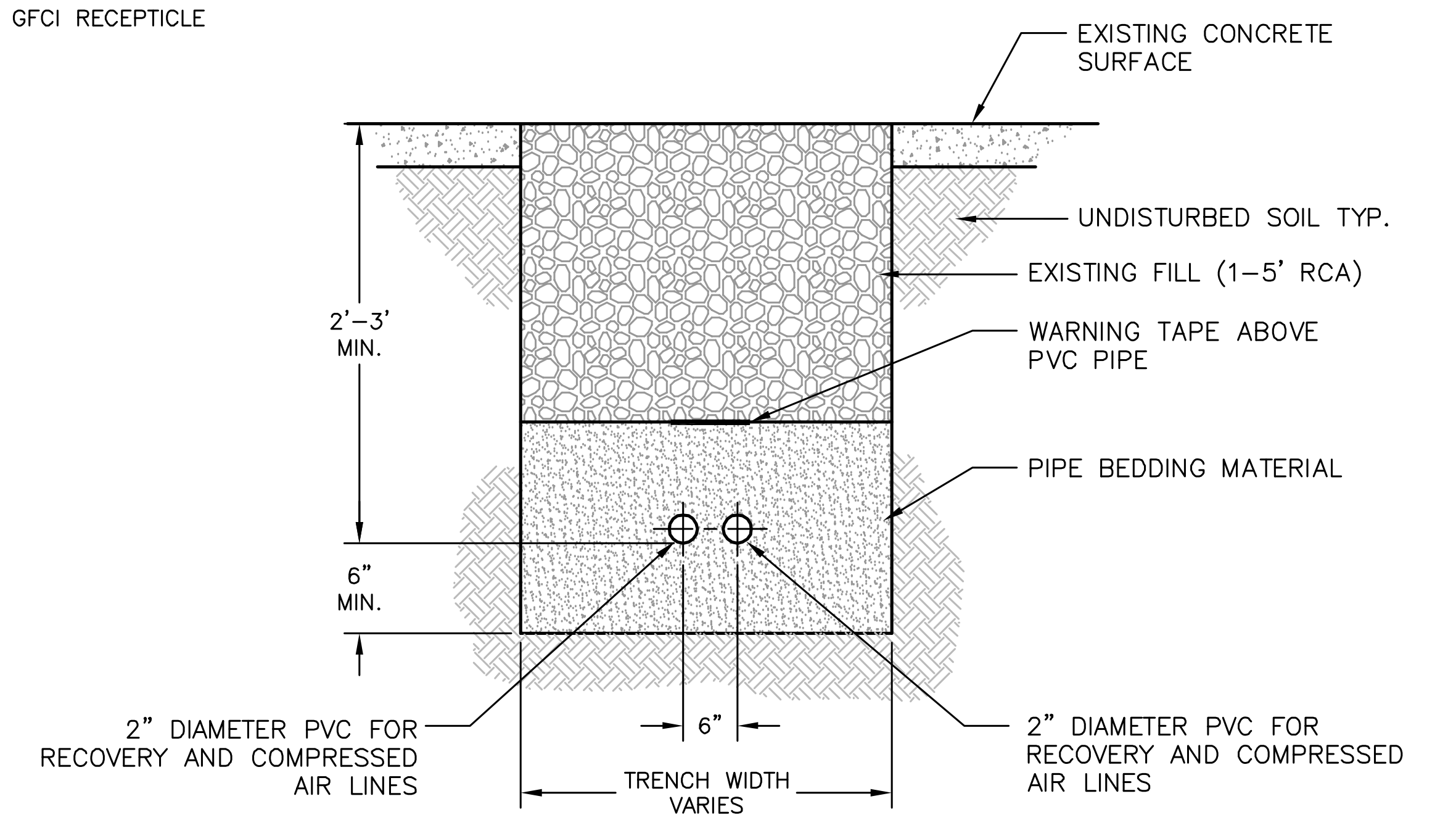


NOTE:

PROVIDE JUNCTION BOX WHEN TWO CONTROL PANELS ARE NEEDED

3/1 TYPICAL AC SIPPER CONTROLS

NOT TO SCALE



5/1 TRENCH DETAIL

NOT TO SCALE

STATE OF NEW YORK
OMAR RAMOTAR
077995
LICENSED PROFESSIONAL ENGINEER

Title: **ENGINEERING CONTROL LOCATION -**
"LNAPL RECOVERY SYSTEM
WITH DESIGN DETAILS"
SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 19SEP16	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	**4**
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204R.02.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.02.DWG

APPENDIX F

Health and Safety Plan and
Site-Specific Community Air Monitoring Plan

February 7, 2013

SITE HEALTH AND SAFETY PLAN

Former Paragon Paint and Varnish Company Manufacturing Facility
BCP Site Number C241108
5-43 to 5-49 46th Avenue and
45-38 Vernon Boulevard to
45-40 Vernon Boulevard
Long Island City, New York

Prepared for

VERNON 4540 REALTY, LLC
45 Carleon Avenue
Larchmont, New York 10538

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

ROUX

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

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued)

TABLE OF CONTENTS

(Continued)

TABLES

FIGURES

APPENDICES

APPROVALS

By their signature, the undersigned certify that this Health and Safety Plan (HASP) is approved and will be utilized at the project site located at 5-43 to 5-49 46th Avenue and 45-35 to 45-40 Vernon Boulevard in Long Island City, New York.

Joseph W. Gentile February 7, 2013
Joseph Gentile Date
Corporate Health and Safety Manager
Roux Associates, Inc.

R Maxwell February 7, 2013
Richard Maxwell Date
Site Health and Safety Officer
Roux Associates, Inc.

Joseph Dum February 7, 2013
Joseph D. Duminuco Date
Project Principal/
Vice President
Roux Associates, Inc.

1.0 INTRODUCTION

This Site-specific health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) and Roux Associates, Inc. (Roux Associates) Standard Operating Procedures (SOPs). It addresses all activities to be performed during the implementation of Remedial Investigation (RI) activities, Interim Remedial Measures (IRM), and Remedial Actions (RA) at the property identified as the former Paragon Paint manufacturing facility and located at 5-43 to 5-49 46th Avenue and 45-35 to 45-40 Vernon Boulevard in Long Island City, New York (Site) (Figure 1). The HASP will be implemented by the designated Site Health and Safety Officer (SSO) during work at the Site. The HASP attempts to identify all potential hazards at the Site; however, Site conditions are dynamic and new hazards may appear constantly. Personnel must remain alert to existing and potential hazards as Site conditions change and protect themselves accordingly.

Compliance with this HASP is required of all persons and subcontractors who perform fieldwork or enter the Site. The contents of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be reviewed and approved by the Corporate Health and Safety Manager (CHSM), with the SSO implementing the changes to the HASP.

Upon entering the Site, all visitors are required to sign in. All visitors entering the Contamination Reduction Zone (CRZ) (defined in Section 8.1.2), the Contamination Reduction Corridor (CRC) (defined in Section 8.1.2), or the Exclusion Zone (EZ) (defined in Section 8.1.3) will be required to read and comply with the provisions of this HASP. Visitors will be required to comply with applicable OSHA requirements such as training, medical monitoring, and respiratory protection.

In the event that a visitor does not adhere to the provisions of this HASP, he or she will be required to leave the Site. Mobilization activities not requiring intrusive activities (e.g., survey, equipment staging, etc.) or exposure to potentially impacted areas may only be performed if supervised by a competent Roux Associates employee.

1.1 Scope of Work

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

The Scope of Work activities are as follows:

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

1.2 Emergency Numbers

1.2.1 Emergency Phone Numbers

Emergency Medical Service	911
Police: New York City Police Department (NYCPD)	911
Fire:	911
Hospital: Mt. Sinai Queens Hospital	718-267-4285
National Response Center	800-424-8802
Poison Control Center	800-222-1222
CHEMTREC	800-262-8200
Fire: New York City Fire Department	911
Center for Disease Control	800-311-3435
USEPA (Region II)	212-637-5000
NYSDEC Emergency Spill Response	800-457-7362

1.2.2 Project Management/Health and Safety Personnel

Title	Contact	Telephone/Cell
Roux Associates		
Project Director	Joseph Dumunico	631-232-2600 Cell – 631-921-6279
Site Health and Safety Officer	Richard Maxwell	631-232-2600 Cell – 631-927-9531
Corporate Health and Safety Manager	Joseph Gentile	856-423-8800 Cell – 610-844-6911

1.2.3 Other Important Phone Numbers

New York City Emergency Response Team 911

HealthSource Medical Services of Islandia 631-435-0110
(For non-emergency medical services)

1.2.4 Directions to Mt. Sinai Queens Hospital

See Figure 2 for street map.

- Head west on 46th Avenue toward 5th Street
- Turn left onto 5th Street
- Take first left onto 46th Road
- Take the third left onto 21st Street
- Turn right onto 30th Avenue
- Arrive at Mt. Sinai Queens Hospital on the right (total distance is 2.7 miles)

2.0 HEALTH AND SAFETY STAFF

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

2.1 Project Principal (PP) – Joseph D. Dumunico – Roux Associates

- Has the overall responsibility for the health and safety of Site personnel.
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below.

2.2 Corporate Health and Safety Manager (CHSM) – Joseph W. Gentile – Roux Associates

- Implements the HASP.
- Performs or oversees site-specific training and approves revised or new safety protocols or field operations.
- Coordinates revisions of this HASP with Project Principal.
- Responsible for the development of new task safety protocols and procedures and resolution of any outstanding safety issues which may arise during the performance of site work.
- Review and approve all health and safety training and medical surveillance records for personnel and subcontractors.

2.3 Site Safety and Health Officer (SSO) – Richard Maxwell – Roux Associates

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment.
- Conducts initial onsite specific training prior to personnel and/or subcontractors commencing work.
- Conducts and documents periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Completes and maintains Accident Report and Investigation Forms.
- Notifies PP and CHSM of all accidents/incidents.

- Notifies PP of daily field operations and work progress, who will then communicate at the end of the day to the designated representative the following:
    1. End of day tasks completed
    2. Next day's planned activities
    3. Third party issues
    4. Change of Plans – approvals
- Maintains contact with Contractors.
- Determines upgrade or downgrade of personal protective equipment (PPE) based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as manufacturers suggested instructions determine.
- Submits and maintains health and safety field log books, daily safety logs, training logs, air monitoring result reports, weekly safety report.

2.4 Field Personnel and Subcontractors

- Report any unsafe or potentially hazardous conditions to the SSO.
- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.
- Comply with rules, regulations, and procedures as set forth in this HASP and any revisions, which are instituted.
- Prevent admittance to work Site by unauthorized personnel.

3.0 SITE LOCATION, DESCRIPTION, AND HISTORY

Descriptions of the Site and surrounding property usage are included in the following sections. The location of the Site is presented in Figure 1.

3.1 Property Location and Description

The Site is located at 5-43 46th Avenue to 5-49 46th Avenue and 45-38 Vernon Boulevard to 45-40 Vernon Boulevard in Long Island City, New York. The New York City Tax Map identified the Site as Block 26, Lot Number 4. The Site consists of an approximately 33,150-square foot lot improved by one four story former paint factory building, one three story former garage and office, one three story former warehouse, one 1-story shed and a concrete paved access road off 46th Avenue and a rear courtyard that fronts approximately 60 feet of Anable Basin. The buildings were reportedly constructed between 1923 and 1947.

The total area of the on-Site buildings is approximately 69,500 square feet. Floors two through four of the former paint factory building contain the bulk of the paint and varnish manufacturing equipment and bulk liquid mixing tanks including multiple (53) ASTs and a significant amount of piping that still may contain unknown liquids or residues. The one story shed, which is attached to the four story former paint factory building, contains a boiler room and a historical varnish cooking pot room that is currently empty. Seven underground varnish cooking pots in addition to two underground storage tanks (USTs) are reported to be located beneath the concrete slab of the shed. The three-story building known as the garage contains offices, a former small paint laboratory and storage space. Nine USTs are reported to be located beneath the concrete slab of the garage. The three-story building known as the warehouse stored raw materials and paint products; currently most of the building is empty.

The courtyard is concrete paved and is reported to contain nine USTs. Vehicular access is provided by a concrete paved access road off 46th Avenue, which is reported to contain two USTs.

4.0 WASTE DESCRIPTION/CHARACTERIZATION

4.1 General

The following information is presented in order to identify the types of materials that may be encountered at the Site. The detailed information on these materials was obtained from:

- Sax's Dangerous Properties of Industrial Materials – Lewis Eight Edition
- Chemical Hazards of the Workplace – Proctor/Hughes
- Condensed Chemical Dictionary – Hawley
- Rapid Guide to Hazardous Chemical in the Workplace – Lewis 1990
- NIOSH Pocket Guide to Chemical Hazards – 2005
- ACGIH TLV Values and Biological Exposure Indices
- OSHA 29 CFR 1910.1000

4.2 Chemical Data Sheets

Several chemicals that may potentially be present in soils and groundwater at the Site, based on previous soil, soil vapor and groundwater sampling results and historic operations conducted at the Site that have been identified. The Summary of Toxicological Data is found in Table 1 and is provided for review of chemicals that may be encountered. The Summary of Toxicological Data Sheets provides information such as the chemicals characteristics, health hazards, protection, and exposure limits.

4.2.1 Contaminants of Concern

Soil and groundwater contaminants that may be encountered during drilling and sampling activities include both organic and inorganic compounds. Prior investigations at the site have indicated detection of light non-aqueous phase liquid (LNAPL), Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs) and metals.

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

5.0 HAZARD ASSESSMENT

The potential to encounter chemical hazards is dependent upon the work activity performed (intrusive versus non-intrusive) and the duration and location of the work activity. Such hazards could include inhalation and/or skin contact with chemicals/gases that could cause: dermatitis, skin burns, being overcome by vapors or asphyxiation.

Physical hazards that may be encountered during Site work include: heat and cold stress, exposure to excessive noise, loss of limbs, being crushed, head injuries, punctures, cuts, falls, electrocution and bruises; structural integrity of buildings; asbestos and lead paint exposure; and other physical hazards due to motor vehicle operation, heavy equipment and power tools.

Biological hazards may exist during Site activities. These hazards include exposure to insect bites/stings, animals and animal wastes, mold and bloodborne pathogens.

Prior to the beginning of each new phase of work, an activity hazard analysis will be prepared by the SSO with assistance from the CHSM. The analysis will address the hazards for each activity performed in the phase and will present the procedures and safeguards necessary to eliminate the hazards or reduce the risk. The Activity Hazard Analysis Sheets are located in Appendix A.

5.1 Chemical Hazards

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

- Gauging, bailing/purging, and sampling monitoring wells;
- Drilling Activities; and
- Decontamination Activities.

For chronic and acute toxicity data, refer to Summary of Toxicological Data Sheets in Table 1 for further details on compound characteristics.

5.1.1 Exposure Pathways

Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of VOCs and SVOCs, dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross-contamination activities.

Inhalation of contaminated dust particles (VOCs, SVOCs, and inorganics) can occur during adverse weather conditions (high or changing wind directions) or during operations that may generate airborne dust such as excavation and loading of contaminated soils. Dust control measures such as applying water to roadways and excavations will be implemented where visible dust is generated. Where dust control measures are not feasible or effective, respiratory protection will be used when necessary (see Section 9.2.2 for monitoring procedures and action levels).

5.1.2 Operational Action Levels

A decision-making protocol for an upgrade in levels of protection and/or withdrawal of personnel from an area based on atmospheric hazards is outlined in Table 2.

5.1.3 Additional Precautions

Dermal absorption or skin contact with chemical compounds is possible during intrusive activities and while gauging, purging or sampling a monitoring well at the Site. The use of PPE in accordance with Section 8.2 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote, when good hygiene practices are used.

5.2 Physical Hazards

A variety of physical hazards may be present during Site activities. These hazards include typical construction activities: operation of motor vehicles and heavy equipment operation, the use of power and hand tools, the use of pressurized pumps for *in situ* injections, roping and rigging of steel sheeting, walking on objects, tripping over objects, working on surfaces which have the potential to promote falling, skin burns, crushing of fingers, toes, limbs, head injuries caused by falling objects, temporary loss of one's hearing and/or eyesight. The referenced hazards are not unique and are generally familiar to most hazardous waste site workers at construction sites. Task-specific safety requirements for each phase will be covered during safety briefings. Activity Hazard Analysis summaries are contained in Appendix A.

5.2.1 Noise

Noise is a potential hazard associated with operation of heavy equipment, power tools, pumps, and generators. High noise equipment operators will be evaluated at the discretion of the SSO. Employees with an 8-hour time weighted average exposure exceeding 85 dBA will be included in a hearing conservation program in accordance with 29 CFR 1910.95 and 1926.52.

It is mandated that employees working around heavy equipment or using power tools that produce noise levels exceeding 90 dBA are to wear hearing protection that shall consist of earplugs or protective earmuffs.

5.2.2 Heat Stress

Heat stress is a significant potential hazard, associated with the use of protective equipment in a hot weather environment. The human body is designed to function at a certain internal temperature. When metabolism or external sources (fire or hot summer day) cause the body temperature to rise, the body seeks to protect itself by triggering cooling mechanisms. The SSO will monitor the air temperature (as described later in this section) to determine potential adverse affects the weather can cause onsite personnel. Excess heat is dissipated by two means:

- Changes in blood flow to dissipate heat by convection, which can be seen as "flushing" or reddening of the skin in extreme cases.
- Perspiration, the release of water through skin and sweat glands. While working in hot environments, evaporation of perspiration is the primary cooling mechanism.

Protective clothing worn to guard against chemical contact effectively stops the evaporation of perspiration. Thus the use of protective clothing increases heat stress problems.

The major disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms, which occur in the skeletal muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the bodies lost salts or electrolytes. Drinking water while continuing to lose salt tends to dilute the body's extracellular fluids.

Soon water seeps by osmosis into active muscles and causes pain. Muscles fatigued from work are usually most susceptible to cramps.

Extreme weakness or fatigue, dizziness, nausea, and headache characterize heat exhaustion. In serious cases, a person may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and body temperature normal or slightly higher than normal. Treatment is rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment; severe cases may require care for several days. There are no permanent effects. As first aid treatment, the person should be moved to a cool place. Body heat should be reduced artificially, but not too rapidly, by soaking the person's clothes in water and fanning them.

Heat stroke is considered a medical emergency and is caused by the breakdown of the body's regulating mechanisms. The skin is very dry and hot with red mottled or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage.

Steps that can be taken to reduce heat stress are:

- Acclimate the body. Allow a period of adjustment to make further heat exposure endurable.
- Drink more liquids to replace the body water lost during sweating.
- Rest is necessary and should be conducted under the direction of the SSO.
- Wear personal cooling devices. These are two basic designs; units with pockets for holding frozen packets and units that circulate fluid from a reservoir through tubes to different parts of the body. Both designs can be in the form of a vest, jacket, or coverall. Some circulating units also have a cap for cooling the head.
- Wear long cotton underwear under chemical protective clothing. The cotton will absorb perspiration and will hold it close to the skin. This will provide the body with the maximum cooling available from the limited evaporation that takes place beneath chemical resistant clothing. It also allows for rapid cooling of the body when the protective clothing is removed.

Heat stress is a significant hazard associated with using protective equipment in hot weather environments. Local weather conditions may produce conditions, which will require restricted work schedules in order to protect employees.

Appendix B contains procedures for heat stress; these will be used as a guideline and to provide additional information.

5.2.3 Cold Stress

Cold temperatures are a significant potential hazard. Examples of cold temperature hazards are frostbite and hypothermia.

Frostbite is the most common injury resulting from exposure to cold. The extremities of the body are most often affected. The signs of frostbite are:

- The skin turns white or grayish-yellow.
- Pain is sometimes felt early but subsides later. Often there is no pain.
- The affected parts feel intensely cold and numb.

Hypothermia is characterized by shivering, numbness, drowsiness, muscular weakness, and a low internal body temperature when the body feels extremely warm. This can lead to unconsciousness and death. With both frostbite and hypothermia, the affected areas need to be warmed quickly. Immersion in warm water is an effective means of warming the affected areas quickly. In such cases, medical assistance will be sought.

To prevent these effects from occurring, persons working in the cold should wear adequate clothing and reduce the time spent in the cold area. The field SSO is responsible for determining appropriate time personnel should spend in adverse weather conditions and will monitor this.

Appendix B, which contains the Heat and Cold Stress Guidelines, provides additional information.

5.2.4 Asbestos

Asbestos is a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Depending on the chemical composition, fibers may range from course to silky. The properties that make asbestos fibers valuable to industry are its high-tensile strength, flexibility, heat and chemical resistance and good frictional properties. Asbestos is a common naturally occurring group of fibrous minerals. Asbestos fibers have been used in a variety of building materials; generally, most asbestos is found in pipe insulation, doors, textures paints and plasters, structural fireproofing, and floor tiles. Friable asbestos (that is, material that contains more than 0.1% asbestos by weight and can be crumbled by hand) is a potential hazard because it can release fibers into the air if damaged. Roux Associates' personnel will not disturb any suspected asbestos material.

5.2.5 Structural Integrity

The structural integrity of a building and the safety of the individuals inside depend on meeting and maintaining national and local building codes. Structural integrity can range from minor defects such as loose floorboards and roof leaks to major defects such as floors and walls sagging and collapsed roofs. Numerous other structural defects can exist with or without consequence to the occupants. If Roux Associates personnel detect a problem, they should notify their supervisor, who in turn, should seek the opinion of a qualified structural engineer to offer an opinion regarding the integrity of the building. If in the opinion of the qualified engineer it is unsafe, no work can proceed until a solution to rectify the situation has been performed.

It is presently known that the majority of the onsite buildings have been unoccupied since approximately 1998. As such, personnel will take this into consideration during the initial site visits and communicate this potential hazard during the safety tailgate meetings to all workers entering the site.

5.2.6 Lockout/Tagout

Roux Associates and all Site contractors will develop a lockout/tagout plan in the event of the repair of electrical, pneumatic, hydraulic, mechanical systems, per OSHA requirements under 29 CFR 1910.147.

5.3 Biological Hazards

The biological hazards, which have the potential to cause adverse health effects, are from exposure to domestic flies, mosquitoes, insects, animals and animal wastes, mold and bloodborne pathogens. The Activity Hazard Analysis (Appendix A) suggests controls for various hazards to be potentially encountered onsite.

5.3.1 Insect Stings

Stings from insects are often painful, cause swelling and can be fatal if a severe allergic reaction such as anaphylactic shock occurs. If a sting occurs, the stinger should be scraped out of the skin, opposite of the sting direction. The area should be washed with soap and water followed by application of an ice pack.

If the victim has a history of allergic reaction, he should be taken to the nearest medical facility. If the victim has medication to reverse the effects of the sting, it should be taken immediately.

If the victim experiences a severe reaction, a constricting band should be placed between the sting and the heart. The bitten area should be kept below the heart if possible. A physician should be contacted immediately for further instructions.

5.3.2 Animals and Animal Wastes

Due to most of the onsite structures being unutilized for several years, there lies the potential for various wildlife to reside within the structures, including, but not limited to, pigeons, bats, mice, rats, squirrels, raccoons, and feral cats. Certain animals can represent significant sources (vectors) of disease transmission. Precautions to avoid or minimize potential contact with (biting) animals (such as some of the above listed) or animal waste and/or deceased animals should be considered prior to all field activities. Rats, squirrels, raccoons, feral cats, and other wild animals can inflict painful bites which can also cause disease (as in the case of rabid animals). Site personnel should avoid contact with any of the above.

If contact occurs, be sure to clean the area thoroughly with soap and water as soon as possible. If a bite occurs, the area should be cleaned thoroughly immediately with soap and water and medical attention should be sought.

5.3.3 Mold

Due to the unutilized state of the various structures onsite, leaking roofs and the collection of water may have gone unnoticed which may have led to the growth of mold within the buildings.

Although mold affects individuals differently and to different degrees, the following are some of the most common adverse health effects:

- Respiratory problems – wheezing, difficulty breathing;
- Nasal and sinus congestion;
- Eyes – burning, watery, reddened, blurry vision, light sensitivity;
- Dry, hacking cough;
- Sore throat;
- Nose and throat irritation;
- Shortness of breath and lung disease;
- Chronic fatigue;
- Skin irritation;
- Central nervous system (headaches, loss of memory, and mood changes);
- Aches and pains;
- Fever;
- Headaches;
- Diarrhea; and
- Immune suppression.

Decisions about removing individuals from an affected area must be based on the results of a medical evaluation, and will be made on a case-by-case basis.

Workers that discover the visible presence of mold in excess of 10 sq. feet need to notify the SSO for consultation. If a worker smells mold and feels that he/she is experiencing symptoms of exposure, he/she should leave the area and report the symptoms to the SSO.

5.3.4 Bloodborne Pathogens

The majority of the occupational tasks onsite will not involve a significant risk of exposure to blood, blood components, or body fluids. The highest risk of acquiring any bloodborne pathogen for employees onsite will be following an injury. When administering first aid care, there are potential hazards associated with bloodborne pathogens that cause diseases such as Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Hepatitis A (HAV), Hepatitis C (HCV), or the Herpes Simplex Virus (HSV). An employee who has not received the appropriate certification should never execute first aid and/or CPR.

In order to minimize any potential pathogen exposure, all employees should use the hand washing facilities on a regular basis. Additionally, the following universal precautions should be followed to prevent further potential risk:

- Direct skin or mucous membrane contact with blood should be avoided.
- Open skin cuts or sores should be covered to prevent contamination from infectious agents.
- Body parts should be washed immediately after contact with blood or body fluids that might contain blood, even when gloves or other barriers have been used.
- Gloves and disposable materials used to clean spilled blood shall be properly disposed of in an approved hazardous waste container.
- First aid responders shall wear latex or thin mil nitrile gloves when performing any procedure risking contact with blood or body substances.
- Safety glasses will be worn to protect the eyes from splashing or aerosolization of body fluids.
- A CPR mask will be worn when performing CPR to avoid mouth-to-mouth contact.
- Appropriate work gloves will be worn to minimize the risk of injury to the hands and fingers when working on all equipment with sharp or rough edges.
- Never pick up broken glass or possible contaminated material with your unprotected hands.
- Never handle wildlife (living or deceased) encountered onsite.

5.4 Hazard Assessment

Task	Hazards	Risk of Exposure
Gauging, purging and Sampling Monitoring Wells	Inhalation/Skin Contact	Moderate/High
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Low/Moderate
	Noise	Low
Decontamination	Inhalation/Skin Contact	Moderate
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Low/Moderate
	Noise	Low
Drilling/Sampling	Inhalation/Skin Contact	Moderate
	Heat Stress/Cold Stress	Moderate
	Noise	Moderate/High
	Physical Injury	Moderate

6.0 TRAINING

6.1 General Health and Safety Training

In accordance with Roux Associates' corporate policies, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of the job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training will not be allowed to work in any Site activities in which they may be exposed to hazards (chemical or physical).

Completion of a 40-hour Health and Safety Training Course for Hazardous Waste Operations or an approved equivalent will fulfill the requirements of this section.

In addition to the required initial training, each employee shall have received 3 days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

Roux Associates' SSO has the responsibility of ensuring that personnel assigned to this project comply with these requirements.

6.2 Annual Eight-Hour Refresher Training

Current, annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The following topics will be reviewed; toxicology, respiratory protection, including air purifying devices and self-contained breathing apparatus (SCBA), medical surveillance, decontamination procedures, and personal protective clothing. In addition, topics deemed necessary by Roux Associates' Health and Safety Director may be added to the above list.

6.3 Site-Specific Training

Site personnel will receive training that will specifically address the activities, procedures, monitoring and equipment for Site operations. It will include Site and facility layout, hazards, first aid equipment locations and emergency services at the Site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

6.4 Onsite Safety Meetings

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

The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits by Roux Associates or other involved parties.

6.5 First Aid and CPR

The SSO will identify those individuals having first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association and, as applicable, the American Heart Association. Certification and appropriate training documentation will be kept with the Site personnel records.

6.6 Additional Training

The CHSM may require additional or specialized training throughout the project. Such training shall be in the safe operation of heavy or power tool equipment or hazard communication training or other topic deemed Site appropriate.

6.7 Subcontractor Training

All subcontractor personnel working on the Site shall have completed the 40-hour training requirement and meet the medical surveillance requirements found in Section 7.1. Subcontractor training shall be performed in accordance with 29 CFR 1910.120 and HASP specifications. In certain unique situations (e.g., mechanical failure of equipment), the non-trained individual performing emergency repairs may be allowed, at the discretion of the SSO, to perform repairs when no intrusive activities are being performed and provisions have been made to mitigate potential exposure.

7.0 MEDICAL SURVEILLANCE PROCEDURES

7.1 General

A Medical Surveillance Program has been established as part of this plan and is included in Appendix C. Roux Associates and subcontractor personnel performing field work at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f). A physician's medical release for work will be confirmed by the SSO before an employee can begin Site activities. Such examinations shall include a statement as to the worker's present health status, the ability to work in a hazardous environment (including any required PPE, which may be used during temperature extremes), and the worker's ability to wear respiratory protection.

In the event that personal medical information is needed for emergency treatment, information will be made available to the treating health care professional through Roux Associates’ Human Resources Department and the CHSM.

8.0 SITE CONTROL, PERSONAL PROTECTIVE EQUIPMENT, AND COMMUNICATIONS

A modified Site control approach may be utilized since activities will be limited to site inspection/geophysical survey, drilling and sampling only during this phase of work. If remedial work is necessary, the following four-zone approach will be used.

8.1 Site Control

Based on the Site history and operations, a potential for the presence of hazardous material does exist. During drilling and sampling work areas will be delineated with high visibility cones and/or caution tape. A dedicated decontamination area will be established to decontaminate all equipment used for sampling.

If remedial activities are necessary, a four-zone approach will be employed in order to prevent the spread of contamination from the disturbed areas onsite. The four zones include: the Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), Contamination Reduction Corridor (CRC) and the Support Zone (SZ). A stepped remedial approach will be managed and the zones modified as the work progresses. Each of the areas will be defined through the use of control barricades and/or construction/hazard fencing. A clearly marked delineation between the SZ and the remaining three zones, the CRZ, CRC and EZ, will be maintained. The preferred method will utilize high visibility orange fencing and hand-driven metal posts, or orange cones. Signage will be posted to further identify and delineate these areas.

8.1.1 Support Zone

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold stress.

8.1.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE;
- Medical authorization;
- Training certification; and
- A need to be in the zone.

8.1.3 Exclusion Zone

The area where contamination exists is considered to be the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be clearly delineated by orange high visibility fencing. Safety tape may be used as a secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The SSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy (co-worker);
- Appropriate PPE;
- Medical authorization;
- Training certification; and
- A need to be in the zone.

8.2 Personal Protective Equipment

8.2.1 General

The level of protection worn by field personnel will be enforced by the SSO. Levels of protection for general operations are provided below and are defined in this section. Levels of protection may be upgraded at the discretion of the SSO. All decisions on the level of protection will be based upon a conservative interpretation by the SSO of the information provided by air monitoring results, environmental results and other appropriate information. Any changes in the level of protection shall be recorded in the health and safety field logbook.

8.2.2 Personal Protective Equipment Specifications

The initial level of personal protective equipment is Level D. It is not anticipated that either Level B or Level C protection will be necessary.

Although not anticipated, any tasks requiring Level B personal protective equipment (PPE) will utilize the following equipment:

- Positive pressure, full facepiece, self-contained breathing apparatus (SCBA) or positive pressure, supplied air respirator with escape SCBA (NIOSH approved)
- Disposable coveralls (Tyvek, Poly-coated Tyvek, or Saranex)
- Gloves, inner: latex or nitrile
- Gloves, outer: cut-resistant
- Chemical resistant boots over the work boots
- Steel toe work boots
- Hard hat
- Hearing protection (as needed)
- Boot cover (as needed)

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

- Full-face, air purifying, canister-equipped respirators (NIOSH approved) utilizing Organic Vapor/Acid Gas and P-100 filters (half-face if approved by SSO)
- Disposable coveralls (Tyvek, Poly-coated Tyvek, or Saranex) as required
- Gloves, inner: latex or nitrile as required
- Gloves, outer: cut-resistant
- Chemical resistant boots over the work boots as required

- Steel toe work boots
- Hard hat
- Hearing protection (as needed)
- Safety glasses (if half-mask is utilized)
- Boot covers (as needed)

The Minimum level of PPE for entry onto the Site is Level D PPE. The following equipment shall be used:

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

Modified Level D PPE consists of the following:

- Regular Tyvek coveralls (Poly-coated Tyvek as required)
- Outer gloves: cut-resistant, leather, cotton (as required)
- Inner gloves: latex or nitrile (doubled) as required
- Chemical resistant boots over work boots (as required)
- Steel toe work boots
- Hard hat
- Safety glasses
- Hearing protection as needed
- Reflective safety vest

8.2.3 Initial Levels of Protection

Levels of protection for the proposed scope of work may be upgraded or downgraded depending on direct-reading instruments or personnel monitoring. The following are the initial levels of protection that shall be used for each planned field activity:

Activity	**Initial level of PPE**
Mobilization/Demobilization	D
Site Inspection/Geophysical Survey	D
Decontamination	D
Drilling	D
Monitoring Well Gauging, Purging and Sampling	D

8.3 Communications

If working in level C/B respiratory protection is required, personnel may find that communication becomes a more difficult task and process to accomplish. Distance and space further complicate this. In order to address this problem, electronic instruments, mechanical devices, or hand signals will be used as follows:

Telephones – Mobile telephones will be carried by designated personnel for communication with emergency support services/facilities.

Radios – Two-way radios will be utilized onsite for communications between field personnel in areas where visual contact cannot be maintained and where hand signals cannot be employed.

Air Horn – Available as posted in the Site trailer or support zone to alert field personnel to an emergency situation. The emergency signal will be three sharp blasts of the air horn.

Hand Signals – This communication method will be employed by members of the field team along with use of the buddy system. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before Site operations commence, and will be reinforced and reviewed during site-specific training.

Signal	**Meaning**
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; Unable to understand you, I'm not all right

9.0 MONITORING PROCEDURES

9.1 General

Monitoring will be performed to verify the adequacy of respiratory protection, to aid in Site layout, and to document worker exposure. If air monitoring in these areas indicates the presence of potentially hazardous materials, control measures will be implemented. All monitoring instruments shall be operated by qualified personnel only and will be calibrated daily prior to use or, more often, as necessary. General air monitoring will be performed in accordance with the Community Air Monitoring Plan included as Appendix E of the Revised Remedial Investigation Work Plan.

9.2 Exclusion Zone Monitoring

9.2.1 Instrumentation

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

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

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

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

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

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

9.2.2 Action Levels

Action levels for the upgrading of PPE requirements in the HASP will apply to all Site work during investigation and remediation activities at the Site. Action levels are for known contaminants using direct reading instruments in the Breathing Zone (BZ) for VOCs and particulates, and at the source for combustible gases. The BZ will be determined by the SSO, but is typically 4 to 5 feet above the work area surface or elevation. The action levels to be utilized for the Site are found in Table 2.

9.2.3 Monitoring During Field Activities

Intrusive Operations – Continuous Personnel Breathing Zone Air Monitoring will be performed by the SSO during drilling activities. Real-time monitoring for all onsite activities will be accomplished as follows:

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

The frequency of monitoring may be modified by the SSO, after consultation with the Project Principal. The rationale for any modification must be documented in the HASP.

10.0 SAFETY CONSIDERATIONS

10.1 General

In addition to the specific requirements of this HASP, common sense should be used at all times.

The following general safety rules and practices will be in effect at the site.

- All open holes, trenches, and obstacles will be properly barricaded in accordance with local Site needs and requirements. Proximity to traffic ways, both pedestrian and vehicular, and location of the open hole, trench, or obstacle will determine these needs.
- All excavation and other Site work will be planned and performed with consideration for underground lines.
- Smoking and ignition sources in the vicinity of potentially flammable or contaminated material are strictly prohibited.
- Drilling, boring, and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment, and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; lights; canopies; buildings and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.
- When working in areas where flammable vapors may be present, particular care shall be exercised with tools and equipment that may be sources of ignition. All tools and equipment provided must be properly bonded and/or grounded.
- Approved and appropriate safety equipment (as specified in this HASP), such as eye protection, hard hats, hand protection (nitrile, leather and/or cut resistant gloves as necessary), foot protection, and respirators, must be worn in areas where required. In addition, eye protection must be worn when sampling soil or water that may be contaminated.
- All site personnel may be called upon to use respiratory protection in some situations. Fit testing will be necessary for all persons using respirators. The criteria for facial hair will be determined by the SSO. In general, the guideline is that facial hair cannot impede the fit of the respirator.
- No smoking, eating, chewing tobacco, gum chewing or drinking will be allowed outside the SZ.
- Contaminated tools and hands must be kept away from the face.
- Personnel must use personal hygiene safe guards (washing up) at the end of the shift.
- Each sample must be treated and handled as though it were contaminated.
- Persons with long hair and/or loose-fitting clothing that could become entangled in power equipment must take adequate precautions.

- Horseplay is prohibited in the work area.
- Work while under the influence of intoxicants, narcotics, or controlled substances is strictly prohibited.

10.2 Traffic Control

Traffic control methods and barricades will be used when working on the sidewalk along 46th Avenue and when working on the driveway off of 46th Avenue. Since the site is fenced off and the areas of investigation are not in current use, outside vehicular and pedestrian traffic is not considered to be an issue when working in other areas of the Site.

10.3 Sample Handling

Personnel responsible for handling of samples will wear the prescribed level of protection. Samples are to be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions shall be noted. Laboratory personnel and all field personnel shall be advised of sample hazard levels and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling in order to assure that the practices are appropriate for the suspected contaminants in the sample.

11.0 DECONTAMINATION AND DISPOSAL PROCEDURES

11.1 Contamination Prevention

Contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure that there are no cuts or tears on PPE.
- Fasten all closures in suits; cover with tape, if necessary.
- Particular care should be taken to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, cosmetics, gum, etc., into contaminated areas.

Sampling/Monitoring

- When required by the SSO, cover instruments with clear plastic, leaving openings for sampling ports.
- Bag sample containers prior to emplacement of sample material.

Heavy Equipment

- Care should be taken to limit the amount of contamination that comes in contact with heavy equipment (tires, contaminated augers).
- If contaminated tools are to be placed on non-contaminated equipment for transport to a decontamination area, plastic should be used to keep the equipment clean.
- Dust control measures including water misting will be used on roads inside the Site boundaries.

11.2 Personnel Decontamination

A field wash for equipment and PPE shall be set up and maintained for all persons exiting the EZ. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. As necessary, equipment and facilities will be available for personnel to wash their hands, arms, neck, and face.

11.3 Equipment Decontamination

All potentially contaminated equipment used at the Site will be decontaminated to prevent contaminants from leaving the Site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators and any other PPE that comes in contact with contaminated materials shall pass through a field wash in the decontamination area, and a thorough decontamination at the end of the day. All decontamination rinse water will be collected and managed in accordance with all applicable regulations.

11.4 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or omitted. The Site SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and/or medical personnel. Outer garments are then removed at the medical facility. Attempt to wash or rinse the victim if it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems (ambulatory) or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately. Unless the victim is obviously contaminated, decontamination should be omitted or minimized, and treatment begun immediately.

11.5 Disposal Procedures

A system of segregating all waste will be developed by the SSO.

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left onsite. All potentially contaminated materials (e.g., clothing, gloves, etc.,) will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as domestic waste.

12.0 EMERGENCY PLAN

Should an emergency situation occur, the emergency plan, outlined in this section, shall be known by Roux Associates and all Subcontractors prior to the start of work. The emergency plan will be available for use at all times during Site work. The plan provides the phone numbers for the fire, police, ambulance, hospital, poison control centers, and directions to the hospital from the Site. This information is to be found in Section 1.2 of the HASP.

Various individual Site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a Site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of Site release of vapors, which could affect the surrounding community.

The emergency coordinator shall implement the contingency plan whenever conditions at the Site warrant such action. The coordinator will be responsible for coordination of the evacuation, emergency treatment, and transport of Site personnel as necessary, and notification of emergency response units and the appropriate management staff.

In cases where the project principal (manager is not mentioned in HASP?) is not available, the SSO shall serve as the alternate emergency coordinator.

The SSO during an emergency will perform air monitoring as needed, as well as lend assistance and provide health and safety information to responding emergency personnel.

Site Personnel will endeavor to keep non-essential personnel away from the incident until the appropriate emergency resources arrive. At that time the responders will take control of the Site. Site personnel may be asked to lend assistance to emergency personnel such as during evacuations, help with the injured, etc.

12.1 Evacuation

Evacuation procedures will be discussed prior to the start of work and periodically during safety meetings. In the event of an emergency situation, such as fire, or explosion, an air horn, automobile horn, or other appropriate device will be sounded for three (3) sharp blasts indicating the initiation of evacuation procedures. The emergency evacuation route shall be known by all site workers. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SSO or project manager must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. All Site personnel will assemble in the designated nearest safe location. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency.

12.2 Personnel Injury

Emergency first aid shall be applied onsite as appropriate. If necessary, the individual shall be decontaminated and transported to the nearest hospital. The SSO will supply medical data sheets to medical personnel and complete the accident/incident reports in accordance with Section 13.4 of the HASP.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, the injured person shall be escorted to the occupational health clinic or hospital. Maps to these facilities are shown in Figure 2.

12.3 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone: (Direct contact, no phone messages).

		Office:	**Cell:**
1. Project Director:	Joseph Duminuco	631-232-2600	631-921-6279
2. Office Health and Safety Manager:	Joe Gentile	856-423-8800	610-844-6911
3. Site Health and Safety Officer:	Richard Maxwell	631-232-2600	631-921-9531

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

Written confirmation of verbal reports are to be submitted within 24 hours. The report form entitled "Accident Report and Investigation Form" (Appendix E) is to be used for this purpose. All representatives contacted by telephone are to receive a copy of this report. If the employee involved is not a Roux Associates employee, his employer shall receive a copy of the report. In addition to filling out the Accident Report and Investigation Form, if a Roux employee is involved in a motor vehicle accident, the employee must also complete the Acord form (Appendix F).

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill or exposure to hazardous materials (radioactive materials, toxic materials, explosive or flammable materials), fire, explosion, property damage, or potential occurrence (i.e., near miss) of the above.

Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information, which is released by patient consent, is to be filed in the individual's medical record and treated as confidential.

12.4 Personnel Exposure

<u>Skin Contact</u>:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination.
<u>Inhalation</u>:	Move to fresh air and/or, if necessary, decontaminate/transport to hospital.
<u>Ingestion</u>:	Decontamination and transport to emergency medical facility.
<u>Puncture Wound or Laceration</u>:	Decontamination and transport to emergency medical facility.

12.5 Adverse Weather Conditions

In the event of adverse weather conditions, the SSO or project manager will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related conditions.

- Limited visibility.
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lightning. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

13.0 LOGS, REPORTS AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for this project.

13.1 Medical and Training Records

The employer keeps medical and training records. The subcontractor employer must provide verification of training and medical qualifications to the SSO. The SSO will keep a log of personnel meeting appropriate training and medical qualifications for Site work. The log will be kept in the project file. Roux Associates will maintain medical records in accordance with 29 CFR 1910.20.

13.2 Onsite Log

The SSO or project manager will keep a log of onsite personnel daily in the designated field book.

13.3 Exposure Records

Any personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept by Roux Associates in accordance with 29 CFR 1910.20.

13.4 Accident/Incident Reports

An accident/incident report must be completed following procedures given in Appendix E. The originals will be sent to Roux Associates for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

13.5 OSHA Form 300

An OSHA Form 300 (Log of Occupational Injuries and Illnesses) (Appendix G) will be kept at the Site. All reportable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to Roux Associates for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form.

13.6 Daily Safety Logs

The Daily Safety Log form in Appendix D will be completed daily by the SSO and submitted to the project manager.

13.7 Weekly Safety Reports

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

13.8 Close-Out Safety Report

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

14.0 FIELD TEAM REVIEW

Each Roux Associates employee or subcontractor shall sign this section after site-specific training is completed and before being permitted to work at the Site.

> *I have read and reviewed the Site Health and Safety Plan prepared for this Site. I understand and will comply with the provisions contained therein.*

Site/Project: Former Paragon Paint Manufacturing Facility
5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard
Long Island City, New York

Date	Name	Signature	Company

SSO CERTIFICATION OF
OCCUPATIONAL HEALTH CLINIC AND HOSPITAL DIRECTIONS

Name of Roux Associates SSO: Richard Maxwell

Date: February 7, 2013

This is to certify that on February 1, 2013, I personally drove the route to Mt. Sinai Queens Hospital as listed in the HASP. The Map Routings and Directions were/were not as listed in the plan. Listed below were conditions that resulted in different directions.

R Maxwell

Roux Associates Site Health and Safety Officer

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,1,1-Trichloroethane	71-55-6	TWA 350 ppm STEL 440 ppm C 440 ppm	C 350 ppm (1900 mg/m^3) [15-minute]	TWA 350 ppm (1900 mg/m^3)	700 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias;	Eyes, skin, central nervous system, cardiovascular system, liver	Colorless liquid with a mild, chloroform-like odor. BP: 165°F UEL: 12.5% LEL: 7.5%
1,1,2-Trichloroethane	79-00-5	TWA 10 ppm	Ca TWA 10 ppm (45 mg/m^3) [skin]	TWA 10 ppm (45 mg/m^3) [skin]	Ca [100 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eyes, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, chloroform-like odor. BP: 237°F UEL: 15.5% LEL: 6%
1,1-Dichloroethane	75-34-3	TWA 100 ppm	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system	Colorless, oily liquid with a chloroform-like odor. BP: 135°F Fl.P: 2°F UEL: 11.4% LEL: 5.4%
1,1-Dichloroethene	75-35-4	TWA 5 ppm	Ca (lowest feasible concentration)	TWA 1ppm	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor. BP: 89°F Fl.P: -2°F UEL: 15.5% LEL: 6.5% Class IA Flammable Liquid
1,2,4-Trimethylbenzene	95-63-6	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 337°F FL.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable liquid
1,2,4-Trimethylbenzene	95-63-6	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 337°F Fl.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m^3)	C 50 ppm (300 mg/m^3)	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F Fl.P: 151°F UEL: 9.2% LEL: 2.2% Class IIIA Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m^3) STEL 2 ppm (8 mg/m^3)	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F Fl.P: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790 m	TWA 200 ppm (790 mg/m^3)	TWA 200 ppm (790 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor BP: 118-140°F Fl.P: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
1,3,5-Trimethylbenzene	108-67-8	None established	TWA 25 ppm (125mg/m^3)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 329°F FL.P: 122°F Class II Flammable liquid
1,3,5-Trimethylbenzene	108-67-8	TWA 25 ppm (125 mg	TWA 25 ppm (125 mg/m^3)	None established	N.D	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 329°F Fl.P: 122°F Class II Flammable Liquid
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m^3)	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F Fl.P: 150°F LEL: 2.5% Combustible Solid
2,4-Dimethylphenol	105-67-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system, mouth, throat, stomach; dizziness, weakness, fatigue, nausea, headache; systemic damage; moderate to severe eye injury.	Skin, CVS, eyes, CNS	Clear, colorless liquid with a faint ether or chloroform-like odor BP: 178°F

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
2-Butanone (MEK)	78-93-3	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3) STEL 300 ppm (885 mg/m^3)	TWA 200 ppm (590 mg/m^3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor. BP: 175°F Fl.P: 16°F UEL(200°F): 11.4% LEL(200°F): 1.4% Class IB Flammable Liquid
Acenaphthene	83-32-9	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Brown solid
Acetone	67-64-1	TWA 500 ppm STEL 50 ppm	TWA 250 ppm (590 mg/m^3)	TWA 1000 ppm (2400 mg/m^3)	2500 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F Fl.P: 0°F UEL: 12.8% LEL: 2.5% Class IB Flammable Liquid
Anthracene	65996-93-2	TWA 0.2 mg/m^3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
Antimony	7440-36-0	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	TWA 0.5 mg/m^3	50 mg/m^3 (as Sb	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder. BP: 2975°F
Arsenic (inorganic)	7440-38-2 (metal)	TWA 0.01 mg/m3	Ca C 0.002 mg/m3 [15-min]	TWA 0.010 mg/m3	Ca [5 mg/m3 (as As)]	Inhalation; ingestion; skin absorption; skin and/or eye contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic sys	Metal: sliver-gray or tin-white, brittle, odorless solid BP: sublimes
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m3	TWA 0.1 fiber/cm3	Ca [IDLH value has not been determined]	Inhalation; ingestion; skin and/or eye contact	Asbestosis (chronic exposure), dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation eyes, [potential occupational carcinogen]	Respiratory system, eyes,	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite), fibrous, odorless solids. BP: decomposes
Asphalt fumes	8052-42-4	TWA 0.5 mg/m^3(fumes)	Ca C 5 mg/m3 [15 min]	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; skin and/or eye contact	Irritation eyes, resp sys	Eyes, respiratory system	Black or dark brown cement-like substance Combustible solid
Barium	7440-39-3	TWA 0.5 mg/m3	None established	TWA 0.5 mg/m3	None established	Inhalation, ingestion, skin contact	Irritation skin, respiratory system,	Skin, eyes, respiratory system	Yellow white powder BP: 1640 C
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm STEL 1 ppm	TWA 1 ppm STEL 5 ppm	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F] BP: 176°F Fl.Pt = 12°F LEL: 1.2% UEL: 7.8% Class B Flammable liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Benzo[a]anthracene	56-55-3	None established	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS	Skin	Pale Yellow crystal, solid BP: 438 C
Benzo[a]pyrene	50-32-8	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	POISON. This material is an experimental carcinogen, mutagen, tumorigen, neoplastigen and teratogen. It is a probable carcinogen in humans and a known human mutagen. IARC Group 2A carcinogen. It is believed to cause bladder, skin and lung cancer. Exposure to it may damage the developing foetus. May cause reproductive damage. Skin, respiratory and eye irritant or burns.	Skin, eye, bladder, lung, reproductive	Yellow crystals or powder [found in cigarette smoke, coal tar, fuel exhaust gas and in many other sources] BP: 495 C
Benzo[b]fluoranthene	205-99-2	None established	TWA 0.1 mg/m3	TWA 0.2 mg/m3	None established	Inhalation; ingestion; skin and/or eye contact	No data were identified on the toxicity of benzo[b]fluoranthene to humans. Based on results of studies in animals, IARC concluded that benzo[b]fluoranthene is possibly carcinogenic to humans	Respiratory system, skin, bladder, kidneys	Off-white to tan powder
Benzo[k]fluoranthene	207-08-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, gastrointestinal; fatal if swallowed, inhaled, absorbed through the skin; vomiting, nausea, diarrhea	Lungs, respiratory system	Yellow crystals BP: 480 C
Beryllium	7440-41-7 (metal)	TWA 0.002 mg/m^3	Ca C 0.0005 mg/m^3	TWA 0.002 mg/m^3 C 0.005 mg/m^3 (30 minutes) with a maximum peak of 0.025 mg/m^3	Ca [4 mg/m^3 (as Be)]	inhalation, skin and/or eye contact	Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]	Eyes, skin, respiratory system	Metal: A hard, brittle, gray-white solid. BP: 4532°F
Bis(2-ethylhexyl) phthalate	117-81-7	TWA 5 mg/m^3	TWA 5 mg/m^3 STEL 10 mg/m^3 (do not exceed during andy 15-minute work period)	TWA 5 mg/m^3	None established	inhalation, skin and/or eye contact	Irritation eyes, skin, nose, throat; affect the nervous system and liver; damage to male reproductive glands	Eyes, skin, nose, respiratory system, nervous system, reproductive system, liver	Colorless to light colored, thick liquid with slight odor
Butane	106-97-8	TWA 1000 ppm	TWA 800 ppm (1900 mg/m^3)	None established	None established	inhalation, skin and/or eye contact (liquid)	Drowsiness, narcosis, asphyxia; liquid: frostbite	central nervous system	Colorless gas with a gasoline-like or natural gas odor. BP: 31°F UEL: 8.4% LEL: 1.6% Flammable Gas

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Cadmium	7440-43-9 (metal)	TWA 0.01 mg/m^3	Ca	TWA 0.005 mg/m^3	Ca [9 mg/m^3 (as Cd)]	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	respiratory system, kidneys, prostate, blood	Metal: Silver-white, blue-tinged lustrous, odorless solid. BP: 1409°F
Carbon Disulfide	75-15-0	TWA 1 ppm	TWA 1 ppm (3 mg/m^3) STEL 10 ppm (30 mg/m^3) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. BP: 116°F Fl.P: -22°F UEL: 50.0% LEL: 1.3% Class IB Flammable Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	None established	TWA 75 ppm (350 mg/m^3)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond-like odor BP: 270°F Fl.P: 82°F UEL: 9.6% LEL: 1.3%
Chloroethane	75-00-3	TWA 100ppm	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m^3)	3800 ppm [10%LEL]	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. BP: 54°F Fl.P: NA (Gas) -58°F (Liquid) UEL: 15.4% LEL: 3.8%
Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m^3) [60-minute]	C 50 ppm (240 mg/m^3)	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F
Chromium	7440-47-3	TWA 0.5 mg/m^3 (metal and Cr III compounds) TWA 0.05 mg/m^3 (water-soluble Cr IV compounds) TWA 0.01 mg/m^3 (insoluble Cr IV compounds)	TWA 0.5 mg/m^3	TWA 1 mg/m^3	250 mg/m^3 (as Cr)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. BP: 4788°F
Chrysene; Phenanthrene; Pyrene; Coal tar pitch volatiles	65996-93-2	TWA 0.2 mg/m3	Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m^3 (benzene-soluble fraction)	Ca [80 mg/m^3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
cis-1,2-Dichloroethene	158-59-2	TWA 200 ppm	TWA 200 ppm	TWA 200 ppm	None established	inhalation, skin absorption, ingestion	Harmful if swallowed, inhaled, or absorbed through skin. Irritant. Narcotic. Suspected carcinogen	Skin	Colorless liquid BP: 60 C Fl.P: 4 C UEL: 12.8% LEL: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m^3 (fume) 1 mg/m^3 (dusts and mists)	TWA 1 mg/m^3	TWA 1 mg/m^3	100 mg/m^3 (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing	Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)	Noncombustible Solid in bulk form, but powdered form may ignite. BP: 4703°F
Dibenzo[a,h]anthracene	53-70-3	None established	None established	None established	None established	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin	Eyes, skin; skin photosensitization.	Colorless crystalline powder BP: 524°C
Diesel Fuel #2	68476-34-6	None established	None established	Designated as an OSHA Select Carcinogen	None established	ingestion, skin and/or eye contact	Kidney damage; potential lung damage; suspected carcinogen; irritation of eyes, skin, respiratory tract; dizziness, headache, nausea; chemical pneumonitis (from aspiration of liquid); dry, red skin; irritant contact dermatitis; eye redness, pain.	Eyes, skin, kidneys	Clear yellow brown combustible liquid; floats on water; distinct diesel petroleum hydrocarbon odor. BP: 356-716°F Fl.P: 154.4-165.2°F LEL: 0.6% UEL: 7.0%
Ethylbenzene	100-41-4	TWA 100 ppm STEL 125 ppm	TWA 100 ppm (435 mg/m^3) STEL 125 ppm (545 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F Fl.P: 55°F UEL: 6.7% LEL: 0.8% Class IB Flammable Liquid
Fluoranthene	206-44-0	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible burns; heart and liver injury, pulmonary edema, respiratory arrest, gastrointestinal disturbances.	Heart, liver, lungs.	Yellow needles.
Fluorene	86-73-7	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation skin, digestive tract	Skin	White crystals BP: 563°F
Fuel Oil #2	68476-30-2	TWA 100mg/m^3 (aerosol and vapor, as total hydrocarbons)	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS effects; nausea, vomiting, headache, cramping, dizziness, weakness, loss of coordination,, drowsiness; kidney, liver damage	Eyes, skin, CNS	Clear or yellow to red oily liquid, kerosene-like odor BP: 347 - 689 °F UEL:5-6% LEL: 0.7-1.0%
Gasoline	8006-61-9	TWA 300 ppm STEL 500 ppm	Carcinogen	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; ingestion; skin and/or eye contact	Eyes and skin irritation, mucous membrane; dermatitis; headache; listlessness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis; possible liver, kidney damage [Potential occupational carcinogen]	Eyes, skin, respiratory system, CNS, Liver, Kidneys	Clear liquid with a characteristic odor, aromatic Fl.Pt = -45°F LEL = 1.4% UEL = 7.6% Classs 1B Flammable Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m^3) [skin]	None established	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys	Clear, colorless liquid with a mild, turpentine-like odor. BP: 419°F
Hydrogen Sulfide	7783-06-4	TWA (10 ppm) STEL (15 ppm) (adopted values for which changes are proposed in the NIC)	C 10 ppm (15 mg/m^3) [10-minute]	C 20 ppm 50 ppm [10-minute maximum peak]	100 ppm	inhalation, skin and/or eye contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	Colorless gas with a strong odor of rotten eggs. BP: -77°F UEL: 44.0% LEL: 4.0% Flammable Gas
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impariment of blood forming tissue	Skin	Fluorescent green-yellow crystalline solid BP: 536 C
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impariment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m^3) [skin]	TWA 50 ppm (245 mg/m^3) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F Fl.P: 96°F UEL: 6.5% LEL: 0.9%
Kerosene	8008-20-6	TWA 200 mg/m^3	TWA 100 mg/m^3	None established	IDLH value has not been determined	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system	Colorless to yellowish, oily liquid with a strong, characteristic odor. BP: 347-617°F Fl.P: 100-162°F UEL: 5% LEL: 0.7% Class II Combustible Liquid
Lead	7439-92-1	TWA 0.05 mg/m^3	TWA (8-hour) 0.050 mg/m^3	TWA 0.050 mg/m^3	100 mg/m^3 (as Pb)	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. BP: 3164°F Noncombustible Solid in bulk form

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Manganese	7439-96-5 (metal)	TWA 0.2 mg/m^3	TWA 1 mg/m^3 STEL 3 mg/m^3	C 5 mg/m^3	500 mg/m^3 (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. BP: 3564°F
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 STEL 0.03 mg/m^3 [skin]	TWA 0.01 mg/m^3 C 0.04 mg/m^3	2 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects	Eyes, skin, central nervous system, peripheral nervous system, kidneys	Appearance and odor vary depending upon the specific (organo) alkyl mercury compound
Mercury compounds [except (organo) alkyls] (as Hg) Mercury	7439-97-6	TWA 0.025 mg/m^3 (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m^3 [skin] Other: C 0.1 mg/m3 [skin]	TWA 0.1 mg/m^3	10 mg/m^3 (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.] BP: 674°F
Methyl tert-butyl ether (MTBE)	1634-04-4	TWA 50 ppm	No established REL	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane, respiratory; dizziness, nausea, headache, intoxication	Eyes, skin, mucous membrane, respiratory system, central nervous system	Colorless liquid BP: 55.2 C
Methylene Chloride	75-09-2	TWA 50 ppm, A3 - suspected human carcinogen	Ca	TWA 25 ppm STEL 125 ppm	Ca [2300 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor BP: 104°F UEL: 23% LEL: 13%
Naphtha (coal tar)	8030-30-6	None established	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	1000 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Reddish-brown, mobile liquid with an aromatic odor BP: 320-428°F Fl.P: 100-109°F Class II Combustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Naphthalene	91-20-3	TWA 10 ppm STEL 15 ppm	TWA 10 ppm (50 mg/m^3) STEL 15 ppm (75 mg/m^3)	TWA 10 ppm (50 mg/m^3)	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system	Colorless to brown solid with an odor of mothballs. BP: 424°F Fl.P: 174°F UEL: 5.9% LEL: 0.9%
n-Butylbenzene	104-51-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS depression, lung damage; nausea, vomiting, headache, dizziness, weakness, loss of coordination, blured vision, drowsiness, confusion, disorientation	Eyes, skin,repiratory system, central nervous system	Colorless liquid with a sweet odor BP: 183 C Fl.P: 59 C UEL: 5.8% LEL: 0.8%
Nickel	7440-02-0 (Metal)	TWA 1.5 mg/m^3 (elemental) TWA 0.1 mg/m^3 (soluble inorganic compounds) TWA 0.2 mg/m^3 (insoluble inorganic compounds) TWA 0.1 mg/m^3 (Nickle subsulfide)	Ca TWA 0.015 mg/m^3	TWA 1 mg/m^3	Ca [10 mg/m^3 (as Ni)]	inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Metal: Lustrous, silvery, odorless solid. BP: 5139°F
Nitrobenzene	98-95-3	TWA 1 ppm	TWA 1 ppm (5 mg/m^3) [skin]	TWA 1 ppm (5 mg/m^3) [skin]	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system	Yellow, oily liquid with a pungent odor like paste shoe polish. BP: 411°F Fl.P: 190°F LEL(200°F): 1.8%
n-Propylbenzene	103-65-1	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Harmful if swallowed, Irritation eyes, skin, digestive tract, respiratory tract, central nervous system	Eyes, skin, central nervous system, respiratory system	colorless or light yellow liquid BP: 159 C Fl.P: 47 C UEL: 6% LEL: 0.8%
Petroleum hydrocarbons(Petroleum distillates)	8002-05-9	None established	TWA 350 mg/m^3 C 1800 mg/m^3 [15 min]	TWA 500 ppm (2000 mg/m^3)	1,100 [10% LEL]	Inhalation; ingestion; skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness, headache, nausea; dried/cracked skin; chemical pneumonitis	CNS, eyes, respiratory system, skin	Colorless liquid with a gasoline or kerosene-like odor BP: 86-460°F Fl. Pt = -40 to -86°F UEL: 5.9% LEL: 1.1% Flammable liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Phenol	108-95-2	TWA 5 ppm	TWA 5 ppm (19 mg/m^3) C 15.6 ppm (60 mg/m^3) [15-minute] [skin]	TWA 5 ppm (19 mg/m^3) [skin]	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light-pink, crystalline solid with a sweet, acrid odor. BP: 359°F UEL: 8.6% LEL: 1.8%
p-Isopropyltoluene	99-87-6	None established	None established	None established	None established	inhalation, skin absorption, eye contact	Irritation skin	CNS, skin	Colorless, clear liquid, sweetish aromatic odor BP: 350.8°F Class III Flammable liquid
sec-Butylbenzene	135-98-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, upper airway; central nervous system, headache, dizziness; gastrointestinal disturbance	Respiratory system, central nervous system, eyes, skin;	Colorless liquid BP: 344°F Fl.P: 126 °F UEL: 6.9% LEL: 0.8% Combustible liquid
Selenium	7782-49-2	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	TWA 0.2 mg/m^3	1 mg/m^3 (as Se)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] BP: 1265°F
Silver	7440-22-4 (metal)	TWA 0.1 mg/m^3 (metal, dust, fumes) TWA 0.01 mg/m^3 (Soluble compounds, as Ag)	TWA 0.01 mg/m^3	TWA 0.01 mg/m^3	10 mg/m^3 (as Ag)	inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	Metal: White, lustrous solid BP: 3632°F
Slop Oil	69029-75-0	None established	None established	None established	None established	Inhalation; ingestion	Irritation eyes, skin, gastrointestinal tract	Eyes, skin, gastrointestinal tract	Clear light to dark amber liquid, with mild hydrocarbon odor. BP: >500°F Fl.P : 250°F
Sulfuric Acid	7664-93-9	TWA 0.2 mg/m^3	TWA 1 mg/m^3	TWA 1 mg/m^3	15 mg/m^3	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis	Eyes, skin, respiratory system, teeth	Colorless to dark-brown, oily, odorless liquid. BP: 554°F Noncombustible Liquid
tert-Butylbenzene	98-06-6	None established	None established	None established	None established	inhalation, skin absorption, ingestion,	Eye and respiratory irritant; CNS depression; liver or kidney damage	Respiratory system, central nervous system, eyes, liver, kidney	Colorless liquid with an aromatic odor BP: 168 - 169 C Fl.P: 34 C UEL:5.6 % LEL: 0.8 %

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm (STEL) listed as A3, animal carcinogen	Ca Minimize workplace exposure concentrations	TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor. BP: 250°F Noncombustible Liquid
Toluene	108-88-3	TWA 20 ppm	TWA 100 ppm (375 mg/m^3) STEL 150 ppm (560 mg/m^3)	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F Fl.P: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid
trans-1,2-Dichloroethene	156-60-5	TWA 200 ppm	None established	TWA 200 ppm STEL 250 ppm (skin)	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Narcotic. Irritation eyes, skin, respiratory tract, mucous membrane; CNS depression.	Respiratory tract, mucous membrane, eyes, skin, CNS	Colorless liquid with a fruity pleasant odor BP: 48°C Fl.P 6C UEL: 12.8% LEL: 9.7%
Trichloroethene	79-01-6	TWA 10 ppm STEL 25 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	Ca [1000 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor. BP: 189°F UEL(77°F): 10.5% LEL(77°F): 8%
Vinyl Chloride	75-01-4	TWA 1 ppm	Carcinogen	TWA 1 ppm C 5 ppm [15-minute]	Ca [IDLH value has not been determined]	inhalation, skin, and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Liver, central nervous system, blood, respiratory system, lymphatic system	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. BP: 7°F UEL: 33.0% LEL: 3.6% Flammable Gas
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 100 ppm (435 mg/m^3) STEL 150 ppm	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	900 ppm	Skin absorption, inhalation, ingestion, skin, and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Classs C Flammable Liquid
Zinc	7440-66-6	TWA 10 mg/m3 (Inhalable fraction)	None established	TWA 10 mg/m3 (for zinc oxide fume)	None established	skin and/or eye contact, inhalation, ingestion	Irritation eyes, skin, respiratory tract; gastrointestinal disturbances	Eyes, skin, respiratory system	Bluish gray solid BP: 1664.6°F Flammable

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

References

U.S. Department of Labor. 1990. OSHA Regulated Hazardous Substances, industrial Exposure and Control Technologies Government Institutes, Inc.
Hawley's Condensed Chemical Dictionary, Sax, N. Van Nostrand and Reinhold Company, 11th Edition, 1987.
Proctor, N.H., J.P. Hughes and M.L. Fischman, 1989. Chemical Hazards of the Workplace. Van Nostrand Reinhold. New York.
Sax, N.I. and R.J. Lewis. 1989. Dangerous Properties of Industrial Materials. 7th Edition. Van Nostrand Reinhold. New York.
Guide to Occupational Exposure Values. 2008. American Conference of Governmental Industrial Hygienists (ACGIH).
NIOSH Pocket Guide to Chemical Hazards. 2005. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health

Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists.
BP – boiling point at 1 atmosphere, °F
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.
Ca - considered by NIOSH to be a potential occupational carcinogen
CAS# Chemical Abstracts Service registry number which is unique for each chemical.
Fl. Pt. – Flash point
IDLH - Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature)
mg/m^3 – Milligrams of substance per cubic meter of air
NIOSH -National Institute for Occupational Safety and Health.
OSHA – Occupational Safety and Health Administration
PEL - OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.
ppm – parts per million
REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week
STEL – Short-term exposure limit
TLV -ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).
TWA – 8-hour, time-weighted average
UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)

TABLE 2

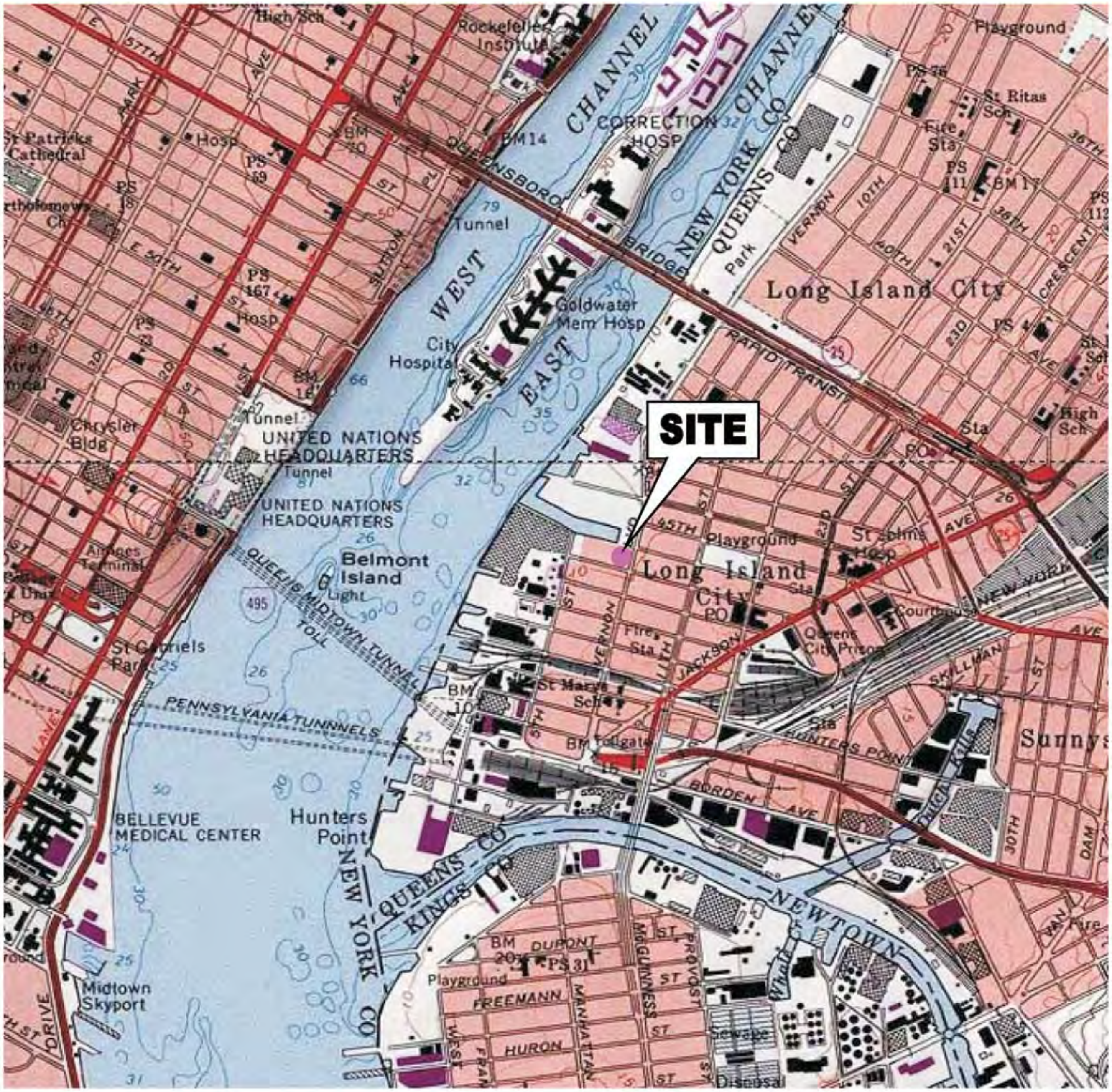
ACTION LEVELS FOR WORKER BREATHING ZONE

Instrument	Action Level *	Level of Respiratory Protection/Action
PID	0 to <5 ppm (one minute sustained)	Level D *
PID	>5 to <50 ppm (one minute sustained)	Utilize APR (Level C)
PID	>50 to <100 ppm (one minute sustained)	Level B
PID	>100ppm	Stop work** (ventilate, apply foam)
CGI/H_2S Meter	<5%	Level D
CGI/H_2S Meter	>5% to <25%	Level B
CGI/H_2S Meter	>25%	Stop work**
CGI/CO Meter	>25%	Level B
CGI/CO Meter	>50%	Stop work** (ventilate area)
CGI/O_2 Meter	<10% LEL, in excavation	Level D
	19.5% oxygen – 23.5%	Level D
CGI/O_2 Meter	>10% LEL, in excavation	Allow to vent, apply foam**
	>23.5% oxygen	Stop work, Oxygen Enriched ATM**
Dust Monitor	0 – 1.0 mg/m^3, 5-minutes average	Level D
Dust Monitor	>1.0 to 5.0 mg/m^3, 5-minutes average	Level D – Institute dust suppression measures
Dust Monitor	5.0 to >50 mg/m^3, 5-minute average	Level C – Institute dust suppression measures

Note: Action levels are based on above background levels.

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

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



QUADRANGLE LOCATION

N

0 2000'

SOURCE:
USGS; 1995, Central Park & Brooklyn
7.5 Minute Topographic Quadrangle

Title:

SITE LOCATION MAP

FORMER PARAGON PAINT AND VARNISH
COMPANY MANUFACTURING FACILITY
5-49 46TH AVENUE & 45-40 VERNON BOULEVARD
LONG ISLAND CITY, NEW YORK

Prepared for:

VERNON 4540 REALTY LLC

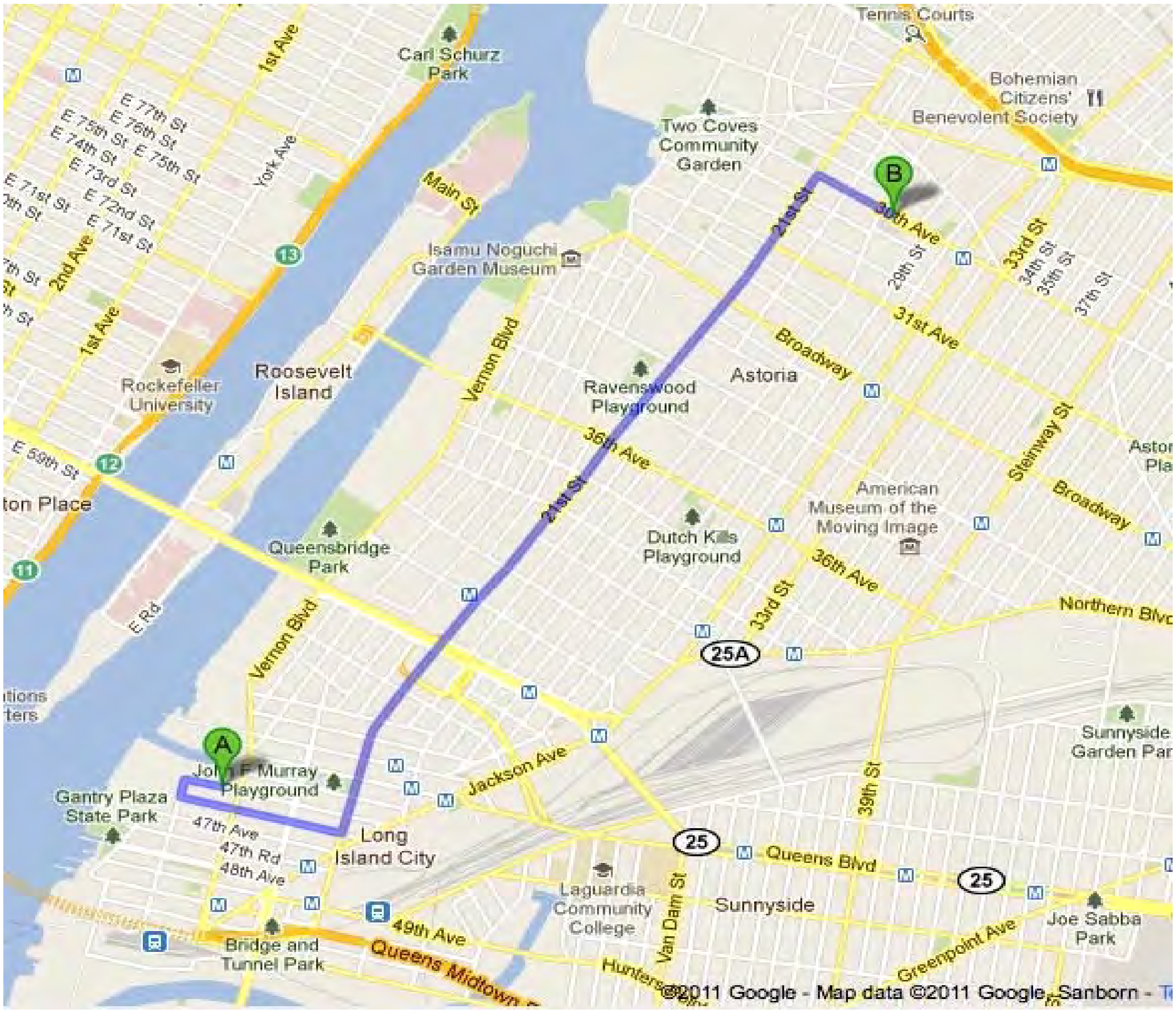
ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: R.M.	Date: 11OCT11	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: R.M.	Project No.: 2051.0001Y000	
File: 2051.0001Y105.01.CDR		

V:\CAD\PROJECTS\2051Y\0001Y105\2051.0001Y105.01.CDR

FIGURE 2

Directions to Mt. Sinai Queens Hospital – 25-10 30th Avenue, Long Island City, New York



- Head west on 46th Avenue toward 5th Street
- Turn left onto 46th Road
- Take the third left onto 21st Street
- Turn right onto 30th Avenue
- Arrive at Mt. Sinai Queens Hospital on your right

APPENDIX A

Activity Hazard Analysis and Material Safety Data Sheets

ACTIVITY HAZARD ANALYSIS

ACTIVITY: Mobilization/Demobilization **Analyzed by / Date:________________________**

Principal Steps	**Potential Hazards**	**Recommended Controls**
Temporary Facilities Set Up (Support and CRZ zones)	Noise	Ear plugs, ear muffs.
	Eyes	Safety glasses with side shields, safety visor or shield.
	Slips-Trips-Falls	Be sure footing is in a clear area free of loose material.
	Power Tools	Hard hats, work gloves.
	Heat Stress/Cold Stress	Follow heat stress/cold stress guidelines in HASP appendices.
	Cuts and Abrasions	Wear work gloves.
	Punctures	Wear puncture resistant steel toed boots, long sleeve shirts, work shirts or coveralls.
	Electrocution	Ground fault circuit interrupters, inspect power supply cords of equipment prior to use.
	Traffic Hazards	Wear orange safety vests and/or high visibility clothing.
	Insect Bites/Wildlife	Use insect repellent. Avoid contact with all wildlife.
	Sun exposure	Use sunscreen as needed, take breaks in shaded areas, drink ample fluids.

Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Power Tools (e.g., Drills, Saws) Hand Tools (e.g., Hammer, Shovel, Pry Bars) Trailers, Vehicles, Low Boy, Heavy Equipment	Daily inspections to insure personnel wear appropriate PPE during mobilization and demobilization and survey work. Inspect equipment for wear or damage, test emergency shut-off switches. Ensure all equipment on wheels is chocked per Wheel Chocking Policy.	Tool box safety meetings. Review heavy equipment safety guidelines. Review Wheel Chocking Policy.

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Contaminated Soil Excavation **Analyzed by / Date:__________________________**

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

ACTIVITY HAZARD ANALYSIS

(Continued)

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Drilling Activities **Analyzed by / Date:**_________________________

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Drilling Activities **Analyzed by / Date:**________________________

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Miscellaneous Fill Placement **Analyzed by / Date:**________________________

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation **Analyzed by / Date:________________________**

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: Sheeting/Pile Installation **Analyzed by / Date:**_________________________

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

ACTIVITY HAZARD ANALYSIS

(Continued)

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

ACTIVITY HAZARD ANALYSIS

(Continued)

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

ACTIVITY HAZARD ANALYSIS

(Continued)

ACTIVITY: In-situ Chemical Injections **Analyzed by / Date:**________________________

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

ACTIVITY HAZARD ANALYSIS

(Continued)

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

APPENDIX B

Heat and Cold Stress Guidelines

Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment (PPE) in hot weather environments.

Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat cramps are as follows:

- severe muscle cramps, usually in the legs and abdomen;
- exhaustion, often to the point of collapse; and
- dizziness or periods of faintness.

First aid treatment includes moving to a shaded area, rest, and fluid intake. Normally, the individual should recover within one-half hour. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to a hospital for medical attention.

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat. The circulatory system of the individual fails as blood collects near the skin in an effort to rid the body of excess heat. The signs and symptoms of heat exhaustion are as follows:

- rapid and shallow breathing;
- weak pulse;
- cold and clammy skin with heavy perspiration;
- skin appears pale;
- fatigue and weakness;
- dizziness; and
- elevated body temperature.

First aid treatment includes cooling the victim, elevating the feet, and replacing fluids and electrolytes. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to the hospital for medical attention.

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a **MEDICAL EMERGENCY**, requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- dry, hot, red skin;
- body temperature approaching or above 105°F;
- large (dilated) pupils; and
- loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility.

Heat stress (heat cramps, heat exhaustion, and heat stroke) is a significant hazard if any type of protective equipment (semi-permeable or impermeable) which prevents evaporative cooling is worn in hot weather environments. Local weather conditions may require restricted work schedules in order to adequately protect personnel. The use of work/rest cycles (including working in the cooler periods of the day or evening) and training on the signs and symptoms of heat stress should help prevent heat-related illnesses from occurring. Work/rest cycles will depend on the work load required to perform each task, type of protective equipment, temperature, and humidity. In general, when the temperature exceeds 88°F, a 15 minute rest cycle will be initiated once every two hours. In addition, potable water and fluids containing electrolytes (e.g., Gatorade) will be available to replace lost body fluids.

Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 40°F. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. Training on the signs and symptoms of cold stress should prevent cold-related illnesses from occurring. The signs and symptoms of cold stress include the following:

- severe shivering;
- abnormal behavior;

- slowing of body movement;
- confusion;
- weakness;
- stumbling or repeated falling;
- inability to walk;
- collapse; and/or
- unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks, and encourage activity, such as walking wrapped in a blanket.

APPENDIX C

Medical Data Form

MEDICAL DATA SHEET

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

(This form should be typed or printed legibly.)

Site: ______________________________

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

Address: ______________________________

Date of Birth: ______________ Height: ______________ Weight: ______________

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

Drug Allergies or Other Allergies: ______________________________

Previous Illnesses or Exposures to Hazardous Substances: ______________________________

Current Medication (Prescription and Non-Prescription): ______________________________

Medical Restrictions: ______________________________

Name, Address and Telephone Number of Person Physician: ______________________________

APPENDIX D

Health and Safety
Briefing/Tailgate Meeting Form

HEALTH AND SAFETY BRIEFING / TAILGATE MEETING FORM

Site Name / Location ______________________________

Date: ____________________ Weather Forecast: ____________________

Names of Personnel Attending Briefing

Planned Work

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

Items Discussed

Work Permit Type and Applicable Restrictions

Signatures of Attending Personnel

APPENDIX E

Accident Report and Investigation Form

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

ACCIDENT REPORT

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

PART 1: ADMINISTRATIVE INFORMATION

Project #: ______________________
Project Name: ______________________
Project Location (street address/city/state):
____
____

Client Corporate Name / Contact / Address / Phone #:
____
____
____
____
____

Immediate Verbal Notifications Given To:

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

REPORT STATUS (time due):

☐ Initial (24 hr) ☐ Final (5-10 days)
Date: ____________ Date: ____________

Accident Report Delivered To:

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

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

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

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

DATE OF INCIDENT: ________________

TIME INCIDENT OCCURRED: ____________ ☐AM ☐PM

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

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

☐INJURY **☐ILLNESS**

------------------------**Severity Level**---------------------------

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

OTHER INCIDENT TYPES

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

☐Misdirected Waste
☐Property Damage
☐Motor Vehicle

☐Consent Order ☐NOV
☐Exceedance
☐Fine / Penalty

ACTIVITY TYPE (Check most appropriate one.)

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

INJURY TYPE (Check all applicable.)

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

BODY PART AFFECTED (Check all applicable.)

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

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

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

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

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

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

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

2)				$

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

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

PART 2: WHAT HAPPENED AND INCIDENT DETAILS

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

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

Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of Notification:	Exact Information Reported/Provided:

II. PUBLIC RESPONSES TO INCIDENT (if applicable)

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

Describe Response/Inquiry:

Roux/Remedial Response:

(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)

ATTACHED INFORMATION: ☐Photo ☐Sketches ☐Vehicle Acord Form ☐Police Report ☐Other

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

PART 3: INVESTIGATION TEAM ANALYSIS

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

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

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

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

INVESTIGATION TEAM:

PRINT NAME	JOB POSITION	DATE	SIGNATURE

APPENDIX F

Acord Form

ACORD™

AUTOMOBILE LOSS NOTICE

DATE

PRODUCER

PHONE (A/C, No, Ext): 516-678-2626

James C. Herrmann & Associates LTD
265 Sunrise Highway, Suite #20
Rockville Centre, NY 11570

CODE:
SUB CODE:
AGENCY CUSTOMER ID:

COMPANY
NAIC CODE: 19410
Commerce & Industry

MISCELLANEOUS INFO (Site & location code)

POLICY NUMBER
CA-3777920

REFERENCE NUMBER
CAT #

EFFECTIVE DATE	EXPIRATION DATE	DATE OF ACCIDENT AND TIME		PREVIOUSLY REPORTED
06/01/10	06/01/11		☐ AM ☐ PM	☐ YES ☐ NO

INSURED

NAME AND ADDRESS
SOC SEC # OR FEIN: 11-2579482

Roux Associates, Inc.
209 Shafter Street
Islandia, NY 11749

RESIDENCE PHONE (A/C, No): NA
BUSINESS PHONE (A/C, No, Ext): 631-232-2600

CONTACT

☐ CONTACT INSURED

NAME AND ADDRESS

Susan Sullivan, General Counsel
Roux Associates, Inc.
209 Shafter Street
Islandia, NY 11749

RESIDENCE PHONE (A/C, No):
BUSINESS PHONE (A/C, No, Ext): 631-232-2600

WHERE TO CONTACT
Fax Notice:
631-232-1525

WHEN TO CONTACT

LOSS

LOCATION OF ACCIDENT (Include city & state)

AUTHORITY CONTACTED:
REPORT #:

VIOLATIONS/CITATIONS

DESCRIPTION OF ACCIDENT (Use separate sheet, if necessary)

POLICY INFORMATION

BODILY INJURY (Per Person)	BODILY INJURY (Per Accident)	PROPERTY DAMAGE	SINGLE LIMIT	MEDICAL PAYMENT	OTC DEDUCTIBLE	OTHER COVERAGE & DEDUCTIBLES (UM, no-fault, towing, etc)

LOSS PAYEE

COLLISION DED

UMBRELLA/EXCESS ☐ UMBRELLA ☐ EXCESS CARRIER:
LIMITS: AGGR PER CLAIM/OCC SIR/DED

INSURED VEHICLE

VEH #
YEAR
MAKE:
BODY TYPE:
MODEL:
V.I.N.:
PLATE NUMBER
STATE

OWNER'S NAME & ADDRESS
RESIDENCE PHONE (A/C, No):
BUSINESS PHONE (A/C, No, Ext):

DRIVER'S NAME & ADDRESS
☐ (Check if same as owner)
RESIDENCE PHONE (A/C, No):
BUSINESS PHONE (A/C, No, Ext):

RELATION TO INSURED (Employee, family, etc.)	DATE OF BIRTH	DRIVER'S LICENSE NUMBER	STATE	PURPOSE OF USE	USED WITH PERMISSION?
Employee					☐ YES ☐ NO

DESCRIBE DAMAGE
ESTIMATE AMOUNT
WHERE CAN VEHICLE BE SEEN?
WHEN CAN VEH BE SEEN?
OTHER INSURANCE ON VEHICLE

PROPERTY DAMAGED

DESCRIBE PROPERTY (If auto, year, make, model, plate #)
OTHER VEH/PROP INS? ☐ YES ☐ NO
COMPANY OR AGENCY NAME:
POLICY #:

OWNER'S NAME & ADDRESS
RESIDENCE PHONE (A/C, No):
BUSINESS PHONE (A/C, No, Ext):

OTHER DRIVER'S NAME & ADDRESS
☐ (Check if same as owner)
RESIDENCE PHONE (A/C, No):
BUSINESS PHONE (A/C, No, Ext):

DESCRIBE DAMAGE
ESTIMATE AMOUNT
WHERE CAN DAMAGE BE SEEN?

INJURED

NAME & ADDRESS	PHONE (A/C, No)	PED	INS VEH	OTH VEH	AGE	EXTENT OF INJURY

WITNESSES OR PASSENGERS

NAME & ADDRESS	PHONE (A/C, No)	INS VEH	OTH VEH	OTHER (Specify)

REMARKS (Include adjuster assigned)

REPORTED BY	REPORTED TO	SIGNATURE OF INSURED	SIGNATURE OF PRODUCER

NOTE: IMPORTANT STATE INFORMATION ON REVERSE SIDE

Applicable in Arizona

For your protection, Arizona law requires the following statement to appear on this form. Any person who knowingly presents a false or fraudulent claim for payment of a loss is subject to criminal and civil penalties.

Applicable in Arkansas, District of Columbia, Kentucky, Louisiana, Maine, Michigan, New Jersey, New Mexico, Pennsylvania and Virginia

Any person who knowingly and with intent to defraud any insurance company or another person, files a statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact, material thereto, commits a fraudulent insurance act, which is a crime, subject to criminal prosecution and civil penalties. In D.C., LA, ME and VA insurance benefits may also be denied.

Applicable in California

Any person who knowingly files a statement of claim containing any false or misleading information is subject to criminal and civil penalties.

Applicable in Colorado

It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policy holder or claimant for the purpose of defrauding or attempting to defraud the policy holder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

Applicable in Florida and Idaho

Any person who knowingly and with the intent to injure, Defraud, or Deceive any Insurance Company Files a Statement of Claim Containing any False, Incomplete or Misleading information is Guilty of a Felony.*

* In Florida - Third Degree Felony

Applicable in Hawaii

For your protection, Hawaii law requires you to be informed that presenting a fraudulanet claim for payment of a loss or benefit is a crime punishable by fines or imprisonment , or both.

Applicable in Indiana

A person who knowingly and with intent to defraud an insurer files a statement of claim containing any false, incomplete, or misleading information commits a felony.

Applicable in Minnesota

A person who files a claim with intent to defraud or helps commit a fraud against an insurer is guilty of a crime.

Applicable in Nevada

Pursuant to NRS 686A.291, any person who knowingly and willfully files a statement of claim that contains any false, incomplete or misleading information concerning a material fact is guilty of a felony.

Applicable in New Hampshire

Any person who, with purpose to injure, defraud or deceive any insurance company, files a statement of claim containing any false, incomplete or misleading information is subject to prosecution and punishment for insurance fraud, as provided in RSA 638:20.

Applicable in New York

Any person who knowingly makes or knowingly assists, abets, solicits or conspires with another to make a false report of the theft, destruction, damage or conversion of any motor vehicle to a law enforcement agency, the Department of Motor Vehicles or an insurance company, commits a fraudulent insurance act, which is a crime, and shall also be subject to a civil penalty not to exceed five thousand dollars and the value of the subject motor vehicle or stated claim for each violation.

Applicable in Ohio

Any person who, with intent to defraud or knowing that he/she is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

Applicable in Oklahoma

WARNING: Any person who knowingly and with intent to injure, defraud or deceive any insurer, makes any claim for the proceeds of an insurance policy containing any false, incomplete or misleading information is guilty of a felony.

APPENDIX G

OSHA 300

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

Log of Work-Related Injuries and Illnesses

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

Year _______

U.S. Department of Labor

Occupational Safety and Health Administration

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

Form approved OMB no. 1218-0176

Establishment name ____________________

City ________________ State __________

Identify the person				Describe the case		Classify the case											
						CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M)					
								Job transfer or restriction	Other record-able cases			Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
					Page totals	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
												Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
												(1)	(2)	(3)	(4)	(5)	(6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300A (Rev. 01/2004)
Summary of Work-Related Injuries and Illnesses

Year ______

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

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of…
(M)

(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

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

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name ____________________

Street ____________________

City ____________ State ____________ Zip ______

Industry description (e.g., Manufacture of motor truck trailers)

____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

__ __ __ __

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

__ __ __ __ __ __

Employment information

Annual average number of employees ________

Total hours worked by all employees last year ________

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

____________________ ____________
Company executive Title

____________________ ____________
Phone Date

OSHA's Form 301
Injuries and Illnesses Incident Report

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

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

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Repor* t is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains

If you need additional copies of this form, you may photocopy and use as many as you need.

Information about the employee

1) Full Name ____________________

2) Street ____________________

City ____________ State ______ Zip ________

3) Date of birth ____________________

4) Date hired ____________________

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional

____

____

7) If treatment was given away from the worksite, where was it given?

Facility ____________________

Street ____________________

City ____________ State ______ Zip ________

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the Log ________ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ________

12) Time employee began work ________ AM/PM

13) Time of event ________ AM/PM ☐ Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt", "pain", or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

18) **If the employee died, when did death occur?** Date of death

Completed by ____________________

Title ____________________

Phone ____________ Date ____________

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

APPENDIX H

Weekly Safety Report

APPENDIX H

WEEKLY SAFETY REPORT

Job Name______________________________ Job#______________________

Week of: Days Without Lost Time Injury:

Describe any recordable incidents or accidents:

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

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

What level of PPE is currently in place?

Has PPE been upgraded or downgraded?

Have Perimeter Air Monitoring action limits been exceeded:

What action was taken to mitigate the exceedance?

Have personal air monitoring limits been exceeded:

What actions were taken?

List any problems with air monitoring equipment:

Write a summary of work completed during the week:

Write a summary of proposed work for the coming week:

Summarize any safety issues that are outstanding:

HSO Name: ________________________ HSO Signature: ________________________

APPENDIX I

Job Safety and Health Protection Poster

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act.*
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA

www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165

APPENDIX J

Community Air Monitoring Program

September 29, 2015

SITE-SPECIFIC
COMMUNITY AIR MONITORING PLAN

Paragon Pain and Varnish Corp. Site
5-43 to 5-49 46th Avenue and
45-38 to 45-40 Vernon Boulevard

Prepared for

VERNON 4540 REALTY, LLC
45 Carlton Avenue
Larchmont, **New York 10538**

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

TABLE OF CONTENTS

TABLE

APPENDICES

1.0 INTRODUCTION

Remedial Engineering, P.C and Roux Associates, Inc. (collectively referred to herein as Roux Associates), on behalf of VERNON 4540 L.L.C. (the “Applicant”), have developed a project specific Community Air Monitoring Plan (CAMP) to implement real time monitoring at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard (Tax Block 26, Lot 4) in Long Island City, State of New York (Site) during soil excavation/foundation construction activities. Based on the results of previous investigations conducted, volatile organic compounds (VOCs) and particulates have been identified as contaminants of potential concern (COPC). Additionally, residual petroleum (and associated VOCs) poses the potential for nuisance odors to adjacent offsite receptors. The monitoring program will screen and analyze ambient air for total VOCs and particulate concentrations at the downwind perimeter of the Site. The monitoring program will be implemented at all times during excavation of the Site and while performing any support of excavation and excavation construction activities that could potentially cause vapors or particulates to migrate towards the Site perimeter. The CAMP is designed to provide a measure of protection for the downwind community and onsite workers not directly involved with the subject work activities from potential airborne contaminant releases as a direct result of remedial and construction activities. This plan is consistent with the New York State Department of Health’s (NYSDOH) Generic Community Air Monitoring Plan guidance document.

Roux Associates shall be responsible for implementation of the CAMP and will have direct and constant communication with all components of the remediation team in order to effectively and instantaneously initiate the necessary onsite controls to prevent and/or minimize offsite migration of fugitive dust or air.

Given the Site-specific characteristics, it is expected that the odor threshold will be lower than the minimum allowable VOC air concentrations. As such, primary emphasis will be placed on odor management as part of the CAMP and Site Operations Plan (SOP) implementation. The suppression techniques discussed in Section 1.4 addresses not only VOCs and particulates, but odors as well. This comprehensive odor management approach will minimize the potential for exceedance of the VOC action levels.

Additionally, a significant portion of the intrusive activities will be conducted in a relatively deep excavation with substantial work below the water table in moist soil. This high moisture content will provide for “natural” dust suppression in these areas. The implementation of direct loading and offsite transport of excavated soils will also minimize particulate issues.

The specifics of the CAMP are presented in the following four (4) sections:

- 1.1 VOC Monitoring Approach
- 1.2 Particulate Monitoring Approach
- 1.3 Meteorological Monitoring Approach
- 1.4 Available Suppression Techniques

1.1 VOC Monitoring Approach

Due to the relatively small size of the Site, it is not practical to monitor individual work areas within the Site. Thus, total VOC concentrations in air will be monitored continuously at the upwind and downwind perimeters of the Site during all ground intrusive activities. The VOC monitoring equipment will be located at temporary monitoring stations that will be established daily based on Site logistics and weather conditions. The monitoring work will be conducted using MiniRAE 3000 portable VOC monitors, or similar type monitors, for all VOC monitoring. The equipment will be calibrated at least once daily using isobutylene as the calibration gas. One (1) upwind and one (1) downwind monitor will be deployed each day. In addition, one roaming portable VOC monitor will be used to evaluate the VOC concentrations in the neighboring community three times a day during times of active excavation to ensure no potential nuisance odors travel offsite. Each monitoring unit is equipped with an audible alarm to indicate exceedance of the action levels (as defined below and summarized in Table 1).

The equipment is capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total VOCs at the downwind perimeter of the Site 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.

- If the ambient air concentration of total VOCs at the downwind perimeter of the Site persists at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of VOCs identified, suppression techniques employed to abate emissions, and monitoring continued. After these steps, work activities can resume if the total organic vapor level at the Site perimeter is below 5 ppm over the background concentration for the 15-minute average. If levels are in excess of 25 ppm above background, identified contributing ground-intrusive activities will be halted and vapor suppression techniques will be evaluated and modified until monitoring indicates VOC levels at the Site perimeter are below 5 ppm over background. Once VOC levels are below 5 ppm at the Site perimeter, work will resume with continued monitoring.

All 15-minute readings will be recorded and be available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an Action Limit Report will be completed, identifying the monitoring device location, the measured VOC level, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Additionally, the NYSDEC and NYSDOH will be notified within 24 hours of the VOC Action Limit Report generation. Daily monitoring equipment locations and meteorological conditions will also be documented on the daily CAMP Monitoring Location Plan, as shown in Appendix B. All documentation will be kept on file at the Site. Chemical specific air monitoring using similar methods and procedures as outlined for the VOCs baseline sampling will be conducted if perimeter action levels for VOCs are regularly exceeded or nuisance odors (as defined by offsite odor complaints) are prevalent offsite.

1.2 Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the Site at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action levels (as defined below and summarized in Table 1). Monitoring equipment will be MIE Data Ram monitors or equivalent. A minimum of one (1) upwind and one (1) downwind monitor will be deployed each day, equipped with an omni-directional sampling inlet and a PM-10 sample head. The data logging averaging period will be set to 15-minutes with time and date stamp recording. Alarm averaging will be set at 90 micrograms per cubic meter (µg/m^3) above the average background concentration per 15-minute period. This setting will allow proactive evaluation of Site conditions prior to reaching Action Levels of 100 µg/m^3 above background. The equipment will be outfitted with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The monitoring will be used to compare values to the following:

- If the downwind PM-10 particulate level is 100 µg/m^3 greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the Site, 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 µg/m^3 above the upwind level and provided that no visible dust is migrating from the Site.

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

All 15-minute readings will be recorded and be available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an Action Limit Report will be completed, identifying the monitoring device location, the measured particulate concentration, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Daily monitoring equipment locations and meteorological conditions will also be documented on the daily CAMP Monitoring Location Plan, as shown in Appendix B. All documentation will be kept on file at the Site.

1.3 Meteorological Monitoring

Meteorological data consisting of wind speed, wind direction, temperature, barometric pressure, and relative humidity will be collected. At a minimum, a full set of meteorological parameters will be measured and recorded at the start of each workday, noon of each workday, and the end of each workday. Wind direction readings will be utilized to position the VOC and particulate monitoring equipment in appropriate upwind and downwind locations. A Davis Corporation wireless instrument station or equivalent will be used to measure and log the meteorological monitoring data.

1.4 Available Suppression Techniques

During all intrusive activities, vapor suppression foam will be applied routinely to areas where there is active excavation and handling or exposure of grossly contaminated odor-producing soils/materials to preemptively mitigate the potential for odors, VOCs, and particulates to be released into the air. Water misting via controlled fire hose and/or dedicated water truck will be utilized as necessary to mitigate the potential for particulate/dust release in non-contaminated Site work areas and roadways. Excavation methods and material staging and loading methods will be continually evaluated and modified (as necessary) to alleviate the potential for odor, VOCs, and particulate releases.

If nuisance odors are identified, 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 complaints about the project from the local community. Implementation of all odor controls, including the halt of work, will be the responsibility of the Contractor.

1.5 Reporting

All recorded monitoring data will be downloaded and field logged daily, including action limit reports (if any) and daily CAMP monitoring location plans. All records will be maintained onsite for NYSDEC/NYSDOH review. The results of the CAMP monitoring will be submitted to the NYSDEC and NYSDOH in monthly CAMP data summary reports that will contain all of the CAMP data collected during the month, daily monitoring station location maps, and copies of the month’s Action Limit Reports (ALRs) (if any). A description of all CAMP-related activities will also be included in the Monthly Progress Report submitted to the NYSDEC and NYSDOH. Additionally, all CAMP monitoring records will be included in the overall Remedial Action Completion Report that will be submitted to the NYSDEC and NYSDOH. If an ALR is generated due to VOC exceedances, the NYSDEC and NYSDOH will be notified within 24 hours of the exceedance.

Table 1. Action Limit Summary for VOCs and Particulates, 5-43 to 5-49 46th Avenue and 45-38 to 45 40 Vernon Boulevard

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

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

COMMUNITY AIR MONITORING PLAN

APPENDIX A

Action Limit Report

ACTION LIMIT REPORT

Project Location: 5-43 to 5-49 46th Avenue and 45-38 to 45 40 Vernon Boulevard

Date: ______________________________ Time: ______________________________

Name: ____

Contaminant: PM-10: ______________ VOC: ______________________________

Wind Speed: ______________ Wind Direction: ______________________________

Temperature: ______________ Barometric Pressure: ______________________________

DOWNWIND DATA

Monitor ID #: ______________ Location:______________________ Level Reported: __________

Monitor ID#: ______________ Location:______________________ Level Reported: __________

UPWIND DATA

Monitor ID #: ______________ Location:______________________ Level Reported: __________

Monitor ID#: ______________ Location:______________________ Level Reported: __________

BACKGROUND CORRECTED LEVELS

Monitor ID #: ______________ Location:______________________ Level Reported: __________

Monitor ID#: ______________ Location:______________________ Level Reported: __________

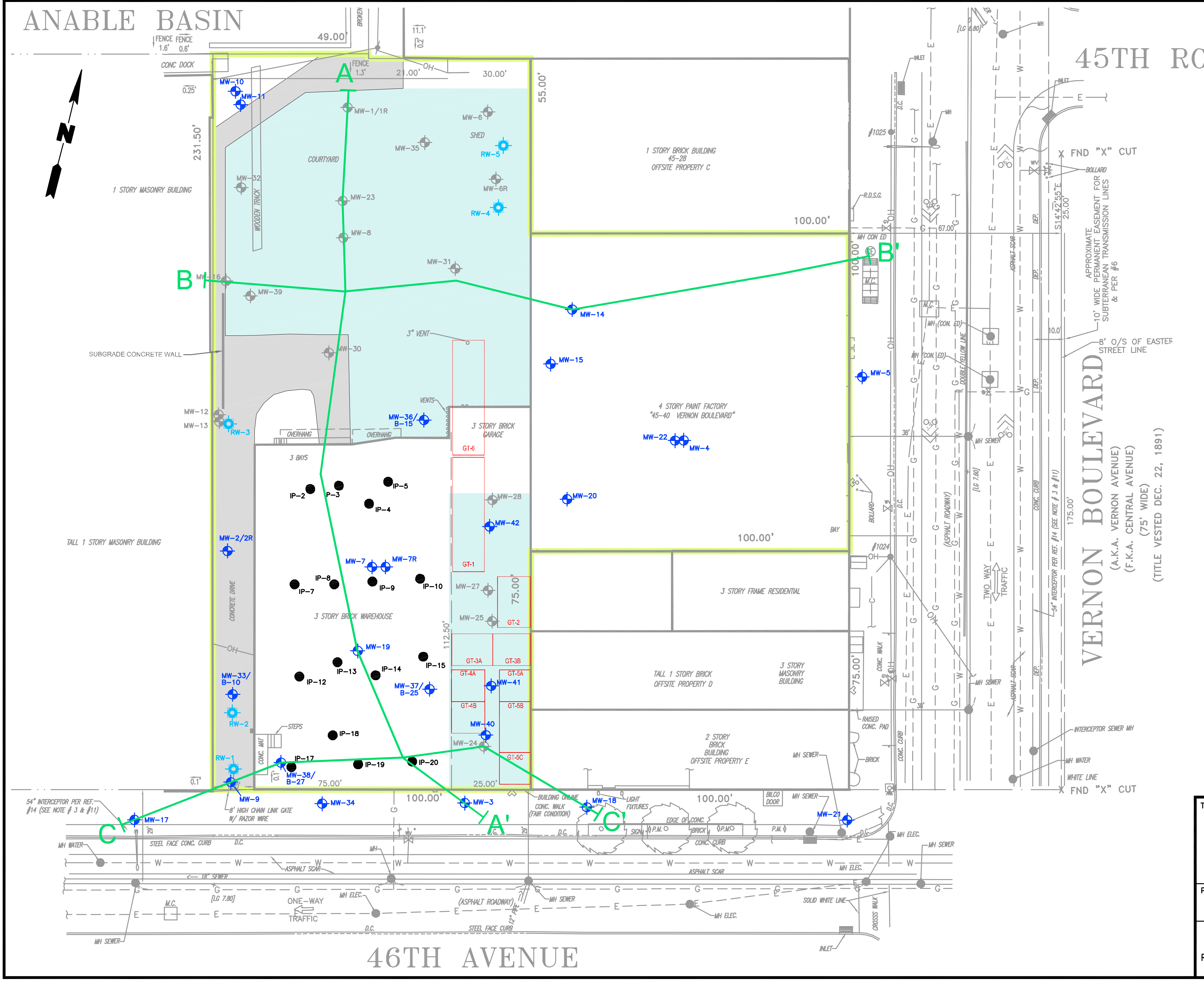
ACTIVITY DESCRIPTION

CORRECTIVE ACTION TAKEN

COMMUNITY AIR MONITORING PLAN

APPENDIX B

Daily CAMP Monitoring Location Plan



LEGEND

MW-5	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
MW-8	LOCATION AND DESIGNATION OF ABANDONED MONITORING WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
🟩	PROPERTY BOUNDARY
GT-6	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
▨	ASPHALT CAP
🟦	RECYCLED CONCRETE AGGREGATE (MIN. 2 FT)
A├─┤A'	LINE OF GEOLOGIC CROSS SECTION

Title:

SITE LAYOUT MAP

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: R.M.	Date: 15JUN16	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y204.01.DWG		

V:\CAD\PROJECTS\2051\0001Y\204\2051.0001Y204.01.DWG

APPENDIX G

Quality Assurance Project Plan

Quality Assurance Project Plan

Former Paragon Paint Manufacturing Facility
5-43 to 5-49 46th Avenue and
45-38 to 45-40 Vernon Boulevard
Long Island City, New York
Site No. C241108

April 3, 2021

Prepared for:

CSC 4540 Property Co, LLC
757 Third Avenue, 17th Floor,
New York, New York 10017

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.
209 Shafter Street
Islandia, New York 11749

Environmental Consulting
& Management
+1.800.322.ROUX
rouxinc.com

Table of Contents

Table

Figure

Appendices

1. Introduction

This Quality Assurance Project Plan (QAPP) has been prepared to describe the measures that will be taken to ensure that the data generated during performance of the Site Management Phase (SMP) at the property identified as the former Paragon Paint manufacturing facility located at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, in Long Island City (Site) are of sufficient quality to meet project-specific data quality objectives (DQOs). The QAPP was prepared in accordance with the guidance provided in New York State Department of Environmental Conservation (NYSDEC) Technical Guidance DER-10 (Technical Guidance for Site Investigation and Remediation), the Brownfield Cleanup Program Guide and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G-4).

2. Project Objectives and Scope

As described in the SMP, the objectives are to manage the residual contamination and monitor the extent of light non-aqueous phase liquid (LNAPL) and volatile organic compound (VOC) impacts in groundwater. In order to achieve project objectives, Roux Environmental Engineering and Geology (Roux) has developed a scope of work for the sampling of groundwater. A brief overview of the work is provided below. SMP sampling locations are shown in Figure 1.

2.1 Groundwater

There are currently 30 monitoring wells at the Site. All monitoring wells will be gauged using an electronic interface probe capable of detecting light non-aqueous phase liquid (LNAPL) with an accuracy of +/- 0.01 feet.

Of the 30 monitoring wells, 21 are part of the SMP monitoring network. Figure 1 includes a map showing the locations and designations of all monitoring wells at the Site. Groundwater samples will be collected from those wells that do not exhibit any LNAPL at the time of gauging.

Samples will be analyzed for TCL VOCs plus Tentatively Identified Compounds (TICs) (USEPA Method 8260). Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured.

In addition, a request was made by the NYSDEC on March 4, 2021 to analyze groundwater at the Site for emerging contaminants (ECs) 1,4-dioxane and per- and poly-fluoroalkyl substances (PFAS) in support of a mandatory State-wide evaluation. Four (4) monitoring wells within the existing SMP monitoring network will be analyzed for ECs, with one well selected for analysis at the following representative locations across the Site:

- Driveway (MW-33 or MW-2)
- Warehouse (MW-37 or MW-38)
- Courtyard (MW-46 or MW-44) and
- Paint factory (MW-48 or MW-4).

Samples will be analyzed for 1,4-dioxane using USEPA Method 8270 SIM and PFAS (NYSDEC 21-compound list) using USEPA Method 537 Modified in accordance with the NYSDEC PFAS sampling guidance dated January 2021.

3. Project Organization

The overall management structure and a general summary of the responsibilities of project team members are presented below. Professional profiles are included in Appendix A.

Project Manager

Omar Ramotar, P.E. of Roux Associates. will serve as Project Manager. The Project Manager is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the investigation. This individual will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation. Activities of the Project Manager are supported by the Project Quality Assurance Officer.

Field Team Leader

Christian Hoelzli of Roux Environmental Engineering and Geology, D.P.C. will serve as the Field Team Leader. The Field Team Leader bears the responsibility for the successful execution of the field program, as scoped in the SMP and the Field Sampling Plan (FSP). The Field Team Leader will direct the activities of all technical staff in the field as well all subcontractors. The Field Team Leader will also assist in the interpretation of data and in report preparation. The Field Team Leader reports to the Project Manager.

Laboratory Project Manager

The laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Project Manager or the Field Team Leader.

Quality Assurance Officer

Wai Kwan, Ph.D., P.E. of Roux Associates will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews, inspections, and audits to ensure that the data collection is conducted in accordance with the FSP and QAPP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

Field Technical Staff

Field technical staff consists of scientists, engineers, Geoprobe operators and technicians who will perform sampling activities. The field technical staff will also be responsible for the preparation of any required field documentation. The field technical staff reports to the Field Team Leader.

4. Sampling Procedures

To ensure groundwater samples collected are representative of the conditions in the surrounding aquifer, monitoring wells will be purged prior to sample collection using low flow sampling procedures as outlined in USEPA document titled “Low Stress (Low Flow) Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells” (USEPA, 1996).

Detailed discussions of sample handling, decontamination, and waste disposal procedures are provided in Sections 5.0, 6.1, and 6.2; respectively, of the site-specific Field Sampling Plan (FSP) in Appendix B of the Remedial Investigation Work Plan.

Samples collected for Perfluorooctanoic Acid (PFOA) and Perfluorinated Compounds (PFCs) from monitoring wells must follow the procedures noted above in addition to the following limitations:

- All acceptable materials for sampling include: stainless steel, high density polyethylene (HDPE), PVC, silicone, acetate, and polypropylene.
- Equipment blanks must be generated daily.
- Grundfos and bladder pumps may NOT be used; as Grundfos pumps contain Teflon washers and bladder pumps contain LDPE bladders.
- All sampling equipment components and sample containers should not come into contact with aluminum foil, low density polyethylene (LDPE), glass, or polytetrafluoroethylene (PTFE, Teflon) materials; including sample bottle cap liners.
- Samplers must avoid wearing clothing that contains PTFE material (including GORE-TEX) or waterproofed with PFC materials. All clothing worn by sampling personnel must be laundered multiple times before sampling.
- Many food and drink packaging materials contain PFCs. Food and drink should not be in the vicinity of samples.
- Waterproof adhesives like, “plumbers thread seal tape” contain PFCs and may not be used during sampling activities.
- The sampler must wear nitrile gloves while filling and sealing the sample bottles.
- Procedure for collecting a groundwater sample for PFOA and PFCs:
    1. Fill two pre-cleaned 500 mL HDPE or polypropylene bottles with the sample.
    2. Cap the bottles with an acceptable cap and liner closure system.
    3. Label the sample bottles.
    4. Fill out the Chain of Custody.
    5. Place in a cooler maintained at 4±2° Celsius.

5. Quality Assurance/Quality Control

The primary intended use for the SMP data is to manage the residual contamination and monitor the extent of LNAPL and impacts in groundwater. The primary DQO of the groundwater sampling program, therefore, is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value, and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called “field blanks”).

Table 1 lists the field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised.

All analyses will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods. The laboratory selected to analyze the field samples (groundwater) collected shall maintain a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the “assessment” analyses listed in Section 2.0. Alpha Analytical, Inc. based in Mahwah, New Jersey is selected for this sampling and its New York certifications are listed in Appendix B.

All laboratory data generated for groundwater samples are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC’s website (http://www.dec.ny.gov/chemical/62440.html).

Per the NYSDEC request, a Data Usability Summary Report (DUSR) will be prepared by an independent party meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages. The resume of the person preparing the DUSR is provided in Appendix A.

TABLE

1. Analytical Methods/Quality Assurance Summary

Table 1. Analytical Methods/Quality Assurance Summary
Quality Assurance Project Plan
Former Paragon Paint and Varnish Facility, Long Island City, NY

	Number of Samples / Frequency	Sample Container Volume / Type / Preservative	Sample Holding Time	Method Detection Limit	Minimum Reporting Requirements	Use
Groundwater						
SMP Phase Sampling						
TCL Volatile Organic Compounds Plus Tentatively Identified Compounds - EPA 8260C	Varies / Annually	40 mL (x3) / VOA / HCl	14 days	Various	NYSDEC ASP - Category B	--
NYSDEC Emerging Contaminants Sampling						
PFAS (NYSDEC 21-Compound List) - EPA 537 Modified	Four / Annually	250 mL (x3) / Plastic / Trizma	14 days	2 ng/L	NYSDEC ASP - Category B	--
1,4-dioxane - EPA 8270 SIM	Four / Annually	500 mL (x2) / Amber / None	14 days	0.075 ug/L	NYSDEC ASP - Category B	--
Low-Flow Parameters*	Varies / Annually	--	--		--	--
Field QC						
Duplicate	1 per matrix per SDG**	--	--		NYSDEC ASP - Category B	Precision
Trip Blank	1 per VOC cooler	--	--		NYSDEC ASP - Category B	Sensitivity
Equipment Rinse Blank	1 per day	--	--		NYSDEC ASP - Category B	Sensitivity
Laboratory QC						
Laboratory Control Sample	1 per matrix per SDG	--	--		NYSDEC ASP - Category B	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate***	1 per matrix per SDG	--	--		NYSDEC ASP - Category B	Accuracy/Precision
Surrogate Spike	All organics samples	--	--		NYSDEC ASP - Category B	Accuracy
Laboratory Duplicate	1 per matrix per SDG	--	--		NYSDEC ASP - Category B	Precision
Method Blank	1 per matrix per SDG	--	--		NYSDEC ASP - Category B	Sensitivity

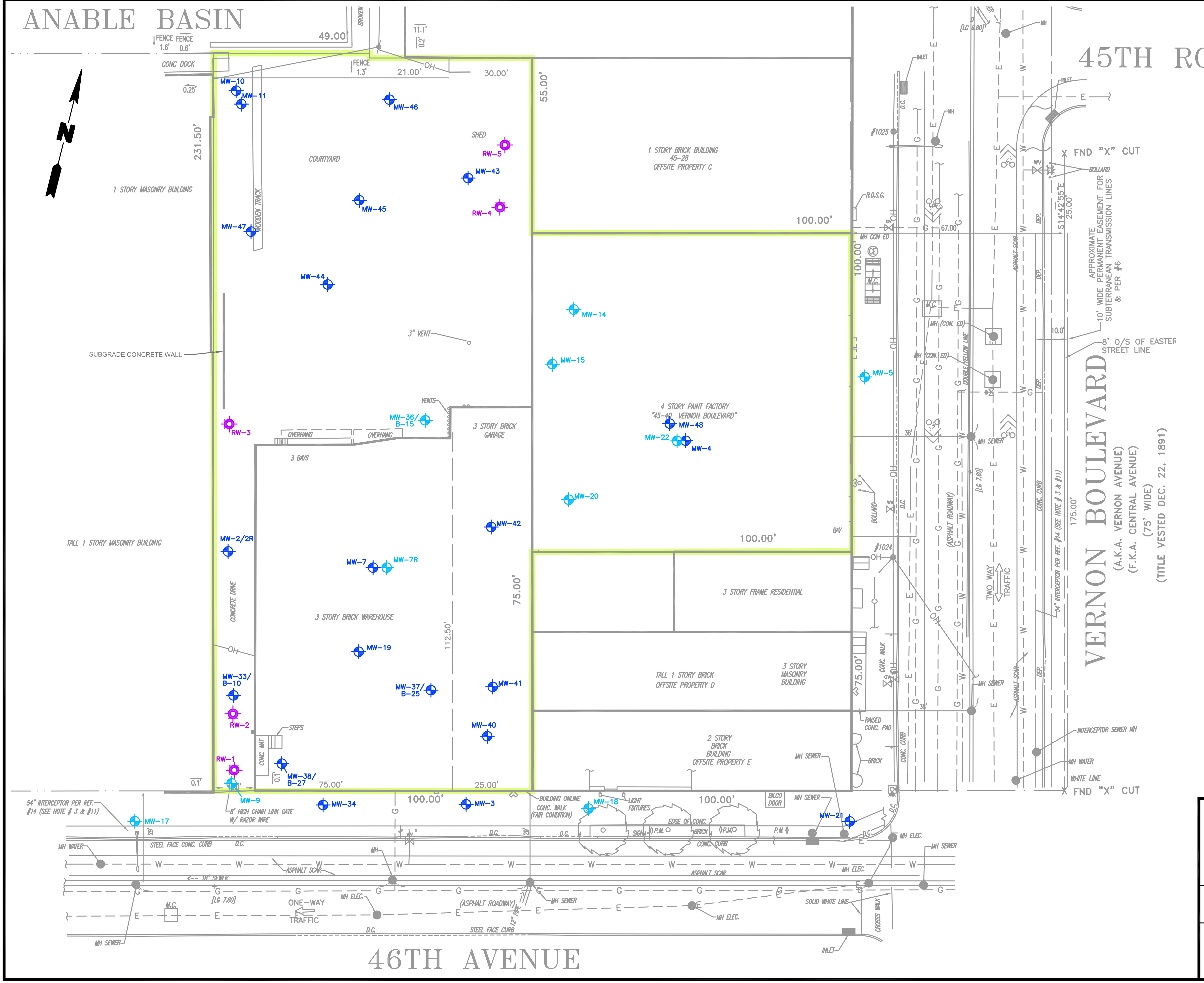
Notes:

* Parameters include Temperature (°C), Hydraulic Conductivity (mS/cm), Dissolved Oxygen Concentration (mg/L), pH, Oxidation Reduction Potential (mV), and Turbidity (NTU)

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

*** Provided to lab by field sampling personnel

FIGURE



LEGEND

MW-4	LOCATION AND DESIGNATION OF GROUNDWATER MONITORING WELL IN THE SAMPLING NETWORK
MW-5	LOCATION AND DESIGNATION OF GROUNDWATER MONITORING WELL NOT INCLUDED IN THE SAMPLING NETWORK
RW-1	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
☐	CONCRETE VAULT
🟩	PROPERTY BOUNDARY

NOTE

REFER TO AS-BUILT DRAWINGS FOR ELEVATION INFORMATION OF INSTALLED PORTIONS OF COVER SYSTEM.

30' 0 30'

Title:

SMP SAMPLING NETWORK

QUALITY ASSURANCE PROJECT PLAN
PARAGON PAINT AND VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:

CSC 4540 PROPERTY CO LLC

ROUX

Compiled by: C.H.	Date: 05JUN18	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr: R.M.	Project: 2051.0001Y000	
File: 2051.0001Y254.01.DWG		

V:\CAD\PROJECTS\2051\0001Y\254\2051.0001Y254.01.DWG

APPENDICES

A. Professional Profiles
B. Laboratory Certifications

APPENDIX A

Professional Profiles

Christian Hoelzli
Project Engineer

TECHNICAL EXPERIENCE

Design, implementation, and management of Environmental Site Assessment and Subsurface Remedial Investigations. Remedial designs include product recovery systems, air sparging and soil vapor extraction, sub-slab depressurization systems, in-situ treatments, and remedial assessment and strategy associated with petroleum-related contamination and chlorinated solvents.

EXPERIENCE SUMMARY:

Five years of experience: Project Engineer at Roux Environmental Engineering and Geology, D.P.C., Islandia, New York

CREDENTIALS:

Engineer in Training (EIT), 2015
B.S. Civil and Environmental Engineering, Villanova University, 2015
OSHA 40-Hour HAZWOPER Training, 2015
OSHA 8-Hour Annual Refresher Training, Certificate Current
OSHA 30-Hour Construction Outreach Training, 2019
NYC DOB Site Safety Training, 2020
Amtrak Railroad Safety Training
Loss Prevention System® Awareness 8-Hour Certified
Transportation Worker Identification Credential (TWIC)

KEY PROJECTS

- Project Manager for three active petroleum bulk storage and distribution terminals in Newburgh, Inwood, and Glenwood Landing; New York with petroleum-impacted soil and groundwater. Terminals require system optimizations to improve protection of public health and the environment and maintain peak performance of five soil vapor extraction/air sparging systems and three groundwater remediation systems, while concurrently fulfilling NYSDEC regulatory reporting requirements per New York Code of Rules and Regulations (6 NYCRR) Part 750. Each soil vapor extraction system consists of multiple vapor extraction wells, a moisture separator, air dilution valve, in line filter screen, regenerative blower, and emissions stack. The groundwater remediation systems consist of air stripping units (packed tower), recovery and transfer pumps, associated piping, and multiple safety, control and isolation valves. Associated responsibilities include coordinating with the client and regulators, scheduling and management of staff and technical personnel, preparation of NYSDEC quarterly monitoring reports, monthly SPDES discharge monitoring reports, and other regulatory deliverables; coordinating facility upgrades and routine equipment maintenance, and collecting performance monitoring samples and data to track efficiency of remedies. Lead design of a large-scale air sparge / soil vapor extraction system at the Newburgh terminal to treat residual petroleum related impacts.
- Project Engineer and Field Manager for the design, construction, and O&M of an air sparge / soil vapor extraction system at a gas station with thermal off-gas treatment in Staten Island, New York. Responsibilities include equipment sizing and specification, communications with equipment vendors, retrofit design of system wells and equipment layout; construction oversight, system startup, system performance monitoring and optimization, and management of bimonthly O&M visits.
- Project Engineer responsible for the design and specification of an air sparge/ soil vapor extraction system with thermal off gas treatment at an offsite downgradient property in Brooklyn, New York. Responsibilities include preparation of a RAWP and 100% Design Letter to the NYSDEC, coordination with third party property owner, equipment sizing and specification, design of system wells and equipment layout within strict footprint constraints, preparation of subcontractor bid package, and construction management.
- Project Manager for a site in the New York State Brownfields Cleanup Program (BCP) that also required a RCRA compliant facility closure. The site is a former paint factory in Long Island City, New York. Due diligence environmental investigations determined historical site operations adversely impacted the subsurface including a LNAPL plume in addition to petroleum hydrocarbon impacts to the soil and groundwater. Responsibilities include management of implementation of the SMP, which includes coordinating quarterly groundwater monitoring events, operation and maintenance of LNAPL recovery system, inspection of RCA cap, and coordination of an ISCO injection program.
- Project Engineer responsible for design and implementation of a remote operated groundwater quality meter at an active railyard in Queens, New York.
- Engineering support to design injection program to remediate chlorinated volatile organic compounds observed in groundwater originating from a dry cleaner in Staten Island, New York. Responsibilities included selection of remedial product, designation of injection point locations, injection method, cost estimating, and alternative analyses.
- Field Engineer responsible for the operation and maintenance of a Dual Phase Vapor Extraction System (DPVE) consisting of 20 vapor recovery wells. The vacuum enhanced recovery system consisted of liquid ring pumps, pneumatic submersible pumps, low profile air stripper, bag filters, granular activated carbon units, and oil/water separator. Operated system in conjunction with a Surfactant injection program to treat groundwater for residual separate-phase petroleum hydrocarbons.
- Field Manager for excavation and site restoration of a former drainage pond and subsequent renovation into a public park in Glen Cove, New York. Responsibilities included subcontractor management, excavation oversight, installation of a floatables collection system, preparing daily reports, and interactions with local townspeople.

JUDY V. HARRY
P. O. Box 208
120 Cobble Creek Rd.
North Creek, NY 12853

Occupation:	Data Validator/Environmental Technical Consultant
Years Experience:	41
Education:	B.S., Chemistry, Magna cum laude, 1976, Phi Beta Kappa
Certifications:	New York State Woman-Owned Business Enterprise (WBE)

Relevant Work History:

Data Validation Services: September 1989 - present

Sole proprietor of Data Validation Services, a woman-owned small business registered with SAM, providing consultation/validation services to regulatory and commercial clients.

These services include the review of analytical laboratory data for compliance with respect to specific protocols, accuracy and defensibility of data, verification of reported values, and evaluation of quality parameters for analytical usability of results. Approved by USEPA, NYSDEC, NJDEP, NYSERDA, and NYCDEP as a data validator for projects, including USEPA Superfund, Brownfield, and lead sites, and those contracted through the NYSDEC Division of Hazardous Waste Remediation, Division of Solid Waste, and Division of Water Quality.

Performed validation for compliance with laboratory analytical protocols including USEPA OLM, USEPA OLC, USEPA ILM, USEPA DFLM, USEPA SOW3/90, USEPA SOW 7/87 CLP, USEPA SOW 2/88 CLP, USEPA SW846, RCRA, AFCEE, NYS 6 NYCRR Part 360, 40 CFR, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, including TO-15, 1989/1991/1995/2000/2005 NYSDEC ASPs, and 1987 NYSDEC CLP.

Performed validation according to the USEPA National and Regional SOPs and Functional Guidelines, AFCEE requirements, NYSDEC Validation Scope of Work, NYS DUSR, and NJDEP Division of Hazardous Site Mitigation/Publicly Funded Site Remediation SOPs.

Performed validation for USEPA Superfund Sites including Salem Acres, York Oil, Port Washington L-4 Landfill, Bridgeport Rental and Oil Services, GE-MRFA, MMR/ OTIS AFB, LCP, and Peter Cooper site; and for USEPA lead sites including SJ&J Piconne, Maska, Bowe System, Jones Sanitation, and Syossett Landfill, involving CLP, RAS, and SAS protocols.

Contracted for NYSDEC Superfund Standby Contracts with LMS Engineers, HDR, CDM Smith, Malcolm-Pirnie/ARCADIS, Ecology & Environment, Shaw Environmental, CG&I, O'Brien & Gere Engineers, and EC Jordan, involving samples collected at NYS Superfund Sites and analyzed under the NYSDEC ASP.

Performed validation services for NYSDEC Phase II remedial investigations, RI/FS projects, Brownfield sites, and PRP over-site projects for hazardous waste sites.

Performed validation services for clients conducting RI/FS activities involving samples of many matrices, including waste, air, sludges, leachates, solids/sediments, aqueous, and biota.

Clients have included AECOM, ARCADIS, Barton & Loguidice, Benchmark Engineering, Bergmann Associates, Blasland, Bouck & Lee, Brown and Caldwell, CDM Smith, CB&I Shaw Environmental, C&S Consulting Engineers, Chazen Companies, Clough Harbour & Associates, Columbia Analytical Services, C.T. Male, Dames & Moore, Day Engineering, EA Engineering, EcolSciences, Ecology & Environment, Ecosystems, EC Jordan, Environmental Chemical Corporation, EHRT, ENSR Consulting, ELM, ERM-Northeast, Fagan Engineers, Fanning Phillips & Molnar, FluorDaniel GTI, Frontier, Foster Wheeler Environmental Corp, Frontier Technical, Galson Consultants, GE&R, Geomatrix Consultants, GZA Environmental, Handex of N, H2M Group, HDR, HRP, IT Corp, Jacques Whitford, JTM Associates, Labella Associates, Langan Engineers, Leader Environmental, Lockwood, Kessler & Bartlett, LMS Engineers, Malcolm-Pirnie, Metcalf & Eddy, NWEC&C, O'Brien & Gere Engineers, Pace, Parsons Engineering-Science, Plumley Engineering, Prescott Environmental, P. W. Grosser, Rizzo Associates, Roux Associates, Sear Brown Group, SECOR, Shaw Environmental, Stantec, ThermoRemediation Inc., TRC Environmental, Turnkey Environmental Restoration, TVGA Engineering, URS Consultants, Wehran Emcon, Weston, YEC, and private firms.

Provided consultation services to laboratories regarding analytical procedures and protocol interpretation, and to law firms for litigation support.

Provided services to firms involving audits of environmental analytical laboratories to determine analytical capability, particularly for compliance with NYSDEC ASP and AFCEE requirements.

Guest speaker on a panel discussing Data Review/Compliance and Usability, for an analysis workshop for the New York Association of Approved Environmental Laboratories, 1993.

Adirondack Environmental Services: June 1987 - August 1989

Senior mass spectroscopist for AES. Responsible for GC/MS analyses of environmental samples by USEPA and NYSDEC protocols, development of the GC/MS laboratory, initiating the instrumental and computer operations from the point of installation, and for implementing the procedures and methodologies for Contract Laboratory Protocol.

CompuChem Laboratories: May 1982 - January 1987

Managed a GC/MS production laboratory; developed, implemented, and supervised QA/QC criteria at three different levels of review; and was responsible for the development and production of the analysis of environmental and clinical samples. Directed a staff of 23 technical and clerical personnel, and managed the extraction and GC/MS labs and data review operations.

Research Triangle Institute: December 1979 - May 1982

Worked as an analytical research chemist responsible for development of analytical methods for the EPA Federal Register at RTI. This involved analysis of biological and environmental samples for priority pollutants, primarily relating to wastewaters and to human sampling studies. Method development included modification and interfacing of the initially developed Tekmar volatile purge apparatus to GC/MS, development and refinement of methods for entrapment and concentration of the air medium for subsequent volatile analysis, and the analysis and resolution/ identification of individual PCB congeners within Aroclor mixtures by capillary column and mass spectra.

Guardsman Chemical Company: February 1977 - November 1979

Performed all quality control functions for the manufacturing plant. Performed research and development on coatings and dyes.

Almay Cosmetics: May 1976 - December 1976

Product evaluation chemist. Responsible for analytical QC of manufactured products.

Publication

Pellizzzari, E.D., Moseley, M.A., Cooper, S.D., Harry, J.V., Demian, B., & Mullin, M. D. (1985). Recent Advances in the Analysis of Polychlorinated Biphenyls in Environmental and Biological Media. *Journal of Chromatography,* 334(3) 277-314.

ROUX

PROFESSIONAL PROFILE

Omar Ramotar, P.E.

Principal Engineer/Office Manager

TECHNICAL SPECIALTIES

Engineering services for the investigation, design, construction, operation, maintenance and monitoring of remedial systems for the remediation of contaminated soil, sediment, and groundwater.

EXPERIENCE SUMMARY

Over 25 years of experience: Staff, Project, Senior, and Principal Engineer with Roux.

CREDENTIALS

B.E., Environmental Engineering, Hofstra University 1994

M.E., Environmental Engineering, Manhattan College 1995

Professional Engineer: New York, 2000

OSHA 40-hour Health & Safety Course, 1995

OSHA 8-hour Health & Safety Refresher Course, 1996-2019

KEY PROJECTS

- Project Manager and Principal-in-Charge for a multi-element (large scale removal action [45,000 cubic yards of impacted materials excavated and consolidated on-site/disposed off-site], large scale subsurface feature and UST removal action, and remediation and restoration of a 3.2-acre seasonal pond located in the Massapequa Preserve) remedial design of a USEPA Superfund Site in Nassau County, New York. Responsible for the Preparation of USEPA response letters, technical drawings, and 95% and 100% remedial design documents in accordance with the Record of Decision and Consent Judgment.

- Project Manager and Principal-in-Charge for design of a natural wastewater treatment solution for a 3,000-acre new industrial complex in Saudi Arabia. Roux Associates was tasked to design an Engineered Natural System (to treat all wastewaters: sanitary, process and stormwater) from construction through operation, incorporate transitioning through phases, and plan for future expansion of the facility and increased wastewater flow rates. The 23-acre ENS was designed to treat a total flow of 1.4 million gallons per day. The major system components include: dump station with five truck hookup ports to collect and convey sanitary wastewater during construction of the facility; three primary sedimentation and anaerobic treatment tanks; one oil/water separator; six patented enhanced subsurface flow constructed treatment wetlands; two down flow disinfection filters; UV disinfection system; One treated water holding tank which conveys the treated water back to the facility for reuse within the refinery and as irrigations for landscaped areas; two infiltration basins; and six activated alumina treatment cells to remove fluoride from facility stormwater runoff.

- Project Manager and Principal-in-Charge for the bidding, contractor selection, and remediation of the wetland and canal portions of a 440-acre tract in western Staten Island that was used as a Major Oil Storage Facility (MOSF) for petroleum products until the end of 1995. Responsible for the preparation of a Remedial Action Work Plans, technical drawings, and 95% and 100% remedial design documents and for the remedial construction phase in accordance with the Site-specific Consent Order issued by the NYSDEC. Key elements of the Work include dredging/excavation of approximately 20,000 cubic yards of petroleum and lead impacted sediments/soils, off-site disposal, on-site capping and restoration of approximately 6.5 acres of disturbed wetlands. Routine activities included coordinating weekly construction meetings; preparing detailed NYSDEC monthly construction progress reports; ensuring Contractor compliance with remedial design, CAMP and project-specific erosion and sedimentation controls; and managing the overall project budget and schedule.

- Project Manager and Principal-in-Charge for the bidding, contractor selection, and remediation of a New York State Superfund Project. Responsible for the preparation of a Remedial Action Work Plans, technical drawings, remedial design documents and for the remedial construction phase in accordance with the Amended Record of Decision issued by the NYSDEC. Key elements of the Work include excavation and off-site disposal of approximately 20,000 tons of VOC impacted soils, on-site capping and in situ chemical oxidation. Routine activities included coordinating weekly construction meetings and preparing associated meeting minutes; preparing detailed NYSDEC monthly construction progress reports; ensuring Contractor compliance with remedial design, CAMP and project-specific soil erosion and sedimentation controls; and managing the overall project budget and schedule.

- Project Manager for the bidding, contractor selection, and remedial construction phase at a 40-acre former metals manufacturing facility in Staten Island under the NYSDEC Voluntary Cleanup Program. Responsible for overall construction management for dredging/stabilization and off-site disposal of approximately 7,000 cubic yards of metal-impacted sediments from a tidally influenced embayment area and creek system, off-site disposal of approximately 3,000 cubic yards of sediment, on-site consolidation of approximately 4,000 cubic yards of sediment; capping of fill material/bank stabilization; in-place abandonment of former water and sanitary sewer system; construction of an 8 acre asphalt cap, installation of new stormwater sewer system and restoration and mitigation of approximately 2 acres of wetland areas disturbed by ongoing remedial activities. Routine activities included coordinating weekly construction meetings; preparing detailed NYSDEC monthly construction progress reports; ensuring Contractor compliance with remedial design; and managing the overall project budget and schedule.

- Project Construction Manager for a NYCDEP storm and sanitary sewer construction project in Brooklyn, New York. Work included design and construction of approximately 690 linear feet of RCP storm sewer, approximately 725 feet of ductile iron sanitary sewer, 6 new house connection spurs, new sewer and sanitary manholes and 12,000 square feet of asphalt removal and replacement. Routine activities included coordinating weekly construction meetings; ensuring Contractor compliance with remedial design, CAMP and SWPPP implementation; and managing the overall project budget and schedule.

- Project Manager for the preparation of a Feasibility Study Report and ongoing remediation of a 40-acre former manufacturing facility in Rensselaer, New York as part of the NY State Superfund Program. Responsible for the preparation and implementation of multiple large-scale IRM soil removal remedial actions resulting in approximately 12,000 tons of non-hazardous waste and 10,720 tons of hazardous waste shipped off-site. Also, responsible for the preparation and implementation of the remediation of two 80,000-square foot former wastewater treatment lagoons. Approximately 7,000 cubic yards of hazardous waste sediments shipped off-site. Approximately 4,000 cubic yards of riprap lining the perimeter of both lagoons mechanical screened to remove interstitial sludge within the riprap matrix. NYSDEC approval gained for on-site reuse of 3,200 tons of riprap saving the client approximately $400,000 in disposal costs. Provided ongoing support for various tasks associated with constructing, operating and maintaining the on-site groundwater treatment system.
- Principal Engineer and Project Manager for On-Site Environmental Monitor (OEM) Program implemented at the largest redevelopment project in New York City (over $5 billion). Required to ensure environmental compliance with regards to air, storm-water, noise, traffic and other relevant environmental concerns during the performance of any construction related activity across the 22-acre redevelopment project Site. The Project consists of the construction of 30 buildings (commercial and residential); eight (8) acres of public open space and approximately 1,200 below grade parking spaces and some retail and community facility uses. The Project also includes the development and construction a new storage and maintenance rail yard facility for the Long Island Rail Road (LIRR) below grade across two city blocks over which a platform will be constructed along with six of the Project buildings and some of the open space.

Additional Soil and Groundwater Remediation Experience

- Principal in Charge and Project Manager for the preparation and implementation of a Remedial Action Work Plan (RAWP) at a former ink ribbon and carbon manufacturer in Glen Cove, New York. Scope of work included the removal of approximately 20,000 tons of listed-hazardous toluene-contaminated soil at various final excavation depths within 1.4-acre area, followed by ISCO injections across the excavated area. All on-site sources of contamination were removed and on-site groundwater was remediated to Site cleanup levels within 18 months from initiation of Site construction activities. Prepared Final Engineering Report (FER) and Site Management Plan (SMP) as required by the NYSDEC.
- Principal in Charge and Project Manager for the source-area excavation and treatment of groundwater and soil grossly impacted by light non-aqueous phase liquid (LNAPL), volatile organic compounds (VOCs), and hazardous materials at a 33,150 square foot lot entered into a NYSDEC Brownfield Cleanup Agreement site in Long Island City, New York. Prepared and certified the NYSDEC-required Remedial Action Work Plan, Site Management Plan and Final Engineering Report. Remediation efforts included removal of approximately 5,000 tons of grossly contaminated material removal using steel sheet piling and disposal/abandonment eleven (11) underground storage tanks (USTs) ranging in size from 2,000 to 25,000+ gallons that contain diesel fuel/fuel oil, mineral spirits, and linseed oil. In Situ Chemical Oxidation (ISCO) injections completed to address residual VOC contamination in soil and groundwater during the performance of the remedial action.
- Project Manager for the remedial design and remediation of a 23-acre former municipal landfill located in Glen Cove, New York as part of the NY State Superfund Program. The work was performed in accordance with Title 3 of the NYS Environmental Quality Bond Act under contract to the City of Glen Cove. Design elements included excavation of hazardous and radiological waste (8,500 cubic yards in total), 44,000 cubic yards of bulky waste, VOC and radiological waste monitoring, demo debris and waste separation and screening, dewatering, waste disposal, capping and site restoration. Additional work included the de-listing of a six acre "clean" portion of the site to allow the development of a ferry terminal and esplanade and development of alternative cleanup standards consistent with future site uses. Site remediation will accommodate site redevelopment as a commercial waterfront and operating ferry service and seaport area.
- Project Manager for the investigation and remediation of several sites spanning multiple blocks for a major pharmaceutical company in Brooklyn, New York. Environmental investigation is being conducted in preparation of possible property transfer. Responsibilities include development and preparation of investigation and remedial action work plans and coordination and management of resulting field investigation and remediation efforts. Project Engineer for a SVE/AS system to treat groundwater contaminated with VOCs and chlorinated VOCs at one 0.8-acre block. Designed and performed two SVE/AS pilot studies. Designed the full-scale SVE/AS system. Managed bidding, contractor selection, remedial construction, system start-up, operation, maintenance and monitoring phases for the full-scale SVE/AS system.

- Project Manager for the design of a soil and groundwater remediation system for a nationwide overnight delivery distribution center in Brooklyn, New York as part of the NYSDEC Voluntary Cleanup Program. A risk based remedial approach that called for the remediation of "hot spot" source area soils and mass-reduction of VOCs was successfully utilized for the Site. As a result, the focus of remediation was on reducing the mass of VOCs in on-site groundwater to a level where natural attenuation would be effective in remediation of VOCs. To address the contamination in the source area, a SVE/AS system consisting of 8 SVE wells and 17 AS wells was designed, constructed, operated, and maintained for a period of approximately 3 years. The SVE/AS system has been permanently shut down and the Site is currently in the post-remediation monitoring phase.
- Project Manager for the remediation of a former major pharmaceutical plant located in Hicksville, New York as part of the NY State Superfund Program. The project consisted of the excavation of non-hazardous soil from 5 on-site drywells and a former waste disposal area, implementation of a community air monitoring plan, coordination with the Long Island Rail Road (LIRR) for work performed within the LIRR's right of way, steel sheeting installation and removal, backfilling, monitoring well abandonment and replacement, transportation and disposal of 3,300 tons of VOC, SVOC and metal contaminated soil, and restoration of approximately 9,800 square feet of asphalt. A 7-foot diameter steel caisson was used to support the deeper excavation required at the invert of two drywells. This innovative approach saved the client approximately $50,000 in costs that would have been incurred by using a traditional steel sheeting support system to protect the on-site commercial building.
- Project Engineer for the complete design, implementation and startup of five distinct air sparge (AS) and soil vapor extraction (SVE) systems for the remediation of gasoline contaminated groundwater and soils. Pilot studies were performed at several locations at an 850-acre petroleum terminal site in Rhode Island and lead to the design of full-scale AS and SVE remediation systems that are being used in a phased approach, to remediate selected areas of the site. The designs included specialized modeling techniques to determine the optimum system requirements and components.
- Project Engineer for the design and construction management of a soil remediation project at a 28-acre former pesticide warehouse facility in Dayton, New Jersey. The project consisted of the excavation and on-site consolidation and capping of 7,500 cubic yards of pesticide contaminated soil. The capped areas were designed to be incorporated into a Site re development plan for use as a storage and trailer parking lot. A Soil Erosion and Sedimentation Control Plan and a NJPDES General Permit were prepared for the project.
- Project Engineer for the design and remediation of a former sanitary wastewater leaching system at a 16.6-acre NYS RCRA site in Bethpage, New York. The project consisted of the excavation, staging, transportation, and disposal of VOC, SVOC, metal and pesticide contaminated soil. Approximately, 5,100 tons of non-hazardous soil, 1,300 tons of hazardous metals contaminated soil and 350 tons of hazardous VOCs contaminated soil. Structures remediated consisted of an imhoff tank, 33 leach pools, 2 distribution boxes, 2 stormwater drains, 2 sludge drying beds, and a blast fence area.
- Staff Engineer for the preparation and implementation of a Soil IRM plan for a major pharmaceutical plant in Brooklyn, New York as part of the NYSDEC Voluntary Cleanup Program. Work elements included contractor plan preparation, steel sheeting and removal, excavation of hazardous and non-hazardous waste, VOC and particulate monitoring, dewatering water management, waste transportation, disposal and tracking, backfill placement and compaction. IRM Soil remediation included excavation of over 1,620 tons of non-hazardous soil and 524 tons of hazardous soil.
- Senior Engineer for design and construction of several elements of a 40 gpm treatment system for a 40-acre former manufacturing facility in Rensselaer, New York. BASF Site. Design support for 4,000 linear feet of collection trenches, 7 extraction well vaults, 2 air release chambers, and 2 groundwater re-injection galleries and a 50 foot by 60-foot treatment system containment pad. Coordination of construction efforts between mechanical and electrical contractors.
- Project Engineer for preparation and certification of Final Engineering Report and Site Management Plans for remediation of a 40-acre former metals manufacturing facility in Staten Island under the NYSDEC Voluntary Cleanup Program. Remediation included dredging/stabilization and off-site disposal of approximately 7,000 cubic yards of metal-impacted sediments from a tidally influenced embayment area and creek system, off-site disposal of approximately 3,000 cubic yards of sediment, on-site consolidation of approximately 4,000 cubic yards of sediment; capping of fill material/bank stabilization; in-place abandonment of former water and sanitary sewer system; construction of an 8 acre asphalt cap, installation of new stormwater sewer system and restoration and mitigation of approximately 2 acres of wetland areas disturbed by ongoing remedial activities. Routine activities included coordinating weekly construction meetings and preparing associated meeting minutes; preparing detailed NYSDEC monthly construction progress reports; ensuring Contractor compliance with remedial design; and managing the overall project budget and schedule.

- Project Engineer for preparation of Final Engineering Report and Site Management Plan for the remediation of a 40-acre former manufacturing facility in Rensselaer, New York as part of the NY State Superfund Program. Remediation included: multiple large-scale IRM soil removal remedial actions resulting in approximately 12,000 tons of non-hazardous waste and 10,720 tons of hazardous waste shipped off-site; remediation of two 80,000-square foot former wastewater treatment lagoons; groundwater containment and treatment system construction and Site-wide capping.

Additional Feasibility Study Experience

- Principal Engineer for the preparation of a Feasibility Study Report for a NYS Superfund Site in Glen Cove, New York. The Site is approximately 15 acres in size with a 1.4-acre portion of the site impacted by historical disposal of industrial wastes. Approximately 10,000 cubic yards of non-hazardous and hazardous waste has been identified to be potentially shipped off-site.

- Principal Engineer for preparation of a Focused Feasibility Study to optimize ongoing free-product recovery efforts for an 18-million-gallon release of petroleum hydrocarbon product from a former refinery and petroleum storage terminal in Brooklyn, New York. The remedial action objectives of the feasibility study were: removal of free product to the extent practicable, prevention and/or elimination of any product seeps from the Site that result in visual petroleum product sheens on surface water and eliminate through removal, treatment, and/or containment the source of surface water contamination to the extent practicable. Technologies evaluated and retained included: Excavation, skimming, dual pump liquid extraction, water flooding, surfactant enhanced subsurface remediation, cosolvent flushing, vapor enhanced fluid recovery, enhanced fluid recovery, and natural source zone depletion.

- Project Manager and Senior Engineer for the preparation of a Remedial Action Selection (RAS) Report for a 9-acre landfill in Rensselaer, New York as part of the NYSDEC Voluntary Cleanup Program. The primary goal of the RASR was to select a remedial alternative that was most protective of human health and the environment under the contemplated future use of the Site as a landfill with an integrated wildlife habitat vegetative cap. The final remedy for the landfill will include 1,000 linear feet of perimeter groundwater collection trenches, a 40-gpm treatment system for metals and VOCs and excavation and in situ chemical oxidation of VOC source areas.

- Project Engineer for the preparation of a Focused Feasibility Study (FFS) Report for the remediation of two dry wells at a formerly government owned, contractor operated, 105-acre New York State RCRA site in Bethpage, New York. The soils below and in the vicinity of each drywell were contaminated at various locations from 2 to 55 feet below land surface (bls) with PCBs exceeding NYSDEC standards. The FFS evaluated the following options: no action, in situ thermal desorption and excavation and off-site disposal. The no action alternative was recommended because the Site characterization and exposure assessment results indicated that there was no potential risk to persons using the Site for commercial or industrial activities, PCB impacted soils had been previously excavated to a depth of 28 feet bls and because PCBs are generally immobile in the environment, so migration is unlikely.

Additional Miscellaneous Design Experience

- Project Engineer for the design and construction management of a private vehicle fueling area at a New York City railyard. System components included: UST and process piping, level/monitoring systems, pump dispenser and keycard system, pump island, canopy and fire suppression system. Design met all substantive requirements of the New York City Fire Department (NYCFD) and New York City Department of Buildings (NYCDOB). Tasks included equipment selection, equipment sizing, piping layout, preparation of plans and specifications and shop drawing review and approval.

Additional Stormwater Design Experience

- Project Engineer for the design and construction management of a stormwater drainage project for a 28-acre former chemical pesticide manufacturing facility located in Dayton, New Jersey. The stormwater drainage system consisted of multiple catch basins, over 2,000 linear feet of reinforced concrete pipe ranging in size from 15 to 30 inches, and a recharge basin. The TR 55 computation method was used to size the drainage system for a 25-year storm event. The drainage system was designed in strict accordance with the New Jersey Department of Environmental Protection (NJDEP), the New Jersey Soil Conservation District (NJSCD) and the local planning departments.

Additional Engineered Natural System Design Experience

- Senior Engineer for the design of a compost treatment (CT) cell retrofitted into an existing sludge drying bed located at an integrated aluminum smelting and fabricating facility in Massena, New York. The principal objective of the CT will be to remove and sequester low level PCBs in the Site wastewater stream prior to discharge to the Site's permitted outfall. The proposed CT cell will be incorporated into the wastewater treatment process to evaluate PCB treatability in a CT environment as an alternative to other technologies currently being considered for the Site. The CT cell will be designed to accommodate variable hydraulic loading rates (10 to 70 gpm) and retention times in order to evaluate and define optimal system performance.

- Senior Engineer for the design of two pilot scale compost treatment (CT) systems for stormwater management at an active aluminum manufacturing facility in Lafayette, Indiana. The design included the retrofit of a 1,000 gallon above-grade septic tank (to handle a variable flow of 0.1 to 1 gpm) and a 100,000 gallon above-grade storage tank (to handle a variable flow of 10 to 50 gpm). The remedial goal of the pilot CT systems is for the removal of PCBs and aluminum from stormwater currently collected in the on-Site 100,000-gallon storage tank. The pilot systems were designed for incorporation into the existing stormwater system, thus precluding the need for additional permitting. The systems have been designed for year-round operation.

- Senior Engineer for the development of design improvements for a 45-acre former Landfill in Holtsville, New York to minimize the source of contamination to a downgradient pond and its' associated creek. A detailed budget water analysis was performed comparing current and proposed conditions to determine the best methods to minimize infiltration into the landfill and divert the stormwater runoff to the onsite recharge basin and away from the landfill. The proposed strategy currently entails modifying the existing stormwater conveyance controls (i.e., lining drainage swales), reducing the permeability of the landfill surface through the addition of recreational areas and lined stormwater storage ponds, and planting hybrid poplar trees to increase evapotranspiration at the Landfill. Overall, these modifications would be expected to reduce annual infiltration in the landfill surface from 24 inches to 18 inches, equivalent to approximately 8.2 million gallons of water annually.

- Project Engineer for the design of structural SMPs to manage runoff generated from a LEED certified 70,000 ft2 athletic facility, which is being constructed as part of a redevelopment of a 110-acre park facility in Staten Island, New York. Innovative structural stormwater management practices incorporated into the Site design include the following: micropool extended detention pond and infiltration basin. The pond will be comprised of a sedimentation forebay, shallow marsh, and pond. Suspended solids will drop out as runoff passes through the forebay, thereby enhancing treatment performance, reducing maintenance, and increasing the longevity of the system. The permanent pool provides additional dry storage capacity to mitigate peak flow rates prior to discharge into the overflow meadow. The forebay and pond are designed with shallow ledges along its fringe to support aquatic marsh plants. These wetland plants will aid in the stormwater treatment by impeding flow and trapping contaminants as they enter the forebay and pond. The fringe vegetation will stabilize and protect deposited sediments from resuspension during large storm events. The fringe wetland plants will include species such as rushes, reeds, and sedges, designed to improve water quality through the trapping and filtering of fine particles and soluble pollutants (metals, organics, and nutrients). Effluent from the micropool extended detention pond will then be discharged to an infiltration basin (i.e., Overflow Meadow) planted with a variety of native wildflower and wetland species for groundwater recharge.

- Project Engineer for the design of a pilot constructed treatment wetland system to treat stormwater discharge from an aluminum manufacturing facility located in Massena, New York. The 0.3-acre treatment system uses activated alumina and compost filter cells, and a sub-surface flow wetland to treat 1,400-4,300 gallons of stormwater daily.

Additional Operation and Maintenance (O&M) Experience

- Senior Engineer responsible for supporting the OM&M of a 40 gpm treatment system for a 40-acre former manufacturing facility in Rensselaer, New York. Processes and system maintained include aeration, bag filtration, air stripping, metals adsorption, liquid and vapor phase carbon adsorption.

- Senior Engineer responsible for the O&M and monitoring of a soil vapor extraction (SVE) and air sparge (AS) system for nationwide distribution center in Brooklyn, New York as part of the NYSDEC Voluntary Cleanup Program. O&M activities included system operation and maintenance, performance monitoring, soil gas monitoring, quarterly monitoring, and preparation of quarterly and annual status reports for submission to the NYSDEC. The SVE and AS system consists of 8 SVE wells and 17 AS wells and was designed, constructed, operated and maintained for a period of approximately 3 years. The SVE and AS system has permanently shut down and the Site is currently in the post-remediation monitoring phase.

- Project Engineer responsible for the O&M of a 430 gpm, dual-phase, product recovery system in Greenpoint, Brooklyn, New York. Processes and system maintained include dual-phase groundwater and product recovery, low profile air strippers and a catalytic oxidation unit. The Site encompasses one of the nation's largest petroleum releases (18 million gallons).

- Project Engineer for the metals removal system upgrade of a 430 gpm, dual-phase, product-recovery system in Greenpoint, Brooklyn, New York. Upgrades included design, procurement and construction oversight to install a metals removal system, allowing the remedial system to run at full capacity with minimal O&M. The metals removal system included two 10-foot diameter continuously backwashing sand filters, process liquid aeration system and ancillary equipment. The pre-design phase also included the performance of an extensive bench study to optimize the system design.

- Project Engineer for the control system upgrade of a 430 gpm, dual-phase, product-recovery system in Greenpoint, Brooklyn, New York. Upgrade included design procurement and construction oversight to install a new control system to eliminate intermittent power surges and sags which, in combination with the communication problems, had caused the previous control system to operate unpredictably. These upgrades included installation of new remote input/output systems, new uninterruptible power supplies and new remote communication cables at all six remote well sites.

- Staff Engineer for the O&M of a product recovery system in Howard Beach, New York. O&M activities include system maintenance and performance monitoring through on-site and off-site monitoring wells.
- Staff Engineer for the O&M of a 40 gpm groundwater remediation system at an industrial facility in Queens, New York as part of the State Superfund Program. O&M activities included system maintenance, effluent sampling, quarterly monitoring, and preparation of quarterly and annual status reports for submission to the NYSDEC.
- Staff Engineer for the design, implementation and O&M for two remedial treatment facilities to remediate groundwater impacted by leaking USTs at two service garages owned by a New York state telecommunications company. System was designed to treat groundwater at a flow-rate between 5 and 10 gpm using granular activated carbon adsorption treatment units.

Additional Health and Safety Management or Facility Decontamination or Demolition Experience

- Principal Engineer for the decontamination and decomissioning (D&D) of a 700,000+ square foot facility, in Brooklyn, New York for a major pharmaceutical company. The D&D activities were performed to allow for future use of the former facility for commercial, retail, and/or industrial purposes after renovation and redevelopment by others, by removing, cleaning, encapsulating or otherwise abating: (1) contaminants in indoor concrete identified during previous environmental investigations, (2) pharmaceutical manufacturing residues in ductwork identified during previous environmental investigations, (3) pharmaceutical manufacturing residues in select existing manufacturing infrastructure [including but not limited to relic air handling units (AHUs), dust collection systems, and air exhaust units], and performing partial interior building demolition and cleaning in connection with such infrastructure, (4) the horizontal drain piping associated with the eighth floor laboratories, and (5) paint containing polychlorinated biphenyls (PCBs) at a concentration of 50 milligrams per kilogram (mg/kg) or greater.
- Senior Engineer responsible for providing both worker and community Health and Safety through the monitoring of air particulates and VOCs during the electrical upgrade of pharmaceutical manufacturing facility in Brooklyn, New York. All work was performed in accordance with OSHA, NYSDEC and USEPA protocols for worker and community health and safety monitoring.
- Senior Engineer responsible for providing both worker and community Health and Safety through the monitoring of air particulates and VOCs during the construction of a parking lot redevelopment project for a pharmaceutical manufacturing facility in Brooklyn, New York. All work was performed in accordance with OSHA, NYSDEC and USEPA protocols for worker and community health and safety monitoring.
- Staff Engineer and Site Health and Safety Officer for the decommissioning of a pharmaceutical manufacturing facility in Brooklyn, New York. Responsibilities included construction oversight of all contractors for the following: dewatering, removal of 26 USTs ranging in capacity up to 30,000 gallons, excavation and stabilization of soil contaminated with VOCs, lead and mercury, and disposal of all waste generated. Additional responsibilities included providing both worker and community Health and Safety through the monitoring of air particulates, VOCs and mercury vapors. All work was performed in accordance with OSHA, NYSDEC and USEPA protocols for worker and community health and safety monitoring.
- Staff Engineer and Site Health and Safety Officer providing construction oversight and management for the completion of a building demolition and UST Removal Program at a metals manufacturing facility in Staten Island, New York. The project included asbestos and lead abatement oversight prior to building demolition activities and the removal of six 550-gallon gasoline USTs, one 1,000-gallon No. 2 fuel oil UST and one 600-gallon No 2 fuel oil UST. A total of four buildings, two smelting kettles, a 200-foot emissions stack and a 50-foot water tower were removed as part of the demolition program. Responsibilities included providing both worker and community Health and Safety through the monitoring of air particulates and VOCs, performing all required sampling, waste disposal tracking to document all activities performed, providing construction oversight of all contractors and preparing weekly progress reports.

Additional UST Experience

- Staff Engineer for the excavation oversight of 11 gasoline USTs, one waste oil UST, three pump islands and all associated underground and aboveground piping at a national railroad company in Queens, New York. Field oversight included post-excavation and waste characterization soil sampling, health and safety monitoring, supervision during the removal of the USTs and preparation of a Closure Report.
- Staff Engineer for the excavation oversight of three 8,000-gallon USTs, two pump islands and all associated piping at a service station in Greenwich, New York. Field oversight included post-excavation and waste characterization soil sampling, health and safety monitoring, supervision during the removal, cleaning, and disposal of the USTs and preparation of a Closure Report.

Wai Kwan, Ph.D., P.E.

Principal Engineer

TECHNICAL SPECIALTIES

Environmental chemistry, engineered natural systems, PCBs, chlorinated solvents, design of remediation systems utilizing traditional and innovative techniques.

EXPERIENCE SUMMARY

Over 14 years of experience as a Principal, Senior, and Project Engineer with Roux Associates, Inc.

CREDENTIALS

Ph.D., Environmental Engineering, Massachusetts Institute of Technology, 2003
M.S., Environmental Engineering, Massachusetts Institute of Technology, 1999
B.S., Chemistry, California Institute of Technology, 1997
B.S., Engineering & Applied Science, California Institute of Technology, 1997
Professional Engineer – New York, California

PUBLICATIONS/PRESENTATIONS/ABSTRACTS

Proactive Evaluation of PRP Status at Hazardous Waste Disposal Sites. Sullivan, D., Kwan, W. P., Gerbig, C. A., and Moore, C., Environmental Claims Journal, 27(2), 2015.

Extricating Membership as a PRP at Hazardous Waste Disposal Sites. Ram, N. M., Kwan, W. P., Gerbig, C. A., and Moore, C., Remediation Journal. Spring 2014.

Long-Term Performance of a Phytoremediation Cap. Kwan, W. P., USEPA Engineering Forum, August 2012.

Long-Term Performance of an Integrated CTW/Phyto Cap System. Kwan, W. P., and W. Eifert, 8th International Phytotechnology Society Conference, 2011.

Large-Scale Enhanced Reductive Dechlorination for the Remediation of Chlorinated Volatile Organic Compounds. Kwan, W. P., Senh, S., and Netuschil, G., Proceedings of The Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Paper F-036, 2010.

Predicting Oxidation Rates of Dissolved Contaminants During In Situ Remediation Using Fenton's Reaction. Kwan, W. P., and B. M. Voelker, Abstracts of Papers of the American Chemical Society, 228(352 ENVR), 2004.

Influence of Electrostatics on the Oxidation Rates of Organic Compounds in Heterogeneous Fenton Systems. Kwan, W. P. and B. M. Voelker, Environmental Science & Technology, 38(12), 2004.

Rates of Hydroxyl Radical Generation and Organic Compound Oxidation in Mineral-Catalyzed Fenton Like Systems. Kwan, W. P. and B. M. Voelker, Environmental Science & Technology, 37(6), 2003.

Decomposition of Hydrogen Peroxide and Organic Compounds in the Presence of Dissolved Iron and Ferrihydrite. Kwan, W. P. and B. M. Voelker, Environmental Science & Technology, 36(7), 2002.

Heterogeneous Fenton-Like Chain Reactions Initiated by Iron Oxides. Kwan, W. P. and B. M. Voelker, Abstracts of Papers of the American Chemical Society, 200(283 ENVR), 2000.

PROFESSIONAL AFFILIATIONS

American Chemical Society
American Society of Civil Engineers

KEY PROJECTS

In Situ Remediation

- Designed and oversaw construction of a full-scale in situ enhanced bioremediation treatment system for groundwater impacted with chlorinated volatile organic compounds (CVOCs) at an 18-acre former electronics manufacturing facility in Taiwan. Evaluated the effectiveness of different substrates for in situ treatment from the results of two concurrent 6-month pilot studies, resulting in selection of enhanced bioremediation. The full-scale treatment system consists of over 9,000 feet of piping and 189 molasses injection wells. The technology decreased tetrachloroethene (PCE) concentrations by 99 percent, trichloroethene (TCE) concentrations by 98 percent, and total CVOC concentrations by 96 percent.

- Project Manager for the injection of 10,280 gallons of Fenton's reagent to address groundwater contaminated with PCE and its breakdown products associated with a former PCE reclamation facility in Brooklyn, New York. The design focused on the source area and two downgradient hot spots that exhibited concentrations of dissolved CVOCs in parts per million and used a proprietary method to activate the Fenton's reagent.

- Project Manager for the remediation and closure of a former dry cleaner site in Brooklyn, New York, under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program. Managed field staff and provided engineering support during excavation and removal of 55 cubic yards of soil and concrete impacted by PCE and its breakdown products from a basement. Provided design and management of injection of 1,700 pounds of potassium permanganate solution to treat CVOCs in groundwater. Prepared Remedial Action Work Plan, permit application, daily construction reports, Final Engineering Report (FER) and Site Management Plan (SMP). Interacted with client, contractor, and regulatory agency project manager.

- Field Engineer for the remediation of a NYSDEC Brownfield Site in Staten Island, New York. Supervised the removal of soil and groundwater contaminated with hazardous levels of PCE and TCE released from a defunct dry cleaner. Evaluated the performance of molasses injections to enhance in situ bioremediation of impacted groundwater. Prepared the Final Engineering Report to document the remedial action.

- Prepared reports that evaluated bench scale and field scale results of using surfactant-enhanced subsurface remediation technology to enhance free-product recovery at an active railroad yard in Sunnyside, Queens, New York. Coordinated lab and field activities with a surfactant vendor, performed literature review, designed a multi-month field scale treatability study, and evaluated the findings for potential application during full scale remediation.
- Prepared a treatability study work plan to evaluate the feasibility of using surfactant-enhanced subsurface remediation technology to enhance free-product recovery at a former petroleum refinery and distribution terminal in Greenpoint, Brooklyn, New York. Corresponded with surfactant vendors, performing literature review, designed a bench scale treatability study, and assessed the feasibility of implementing enhanced recovery of residual free-product in the regional aquifer that is exhibiting decreases in recovery rates via dual-pump liquid extraction.

Landfills

- Project Manager for the remediation of a former petroleum refinery terminal in Buffalo, New York, under the NYSDEC Brownfield Cleanup Program. Prepared conceptual and final designs for stabilization of 1,400 linear feet of river embankment using tiered slopes, rip rap, and reinforced bioengineering as part of a landfill closure remedial action. The stabilized shoreline uses a variety of flora and land features to create multiple habitats for aquatic and terrestrial lifeforms, while also serving as a component of the vegetated landfill cover. Prepared Alternatives Analysis Report to document analysis of engineering options and remedy recommendation. Prepared permit application, Remedial Design and Bid Document for implementation of remedy. Reviewed contractor submittals. Provided oversight and engineering support during remedy construction. Prepared FER and SMP.
- Project Manager for the performance of a Corrective Measures Study (CMS) at a 30-acre land parcel undergoing RCRA Corrective Action in Williamsburg, Virginia. The site is a former fibers manufacturing facility, and a RCRA regulated landfill is located within the parcel. The CMS was conducted to identify, evaluate, and recommend a final remedy to address zinc-impacted groundwater discharging to a tributary. Managed multi-person field crew who installed multiple monitoring wells, gauged and sampled groundwater, and conducted slug tests. Analyzed the CMS data to show more than 96 percent of the zinc loading is attributed to groundwater discharge along approximately 20 percent of the shoreline. Proposed a final remedy consisting of a 6.5-acre phytotechnology cover and 960 linear feet of compost reactive barrier, at a significantly lower cost compared to conventional treatment approaches.

Regulated Sites

- Engineer for the remediation of soil and soil vapor impacted by the release of approximately 1,500 gallons of fuel at an operating gas station in San Bernardino County, California. Designed and involved in the operation of a soil vapor extraction (SVE) system consisting of five extraction wells focused on addressing the source area spanning 55 vertical feet.
- Engineer for the remediation of soil and soil vapor impacted by the release of PCE from a former dry cleaner in Compton, California. Prepared a pilot study to evaluate the feasibility of expanding the current SVE system to treat impacted soil and soil vapor at shallow and deep intervals underneath an existing supermarket.
- Operations Deputy for rapid mobilization and coordination of over 75 people to screen and sample for lead and other heavy metals in soil across 500 residences within 1.7 miles of the source in 10 days in the County of Los Angeles, California. Soil screening involved use of handheld x-ray fluorescence analyzer. Provided laboratory coordination, logistics and technical support, and QA/QC check of data.
- Engineer for the conceptual design of a two-acre engineered phyto cap for a site in Los Angeles County, California. The site is approximately seven acres and contains a waste dump and two abandoned oil production wells. The engineered phyto cap is designed to mitigate the potential for exposure of future residents to trash materials and is incorporated into the private, community-use park.
- Project Manager for a SVE and air sparge (AS) system to treat groundwater contaminated with VOCs and CVOCs at a 0.8-acre NYSDEC Voluntary Cleanup Site in Brooklyn, New York. Designed and performed two SVE/AS pilot studies. Designed the full-scale SVE/AS system. Provided oversight during installation of the full-scale SVE/AS system. Prepared the FER and SMP. Managed daily operations of the SVE/AS system and groundwater gauging and sampling personnel. Responsible for communications with the NYSDEC and reviewing progress reports.
- Project Manager for the performance of multiple soil, groundwater, and soil vapor investigations at a NYSDEC Voluntary Cleanup Site in Brooklyn, New York. Prepared reports, work plans and directed field

staff in the collection of discrete soil, groundwater, and soil vapor samples to delineate the extent of CVOC contamination in groundwater, soil, and soil vapor. Used membrane interface probe (MIP) technology as a screening tool to focus subsequent sample collection efforts and to reduce overall investigation costs.

- Senior and Project Engineer for the evaluation of methods to treat petroleum impacted soils at a former petroleum refinery terminal in Buffalo, New York. Evaluated bench scale studies using organoclay, nitrate, RegenOx, cement/slag, and lime kiln dust. Designed, supervised, and evaluated the performance of favorable treatment agents based on results generated from pilot scale field tests. Also critiqued scanning electron microscopy photographs and energy dispersive x-ray spectroscopy absorption spectra that were used to identify and support the conclusion that multiple, unrelated lead species are present within one operable unit.
- Project Manager for the remedial investigation of a shopping center in Enfield, Connecticut. Designed a focused investigation using MIP technology to focus subsequent collection of groundwater and soil samples using a standard size and portable Geoprobe for interior locations, and installation of soil vapor pins for the collection of sub-slab samples. Managed field staff during the implementation of the remedial investigation and interacted with store proprietors to coordinate the work with minimal business interruptions.
- Field Engineer for the remediation of two 6.25-million-gallon process lagoons adjacent to the Hudson River at a former dye manufacturing facility in Rensselaer, New York. Supervised the excavation, staging, screening, and transport of riprap and soil contaminated with hazardous concentrations of arsenic. Interacted daily with the client and regulatory agency representatives during implementation of the remedial action.
- Project Engineer for a multi-element remedial design of a USEPA Superfund Site in Nassau, New York. Prepared response letters, technical drawings, and 95 percent and 100 percent remedial design documents in accordance with the Record of Decision and Consent Judgment.
- Evaluated laboratory data packages of post-excavation soil samples generated during the interim remediation of a former storage and loading area of a pharmaceutical company in Brooklyn, New York. Initial site investigations concluded site contamination was limited to petroleum-related compounds. Supplemental site investigations conducted a few years after the conclusion of the interim remediation showed a dissolved CVOC plume was present site-wide. Reviewed chromatograms and concluded that CVOCs were detected – but not reported since the reporting scope was limited to petroleum-related compounds – in many of the post-excavation soil samples, which would have provided earlier indications of the presence of the CVOC plume.

Stormwater Management

- Project Manager and Engineer for the design of a full-scale natural media filtration (NMF) system consisting of two stormwater storage basins (0.4 MM and 1.8 MM gallons) and four NMF cells (two 114,000-gallon aboveground cells and 0.15- and 0.25-acre in-ground cells) at a 172-acre active aluminum manufacturing facility in Lafayette, Indiana. The NMF cells treat up to 1,500 GPM of stormwater runoff and process water impacted by polychlorinated biphenyls (PCBs), dissolved and particulate aluminum, and suspended solids. Researched the fate and transport of PCBs, and assessed the treatability of PCBs in wetlands. Evaluated a compost treatability bench-scale experiment. Designed and coordinated groundwater percolation tests. Used HydroCAD to model treatment capacity for multiple storm events.
- Project Engineer for the design of a passive stormwater management system for a 3,500-acre aluminum manufacturing facility in Point Comfort, Texas. The passive stormwater management system uses sedimentation trenches and swales to manage and convey bauxite-laden runoff. Stormwater runoff is managed by a constructed treatment wetland (CTW) and is consumptively used by a phytotechnology tree plot. Completed a hydrologic analysis using USACE HEC-HMS modeling software. Prepared bid specifications and provided bid support.
- Project Manager for the design of a NMF system to reduce PCBs to non-detect levels in stormwater at an aluminum extrusion facility in Cressona, Pennsylvania. The NMF system treats the first flush volume of 240,000 gallons containing residual PCBs. Conducted a detailed analysis of the site's constituents and runoff volumes during dry weather and wet weather to properly size the pump station and the NMF cell. Prepared bid document and provided bid support.
- Project Engineer for the design of a CTW to manage stormwater runoff generated from a scrap metal recycling facility in Sayreville, New Jersey. The CTW was designed to handle and treat runoff with elevated levels of suspended solids prior to discharge to adjacent coastal and freshwater jurisdictional wetlands.
- Evaluated the feasibility of using CTW to treat 110 GPM of groundwater containing elevated levels of cyanide at an aluminum manufacturing facility in Hannibal, Ohio. The CTW was designed to address the

site's constituents and winter environment, and was modularized to facilitate the expansion and incorporation of the pilot-scale CTW into the full-scale CTW.

- Project Manager for a feasibility study to mitigate land subsidence at a golf course adjacent to Long Island Sound in Northport, New York. Completed a data review of existing reports from USGS and local municipality, previous soil investigation, and current stormwater drainage design. Directed a field investigation to obtain data in support of the conceptual model for land movement. Concluded that existing stormwater management measures accelerated the rate of land movement. Evaluated potential engineering remedies.

Compliance

- Project Engineer for the evaluation of air emissions data from a steel mill melt shop in Sayreville, New Jersey. Prepared annual emissions statement in accordance with permit requirements using RADIUS software and emissions factors from AP-42 and CEMS data. Evaluated and summarized trends and anomalies observed in over one year's worth of air monitoring data on particulates and metals from monitors set up in the surrounding community.
- Project Engineer for the preparation of Title V emissions statement for two major hospitals in Nassau County, New York. Responsibilities included reviewing annual fuel usage data, calculating air emissions using emissions factors from AP-42, and preparing the emissions statement.
- Project Manager for the coordination, preparation, and submission of PCB TMDL reporting requirements for multiple sites in Virginia. Responsibilities included managing subcontractors, preparing submission forms in accordance with state guidelines, and preparing the first Pollutant Minimization Plan (PMP) in the state for PCBs.

Litigation Support

- Principal Engineer for the preparation of an expert report on the operation, closure, and pollution caused by a sanitary landfill adjacent to a creek in Indiana. The effort included reviewing historical site photographs; past regulations and practices for siting, operating, and closing of a sanitary landfill; and cost estimate to properly close the landfill.
- Senior Engineer for the analysis of expert reports and preparation of rebuttal for three superfund sites in New York and Massachusetts. The case involved assigning the percentage of PCBs released over time during the operation of the facilities at the three sites for the purpose of remedial costs allocation to various insurance carriers. Reviewed information submitted by opposing experts, conducted independent research to verify methodologies, and provided technical calculations indicating flaws in positions advocated by the opposing experts.
- Senior Engineer and Project Manager for the analysis of the sources and fate and transport of dioxins and PCBs into Newark Bay in New Jersey. Reviewed sediment and water column data from existing investigations, performed independent review of third party publications, and worked with geochemical expert on principal component analysis to identify dioxin contributions from several nearby sources.
- Senior Engineer for the preparation of an expert report for a fuel oil release in Rochelle Park, New Jersey. The release was from a residential underground storage tank (UST). The expert report opined on the age of the release, the reliability of the estimation method used by the opposing expert, and the accuracy of the age dating of the perforations in the UST.
- Project Engineer for the preparation of an affidavit regarding a cesspool explosion on Long Island, New York. The affidavit was prepared for the defendant's counsel providing technical calculations and opining on the improbability that the defendant's use of a drain cleaner contributed to a flash fire that injured the plaintiff. Also prepared an expert rebuttal affidavit to demonstrate the fallacies in the plaintiff's expert's arguments. The judge dismissed the case after reviewing all admitted information.
- Senior Engineer for the evaluation of expected remedial costs for waste disposal sites as part of a large bankruptcy litigation. Reviewed over 70 site records to identify potential liabilities and appropriate statute of limitations. Developed present value of remedial investigation and action costs and apportionment ranging from $160,000 to $1,200,000.
- Senior Engineer for the evaluation of gas chromatograms from multiple retail gasoline stations in Puerto Rico as part of a class action lawsuit. Responsibilities included reviewing for indicators of methyl tert-butyl ether (MTBE) and determining MTBE concentrations from historic laboratory data packages.

APPENDIX B

Laboratory Certifications

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Lead on Air Filter	EPA 40 CFR Part 50 App. G	AE	x	Y	
NY	PCBs and Aroclors	EPA TO-10A	AE	x	Y	
NY	Acenaphthene	EPA TO-13A Full Scan	AE	x	Y	
NY	Acenaphthylene	EPA TO-13A Full Scan	AE	x	Y	
NY	Anthracene	EPA TO-13A Full Scan	AE	x	Y	
NY	Benzo(a)anthracene	EPA TO-13A Full Scan	AE	x	Y	
NY	Benzo(a)pyrene	EPA TO-13A Full Scan	AE	x	Y	
NY	Benzo(b)fluoranthene	EPA TO-13A Full Scan	AE	x	Y	
NY	Benzo(ghi)perylene	EPA TO-13A Full Scan	AE	x	Y	
NY	Benzo(k)fluoranthene	EPA TO-13A Full Scan	AE	x	Y	
NY	Chrysene	EPA TO-13A Full Scan	AE	x	Y	
NY	Dibenzo(a,h)anthracene	EPA TO-13A Full Scan	AE	x	Y	
NY	Fluoranthene	EPA TO-13A Full Scan	AE	x	Y	
NY	Fluorene	EPA TO-13A Full Scan	AE	x	Y	
NY	Indeno(1,2,3-cd)pyrene	EPA TO-13A Full Scan	AE	x	Y	
NY	Naphthalene	EPA TO-13A Full Scan	AE	x	Y	
NY	Phenanthrene	EPA TO-13A Full Scan	AE	x	Y	
NY	Pyrene	EPA TO-13A Full Scan	AE	x	Y	
NY	1,1,1-Trichloroethane	EPA TO-15	AE	x	Y	
NY	1,1,2,2-Tetrachloroethane	EPA TO-15	AE	x	Y	
NY	1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA TO-15	AE	x	Y	
NY	1,1,2-Trichloroethane	EPA TO-15	AE	x	Y	
NY	1,1-Dichloroethane	EPA TO-15	AE	x	Y	
NY	1,1-Dichloroethene	EPA TO-15	AE	x	Y	
NY	1,2,4-Trichlorobenzene	EPA TO-15	AE	x	Y	
NY	1,2,4-Trimethylbenzene	EPA TO-15	AE	x	Y	
NY	1,2-Dibromo-3-Chloropropane (DBCP)	EPA TO-15	AE	x	Y	
NY	1,2-Dibromoethane (EDB)	EPA TO-15	AE	x	Y	
NY	1,2-Dichlorobenzene	EPA TO-15	AE	x	Y	
NY	1,2-Dichloroethane	EPA TO-15	AE	x	Y	
NY	1,2-Dichloropropane	EPA TO-15	AE	x	Y	
NY	1,2-Dichlorotetrafluoroethane	EPA TO-15	AE	x	Y	
NY	1,3,5-Trimethylbenzene	EPA TO-15	AE	x	Y	
NY	1,3-Butadiene	EPA TO-15	AE	x	Y	
NY	1,3-Dichlorobenzene	EPA TO-15	AE	x	Y	
NY	1,4-Dichlorobenzene	EPA TO-15	AE	x	Y	
NY	1,4-Dioxane	EPA TO-15	AE	x	Y	
NY	2,2,4-Trimethylpentane	EPA TO-15	AE	x	Y	
NY	2-Butanone	EPA TO-15	AE	x	Y	
NY	2-Chlorotoluene	EPA TO-15	AE	x	Y	
NY	3-Chloropropene	EPA TO-15	AE	x	Y	
NY	4-Methyl-2-Pentanone	EPA TO-15	AE	x	Y	
NY	Acetaldehyde	EPA TO-15	AE	x	Y	
NY	Acetone	EPA TO-15	AE	x	Y	
NY	Acetonitrile	EPA TO-15	AE	x	Y	
NY	Acrolein	EPA TO-15	AE	x	Y	
NY	Acrylonitrile	EPA TO-15	AE	x	Y	
NY	Benzene	EPA TO-15	AE	x	Y	
NY	Benzyl Chloride	EPA TO-15	AE	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Bromodichloromethane	EPA TO-15	AE	x	Y	
NY	Bromoform	EPA TO-15	AE	x	Y	
NY	Bromomethane	EPA TO-15	AE	x	Y	
NY	Carbon Disulfide	EPA TO-15	AE	x	Y	
NY	Carbon Tetrachloride	EPA TO-15	AE	x	Y	
NY	Chlorobenzene	EPA TO-15	AE	x	Y	
NY	Chloroethane	EPA TO-15	AE	x	Y	
NY	Chloroform	EPA TO-15	AE	x	Y	
NY	Chloromethane	EPA TO-15	AE	x	Y	
NY	cis-1,2-Dichloroethene	EPA TO-15	AE	x	Y	
NY	cis-1,3-Dichloropropene	EPA TO-15	AE	x	Y	
NY	Cyclohexane	EPA TO-15	AE	x	Y	
NY	Dibromochloromethane	EPA TO-15	AE	x	Y	
NY	Dichlorodifluoromethane	EPA TO-15	AE	x	Y	
NY	Ethylbenzene	EPA TO-15	AE	x	Y	
NY	Hexachlorobutadiene	EPA TO-15	AE	x	Y	
NY	Isopropyl Alcohol	EPA TO-15	AE	x	Y	
NY	Isopropylbenzene	EPA TO-15	AE	x	Y	
NY	m+p-Xylene	EPA TO-15	AE	x	Y	
NY	Methyl Alcohol (methanol)	EPA TO-15	AE	x	Y	
NY	Methyl Methacrylate	EPA TO-15	AE	x	Y	
NY	Methyl tert-butyl ether	EPA TO-15	AE	x	Y	
NY	Methylene Chloride	EPA TO-15	AE	x	Y	
NY	Naphthalene	EPA TO-15	AE	x	Y	
NY	n-Heptane	EPA TO-15	AE	x	Y	
NY	n-Hexane	EPA TO-15	AE	x	Y	
NY	o-Xylene	EPA TO-15	AE	x	Y	
NY	Styrene	EPA TO-15	AE	x	Y	
NY	Tert-Butyl Alcohol	EPA TO-15	AE	x	Y	
NY	Tetrachloroethene	EPA TO-15	AE	x	Y	
NY	Toluene	EPA TO-15	AE	x	Y	
NY	Total Xylenes	EPA TO-15	AE	x	Y	
NY	Trans-1,2-Dichloroethene	EPA TO-15	AE	x	Y	
NY	Trans-1,3-Dichloropropene	EPA TO-15	AE	x	Y	
NY	Trichloroethene	EPA TO-15	AE	x	Y	
NY	Trichlorofluoromethane	EPA TO-15	AE	x	Y	
NY	Vinyl acetate	EPA TO-15	AE	x	Y	
NY	Vinyl Bromide	EPA TO-15	AE	x	Y	
NY	Vinyl Chloride	EPA TO-15	AE	x	Y	
NY	Turbidity	EPA 180.1	DW	Y	x	
NY	Aluminum	EPA 200.7	DW	x	Y	
NY	Barium	EPA 200.7	DW	x	Y	
NY	Beryllium	EPA 200.7	DW	x	Y	
Ny	Boron	EPA 200.7	DW	x	Y	
NY	Cadmium	EPA 200.7	DW	x	Y	
NY	Calcium	EPA 200.7	DW	x	Y	
NY	Calcium Hardness	EPA 200.7	DW	x	Y	
NY	Chromium	EPA 200.7	DW	x	Y	
NY	Copper	EPA 200.7	DW	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Iron	EPA 200.7	DW	x	Y	
NY	Magnesium	EPA 200.7	DW	x	Y	
NY	Manganese	EPA 200.7	DW	x	Y	
NY	Nickel	EPA 200.7	DW	x	Y	
NY	Potassium	EPA 200.7	DW	x	Y	
NY	Silver	EPA 200.7	DW	x	Y	
NY	Sodium	EPA 200.7	DW	x	Y	
Ny	Vanadium	EPA 200.7	DW	x	Y	
NY	Zinc	EPA 200.7	DW	x	Y	
NY	Aluminum	EPA 200.8	DW	x	Y	
NY	Antimony	EPA 200.8	DW	x	Y	
NY	Arsenic	EPA 200.8	DW	x	Y	
NY	Barium	EPA 200.8	DW	x	Y	
NY	Beryllium	EPA 200.8	DW	x	Y	
NY	Cadmium	EPA 200.8	DW	x	Y	
NY	Copper	EPA 200.8	DW	x	Y	
NY	Lead	EPA 200.8	DW	x	Y	
Ny	Manganese	EPA 200.8	DW	x	Y	
NY	Nickel	EPA 200.8	DW	x	Y	
NY	Selenium	EPA 200.8	DW	x	Y	
NY	Silver	EPA 200.8	DW	x	Y	
NY	Thallium	EPA 200.8	DW	x	Y	
NY	Vanadium	EPA 200.8	DW	x	Y	
NY	Zinc	EPA 200.8	DW	x	Y	
NY	Mercury	EPA 245.1	DW	x	Y	
NY	Chloride	EPA 300.0	DW	Y	x	
NY	Fluoride	EPA 300.0	DW	Y	x	
NY	Sulfate	EPA 300.0	DW	Y	x	
NY	Perchlorate	EPA 332.0	DW	Y	x	
NY	1,2-Dibromo-3-Chloropropane (DBCP)	EPA 504.1	DW	Y	x	
NY	1,2-Dibromoethane (EDB)	EPA 504.1	DW	Y	x	
NY	1,1,1,2-Tetrachloroethane	EPA 524.2	DW	Y	x	
NY	1,1,1-Trichloroethane	EPA 524.2	DW	Y	x	
NY	1,1,2,2-Tetrachloroethane	EPA 524.2	DW	Y	x	
NY	1,1,2-Trichloroethane	EPA 524.2	DW	Y	x	
NY	1,1-Dichloroethane	EPA 524.2	DW	Y	x	
NY	1,1-Dichloroethene	EPA 524.2	DW	Y	x	
NY	1,1-Dichloropropene	EPA 524.2	DW	Y	x	
NY	1,2,3-Trichlorobenzene	EPA 524.2	DW	Y	x	
NY	1,2,3-Trichloropropane	EPA 524.2	DW	Y	x	
NY	1,2,4-Trichlorobenzene	EPA 524.2	DW	Y	x	
NY	1,2,4-Trimethylbenzene	EPA 524.2	DW	Y	x	
NY	1,2-Dichlorobenzene	EPA 524.2	DW	Y	x	
NY	1,2-Dichloroethane	EPA 524.2	DW	Y	x	
NY	1,2-Dichloropropane	EPA 524.2	DW	Y	x	
NY	1,3,5-Trimethylbenzene	EPA 524.2	DW	Y	x	
NY	1,3-Dichlorobenzene	EPA 524.2	DW	Y	x	
NY	1,3-Dichloropropane	EPA 524.2	DW	Y	x	
NY	1,4-Dichlorobenzene	EPA 524.2	DW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	2,2-Dichloropropane	EPA 524.2	DW	Y	x	
NY	2-Chlorotoluene	EPA 524.2	DW	Y	x	
NY	4-Chlorotoluene	EPA 524.2	DW	Y	x	
NY	Benzene	EPA 524.2	DW	Y	x	
NY	Bromobenzene	EPA 524.2	DW	Y	x	
NY	Bromochloromethane	EPA 524.2	DW	Y	x	
NY	Bromodichloromethane	EPA 524.2	DW	Y	x	
NY	Bromoform	EPA 524.2	DW	Y	x	
NY	Bromomethane	EPA 524.2	DW	Y	x	
NY	Carbon Tetrachloride	EPA 524.2	DW	Y	x	
NY	Chlorobenzene	EPA 524.2	DW	Y	x	
NY	Chloroethane	EPA 524.2	DW	Y	x	
NY	Chloroform	EPA 524.2	DW	Y	x	
NY	Chloromethane	EPA 524.2	DW	Y	x	
NY	cis-1,2-Dichloroethene	EPA 524.2	DW	Y	x	
NY	cis-1,3-Dichloropropene	EPA 524.2	DW	Y	x	
NY	Dibromochloromethane	EPA 524.2	DW	Y	x	
NY	Dibromomethane	EPA 524.2	DW	Y	x	
NY	Dichlorodifluoromethane	EPA 524.2	DW	Y	x	
NY	Ethylbenzene	EPA 524.2	DW	Y	x	
NY	Hexachlorobutadiene	EPA 524.2	DW	Y	x	
NY	Isopropylbenzene	EPA 524.2	DW	Y	x	
NY	Methyl tert-butyl ether	EPA 524.2	DW	Y	x	
NY	Methylene chloride	EPA 524.2	DW	Y	x	
NY	Naphthalene	EPA 524.2	DW	Y	x	
NY	n-Butylbenzene	EPA 524.2	DW	Y	x	
NY	n-Propylbenzene	EPA 524.2	DW	Y	x	
NY	p-Isopropyltoluene	EPA 524.2	DW	Y	x	
NY	sec-Butylbenzene	EPA 524.2	DW	Y	x	
NY	Styrene	EPA 524.2	DW	Y	x	
NY	Tert-Butylbenzene	EPA 524.2	DW	Y	x	
NY	Tetrachloroethene	EPA 524.2	DW	Y	x	
NY	Toluene	EPA 524.2	DW	Y	x	
NY	Total Trihalomethanes	EPA 524.2	DW	Y	x	
NY	Total Xylenes	EPA 524.2	DW	Y	x	
NY	Trans-1,2-Dichloroethene	EPA 524.2	DW	Y	x	
NY	Trans-1,3-Dichloropropene	EPA 524.2	DW	Y	x	
NY	Trichloroethene	EPA 524.2	DW	Y	x	
NY	Trichlorofluoromethane	EPA 524.2	DW	Y	x	
NY	Vinyl chloride	EPA 524.2	DW	Y	x	
NY	Perfluoro-n-octanoic acid (PFOA)	EPA 537	DW	x	Y	
NY	Perfluorooctanesulfonic acid (PFOS)	EPA 537	DW	x	Y	
NY	Color	SM 2120B	DW	Y	x	
NY	Turbidity	SM 2130B	DW	Y	x	
NY	Odor	SM 2150B	DW	Y	x	
NY	Alkalinity	SM 2320B	DW	Y	x	
NY	Specific Conductance	SM 2510B	DW	Y	x	
NY	Total Dissolved Solids	SM 2540C	DW	Y	x	
NY	Cyanide, Distillation	SM 4500 CN C	DW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Cyanide, Total	SM 4500 CN E	DW	Y	x	
NY	Fluoride	SM 4500 F-C	DW	Y	x	
NY	Nitrate-N	SM 4500 NO3-F	DW	Y	x	
NY	Nitrite-N	SM 4500 NO3-F	DW	Y	x	
NY	Total Organic Carbon	SM 5310C	DW	Y	x	
NY	Heterotrophic Plate Count	SM 9215B	DW	Y	x	
NY	Coliform, Total	SM 9223B	DW	Y	x	
NY	E. Coli	SM 9223B	DW	Y	x	P/A
NY	E. Coli	SM 9223B	DW	Y	x	Enumeration
NY	Specific Conductance	EPA 120.1	NPW	Y	x	
NY	Mercury	EPA 1631E	NPW	x	Y	
NY	Oil & Grease	EPA 1664A	NPW	Y	x	
NY	Oil & Grease (TPH)	EPA 1664A	NPW	Y	x	
NY	Turbidity	EPA 180.1	NPW	Y	x	
NY	Aluminum	EPA 200.7	NPW	x	Y	
NY	Antimony	EPA 200.7	NPW	x	Y	
NY	Arsenic	EPA 200.7	NPW	x	Y	
NY	Barium	EPA 200.7	NPW	x	Y	
NY	Beryllium	EPA 200.7	NPW	x	Y	
NY	Boron	EPA 200.7	NPW	x	Y	
NY	Cadmium	EPA 200.7	NPW	x	Y	
NY	Calcium	EPA 200.7	NPW	x	Y	
NY	Chromium	EPA 200.7	NPW	x	Y	
NY	Cobalt	EPA 200.7	NPW	x	Y	
NY	Copper	EPA 200.7	NPW	x	Y	
NY	Iron	EPA 200.7	NPW	x	Y	
NY	Lead	EPA 200.7	NPW	x	Y	
NY	Magnesium	EPA 200.7	NPW	x	Y	
NY	Manganese	EPA 200.7	NPW	x	Y	
NY	Molybdenum	EPA 200.7	NPW	x	Y	
NY	Nickel	EPA 200.7	NPW	x	Y	
NY	Potassium	EPA 200.7	NPW	x	Y	
NY	Selenium	EPA 200.7	NPW	x	Y	
NY	Silica, Dissolved	EPA 200.7	NPW	x	Y	
NY	Silver	EPA 200.7	NPW	x	Y	
NY	Sodium	EPA 200.7	NPW	x	Y	
NY	Strontium	EPA 200.7	NPW	x	Y	
NY	Thallium	EPA 200.7	NPW	x	Y	
NY	Tin	EPA 200.7	NPW	x	Y	
NY	Titanium	EPA 200.7	NPW	x	Y	
NY	Total Hardness (CaCO3)	EPA 200.7	NPW	x	Y	
NY	Vanadium	EPA 200.7	NPW	x	Y	
NY	Zinc	EPA 200.7	NPW	x	Y	
NY	Aluminum	EPA 200.8	NPW	x	Y	
NY	Antimony	EPA 200.8	NPW	x	Y	
NY	Arsenic	EPA 200.8	NPW	x	Y	
NY	Barium	EPA 200.8	NPW	x	Y	
NY	Beryllium	EPA 200.8	NPW	x	Y	
NY	Cadmium	EPA 200.8	NPW	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Chromium	EPA 200.8	NPW	x	Y	
NY	Cobalt	EPA 200.8	NPW	x	Y	
NY	Copper	EPA 200.8	NPW	x	Y	
NY	Lead	EPA 200.8	NPW	x	Y	
NY	Manganese	EPA 200.8	NPW	x	Y	
NY	Molybdenum	EPA 200.8	NPW	x	Y	
NY	Nickel	EPA 200.8	NPW	x	Y	
NY	Selenium	EPA 200.8	NPW	x	Y	
NY	Silver	EPA 200.8	NPW	x	Y	
NY	Thallium	EPA 200.8	NPW	x	Y	
NY	Vanadium	EPA 200.8	NPW	x	Y	
NY	Zinc	EPA 200.8	NPW	x	Y	
NY	Mercury	EPA 245.1	NPW	x	Y	
NY	Bromide	EPA 300.0	NPW	Y	x	
NY	Chloride	EPA 300.0	NPW	Y	x	
NY	Fluoride	EPA 300.0	NPW	Y	x	
NY	Nitrate-N	EPA 300.0	NPW	Y	x	
NY	Sulfate	EPA 300.0	NPW	Y	x	
NY	Acid Digestion of Waters	EPA 3005A	NPW	x	**Y**	
NY	Microwave Acid Digestion	EPA 3015A	NPW	x	**Y**	
NY	Acid Digestion of Waters	EPA 3020A	NPW	x	**Y**	
NY	Ammonia	EPA 350.1	NPW	Y	x	
NY	Nitrogen, Total Kjeldahl	EPA 351.1	NPW	Y	x	
NY	Separatory Funnel Extraction	EPA 3510C	NPW	Y	**Y**	
NY	Nitrate-N	EPA 353.2	NPW	Y	x	
NY	Nitrate-Nitrite	EPA 353.2	NPW	Y	x	
NY	Chemical Oxygen Demand	EPA 410.4	NPW	Y	x	
NY	Total Phenolics	EPA 420.1	NPW	Y	x	
NY	Purge & Trap Aqueous	EPA 5030C	NPW	Y	x	
NY	Aluminum	EPA 6010C	NPW	x	Y	
NY	Antimony	EPA 6010C	NPW	x	Y	
NY	Arsenic	EPA 6010C	NPW	x	Y	
NY	Barium	EPA 6010C	NPW	x	Y	
NY	Beryllium	EPA 6010C	NPW	x	Y	
NY	Boron	EPA 6010C	NPW	x	Y	
NY	Cadmium	EPA 6010C	NPW	x	Y	
NY	Calcium	EPA 6010C	NPW	x	Y	
NY	Chromium	EPA 6010C	NPW	x	Y	
NY	Cobalt	EPA 6010C	NPW	x	Y	
NY	Copper	EPA 6010C	NPW	x	Y	
NY	Iron	EPA 6010C	NPW	x	Y	
NY	Lead	EPA 6010C	NPW	x	Y	
NY	Magnesium	EPA 6010C	NPW	x	Y	
NY	Manganese	EPA 6010C	NPW	x	Y	
NY	Molybdenum	EPA 6010C	NPW	x	Y	
NY	Nickel	EPA 6010C	NPW	x	Y	
NY	Potassium	EPA 6010C	NPW	x	Y	
NY	Selenium	EPA 6010C	NPW	x	Y	
NY	Silver	EPA 6010C	NPW	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Sodium	EPA 6010C	NPW	x	Y	
NY	Strontium	EPA 6010C	NPW	x	Y	
NY	Thallium	EPA 6010C	NPW	x	Y	
NY	Tin	EPA 6010C	NPW	x	Y	
NY	Vanadium	EPA 6010C	NPW	x	Y	
NY	Zinc	EPA 6010C	NPW	x	Y	
NY	Aluminum	EPA 6020A	NPW	x	Y	
NY	Antimony	EPA 6020A	NPW	x	Y	
NY	Arsenic	EPA 6020A	NPW	x	Y	
NY	Barium	EPA 6020A	NPW	x	Y	
NY	Beryllium	EPA 6020A	NPW	x	Y	
NY	Boron	EPA 6020A	NPW	x	Y	
NY	Cadmium	EPA 6020A	NPW	x	Y	
NY	Calcium	EPA 6020A	NPW	x	Y	
NY	Chromium	EPA 6020A	NPW	x	Y	
NY	Cobalt	EPA 6020A	NPW	x	Y	
NY	Copper	EPA 6020A	NPW	x	Y	
NY	Iron	EPA 6020A	NPW	x	Y	
NY	Lead	EPA 6020A	NPW	x	Y	
NY	Magnesium	EPA 6020A	NPW	x	Y	
NY	Manganese	EPA 6020A	NPW	x	Y	
NY	Molybdenum	EPA 6020A	NPW	x	Y	
NY	Nickel	EPA 6020A	NPW	x	Y	
NY	Potassium	EPA 6020A	NPW	x	Y	
NY	Selenium	EPA 6020A	NPW	x	Y	
NY	Silver	EPA 6020A	NPW	x	Y	
NY	Strontium	EPA 6020A	NPW	x	Y	
NY	Thallium	EPA 6020A	NPW	x	Y	
NY	Tin	EPA 6020A	NPW	x	Y	
NY	Titanium	EPA 6020A	NPW	x	Y	
NY	Vanadium	EPA 6020A	NPW	x	Y	
NY	Zinc	EPA 6020A	NPW	x	Y	
NY	4,4'-DDD	EPA 608	NPW	Y	x	
NY	4,4'-DDE	EPA 608	NPW	Y	x	
NY	4,4'-DDT	EPA 608	NPW	Y	x	
NY	Aldrin	EPA 608	NPW	Y	x	
NY	Alpha-BHC	EPA 608	NPW	Y	x	
NY	Beta-BHC	EPA 608	NPW	Y	x	
NY	Chlordane	EPA 608	NPW	Y	x	
NY	Delta-BHC	EPA 608	NPW	Y	x	
NY	Dieldrin	EPA 608	NPW	Y	x	
NY	Endosulfan I	EPA 608	NPW	Y	x	
NY	Endosulfan II	EPA 608	NPW	Y	x	
NY	Endosulfan Sulfate	EPA 608	NPW	Y	x	
NY	Endrin	EPA 608	NPW	Y	x	
NY	Endrin Aldehyde	EPA 608	NPW	Y	x	
NY	Heptachlor	EPA 608	NPW	Y	x	
NY	Heptachlor Epoxide	EPA 608	NPW	Y	x	
NY	Lindane (gamma-BHC)	EPA 608	NPW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Methoxychlor	EPA 608	NPW	Y	x	
NY	PCB-1016	EPA 608	NPW	Y	x	
NY	PCB-1221	EPA 608	NPW	Y	x	
NY	PCB-1232	EPA 608	NPW	Y	x	
NY	PCB-1242	EPA 608	NPW	Y	x	
NY	PCB-1248	EPA 608	NPW	Y	x	
NY	PCB-1254	EPA 608	NPW	Y	x	
NY	PCB-1260	EPA 608	NPW	Y	x	
NY	Toxaphene	EPA 608	NPW	Y	x	
NY	1,1,1-Trichloroethane	EPA 624	NPW	Y	x	
NY	1,1,2,2-Tetrachloroethane	EPA 624	NPW	Y	x	
NY	1,1,2-Trichloroethane	EPA 624	NPW	Y	x	
NY	1,1-Dichloroethane	EPA 624	NPW	Y	x	
NY	1,1-Dichloroethene	EPA 624	NPW	Y	x	
NY	1,2-Dichlorobenzene	EPA 624	NPW	Y	x	
NY	1,2-Dichloroethane	EPA 624	NPW	Y	x	
NY	1,2-Dichloropropane	EPA 624	NPW	Y	x	
NY	1,3-Dichlorobenzene	EPA 624	NPW	Y	x	
NY	1,4-Dichlorobenzene	EPA 624	NPW	Y	x	
NY	2-Chloroethyl Vinyl ether	EPA 624	NPW	Y	x	
NY	Acetone	EPA 624	NPW	Y	x	
NY	Acrolein	EPA 624	NPW	Y	x	
NY	Acrylonitrile	EPA 624	NPW	Y	x	
NY	Benzene	EPA 624	NPW	Y	x	
NY	Bromodichloromethane	EPA 624	NPW	Y	x	
NY	Bromoform	EPA 624	NPW	Y	x	
NY	Bromomethane	EPA 624	NPW	Y	x	
NY	Carbon Tetrachloride	EPA 624	NPW	Y	x	
NY	Chlorobenzene	EPA 624	NPW	Y	x	
NY	Chloroethane	EPA 624	NPW	Y	x	
NY	Chloroform	EPA 624	NPW	Y	x	
NY	Chloromethane	EPA 624	NPW	Y	x	
NY	cis-1,2-Dichloroethene	EPA 624	NPW	Y	x	
NY	cis-1,3-Dichloropropene	EPA 624	NPW	Y	x	
NY	Dibromochloromethane	EPA 624	NPW	Y	x	
NY	Dichlorodifluoromethane	EPA 624	NPW	Y	x	
NY	Ethylbenzene	EPA 624	NPW	Y	x	
NY	Methylene Chloride	EPA 624	NPW	Y	x	
NY	Methyl tert-butyl ether	EPA 624	NPW	Y	x	
NY	Styrene	EPA 624	NPW	Y	x	
NY	Tert-Butyl Alcohol	EPA 624	NPW	Y	x	
NY	Tetrachloroethene	EPA 624	NPW	Y	x	
NY	Toluene	EPA 624	NPW	Y	x	
NY	Total Xylenes	EPA 624	NPW	Y	x	
NY	Trans-1,2-Dichloroethene	EPA 624	NPW	Y	x	
NY	Trans-1,3-Dichloropropene	EPA 624	NPW	Y	x	
NY	Trichloroethene	EPA 624	NPW	Y	x	
NY	Trichlorofluoromethane	EPA 624	NPW	Y	x	
NY	Vinyl Acetate	EPA 624	NPW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Vinyl Chloride	EPA 624	NPW	Y	x	
NY	1,2,4-Trichlorobenzene	EPA 625	NPW	Y	x	
NY	2,4,5-Trichlorophenol	EPA 625	NPW	Y	x	
NY	2,4,6-Trichlorophenol	EPA 625	NPW	Y	x	
NY	2,4-Dichlorophenol	EPA 625	NPW	Y	x	
NY	2,4-Dimethylphenol	EPA 625	NPW	Y	x	
NY	2,4-Dinitrophenol	EPA 625	NPW	Y	x	
NY	2,4-Dinitrotoluene (2,4-DNT)	EPA 625	NPW	Y	x	
NY	2,6-Dinitrotoluene (2,6-DNT)	EPA 625	NPW	Y	x	
NY	2-Chloronaphthalene	EPA 625	NPW	Y	x	
NY	2-Chlorophenol	EPA 625	NPW	Y	x	
NY	2-Methyl-4,6-dinitrophenol	EPA 625	NPW	Y	x	
NY	2-Methylphenol	EPA 625	NPW	Y	x	
NY	2-Nitrophenol	EPA 625	NPW	Y	x	
NY	3,3-Dichlorobenzidine	EPA 625	NPW	Y	x	
NY	3-Methylphenol	EPA 625	NPW	Y	x	
NY	4-Bromophenyl phenyl ether	EPA 625	NPW	Y	x	
NY	4-Chloro-3-methylphenol	EPA 625	NPW	Y	x	
NY	4-Chlorophenyl phenyl ether	EPA 625	NPW	Y	x	
NY	4-Methylphenol	EPA 625	NPW	Y	x	
NY	4-Nitrophenol	EPA 625	NPW	Y	x	
NY	Acenaphthene	EPA 625	NPW	Y	x	
NY	Acenaphthylene	EPA 625	NPW	Y	x	
NY	Acetophenone	EPA 625	NPW	Y	x	
NY	Aniline	EPA 625	NPW	Y	x	
NY	Anthracene	EPA 625	NPW	Y	x	
NY	Benzidine	EPA 625	NPW	Y	x	
NY	Benzo(a)anthracene	EPA 625	NPW	Y	x	
NY	Benzo(a)pyrene	EPA 625	NPW	Y	x	
NY	Benzo(b)fluoranthene	EPA 625	NPW	Y	x	
NY	Benzo(ghi)perylene	EPA 625	NPW	Y	x	
NY	Benzo(k)fluoranthene	EPA 625	NPW	Y	x	
NY	Bis(2-chloroethoxy) methane	EPA 625	NPW	Y	x	
NY	Bis(2-chloroethyl) ether	EPA 625	NPW	Y	x	
NY	Bis(2-chloroisopropyl) ether	EPA 625	NPW	Y	x	
NY	Bis(2-ethylhexyl) phthalate	EPA 625	NPW	Y	x	
NY	Butyl Benzyl phthalate	EPA 625	NPW	Y	x	
NY	Carbazole	EPA 625	NPW	Y	x	
NY	Chrysene	EPA 625	NPW	Y	x	
NY	Dibenzo(a,h)anthracene	EPA 625	NPW	Y	x	
NY	Diethyl phthalate	EPA 625	NPW	Y	x	
NY	Dimethyl phthalate	EPA 625	NPW	Y	x	
NY	Di-n-butyl phthalate	EPA 625	NPW	Y	x	
NY	Di-n-octyl phthalate	EPA 625	NPW	Y	x	
NY	Fluoranthene	EPA 625	NPW	Y	x	
NY	Fluorene	EPA 625	NPW	Y	x	
NY	Hexachlorobenzene	EPA 625	NPW	Y	x	
NY	Hexachlorobutadiene	EPA 625	NPW	Y	x	
NY	Hexachlorocyclopentadiene	EPA 625	NPW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Hexachloroethane	EPA 625	NPW	Y	x	
NY	Indeno(1,2,3-cd)pyrene	EPA 625	NPW	Y	x	
NY	Isophorone	EPA 625	NPW	Y	x	
NY	Naphthalene	EPA 625	NPW	Y	x	
NY	N-Decane	EPA 625	NPW	Y	x	
NY	Nitrobenzene	EPA 625	NPW	Y	x	
NY	N-Nitrosodimethylamine	EPA 625	NPW	Y	x	
NY	N-Nitrosodi-n-propylamine	EPA 625	NPW	Y	x	
NY	N-Nitrosodiphenylamine	EPA 625	NPW	Y	x	
NY	N-Octadecane	EPA 625	NPW	Y	x	
NY	Pentachlorophenol	EPA 625	NPW	Y	x	
NY	Phenanthrene	EPA 625	NPW	Y	x	
NY	Phenol	EPA 625	NPW	Y	x	
NY	Pyrene	EPA 625	NPW	Y	x	
NY	Pyridine	EPA 625	NPW	Y	x	
NY	Chromium VI	EPA 7196A	NPW	Y	x	
NY	Mercury	EPA 7470A	NPW	x	Y	
NY	1,2-Dibromoethane (EDB)	EPA 8011	NPW	Y	x	
NY	1,2-Dibromo-3-Chloropropane (DBCP)	EPA 8011	NPW	Y	x	
NY	Diesel Range Organics	EPA 8015C	NPW	Y	x	
NY	Gasoline Range Organics	EPA 8015C	NPW	Y	x	
NY	Amyl alcohol	EPA 8015D	NPW	x	Y	
NY	Diesel Range Organics	EPA 8015D	NPW	x	Y	
NY	Ethyl alcohol	EPA 8015D	NPW	x	Y	
NY	Ethylene glycol	EPA 8015D	NPW	x	Y	
NY	Gasoline Range Organics	EPA 8015D	NPW	x	Y	
NY	Iso-butyl Alcohol	EPA 8015D	NPW	x	Y	
NY	Methyl Alcohol (methanol)	EPA 8015D	NPW	x	Y	
NY	Tert-Butyl Alcohol	EPA 8015D	NPW	x	Y	
NY	4,4'-DDD	EPA 8081B	NPW	Y	Y	
NY	4,4'-DDE	EPA 8081B	NPW	Y	Y	
NY	4,4'-DDT	EPA 8081B	NPW	Y	Y	
NY	Aldrin	EPA 8081B	NPW	Y	Y	
NY	alpha-BHC	EPA 8081B	NPW	Y	Y	
NY	alpha-Chlordane	EPA 8081B	NPW	Y	Y	
NY	beta-BHC	EPA 8081B	NPW	Y	Y	
NY	Chlordane	EPA 8081B	NPW	Y	Y	
NY	delta-BHC	EPA 8081B	NPW	Y	Y	
NY	Dieldrin	EPA 8081B	NPW	Y	Y	
NY	Endosulfan I	EPA 8081B	NPW	Y	Y	
NY	Endosulfan II	EPA 8081B	NPW	Y	Y	
NY	Endosulfan Sulfate	EPA 8081B	NPW	Y	Y	
NY	Endrin	EPA 8081B	NPW	Y	Y	
NY	Endrin Aldehyde	EPA 8081B	NPW	Y	Y	
NY	Endrin Ketone	EPA 8081B	NPW	Y	Y	
NY	gamma-Chlordane	EPA 8081B	NPW	Y	Y	
NY	Heptachlor	EPA 8081B	NPW	Y	Y	
NY	Heptachlor Epoxide	EPA 8081B	NPW	Y	Y	
NY	Hexachlorobenzene	EPA 8081B	NPW	x	Y	

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Lindane (gamma-BHC)	EPA 8081B	NPW	Y	Y	
NY	Methoxychlor	EPA 8081B	NPW	Y	Y	
NY	Mirex	EPA 8081B	NPW	x	Y	
NY	Toxaphene	EPA 8081B	NPW	Y	Y	
NY	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB	EPA 8082A	NPW	x	Y	
NY	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)	EPA 8082A	NPW	x	Y	
NY	2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)	EPA 8082A	NPW	x	Y	
NY	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	EPA 8082A	NPW	x	Y	
NY	2,2',3,5'-Tetrachlorobiphenyl (PCB 44)	EPA 8082A	NPW	x	Y	
NY	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	EPA 8082A	NPW	x	Y	
NY	2,2',5-Trichlorobiphenyl (PCB 18)	EPA 8082A	NPW	x	Y	
NY	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	EPA 8082A	NPW	x	Y	
NY	2,3',4,4'-Tetrachlorobiphenyl (PCB 66)	EPA 8082A	NPW	x	Y	
NY	PCB-1016	EPA 8082A	NPW	Y	Y	
NY	PCB-1221	EPA 8082A	NPW	Y	Y	
NY	PCB-1232	EPA 8082A	NPW	Y	Y	
NY	PCB-1242	EPA 8082A	NPW	Y	Y	
NY	PCB-1248	EPA 8082A	NPW	Y	Y	
NY	PCB-1254	EPA 8082A	NPW	Y	Y	
NY	PCB-1260	EPA 8082A	NPW	Y	Y	
NY	PCB-1262	EPA 8082A	NPW	Y	Y	
NY	PCB-1268	EPA 8082A	NPW	Y	Y	
NY	2,4,5-T	EPA 8151A	NPW	Y	x	
NY	2,4,5-TP (Silvex)	EPA 8151A	NPW	Y	x	
NY	2,4-D	EPA 8151A	NPW	Y	x	
NY	2,4-DB	EPA 8151A	NPW	Y	x	
NY	Dalapon	EPA 8151A	NPW	Y	x	
NY	Dicamba	EPA 8151A	NPW	Y	x	
NY	Dichloroprop	EPA 8151A	NPW	Y	x	
NY	Dinoseb	EPA 8151A	NPW	Y	x	
NY	1,1,1,2-Tetrachloroethane	EPA 8260C	NPW	Y	x	
NY	1,1,1-Trichloroethane	EPA 8260C	NPW	Y	x	
NY	1,1,2,2-Tetrachloroethane	EPA 8260C	NPW	Y	x	
NY	1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260C	NPW	Y	x	
NY	1,1,2-Trichloroethane	EPA 8260C	NPW	Y	x	
NY	1,1-Dichloroethane	EPA 8260C	NPW	Y	x	
NY	1,1-Dichloroethene	EPA 8260C	NPW	Y	x	
NY	1,1-Dichloropropene	EPA 8260C	NPW	Y	x	
NY	1,2,3-Trichlorobenzene	EPA 8260C	NPW	Y	x	
NY	1,2,3-Trichloropropane	EPA 8260C	NPW	Y	x	
NY	1,2,4-Trichlorobenzene	EPA 8260C	NPW	Y	x	
NY	1,2,4-Trimethylbenzene	EPA 8260C	NPW	Y	x	
NY	1,2-Dibromo-3-Chloropropane (DBCP)	EPA 8260C	NPW	Y	x	
NY	1,2-Dibromoethane (EDB)	EPA 8260C	NPW	Y	x	
NY	1,2-Dichlorobenzene	EPA 8260C	NPW	Y	x	
NY	1,2-Dichloroethane	EPA 8260C	NPW	Y	x	
NY	1,2-Dichloropropane	EPA 8260C	NPW	Y	x	
NY	1,3,5-Trimethylbenzene	EPA 8260C	NPW	Y	x	
NY	1,3-Dichlorobenzene	EPA 8260C	NPW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	1,3-Dichloropropane	EPA 8260C	NPW	Y	x	
NY	1,4-Dichlorobenzene	EPA 8260C	NPW	Y	x	
NY	1,4-Dioxane	EPA 8260C	NPW	Y	x	
NY	1-Butanol	EPA 8260C	NPW	Y	x	
NY	2,2-Dichloropropane	EPA 8260C	NPW	Y	x	
NY	2-Butanone	EPA 8260C	NPW	Y	x	
NY	2-Chloroethyl Vinyl ether	EPA 8260C	NPW	Y	x	
NY	2-Chlorotoluene	EPA 8260C	NPW	Y	x	
NY	2-Hexanone	EPA 8260C	NPW	Y	x	
NY	4-Chlorotoluene	EPA 8260C	NPW	Y	x	
NY	4-Methyl-2-Pentanone	EPA 8260C	NPW	Y	x	
NY	Acetone	EPA 8260C	NPW	Y	x	
NY	Acrolein	EPA 8260C	NPW	Y	x	
NY	Acrylonitrile	EPA 8260C	NPW	Y	x	
NY	Benzene	EPA 8260C	NPW	Y	x	
NY	Bromobenzene	EPA 8260C	NPW	Y	x	
NY	Bromochloromethane	EPA 8260C	NPW	Y	x	
NY	Bromodichloromethane	EPA 8260C	NPW	Y	x	
NY	Bromoform	EPA 8260C	NPW	Y	x	
NY	Bromomethane	EPA 8260C	NPW	Y	x	
NY	Carbon Disulfide	EPA 8260C	NPW	Y	x	
NY	Carbon Tetrachloride	EPA 8260C	NPW	Y	x	
NY	Chlorobenzene	EPA 8260C	NPW	Y	x	
NY	Chloroethane	EPA 8260C	NPW	Y	x	
NY	Chloroform	EPA 8260C	NPW	Y	x	
NY	Chloromethane	EPA 8260C	NPW	Y	x	
NY	cis-1,2-Dichloroethene	EPA 8260C	NPW	Y	x	
NY	cis-1,3-Dichloropropene	EPA 8260C	NPW	Y	x	
NY	Cyclohexane	EPA 8260C	NPW	Y	x	
NY	Dibromochloromethane	EPA 8260C	NPW	Y	x	
NY	Dibromomethane	EPA 8260C	NPW	Y	x	
NY	Dichlorodifluoromethane	EPA 8260C	NPW	Y	x	
NY	Diethyl ether	EPA 8260C	NPW	Y	x	
NY	Diisopropyl ether	EPA 8260C	NPW	Y	x	
NY	Ethanol	EPA 8260C	NPW	Y	x	
NY	Ethyl acetate	EPA 8260C	NPW	Y	x	
NY	Ethyl Methacrylate	EPA 8260C	NPW	Y	x	
NY	Ethylbenzene	EPA 8260C	NPW	Y	x	
NY	Hexachlorobutadiene	EPA 8260C	NPW	Y	x	
NY	Isopropyl Alcohol	EPA 8260C	NPW	Y	x	
NY	Isopropylbenzene	EPA 8260C	NPW	Y	x	
NY	m+p-Xylene	EPA 8260C	NPW	Y	x	
NY	Methyl Acetate	EPA 8260C	NPW	Y	x	
NY	Methyl Cyclohexane	EPA 8260C	NPW	Y	x	
NY	Iodomethane (Methyl Iodide)	EPA 8260C	NPW	Y	x	
NY	Methyl Methacrylate	EPA 8260C	NPW	Y	x	
NY	Methyl tert-butyl ether	EPA 8260C	NPW	Y	x	
NY	Methylene Chloride	EPA 8260C	NPW	Y	x	
NY	Naphthalene	EPA 8260C	NPW	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	n-Butylbenzene	EPA 8260C	NPW	Y	x	
NY	n-Propylbenzene	EPA 8260C	NPW	Y	x	
NY	o-Xylene	EPA 8260C	NPW	Y	x	
NY	p-Isopropyltoluene	EPA 8260C	NPW	Y	x	
NY	sec-Butylbenzene	EPA 8260C	NPW	Y	x	
NY	Styrene	EPA 8260C	NPW	Y	x	
NY	Tert-Amyl Methyl Ether (TAME)	EPA 8260C	NPW	Y	x	
NY	Tert-Butyl Alcohol	EPA 8260C	NPW	Y	x	
NY	tert-butyl Ethyl Ether	EPA 8260C	NPW	Y	x	
NY	Tert-Butylbenzene	EPA 8260C	NPW	Y	x	
NY	Tetrachloroethene	EPA 8260C	NPW	Y	x	
NY	Tetrahydrofuran	EPA 8260C	NPW	Y	x	
NY	Toluene	EPA 8260C	NPW	Y	x	
NY	Total Xylenes	EPA 8260C	NPW	Y	x	
NY	Trans-1,2-Dichloroethene	EPA 8260C	NPW	Y	x	
NY	Trans-1,3-Dichloropropene	EPA 8260C	NPW	Y	x	
NY	Trans-1,4-Dichloro-2-butene	EPA 8260C	NPW	Y	x	
NY	Trichloroethene	EPA 8260C	NPW	Y	x	
NY	Trichlorofluoromethane	EPA 8260C	NPW	Y	x	
NY	Vinyl acetate	EPA 8260C	NPW	Y	x	
NY	Vinyl Chloride	EPA 8260C	NPW	Y	x	
NY	1,1'-Biphenyl	EPA 8270D	NPW	x	Y	
NY	1,2,4,5-Tetrachlorobenzene	EPA 8270D	NPW	Y	Y	
NY	1,2,4-Trichlorobenzene	EPA 8270D	NPW	Y	Y	
NY	1,2-Dichlorobenzene	EPA 8270D	NPW	Y	Y	
NY	1,2-Diphenylhydrazine	EPA 8270D	NPW	Y	Y	
NY	1,3-Dichlorobenzene	EPA 8270D	NPW	Y	Y	
NY	1,4-Dichlorobenzene	EPA 8270D	NPW	Y	Y	
NY	1,4-Dioxane	EPA 8270D	NPW	x	Y	
NY	2,3,4,6-Tetrachlorophenol	EPA 8270D	NPW	Y	Y	
NY	2,4,5-Trichlorophenol	EPA 8270D	NPW	Y	Y	
NY	2,4,6-Trichlorophenol	EPA 8270D	NPW	Y	Y	
NY	2,4-Dichlorophenol	EPA 8270D	NPW	Y	Y	
NY	2,4-Dimethylphenol	EPA 8270D	NPW	Y	Y	
NY	2,4-Dinitrophenol	EPA 8270D	NPW	Y	Y	
NY	2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D	NPW	Y	Y	
NY	2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D	NPW	Y	Y	
NY	2-Chloronaphthalene	EPA 8270D	NPW	Y	Y	
NY	2-Chlorophenol	EPA 8270D	NPW	Y	Y	
NY	2-Methyl-4,6-dinitrophenol	EPA 8270D	NPW	Y	Y	
NY	2-Methylnaphthalene	EPA 8270D	NPW	Y	Y	
NY	2-Methylphenol	EPA 8270D	NPW	Y	Y	
NY	2-Nitroaniline	EPA 8270D	NPW	Y	Y	
NY	2-Nitrophenol	EPA 8270D	NPW	Y	Y	
NY	3,3-Dichlorobenzidine	EPA 8270D	NPW	Y	Y	
NY	3-Methylphenol	EPA 8270D	NPW	Y	Y	
NY	3-Nitroaniline	EPA 8270D	NPW	Y	Y	
NY	4-Bromophenyl phenyl ether	EPA 8270D	NPW	Y	Y	
NY	4-Chloro-3-methylphenol	EPA 8270D	NPW	Y	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	4-Chloroaniline	EPA 8270D	NPW	Y	Y	
NY	4-Chlorophenyl phenyl ether	EPA 8270D	NPW	Y	Y	
NY	4-Methylphenol	EPA 8270D	NPW	Y	Y	
NY	4-Nitroaniline	EPA 8270D	NPW	Y	Y	
NY	4-Nitrophenol	EPA 8270D	NPW	Y	Y	
NY	Acenaphthene	EPA 8270D	NPW	Y	Y	
NY	Acenaphthylene	EPA 8270D	NPW	Y	Y	
NY	Acetophenone	EPA 8270D	NPW	Y	x	
NY	Aniline	EPA 8270D	NPW	Y	Y	
NY	Anthracene	EPA 8270D	NPW	Y	Y	
NY	Atrazine	EPA 8270D	NPW	Y	x	
NY	Benzaldehyde	EPA 8270D	NPW	Y	Y	
NY	Benzidine	EPA 8270D	NPW	Y	Y	
NY	Benzo(a)anthracene	EPA 8270D	NPW	Y	Y	
NY	Benzo(a)pyrene	EPA 8270D	NPW	Y	Y	
NY	Benzo(b)fluoranthene	EPA 8270D	NPW	Y	Y	
NY	Benzo(ghi)perylene	EPA 8270D	NPW	Y	Y	
NY	Benzo(k)fluoranthene	EPA 8270D	NPW	Y	Y	
NY	Benzoic Acid	EPA 8270D	NPW	Y	Y	
NY	Benzyl alcohol	EPA 8270D	NPW	Y	Y	
NY	Biphenyl	EPA 8270D	NPW	Y	x	
NY	Bis(2-chloroethoxy) methane	EPA 8270D	NPW	Y	Y	
NY	Bis(2-chloroethyl) ether	EPA 8270D	NPW	Y	Y	
NY	Bis(2-chloroisopropyl) ether	EPA 8270D	NPW	Y	Y	
NY	Bis(2-ethylhexyl) phthalate	EPA 8270D	NPW	Y	Y	
NY	Butyl Benzyl phthalate	EPA 8270D	NPW	Y	Y	
NY	Caprolactam	EPA 8270D	NPW	Y	Y	
NY	Carbazole	EPA 8270D	NPW	Y	Y	
NY	Chrysene	EPA 8270D	NPW	Y	Y	
NY	Cresols, Total	EPA 8270D	NPW	Y	x	
NY	Dibenzo(a,h)anthracene	EPA 8270D	NPW	Y	Y	
NY	Dibenzofuran	EPA 8270D	NPW	Y	Y	
NY	Diethyl phthalate	EPA 8270D	NPW	Y	Y	
NY	Dimethyl phthalate	EPA 8270D	NPW	Y	Y	
NY	Di-n-butyl phthalate	EPA 8270D	NPW	Y	Y	
NY	Di-n-octyl phthalate	EPA 8270D	NPW	Y	Y	
NY	Diphenylamine	EPA 8270D	NPW	Y	x	
NY	Fluoranthene	EPA 8270D	NPW	Y	Y	
NY	Fluorene	EPA 8270D	NPW	Y	Y	
NY	Hexachlorobenzene	EPA 8270D	NPW	Y	Y	
NY	Hexachlorobutadiene	EPA 8270D	NPW	Y	Y	
NY	Hexachlorocyclopentadiene	EPA 8270D	NPW	Y	Y	
NY	Hexachloroethane	EPA 8270D	NPW	Y	Y	
NY	Indeno(1,2,3-cd)pyrene	EPA 8270D	NPW	Y	Y	
NY	Isophorone	EPA 8270D	NPW	Y	x	
NY	Naphthalene	EPA 8270D	NPW	Y	Y	
NY	Nitrobenzene	EPA 8270D	NPW	Y	Y	
NY	N-Nitrosodimethylamine	EPA 8270D	NPW	Y	Y	
NY	N-Nitrosodi-n-propylamine	EPA 8270D	NPW	Y	Y	

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	N-Nitrosodiphenylamine	EPA 8270D	NPW	Y	Y	
NY	Parathion	EPA 8270D	NPW	Y	x	
NY	Pentachlorophenol	EPA 8270D	NPW	Y	Y	
NY	Phenanthrene	EPA 8270D	NPW	Y	Y	
NY	Phenol	EPA 8270D	NPW	Y	Y	
NY	Pyrene	EPA 8270D	NPW	Y	Y	
NY	Pyridine	EPA 8270D	NPW	Y	Y	
NY	Thionazin	EPA 8270D	NPW	Y	x	
NY	Acenaphthene	EPA 8270D-SIM	NPW	Y	Y	
NY	Acenaphthylene	EPA 8270D-SIM	NPW	Y	Y	
NY	Anthracene	EPA 8270D-SIM	NPW	Y	Y	
NY	Benzo(a)anthracene	EPA 8270D-SIM	NPW	Y	Y	
NY	Benzo(a)anthracene	EPA 8270D-SIM	NPW	Y	x	
NY	Benzo(a)pyrene	EPA 8270D-SIM	NPW	Y	Y	
NY	Benzo(a)pyrene	EPA 8270D-SIM	NPW	Y	x	
NY	Benzo(b)fluoranthene	EPA 8270D-SIM	NPW	Y	Y	
NY	Benzo(b)fluoranthene	EPA 8270D-SIM	NPW	Y	x	
NY	Benzo(ghi)perylene	EPA 8270D-SIM	NPW	Y	Y	
NY	Benzo(k)fluoranthene	EPA 8270D-SIM	NPW	Y	x	
NY	Benzo(k)fluoranthene	EPA 8270D-SIM	NPW	Y	Y	
NY	Chrysene	EPA 8270D-SIM	NPW	Y	Y	
NY	Dibenzo(a,h)anthracene	EPA 8270D-SIM	NPW	Y	Y	
NY	Dibenzo(a,h)anthracene	EPA 8270D-SIM	NPW	Y	x	
NY	Fluoranthene	EPA 8270D-SIM	NPW	Y	Y	
NY	Fluorene	EPA 8270D-SIM	NPW	Y	Y	
NY	Indeno(1,2,3-cd)pyrene	EPA 8270D-SIM	NPW	Y	Y	
NY	Indeno(1,2,3-cd)pyrene	EPA 8270D-SIM	NPW	Y	x	
NY	Naphthalene	EPA 8270D-SIM	NPW	Y	Y	
NY	Phenanthrene	EPA 8270D-SIM	NPW	Y	Y	
NY	Pyrene	EPA 8270D-SIM	NPW	Y	Y	
NY	Formaldehyde	EPA 8315A	NPW	Y	x	
NY	Cyanide - Amenable, Distillation	EPA 9010C	NPW	Y	x	
NY	Cyanide, Distillation	EPA 9010C	NPW	Y	x	
NY	Total Cyanide	EPA 9012B	NPW	Y	x	
NY	Total Cyanide	EPA 9014	NPW	Y	x	
NY	Sulfide	EPA 9030B	NPW	Y	x	
NY	Phenolics	EPA 9065	NPW	Y	x	
NY	Ethane	EPA RSK-175	NPW	x	Y	
NY	Ethene	EPA RSK-175	NPW	x	Y	
NY	Methane	EPA RSK-175	NPW	x	Y	
NY	Propane	EPA RSK-175	NPW	x	Y	
NY	Nitrogen, Total Kjeldahl	Lachat 10-107-06-2	NPW	Y	x	
NY	Cyanide, Total	Lachat 10-204-00-1-X	NPW	Y	x	
NY	Color	SM 2120B	NPW	Y	x	
NY	Turbidity	SM 2130B	NPW	Y	x	
NY	Acidity	SM 2310B	NPW	Y	x	
NY	Alkalinity	SM 2320B	NPW	Y	x	
NY	Total Hardness (CaCO3)	SM 2340B	NPW	x	Y	
NY	Specific Conductance	SM 2510B	NPW	Y	x	

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Total Residue	SM 2540B	NPW	Y	x	
NY	Total Dissolved Solids	SM 2540C	NPW	Y	x	
NY	Total Suspended Solids	SM 2540D	NPW	Y	x	
NY	Volatile Solids	SM 2540E	NPW	Y	x	
NY	Total Settleable Solids	SM 2540F	NPW	Y	x	
NY	Chromium VI	SM 3500 Cr B	NPW	Y	x	
NY	Sulfate	SM 4500 SO4-E	NPW	Y	x	
NY	Chloride	SM 4500 CL-E	NPW	Y	x	
NY	Cyanide, Total	SM 4500 CN E	NPW	Y	x	
NY	Fluoride Preliminary Distillation	SM 4500 F-B	NPW	Y	x	
NY	Fluoride	SM 4500 F-C	NPW	Y	x	
NY	Ammonia	SM 4500 NH3 B	NPW	Y	x	
NY	Ammonia	SM 4500 NH3-H	NPW	Y	x	
NY	Nitrogen, Total Kjeldahl	SM 4500 NH3-H	NPW	Y	x	
NY	Nitrogen, Total Kjeldahl (Distillation)	SM 4500Norg-C	NPW	Y	x	
NY	Nitrite-N	SM 4500 NO2-B	NPW	Y	x	
NY	Nitrate-N	SM 4500 NO3-F	NPW	Y	x	
NY	Nitrate-N	SM 4500 NO3-F	NPW	Y	x	
NY	Nitrate-Nitrite	SM 4500 NO3-F	NPW	Y	x	
NY	Orthophosphate	SM 4500 P-E	NPW	Y	x	
NY	Total Phosphorus (Digestion)	SM 4500 P-B	NPW	Y	x	
NY	Total Phosphorus	SM 4500 P-E	NPW	Y	x	
NY	Sulfide	SM 4500 S2-D	NPW	Y	x	
NY	Sulfate	SM 4500 SO4-E	NPW	Y	x	
NY	Biochemical Oxygen Demand	SM 5210B	NPW	Y	x	
NY	Biochemical Oxygen Demand - Carbonaceous	SM 5210B	NPW	Y	x	
NY	Chemical Oxygen Demand	SM 5220D	NPW	Y	x	
NY	Total Organic Carbon	SM 5310C	NPW	Y	x	
NY	Surfactants (MBAS)	SM 5540C	NPW	Y	x	
NY	Heterotrophic Plate Count	SM 9215B	NPW	Y	x	
NY	Coliform, Total MPN	SM 9221B	NPW	Y	x	
NY	Coliform, Fecal MPN	SM 9221C	NPW	Y	x	
NY	Coliform, Fecal MPN	SM 9221E	NPW	Y	x	
NY	Coliform, Total MF	SM 9222B	NPW	Y	x	
Ny	Titanium	EPA 6010C	NPW	x	Y	
NY	Flashpoint	EPA 1010A	SCM	Y	x	
NY	Ignitability	EPA 1030	SCM	Y	x	
NY	TCLP	EPA 1311	SCM	Y	Y	
NY	SPLP	EPA 1312	SCM	Y	x	
NY	Microwave Acid Digestion	EPA 3050B	SCM	Y	Y	
NY	Microwave Acid Digestion	EPA 3051A	SCM	Y	Y	
NY	Chromium VI Digestion	EPA 3060A	SCM	x	Y	
NY	Soxhlet Extraction	EPA 3540C	SCM	Y	Y	
NY	Microwave Acid Digestion	EPA 3546	SCM	Y	x	
NY	Microscale Solvent Extraction (MSE)	EPA 3570	SCM	x	Y	
NY	Waste Dilution	EPA 3580A	SCM	Y	Y	
NY	Purge & Trap Soil Low/High	EPA 5035A	SCM	Y	x	
NY	Aluminum	EPA 6010C	SCM	x	Y	
NY	Antimony	EPA 6010C	SCM	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Arsenic	EPA 6010C	SCM	x	Y	
NY	Barium	EPA 6010C	SCM	x	Y	
NY	Beryllium	EPA 6010C	SCM	x	Y	
NY	Boron	EPA 6010C	SCM	x	Y	
NY	Cadmium	EPA 6010C	SCM	x	Y	
NY	Calcium	EPA 6010C	SCM	x	Y	
NY	Chromium	EPA 6010C	SCM	x	Y	
NY	Cobalt	EPA 6010C	SCM	x	Y	
NY	Copper	EPA 6010C	SCM	x	Y	
NY	Iron	EPA 6010C	SCM	x	Y	
NY	Lead	EPA 6010C	SCM	x	Y	
NY	Magnesium	EPA 6010C	SCM	x	Y	
NY	Manganese	EPA 6010C	SCM	x	Y	
NY	Molybdenum	EPA 6010C	SCM	x	Y	
NY	Nickel	EPA 6010C	SCM	x	Y	
NY	Potassium	EPA 6010C	SCM	x	Y	
NY	Selenium	EPA 6010C	SCM	x	Y	
NY	Silver	EPA 6010C	SCM	x	Y	
NY	Sodium	EPA 6010C	SCM	x	Y	
NY	Strontium	EPA 6010C	SCM	x	Y	
NY	Thallium	EPA 6010C	SCM	x	Y	
NY	Tin	EPA 6010C	SCM	x	Y	
NY	Titanium	EPA 6010C	SCM	x	Y	
NY	Vanadium	EPA 6010C	SCM	x	Y	
NY	Zinc	EPA 6010C	SCM	x	Y	
NY	Aluminum	EPA 6020A	SCM	x	Y	
NY	Antimony	EPA 6020A	SCM	x	Y	
NY	Arsenic	EPA 6020A	SCM	x	Y	
NY	Barium	EPA 6020A	SCM	x	Y	
NY	Beryllium	EPA 6020A	SCM	x	Y	
NY	Boron	EPA 6020A	SCM	x	Y	
NY	Cadmium	EPA 6020A	SCM	x	Y	
NY	Calcium	EPA 6020A	SCM	x	Y	
NY	Chromium	EPA 6020A	SCM	x	Y	
NY	Cobalt	EPA 6020A	SCM	x	Y	
NY	Copper	EPA 6020A	SCM	x	Y	
NY	Iron	EPA 6020A	SCM	x	Y	
NY	Lead	EPA 6020A	SCM	x	Y	
NY	Magnesium	EPA 6020A	SCM	x	Y	
NY	Manganese	EPA 6020A	SCM	x	Y	
NY	Molybdenum	EPA 6020A	SCM	x	Y	
NY	Nickel	EPA 6020A	SCM	x	Y	
NY	Potassium	EPA 6020A	SCM	x	Y	
NY	Selenium	EPA 6020A	SCM	x	Y	
NY	Silver	EPA 6020A	SCM	x	Y	
NY	Sodium	EPA 6020A	SCM	x	Y	
NY	Strontium	EPA 6020A	SCM	x	Y	
NY	Thallium	EPA 6020A	SCM	x	Y	
NY	Tin	EPA 6020A	SCM	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Vanadium	EPA 6020A	SCM	x	Y	
NY	Zinc	EPA 6020A	SCM	x	Y	
NY	Chromium VI	EPA 7196A	SCM	Y	x	
NY	Mercury	EPA 7471B	SCM	x	Y	
NY	Mercury	EPA 7474	SCM	x	Y	
NY	Diesel Range Organics	EPA 8015C	SCM	Y	x	
NY	Gasoline Range Organics	EPA 8015C	SCM	Y	x	
NY	Diesel Range Organics	EPA 8015D	SCM	x	Y	
NY	Ethylene glycol	EPA 8015D	SCM	x	Y	
NY	Gasoline Range Organics	EPA 8015D	SCM	x	Y	
NY	Iso-butyl Alcohol	EPA 8015D	SCM	x	Y	
NY	Tert-Butyl Alcohol	EPA 8015D	SCM	x	Y	
NY	4,4'-DDD	EPA 8081B	SCM	Y	Y	
NY	4,4'-DDE	EPA 8081B	SCM	Y	Y	
NY	4,4'-DDT	EPA 8081B	SCM	Y	Y	
NY	Aldrin	EPA 8081B	SCM	Y	Y	
NY	alpha-BHC	EPA 8081B	SCM	Y	Y	
NY	alpha-Chlordane	EPA 8081B	SCM	Y	x	
NY	beta-BHC	EPA 8081B	SCM	Y	Y	
NY	Chlordane	EPA 8081B	SCM	Y	Y	
NY	delta-BHC	EPA 8081B	SCM	Y	Y	
NY	Dieldrin	EPA 8081B	SCM	Y	Y	
NY	Endosulfan I	EPA 8081B	SCM	Y	Y	
NY	Endosulfan II	EPA 8081B	SCM	Y	Y	
NY	Endosulfan Sulfate	EPA 8081B	SCM	Y	Y	
NY	Endrin	EPA 8081B	SCM	Y	Y	
NY	Endrin Aldehyde	EPA 8081B	SCM	Y	Y	
NY	Endrin Ketone	EPA 8081B	SCM	Y	Y	
NY	gamma-Chlordane	EPA 8081B	SCM	Y	Y	
NY	Heptachlor	EPA 8081B	SCM	Y	Y	
NY	Heptachlor Epoxide	EPA 8081B	SCM	Y	Y	
NY	Lindane (gamma-BHC)	EPA 8081B	SCM	Y	Y	
NY	Methoxychlor	EPA 8081B	SCM	Y	Y	
NY	Mirex	EPA 8081B	SCM	x	Y	
NY	Toxaphene	EPA 8081B	SCM	Y	Y	
NY	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB	EPA 8082A	SCM	x	Y	
NY	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)	EPA 8082A	SCM	x	Y	
NY	2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4,4',5,5'-Heptacholorbiphenyl (PCB 180)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB 183)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB 187)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4,5,5'-Hexachlorobiphenyl (PCB 141)	EPA 8082A	SCM	x	Y	
NY	2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)	EPA 8082A	SCM	x	Y	
NY	2,2',3,5,5',6-Hexachlorobiphenyl (PCB 151)	EPA 8082A	SCM	x	Y	
NY	2,2',3,5'-Tetrachlorobiphenyl (PCB 44)	EPA 8082A	SCM	x	Y	
NY	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)	EPA 8082A	SCM	x	Y	
NY	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	EPA 8082A	SCM	x	Y	
NY	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	EPA 8082A	SCM	x	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	2,2',5-Trichlorobiphenyl (PCB 18)	EPA 8082A	SCM	x	Y	
NY	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	EPA 8082A	SCM	x	Y	
NY	2,3',4,4'-Tetrachlorobiphenyl (PCB 66)	EPA 8082A	SCM	x	Y	
NY	2,3-Dichlorobiphenyl (PCB 5)	EPA 8082A	SCM	x	Y	
NY	2,4'-Trichlorobiphenyl (PCB 31)	EPA 8082A	SCM	x	Y	
NY	2-Chlorobiphenyl (PCB 1)	EPA 8082A	SCM	x	Y	
NY	PCB-1016	EPA 8082A	SCM	Y	Y	
NY	PCB-1221	EPA 8082A	SCM	Y	Y	
NY	PCB-1232	EPA 8082A	SCM	Y	Y	
NY	PCB-1242	EPA 8082A	SCM	Y	Y	
NY	PCB-1248	EPA 8082A	SCM	Y	Y	
NY	PCB-1254	EPA 8082A	SCM	Y	Y	
NY	PCB-1260	EPA 8082A	SCM	Y	Y	
NY	PCB-1262	EPA 8082A	SCM	Y	Y	
NY	PCB-1268	EPA 8082A	SCM	Y	Y	
NY	PCBs in Oil	EPA 8082A	SCM	Y	x	
NY	2,4,5-T	EPA 8151A	SCM	Y	x	
NY	2,4,5-TP (Silvex)	EPA 8151A	SCM	Y	x	
NY	2,4-D	EPA 8151A	SCM	Y	x	
NY	2,4-DB	EPA 8151A	SCM	Y	x	
NY	Dalapon	EPA 8151A	SCM	Y	x	
NY	Dicamba	EPA 8151A	SCM	Y	x	
NY	Dichloroprop	EPA 8151A	SCM	Y	x	
NY	Dinoseb	EPA 8151A	SCM	Y	x	
NY	MCPA	EPA 8151A	SCM	Y	x	
NY	MCPP	EPA 8151A	SCM	Y	x	
NY	1,1,1,2-Tetrachloroethane	EPA 8260C	SCM	Y	x	
NY	1,1,1-Trichloroethane	EPA 8260C	SCM	Y	x	
NY	1,1,2,2-Tetrachloroethane	EPA 8260C	SCM	Y	x	
NY	1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260C	SCM	Y	x	
NY	1,1,2-Trichloroethane	EPA 8260C	SCM	Y	x	
NY	1,1-Dichloroethane	EPA 8260C	SCM	Y	x	
NY	1,1-Dichloroethene	EPA 8260C	SCM	Y	x	
NY	1,1-Dichloropropene	EPA 8260C	SCM	Y	x	
NY	1,2,3-Trichloropropane	EPA 8260C	SCM	Y	x	
NY	1,2,4-Trichlorobenzene	EPA 8260C	SCM	Y	x	
NY	1,2,4-Trimethylbenzene	EPA 8260C	SCM	Y	x	
NY	1,2-Dibromo-3-Chloropropane (DBCP)	EPA 8260C	SCM	Y	x	
NY	1,2-Dibromoethane (EDB)	EPA 8260C	SCM	Y	x	
NY	1,2-Dichlorobenzene	EPA 8260C	SCM	Y	x	
NY	1,2-Dichloroethane	EPA 8260C	SCM	Y	x	
NY	1,2-Dichloropropane	EPA 8260C	SCM	Y	x	
NY	1,3,5-Trimethylbenzene	EPA 8260C	SCM	Y	x	
NY	1,3-Dichlorobenzene	EPA 8260C	SCM	Y	x	
NY	1,3-Dichloropropane	EPA 8260C	SCM	Y	x	
NY	1,4-Dichlorobenzene	EPA 8260C	SCM	Y	x	
NY	1,4-Dioxane	EPA 8260C	SCM	Y	x	
NY	2,2-Dichloropropane	EPA 8260C	SCM	Y	x	
NY	2-Butanone	EPA 8260C	SCM	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	2-Chloroethyl Vinyl ether	EPA 8260C	SCM	Y	x	
NY	2-Chlorotoluene	EPA 8260C	SCM	Y	x	
NY	2-Hexanone	EPA 8260C	SCM	Y	x	
NY	4-Chlorotoluene	EPA 8260C	SCM	Y	x	
NY	4-Methyl-2-Pentanone	EPA 8260C	SCM	Y	x	
NY	Acetone	EPA 8260C	SCM	Y	x	
NY	Acrolein	EPA 8260C	SCM	Y	x	
NY	Acrylonitrile	EPA 8260C	SCM	Y	x	
NY	Benzene	EPA 8260C	SCM	Y	x	
NY	Bromobenzene	EPA 8260C	SCM	Y	x	
NY	Bromochloromethane	EPA 8260C	SCM	Y	x	
NY	Bromodichloromethane	EPA 8260C	SCM	Y	x	
NY	Bromoform	EPA 8260C	SCM	Y	x	
NY	Bromomethane	EPA 8260C	SCM	Y	x	
NY	Carbon Disulfide	EPA 8260C	SCM	Y	x	
NY	Carbon Tetrachloride	EPA 8260C	SCM	Y	x	
NY	Chlorobenzene	EPA 8260C	SCM	Y	x	
NY	Chloroethane	EPA 8260C	SCM	Y	x	
NY	Chloroform	EPA 8260C	SCM	Y	x	
NY	Chloromethane	EPA 8260C	SCM	Y	x	
NY	cis-1,2-Dichloroethene	EPA 8260C	SCM	Y	x	
NY	cis-1,3-Dichloropropene	EPA 8260C	SCM	Y	x	
NY	Cyclohexane	EPA 8260C	SCM	Y	x	
NY	Dibromochloromethane	EPA 8260C	SCM	Y	x	
NY	Dibromomethane	EPA 8260C	SCM	Y	x	
NY	Dichlorodifluoromethane	EPA 8260C	SCM	Y	x	
NY	Diethyl ether	EPA 8260C	SCM	Y	x	
NY	Ethyl acetate	EPA 8260C	SCM	Y	x	
NY	Ethyl Methacrylate	EPA 8260C	SCM	Y	x	
NY	Ethylbenzene	EPA 8260C	SCM	Y	x	
NY	Hexachlorobutadiene	EPA 8260C	SCM	Y	x	
NY	Isopropylbenzene	EPA 8260C	SCM	Y	x	
NY	m+p-Xylene	EPA 8260C	SCM	Y	x	
NY	Methyl Acetate	EPA 8260C	SCM	Y	x	
NY	Methyl Cyclohexane	EPA 8260C	SCM	Y	x	
NY	Methyl tert-butyl ether	EPA 8260C	SCM	Y	x	
NY	Methylene Chloride	EPA 8260C	SCM	Y	x	
NY	Naphthalene	EPA 8260C	SCM	Y	x	
NY	n-Butanol	EPA 8260C	SCM	Y	x	
NY	n-Butylbenzene	EPA 8260C	SCM	Y	x	
NY	n-Propylbenzene	EPA 8260C	SCM	Y	x	
NY	o-Xylene	EPA 8260C	SCM	Y	x	
NY	p-Isopropyltoluene	EPA 8260C	SCM	Y	x	
NY	sec-Butylbenzene	EPA 8260C	SCM	Y	x	
NY	Styrene	EPA 8260C	SCM	Y	x	
NY	Tert-Butyl Alcohol	EPA 8260C	SCM	Y	x	
NY	Tert-Butylbenzene	EPA 8260C	SCM	Y	x	
NY	Tetrachloroethene	EPA 8260C	SCM	Y	x	
NY	Toluene	EPA 8260C	SCM	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Total Xylenes	EPA 8260C	SCM	Y	x	
NY	Trans-1,2-Dichloroethene	EPA 8260C	SCM	Y	x	
NY	Trans-1,3-Dichloropropene	EPA 8260C	SCM	Y	x	
NY	Trans-1,4-Dichloro-2-butene	EPA 8260C	SCM	Y	x	
NY	Trichloroethene	EPA 8260C	SCM	Y	x	
NY	Trichlorofluoromethane	EPA 8260C	SCM	Y	x	
NY	Vinyl Acetate	EPA 8260C	SCM	Y	x	
NY	Vinyl Chloride	EPA 8260C	SCM	Y	x	
NY	1,1'-Biphenyl	EPA 8270D	SCM	x	Y	
NY	1,2,4,5-Tetrachlorobenzene	EPA 8270D	SCM	Y	Y	
NY	1,2,4-Trichlorobenzene	EPA 8270D	SCM	Y	Y	
NY	1,2-Dichlorobenzene	EPA 8270D	SCM	Y	Y	
NY	1,2-Diphenylhydrazine	EPA 8270D	SCM	Y	Y	
NY	1,3-Dichlorobenzene	EPA 8270D	SCM	Y	Y	
NY	1,4-Dichlorobenzene	EPA 8270D	SCM	Y	Y	
NY	2,3,4,6-Tetrachlorophenol	EPA 8270D	SCM	Y	Y	
NY	2,4,5-Trichlorophenol	EPA 8270D	SCM	Y	Y	
NY	2,4,6-Trichlorophenol	EPA 8270D	SCM	Y	Y	
NY	2,4-Dichlorophenol	EPA 8270D	SCM	Y	Y	
NY	2,4-Dimethylphenol	EPA 8270D	SCM	Y	Y	
NY	2,4-Dinitrophenol	EPA 8270D	SCM	Y	Y	
NY	2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D	SCM	Y	x	
NY	2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D	SCM	Y	x	
NY	2-Chloronaphthalene	EPA 8270D	SCM	Y	Y	
NY	2-Chlorophenol	EPA 8270D	SCM	Y	Y	
NY	2-Methyl-4,6-dinitrophenol	EPA 8270D	SCM	Y	Y	
NY	2-Methylnaphthalene	EPA 8270D	SCM	Y	Y	
NY	2-Methylphenol	EPA 8270D	SCM	Y	Y	
NY	2-Nitroaniline	EPA 8270D	SCM	Y	Y	
NY	2-Nitrophenol	EPA 8270D	SCM	Y	Y	
NY	3,3-Dichlorobenzidine	EPA 8270D	SCM	Y	Y	
NY	3-Methylphenol	EPA 8270D	SCM	Y	Y	
NY	3-Nitroaniline	EPA 8270D	SCM	Y	Y	
NY	4-Bromophenyl phenyl ether	EPA 8270D	SCM	Y	Y	
NY	4-Chloro-3-methylphenol	EPA 8270D	SCM	Y	Y	
NY	4-Chlorophenyl phenyl ether	EPA 8270D	SCM	Y	Y	
NY	4-Methylphenol	EPA 8270D	SCM	Y	Y	
NY	4-Nitroaniline	EPA 8270D	SCM	Y	Y	
NY	4-Nitrophenol	EPA 8270D	SCM	Y	Y	
NY	Acenaphthene	EPA 8270D	SCM	Y	Y	
NY	Acenaphthylene	EPA 8270D	SCM	Y	Y	
NY	Acetophenone	EPA 8270D	SCM	Y	Y	
NY	Aniline	EPA 8270D	SCM	Y	Y	
NY	Anthracene	EPA 8270D	SCM	Y	Y	
NY	Atrazine	EPA 8270D	SCM	Y	x	
NY	Benzaldehyde	EPA 8270D	SCM	Y	Y	
NY	Benzidine	EPA 8270D	SCM	Y	Y	
NY	Benzo(a)anthracene	EPA 8270D	SCM	Y	Y	
NY	Benzo(a)pyrene	EPA 8270D	SCM	Y	Y	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Benzo(b)fluoranthene	EPA 8270D	SCM	Y	Y	
NY	Benzo(ghi)perylene	EPA 8270D	SCM	Y	Y	
NY	Benzo(k)fluoranthene	EPA 8270D	SCM	Y	Y	
NY	Benzoic Acid	EPA 8270D	SCM	Y	Y	
NY	Benzyl alcohol	EPA 8270D	SCM	Y	Y	
NY	Biphenyl	EPA 8270D	SCM	Y	x	
NY	Bis(2-chloroethoxy) methane	EPA 8270D	SCM	Y	Y	
NY	Bis(2-chloroethyl) ether	EPA 8270D	SCM	Y	Y	
NY	Bis(2-chloroisopropyl) ether	EPA 8270D	SCM	Y	Y	
NY	Bis(2-ethylhexyl) phthalate	EPA 8270D	SCM	Y	Y	
NY	Butyl Benzyl phthalate	EPA 8270D	SCM	Y	Y	
NY	Caprolactam	EPA 8270D	SCM	Y	Y	
NY	Carbazole	EPA 8270D	SCM	Y	Y	
NY	Chrysene	EPA 8270D	SCM	Y	Y	
NY	Dibenzo(a,h)anthracene	EPA 8270D	SCM	Y	Y	
NY	Dibenzofuran	EPA 8270D	SCM	Y	Y	
NY	Diethyl phthalate	EPA 8270D	SCM	Y	Y	
NY	Dimethyl phthalate	EPA 8270D	SCM	Y	Y	
NY	Di-n-butyl phthalate	EPA 8270D	SCM	Y	Y	
NY	Di-n-octyl phthalate	EPA 8270D	SCM	Y	Y	
NY	Diphenylamine	EPA 8270D	SCM	Y	x	
NY	Fluoranthene	EPA 8270D	SCM	Y	Y	
NY	Fluorene	EPA 8270D	SCM	Y	Y	
NY	Hexachlorobenzene	EPA 8270D	SCM	Y	Y	
NY	Hexachlorobutadiene	EPA 8270D	SCM	Y	x	
NY	Hexachlorocyclopentadiene	EPA 8270D	SCM	Y	Y	
NY	Hexachloroethane	EPA 8270D	SCM	Y	Y	
NY	Indeno(1,2,3-cd)pyrene	EPA 8270D	SCM	Y	Y	
NY	Isophorone	EPA 8270D	SCM	Y	Y	
NY	Naphthalene	EPA 8270D	SCM	Y	Y	
NY	Nitrobenzene	EPA 8270D	SCM	Y	Y	
NY	N-Nitrosodimethylamine	EPA 8270D	SCM	Y	Y	
NY	N-Nitrosodi-n-propylamine	EPA 8270D	SCM	Y	Y	
NY	N-Nitrosodiphenylamine	EPA 8270D	SCM	Y	Y	
NY	Parathion	EPA 8270D	SCM	Y	x	
NY	Pentachloronitrobenzene	EPA 8270D	SCM	Y	Y	
NY	Pentachlorophenol	EPA 8270D	SCM	Y	Y	
NY	Phenanthrene	EPA 8270D	SCM	Y	Y	
NY	Phenol	EPA 8270D	SCM	Y	Y	
NY	Pyrene	EPA 8270D	SCM	Y	Y	
NY	Pyridine	EPA 8270D	SCM	Y	Y	
NY	Acenaphthene	EPA 8270D-SIM	SCM	Y	x	
NY	Acenaphthylene	EPA 8270D-SIM	SCM	Y	x	
NY	Anthracene	EPA 8270D-SIM	SCM	Y	x	
NY	Benzo(a)anthracene	EPA 8270D-SIM	SCM	Y	x	
NY	Benzo(a)pyrene	EPA 8270D-SIM	SCM	Y	x	
NY	Benzo(b)fluoranthene	EPA 8270D-SIM	SCM	Y	x	
NY	Benzo(ghi)perylene	EPA 8270D-SIM	SCM	Y	x	
NY	Benzo(k)fluoranthene	EPA 8270D-SIM	SCM	Y	x	

Summary of Certification

State	Parameter	Method	Matrix	Alpha Westboro	Alpha Mansfield	Notes
NY	Chrysene	EPA 8270D-SIM	SCM	Y	x	
NY	Dibenzo(a,h)anthracene	EPA 8270D-SIM	SCM	Y	x	
NY	Fluoranthene	EPA 8270D-SIM	SCM	Y	x	
NY	Fluorene	EPA 8270D-SIM	SCM	Y	x	
NY	Indeno(1,2,3-cd)pyrene	EPA 8270D-SIM	SCM	Y	x	
NY	Naphthalene	EPA 8270D-SIM	SCM	Y	x	
NY	Phenanthrene	EPA 8270D-SIM	SCM	Y	x	
NY	Pyrene	EPA 8270D-SIM	SCM	Y	x	
NY	Cyanide - Amenable, Distillation	EPA 9010C	SCM	Y	x	
NY	Cyanide, Distillation	EPA 9010C	SCM	Y	x	
NY	Cyanide, Total	EPA 9012B	SCM	Y	x	
NY	Cyanide, Total	EPA 9014	SCM	Y	x	
NY	Extractable Organic Halides (EOX)	EPA 9023	SCM	Y	x	
NY	Sulfate	EPA 9038	SCM	Y	x	
NY	pH	EPA 9040C	SCM	Y	x	
NY	pH	EPA 9045D	SCM	Y	x	
NY	Specific Conductance	EPA 9050A	SCM	Y	x	
NY	Total Organic Carbon	EPA 9060	SCM	x	Y	
NY	Total Phenolics	EPA 9065	SCM	Y	x	
NY	Oil & Grease	EPA 9071B	SCM	Y	x	
NY	Chloride	EPA 9251	SCM	Y	x	
NY	Total Organic Carbon	Lloyd Kahn	SCM	x	Y	

APPENDIX H

Site Management Forms

ROUX ASSOCIATES, INC. / REMEDIAL ENGINEERING, P.C.

SITE-WIDE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: **Vernon 4540 Realty LLC**
Location: **5-49 46th Avenue, Long Island City, Queens, New York**
Inspector:
Date:

Site Observations: **Performed by ( ) on ( )**

Yes	No	
☐	☐	Have any Site improvements been made since last inspection?
☐	☐	Has there been any maintenance activity impacting engineering controls?
☐	☐	Are monitoring wells intact?
		-Include sketches or photos of observations

Inspection of RCA Cap: **Performed by ( ) on ( )**

Yes	No	
☐	☐	Underlying demarcation barrier exposed?
☐	☐	Are soil caps sloped to allow for drainage away from the peak?

Inspection of Asphalt/Concrete Caps: **Performed by ( ) on ( )**

Yes	No	
☐	☐	Significant cracks observed?
☐	☐	Other damage observed? If yes, refer to Page 2 for additional clarification.
		-Include sketches or photos of observations

Inspection of Building Covers: **Performed by ( ) on ( )**

Yes	No	
☐	☐	Were all buildings inspected?
☐	☐	Significant cracks observed?
☐	☐	Other damage observed? If yes, refer to Page 2 for additional clarification.
☐	☐	Any new slab penetrations observed? If yes, include description on page 2.
		-Include sketched or photos of observations

Inspection of LNAPL Recovery System : **Performed by ( ) on ( )**

Yes	No	
☐	☐	Were all five (5) Recovery wells intact?
☐	☐	Were all five (5) AC Sipper reels operating properly?
☐	☐	Were there any signs of corrosion on the 55 gallon drum?
☐	☐	Were the fill alarm and spill alarms operating properly?
☐	☐	Was the secondary containment pallet intact?
☐	☐	Is the AC Sipper control panel intact?

ROUX ASSOCIATES, INC. / REMEDIAL ENGINEERING, P.C.

SITE-WIDE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: **Vernon 4540 Realty LLC**
Location: **5-49 46th Avenue, Long Island City, Queens, New York**
Inspector:
Date:

Site Observations

Additional Comments or Clarification Where Corrective Actions May Be Required:

LNAPL Recovery System Monitoring Log, Former Paragon Paint & Varnish Factory, Long Island City, New York

Source of Reading	Value	Unit	Comments
Recovery Well Network -Presence of Product	Product Present?	Ft in RW	
Recovery Well RW-1	Y/N		
Recovery Well RW-2	Y/N		
Recovery Well RW-3	Y/N		
Recovery Well RW-4	Y/N		
Recovery Well RW-5	Y/N		
Product Volume in Recovery Drum			
0-55 gallons in Recovery Drum		Gallons	

Is the system operating within the acceptable conditions? ______________________

If no, was the condition corrected and how? ______________________

Form Completed By: Signature: Date and Time:

Groundwater Gauging Former Paragon Paint Varnish Corp

5-43 to 5-49 46th Ave. and 45-38 to 45-40 Vernon Blvd.

Long Island City, New York, NYSDEC Site No. C241108

Date	Well	Depth to Product (ft)	Depth to Water (ft)	Well Diameter (inch)	PID (ppm)	Product Thickness (ft)	Purged (g)	Cumulative (g)
	MW-2R							
	MW-3							
	MW-4							
	MW-7							
	MW-10							
	MW-11							
	MW-15							
	MW-19							
	MW-21							
	MW-33							
	MW-34							
	MW-38							
	MW-40							
	MW-41							
	MW-42							
	MW-43							
	MW-44							
	MW-45							
	MW-46							
	MW-47							
	MW-48							
	RW-01							
	RW-02							
	RW-03							
	RW-04							
	RW-05							
							Total	**0.00**

Notes:

PID - Photo ionization detector (well headspace reading)
ft - Feet
ppm - Parts per million
g - Gallons
ND - Not detected
NG - Not gauged
NM - Not measured
NA - Not applicable

Groundwater Sampling Form, Former Paragon Paint Varnish Corp
5-43 to 5-49 46th Ave. and 45-38 to 45-40 Vernon Blvd.
Long Island City, New York, NYSDEC Site No. C241108

SITE NAME: **Former Paragon Paint & Varnish Corp.**

Project Number: **2051.0001Y002**

Weather: ______________________

Date: ______________________

Well ID: ______________________

Intake depth: ______________________

DTW: ______________________

Vol Purged: ______________________

DTB: ______________________

Sampler: ______________________

Purge Start: ______________________

Purge End Time: ______________________

Purge WaterDescription: ______________________

Time	DTW (ft bls) (+/- 0.3 ft)	Flow Rate (ml/Min)	Temp (Degree C) (+/- 3%)	Conductivity (mS/cm) (+/- 3%)	DO (mg/L) (+/- 10%)	Ph (+/- 0.1 SU)	ORP (mV) (+/- 10)	Turbidity (NTU) (+/- 10%)

REMEDIAL ENGINEERING, P.C.

Summary of Green Remediation Metrics for Site Management

Site Name: ________________________________ Site Code: ______________________
Address: __________________________________ City: __________________________
State: _____________ Zip Code: _________ County: ________________________

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____________________

Current Reporting Period
Reporting Period From: ______________________ To: ___________________________

Contact Information
Preparer's Name: ____________________________ Phone No.: ____________________
Preparer's Affiliation: ____________________________________

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	Total to Date (miles)
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	Total to Date (gallons)
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	Total to Date (acres)
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR

I, ___________________________ (**Name**) do hereby certify that I am ______________________ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application.

________________________ ____

Date **Contractor**

Site Management Plan

Former Paragon Paint Manufacturing Facility
5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard
Long Island City, New York - Site No. C241108

APPENDIX I

Field Sampling Plan

February 7, 2013

FIELD SAMPLING PLAN

Former Paragon Paint and Varnish Company Manufacturing Facility
BCP Site Number C241108
5-43 to 5-49 46th Avenue and
45-38 Vernon Boulevard to
45-40 Vernon Boulevard
Long Island City, New York

Prepared for

VERNON 4540 REALTY, LLC
45 Carleon Avenue
Larchmont, New York 10538

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

ROUX

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

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) has developed a Remedial Investigation (RI) Work Plan to further determine the nature and extent of potential environmental impacts to the facility identified as the former Paragon Paint manufacturing facility located at 5-43 to 5-49 46th Avenue and 45-38 to 45-40 Vernon Boulevard, Long Island City, New York (Site). This Field Sampling Plan (FSP) was developed to describe in detail the methods and procedures to be followed by field personnel during the implementation of the fieldwork associated with the RI.

The FSP was prepared in accordance with directives provided in the DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) issued by the New York State Department of Environmental Conservation (NYSDEC), as well as relevant NYSDEC Technical and Administrative Guidance Memoranda (TAGMs), and provides guidelines and procedures to be followed by field personnel during performance of the RI. Information contained in this FSP relates to sampling objectives, sampling locations, sampling frequencies, sample designations, sampling equipment, sample handling, sample analysis, and decontamination.

2.0 SAMPLING OBJECTIVES

This FSP was developed based upon a detailed review of available information obtained during previous investigations and is designed to obtain the additional data necessary to achieve the objectives of the RI. This FSP describes in detail the sampling and data gathering methods to be used during implementation of the RI.

The objective of the proposed sampling is to further characterize the nature and extent of the known contamination on Site, to evaluate any additional areas of concern (AOCs) and to obtain a current representation of the environmental conditions at the Site.

The scope of work discussed in the FSP includes five of the tasks described in the RI Work Plan, these tasks include:

- Light non-aqueous phase liquid (LNAPL) investigation;
- Underground storage tank inventory;
- Light non-aqueous phase liquid sampling;
- Soil investigation; and
- Groundwater investigation.

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

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled during the RI include soil, groundwater and LNAPL. Sampling locations, analytical suites, and frequency vary by medium. A discussion of the sampling schedule for each medium is provided below, while the assumed number of field samples to be collected for each medium, including quality control (QC) samples, is shown in Table 1. Proposed sample locations (proposed monitoring wells and soil borings) are shown on Figure 3 of the RI Work Plan. Specifics regarding the collection of samples at each location and for each task are provided in Section 4 of this FSP.

3.1 Soil Sampling

Soil samples underlying the Site will be collected at 37 locations (monitoring wells and soil borings) as shown in Figure 3 of the RI Work Plan. All samples will be analyzed for the full Target Compound List (TCL) plus the 30 (10 VOC and 20 SVOC organic compounds) highest concentration tentatively identified compounds (TICs), and Target Analyte List (TAL) metals. Additionally, provided the historic data is verified as described in Section 3.2.1, a portion (25%) of all soil samples collected will also be analyzed for TCL pesticides and TCL polychlorinated biphenyl's (PCBs). In the event that the historic data cannot be validated all soil sampled will be analyzed for PCBs and pesticides.

All soil samples will be analyzed at a laboratory with a current New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the parameters noted above. Samples will be analyzed on a standard turnaround time and will be reported as Category B data deliverables.

3.2 Groundwater Sampling

There are 13 existing monitoring wells at the Site, over the course of the RI, 10 additional monitoring wells will be installed (four existing wells will also be replaced). All 23 monitoring wells will be gauged using an electronic interface probe capable of detecting LNAPL with an accuracy of +/- 0.01 feet. Groundwater samples will be collected from those wells that do not exhibit any LNAPL. Samples will be analyzed for the full TCL list plus the 30 highest concentration tentatively identified compounds and TAL metals. Additionally, provided the historic data is verified as described in Section 3.2.1 of the RIWP, a portion (25%) of the groundwater samples collected will also be analyzed for TCL pesticides (USEPA Method 8081) and TCL PCBs (USEPA Method 8082). In the event that the historic data cannot be verified all groundwater samples will be analyzed for PCBs and pesticides. Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured.

All Groundwater samples will be analyzed at a laboratory with a current NYSDOH ELAP CLP certification for each of the parameters noted above. Samples will be analyzed on a standard turnaround time and will be reported as Category B data deliverables.

3.3 Light Non-Aqueous Phase Liquid Sampling

Light non aqueous phase liquid samples will be collected from each of the underground storage tanks (USTs) and monitoring wells located at the Site to be analyzed for fingerprinting to determine the type and characteristics of the LNAPL. Laboratory analyses may include viscosity, density, corrosivity, solubility, reactivity, TCLP and fingerprinting among others.

4.0 FIELD INVESTIGATION PROCEDURES

This section provides a detailed discussion of the field procedures to be followed during the performance of each field task described in Section 2.0 of the FSP. Proposed sampling locations were determined based upon the information collected during previous investigations and are shown on Figure 3 of the RI Work Plan.

Roux Associates' Standard Operating Procedures (SOPs) that are relevant to this scope of work are included in Attachment 1 and will be referenced where applicable. Additional information regarding QA/QC protocols and methods may be found in the QAPP (Appendix C of the RI Work Plan).

4.1 Light Non-aqueous Phase Liquid Investigation

Procedures for the advancement of soil borings and the installation of monitoring wells are provided below:

Soil Boring/Sampling

Prior to subsurface activity, soil boring/monitoring well locations will be cleared for utilities and USTs using vacuum-assisted excavation methods (i.e., air knife and/or Vactron) or hand digging methods to a depth of 5 feet (ft) below land surface (bls). Soil samples from the land surface to 5 ft bls will be collected by hand prior to utilization of the air knife and/or vactron.

Borings will be advanced using a Geoprobe™ truck or track-mounted direct-push drill rig equipped with hollow-stem augers. Samples of the soil profile will be collected in continuous four or five-foot increments using a 2-inch-diameter macrocore sampler. Soil samples will be screened for impacts using visual and olfactory observations; a photoionization detector (PID) will be used to screen for VOCs. In the event that impacted soils are identified, the boring will be advanced until impacts are no longer observed (i.e., clean soil) or bedrock is encountered. Each four or five-foot increment will be collected in dedicated acetate sleeves or similar. The sleeve will be laid on a piece of polyethylene sheeting and opened. Soil samples in the sleeve will be separated into two-foot sections and screened for VOCs with a PID. Following the PID screening, soil samples will be collected for laboratory analysis as described below. Soil samples selected for analysis will be placed into pre-cleaned sample jars and placed on ice in a cooler at 4°C. All remaining soils will be visually characterized according to the Unified Soils Classification System (USCS).

Three or four soil samples will be collected and submitted for laboratory analysis from each location as follows:

Soil samples to be collected in the event no impacts are observed:

- A soil sample from 0-2 feet below the surface or below the concrete floor;
- The depth interval just above the observed water table will be submitted for laboratory analysis; and
- A soil sample from the terminal depth of each boring will be submitted for laboratory analysis.

If impacts are observed the following samples will be collected for analysis:

- A soil sample from 0-2 feet below the surface or below the concrete floor;
- The depth interval just above the observed water table will be submitted for laboratory analysis;
- The sample that contains the highest field screening results for VOCs (via PID, visual and/or olfactory observations) will be submitted for laboratory analysis (this may coincide with a another interval); and
- A soil sample from the first clean interval below the observed impacts will be collected.

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

Monitoring Well Installation

Following soil sampling activities, monitoring wells will be installed at select locations (see figure 3 of the RI Work Plan for locations). Each of the monitoring wells will be constructed of four-inch diameter poly vinyl chloride (PVC) and consist of ten feet of 0.020-inch slot well screen that will intersect the water table at approximately three to four feet below the top of the screen. Historical data indicates that the LNAPL at the Site consists largely of mineral spirits; available data suggests that PVC is compatible with mineral spirits. This is supported by the fact that the monitoring wells that currently exist at the Site have been in place for five years and are not compromised; however, in the unlikely event that the wells become compromised, they will be replaced with stainless steel screens. A sand pack will be placed around the well screen, extending two feet above the top of the screened zone. Once the driller confirms the depth of the sand pack, a minimum two-foot-thick bentonite pellet seal will be placed above the sand pack. Once the pellets have been allowed to hydrate, a cement-bentonite grout will be pumped into the remaining annular space from the bottom up using a tremie pipe lowered to just above the bentonite seal. The wells will be completed using locking well plugs, and flush mounted, bolt down, watertight, manhole covers cemented into place. This procedure may be modified for the monitoring wells that are to be installed in the basement of the warehouse to allow for adequate well screen exposure.

Following installation each monitoring well will be developed using a submersible pump and a surge block to ensure good hydraulic connection with the surrounding saturated deposits. All monitoring wells will be surveyed to obtain horizontal and vertical survey coordinates.

4.2 Underground Storage Tank Inventory

Roux Associates will attempt to locate, inspect, estimate the volume, characterize the contents, and prepare an inventory for the 29 reported USTs and any unknown/unreported USTs that are discovered during the course of the investigation. We anticipate that the inventory will include demolition of the concrete floor of the shed in the area of the varnish cooking pots. It appears a second concrete floor was poured on top of the previous floor grade and as such, there is no access to the suspected cooking pot location.

Specific procedures regarding the UST inventory have not yet been developed because a detailed inspection of the UST access ways, ports, sumps, fill ports and vent lines has not occurred. Once it is known how accessing the inside of each of the USTs will be accomplished, detailed procedures will be prepared.

4.3 Light Non-aqueous Phase Liquid Sampling

As noted in Section 3.3, samples of LNAPL will be collected and submitted for laboratory analysis from each UST and monitoring well. Samples will be collected from each UST and monitoring well observed to contain LNAPL using a disposal bailer carefully lowered to the top of the air/LNAPL interface. The bailer will be allowed to fill from the bottom to help prevent water from entering the bailer. Samples will then be transferred to laboratory supplied glassware and shipped under proper chain-of-custody procedures to an environmental forensic laboratory for further analysis.

4.4 Soil Investigation

Soil boring installation and soil sampling procedures are discussed above in Section 4.1.

4.5 Groundwater Investigation

To characterize groundwater flow and quality conditions, following well installation and development, the entire network of monitoring wells will be gauged and sampled. Groundwater samples will be collected no sooner than two weeks following development of the wells. As part of the gauging round, water-level measurements will be recorded for all monitoring wells to further define groundwater flow patterns beneath the Site. The wells will be gauged using an electronic oil/water interface probe capable of detecting an LNAPL thickness of 0.01 feet.

Following the groundwater gauging event, a comprehensive groundwater sampling event will be completed. Groundwater samples will be collected from all wells that do not contain LNAPL or LNAPL sheen. To ensure groundwater samples collected are representative of the conditions in the surrounding aquifer, monitoring wells will be purged prior to sample collection using low flow sampling procedures as outlined in USEPA document titled “Low Stress (Low Flow) Purging and Sampling Procedures for the Collection of Groundwater Samples From Monitoring Wells” (USEPA, 2010) (Attachment 3). Additional details for the collection of groundwater samples are included in Roux Associates SOPs (Attachment 1).

5.0 SAMPLE HANDLING AND ANALYSIS

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples as well as sample packaging and shipping procedures.

5.1 Field Sample Handling

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

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to confirm that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis. Specific procedures regarding sample tracking from the field to the laboratory are described in Roux Associates' SOP for Sample Handling (Attachment 1).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels should be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the fieldwork and to decide if additional samples are required.

All samples being shipped off-site for analysis must be accompanied by a properly completed chain of custody form (Attachment 2). The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for laboratory pick up and/or shipment with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

5.3 Sample Shipment

Laboratory courier services will be used for the majority of sample transport on this project. However, in the event that samples are shipped to the laboratory the following procedures will apply. Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix, and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below. Additional information regarding sample handling is provided in Roux Associates' SOP for Sample Handling (Attachment 1).

All samples will be shipped within 12 hours of collection (when possible) and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment.
    - Tape drain(s) of cooler shut;
    - Affix "This Side Up" arrow labels and "Fragile" labels on each cooler; and
    - Place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number or analyte.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed with packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in double Zip-Lock™ bags, and placed on top of the packaging material.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or other carrier, as appropriate.

11. Separate chain of custody forms. Seal proper copies within a large Zip-Lock™ bag and tape to cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to Federal Express or other courier service as appropriate. Retain airbill receipt for project records. (Note: All samples will be shipped for "NEXT A.M." delivery).
16. Telephone laboratory contact and provide him/her with the following shipment information:
    - sampler's name;
    - project name;
    - number of samples sent according to matrix and concentration; and
    - airbill number.

6.0 SITE CONTROL PROCEDURES

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

6.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux Associates' SOPs for the Decontamination of Field Equipment, which is provided in Attachment 1. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

6.2 Waste Handling and Disposal

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

Table 1. Remedial Investigation Field and Quality Control Sampling Summary, Field Sampling Plan, Revised Remedial Investigation Work Plan
Former Paragon Paint Manufacturing Facility, Long Island City, NY

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[3]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	TCL VOCs + 10	148	8	20	20	5	5	206
	TCL SVOCs +20	148	8	NA	20	5	5	186
	TCL Pesticides	37	2	NA	20	2	2	63
	TCL PCBs	37	2	NA	20	2	2	63
	TAL Metals	148	8	NA	20	5	5	186
Groundwater	TCL VOCs + 10	36	2	2	2	2	2	46
	TCL SVOCs +20	36	2	NA	2	2	2	44
	TAL Metals (total)	36	2	NA	2	2	2	44
	TCL Pesticides	9	1	NA	2	2	2	16
	TCL PCBs	9	1	NA	2	2	2	16
	TAL Metals (dissolved)	36	2	NA	2	2	2	44

Notes:

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

[2] Based on 1 cooler per day

[3] Based on 1 per day

TCL - USEPA Contract Laboratory Program Target Compound List

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

PCBs - Polychlorinated Biphenyls

TAL - USEPA Contract Laboratory Program Target Analyte List

NA - Not applicable

Table 2. Preservation, Holding Times and Sample Containers, Field Sampling Plan, Revised Remedial Investigation Work Plan
Former Paragon Paint Manufacturing Facility, Long Island City, NY

Analysis	Sample Medium	Bottle Type	Preservation[a]	Holding Time[b]
TAL Metals (total) SW-846 6010/7471	Soil	8 oz wide mouth glass, Teflon lined cap	Cool to 4°C	180 days, Hg 28 days
	Water	500 ml plastic, Teflon lined cap	Cool to 4°C, nitric acid	180 days, Hg 28 days
TCL Volatile Organic Compounds (VOCs) SW-846 8260B	Soil	2 oz wide mouth glass, Teflon lined cap	Cool to 4°C	14 days from sample collection
	Water	3- 40 ml glass, Teflon lined cap	Cool to 4°C, HCL	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs) SW-846 8270C	Soil	8 oz wide mouth glass, Teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
	Water	2- 1 liter amber glass, Teflon lined cap	Cool to 4°C	7 days to extract, 40 days to analysis
TCL Pesticides SW-846 8081A	Soil	8 oz wide mouth glass, Teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
	Water	2- 1 liter amber glass, Teflon lined cap	Cool to 4°C	7 days to extract, 40 days to analysis
TCL Polychlorinated biphenyls (PCBs) SW-846 8082	Soil	8 oz wide mouth glass, Teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
	Water	2- 1 liter amber glass, Teflon lined cap	Cool to 4°C	7 days to extract, 40 days to analysis

Notes:

(a) All soil and groundwater samples to be preserved in ice immediately after collection and during transport

(b) Days from date of sample collection.

TAL - Target analyte List

TCL - Target Compound List

oz - Ounces
ml - Milliliters
HCL - Hydrochloric acid

Attachment 1

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

STANDARD OPERATING PROCEDURE 3.1
FOR COLLECTION OF QUALITY CONTROL SAMPLES FOR WATER-QUALITY DATA

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to explain the quality control (QC) measures taken to ensure the integrity of the samples collected and to establish the guidelines for the collection of QC samples. The objective of the QC program is to ensure that water-quality data of known and reliable quality are developed.

Because valid water-chemistry data are integral to a hydrogeologic investigation that characterizes water-quality conditions, the data will be confirmed by QC samples. Without checks on the sampling and analytical procedures, the potential exists for contradictory or incorrect results. The acceptance of water-quality data by regulatory agencies and in litigation-support investigations depends heavily on the proper QC program to justify the results presented. The QC sampling requirements must be determined by the project manager and be clearly defined in the work plan. If data validation (for in-house purposes or for compliance with the United States Environmental Protection Agency [USEPA] regulations) is stipulated as part of the hydrogeologic investigation, QC sampling must be conducted.

2.0 QUALITY CONTROL SAMPLES

2.1 Samples taken for analysis of compounds require the use of quality control samples to monitor sampling activities and laboratory performance. Types of quality control samples may include replicate and/or replicate split, trip blank, field equipment blank, matrix spike and matrix spike duplicate, and fortification. A discussion pertaining to each quality control sample follows:

a. Replicate and Replicate Split - Replicate sample analysis is done to check on the reproducibility of results either within a laboratory or between laboratories. A replicate sample is called a split sample when it is collected with or turned over to a second party (e.g., regulatory agency, consulting firm) for an independent analysis. Replicate samples are aliquots (equal portions) from a sample in a common container.

To collect a replicate sample, water from the bailer or pump will be distributed first to fill one container and then to fill the second container. Adequate water should be available to fill the bottles completely before they are capped. If the water is insufficient to fill all the bottles at once, then incrementally fill each bottle with water from two or more bailer volumes or pump cycles.

For some test substances, water may have to be accumulated in a common container and then decanted slowly into the sample bottles. The work plan should be checked for a description of how replicate samples are to be collected. Additionally, in the case of wells that recover slowly and produce insufficient water to fill all the replicate sample containers, the containers should be filled incrementally and kept on ice in the cooler in between filling periods.

b. Trip Blank - A trip blank sample is a sample bottle that is filled with "clean" (e.g., distilled/deionized) water in the laboratory, and travels unopened with the sample bottles. (The USEPA now uses the phrase "demonstrated analyte free water.") It is opened in the laboratory and analyzed along with the field samples for the constituent(s) of interest to detect if contamination has occurred during field handling, shipment, or in the laboratory. Trip blanks are primarily used to check for "artificial" contamination of the sample caused by airborne volatile organic compounds (VOCs) but may also be used to check for "artificial" contamination of the sample by a test substance or other analyte(s). One trip blank per cooler containing VOC samples, or test substance of other analyte(s) of interest would accompany each day's samples.

c. Field Equipment Blank - A field equipment blank (field blank) sample is collected to check on the sampling procedures implemented in the field. A field blank is made with "clean" (e.g., distilled/deionized/demonstrated analyte free) water by exposing it to sampling processes (i.e., the clean water must pass through the actual sampling equipment). For example, if samples are being collected with a bailer, the field blank would be made by pouring the clean water into a bailer which has been decontaminated and is ready for sampling, and then pouring from the bailer into the sample containers. If a metals equipment blank is to be made, and the water was filtered, then the sample must be filtered (i.e., exposed to the sampling process). One equipment blank would be incorporated into the sampling program for each day's collection of samples and analyzed for the identical suite of constituents as the sample. In some situations one equipment blank will be required for each type of sampling procedure (e.g., split-spoon, bailer, hand auger).

A special type of field blank may be needed where ambient air quality may be poor. This field blank sample would be taken to determine if airborne contaminants will interfere with constituent identification or quantification. This field blank sample is a sample bottle that is filled and sealed with "clean" (e.g., distilled/deionized/demonstrated analyte free) water in the analytical laboratory, and travels unopened with the sample bottles. It is opened in the field and exposed to the air at a location(s) to check for potential atmospheric interference(s). The field blank is resealed and shipped to the contract laboratory for analysis.

d. Matrix Spike and Matrix Spike Duplicate - Spikes of compounds (e.g., standard compound, test substance, etc.) may be added to samples in the laboratory to determine if the ground-water matrix is interfering with constituent identification or quantification, as well as a check for systematic errors and lack of sensitivity of analytical equipment. Samples for spikes are collected in the identical manner as for standard analysis, and shipped to the laboratory for spiking. Matrix spike duplicate sample collection, and laboratory spiking and analysis is done to check on the reproducibility of matrix spike results.

e. Fortification - A fortification, which is performed in the field, is used to check on the laboratory's ability to recover the test substance (analyte) added as well as its stability between fortification and analysis.

A field fortification (spike) is prepared by filling the container(s) with field or distilled/deionized/demonstrated analyte free water (as specified by the laboratory) to a predetermined volume (as specified by the laboratory) and adding the spike (supplied by the laboratory). The predetermined volume of water is measured with a clean (decontaminated) graduated cylinder. Field spikes will be prepared following the collection, labeling, and sealing of nonspiked samples in a separate cooler. The spike is kept at a safe distance from the sampling point (e.g., in the hotel room).

2.2 The work plan must be referred to for details regarding the type of QC samples to be collected and the QC sample collection method.

3.0 PROCEDURE

3.1 Implement QC sampling as outlined above, depending on the type of QC sample(s) specified in the work plan.

3.2 Ensure unbiased handling and analysis of replicate and blank QC samples by concealing their identity by means of coding so that the analytical laboratory cannot determine which samples are included for QC purposes. Attempt to use a code that will not cause confusion if additional samples are collected or additional monitoring wells are installed. For example, if there are three existing monitoring wells (MW-1, 2 and 3), do not label the QC blank MW-4. If an additional monitoring well were installed, confusion could result.

3.3 Label matrix spike and field fortification (spike) QC samples so that the analytical laboratory knows which samples are to be spiked in the laboratory and which samples were fortified (spiked) in the field, respectively. In certain situations, the field fortification will be "blind" or undisclosed to the laboratory to independently verify their analytical ability.

3.4 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," and placed in its appropriate container (holder) in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory. Consult the site work plan to determine if a particular ice is specified as the preservative for transportation (e.g., the USEPA prefers the use of wet ice because they claim that blue ice will not hold the samples at 4° Centigrade/Celsius).

3.5 Document the QC samples on the appropriate field form and in the field notebook. On the chain-of-custody form, replicate and blank QC samples will be labeled using the codes (Number 3.2, above), and matrix spike and field fortification QC samples will be identified as such (Number 3.3, above).

3.6 Follow standard shipping procedures for samples (i.e., retain one copy of the chain-of-custody form, secure the cooler with sufficient packing tape and a custody seal, forward the samples via overnight [express] mail or hand deliver to the designated analytical laboratory preferably within 24 hours but no later than 48 hours after sampling). However, check the site work plan for information on the analyte(s), as some have to be analyzed immediately (e.g., CN).

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for using m-scopes. A m-scope is an electronic sounding device used to measure the depth to ground water below an established (surveyed) measuring point (MP). Measuring the depth to water (DTW) below the surveyed MP provides information for calculating ground-water elevations needed to construct ground-water elevation maps and determine the direction of ground-water flow.

M-scopes can be less accurate than a steel tape because the wire can kink, measurement increment marks can shift, and the tip may have been cut off and replaced without proper documentation. Thus, it is mandatory that a m-scope be calibrated before use.

2.0 DECONTAMINATION

The m-scope must be pre-cleaned (decontaminated) using a non-phosphate, laboratory-grade solution and rinsed with copious amounts of distilled or deionized water. This process is repeated before each measurement and following the final measurement.

3.0 CALIBRATION

The m-scope must be calibrated before being used to measure water levels. Calibration is accomplished by measuring the water level with the m-scope followed by a measurement using a steel tape. This dual measurement procedure is continued until the individual is confident that measurements taken using both devices are similar and the m-scope is reliable. The calibration procedure is documented in the field notebook or on an appropriate field form, and initialed and dated.

4.0 PROCEDURE

4.1 If the well is not vented, then remove the cap and wait several minutes for the water level to equilibrate. Take several measurements to ensure that the water level measured is in equilibrium with the aquifer (i.e., not changing substantially).

4.2 The manufacturer's model must be noted because some have switches, lights, beepers, or a combination of the above.

4.3 The 1-foot or 5-foot marked intervals on the electrical line must be checked to ensure that they have not shifted, and the bottom of the probe has not been cut. Check on a periodic basis that the cord has not kinked.

4.4 The water-level measurement is taken by lowering the probe into the well until the instrument-specific detection method (e.g., light, beeper, or both) is activated by contacting the water.

4.5 The electrical line is held at the MP and, using a ruler (e.g., carpenter's folding ruler) or an engineer's scale, the distance from the "held" point to the nearest marked interval is measured. The distance measured is added to, or subtracted from, the marked interval reading. The result is the DTW.

4.6 Measurements will be taken accurately and to the nearest 0.01 foot.

4.7 After measuring all wells in an area, always re-measure at least one well, preferably the first well measured, to see if the static water level has changed (e.g., due to pumping in the area, tidal effects, etc.). If a significant change has occurred, it may be necessary to re-measure other wells.

4.8 If there are previous water-level measurements available for the wells, then have these data available to compare the measurements with those just taken. Use these data to see if water levels are similar or if they have changed. If water levels have changed, then check if the changes are consistent (i.e., all up or all down) and make sense.

4.9 Water-level elevations are calculated by subtracting the DTW from the MP and a water-elevation map is constructed (contoured) on a well location map. This also provides a check to evaluate if the water levels make sense (or anomalies are evidenced). Re-measure the well(s) where anomalies are found as a check on the initial measurement(s).

4.10 If anomalies persist or water-level trends are different from the historical database, then check to see if hydrogeologic conditions and/or stresses have changed (e.g., discharge areas, pumping and/or injection wells, etc.).

4.11 All pertinent data will be documented in the field notebook, and initialed and dated.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for purging a well prior to the collection of a ground-water sample. Purging (evacuating) a well involves the removal of the standing column of water in the well to allow “fresh” (representative) formation water to enter the well. Two conventionally used methods for well purging include: 1) discharge of a specified number of casing volumes of water (which is more commonly used); and 2) pumping until specific indicator parameters (e.g., specific conductance, pH, temperature) stabilize. Wells must be purged prior to sampling to ensure the collection of representative formation ground water for water-quality analysis.

For accepted, existing sampling and analysis programs, the same purging method will be used each time to maintain consistency. For new sampling and analysis programs, the basis for the purging technique(s) will be site-specific field conditions, client input, the experience of Roux Associates, Inc. and regulatory agency(ies) guidelines (e.g., some states permit purging a low-yield well to dryness while others insist that some water remains in the well).

2.0 EQUIPMENT AND MATERIALS

2.1 The following equipment may be needed to purge a monitoring well before sampling:

a. Bailers.

b. Centrifugal pumps.

c. Electrical submersible pumps.

d. Peristaltic pumps.

e. Positive gas-displacement devices.

f. Bladder pumps.

g. Hand-operated diaphragm or bilge pump(s).

h. Teflon™ tape, electrical tape.

i. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (e.g., blue carpenter’s) or m-scope.

j. Appropriate discharge hose and valves.

k. Appropriate discharge tubing (e.g., polypropylene) if using a peristaltic pump.

l. Appropriate compressed gas if using bladder-type or gas-displacement device.

m. Extension cord(s) or portable generator (and fuel) if using an electric submersible pump.

n. Non-absorbent cord (e.g., polypropylene, etc.), cotton (absorbent) cord.

o. Tripod(s).

p. Water Well Handbook.

q. Explosimeter.

r. Flow meter.

2.2 Bailers or centrifugal pumps are recommended for shallow, small diameter monitoring wells. For deep wells, or large diameter wells, a submersible pump is recommended.

3.0 DECONTAMINATION

Each piece of equipment that is used to evacuate wells (e.g., bailers, pumps, hoses) will be decontaminated thoroughly prior to the introduction of the equipment into the well and prior to leaving the site. Additionally, disposable items (e.g., cord, tubing) will be changed between each well purged and discarded in an appropriate manner.

4.0 PROCEDURE

4.1 The depth to water (DTW) is measured and subtracted from the sounded (total) depth of the well to calculate the length of the column of standing water in the well (in feet).

4.2 The volume of the standing water in the well is calculated by multiplying the length of standing water by a coefficient which equates the diameter of the well to gallons per linear foot. (Refer to the attached table from the Water Well Handbook for the coefficient or use the following equation [V=(7.48 gal/ft3)(r2h), where V is volume of water in gallons, r is the radius of the well casing in feet, and h is the height of the water column in the well in feet].)

4.3 If purging is performed by evacuating a specified number of casing volumes, then three to five volumes are purged (typical regulatory agency requirement).

4.4 If wells are screened in low permeability formations, then the well may go dry prior to removing the specified volume of water. If the recovery rate is fairly rapid and time allows, then remove more than one casing volume; otherwise, the evacuation of one casing volume may suffice. (Refer to the site sampling and analysis plan [SAP] for details of purging a low-yield well.)

4.5 Evacuation will occur from the top of the water column in the well to ensure that “fresh” formation water enters the bottom of the well through the screen, moves up as standing water is removed from the top, and all standing water is removed (i.e., only representative formation water is in the well).

4.6 The volume of water purged from the well must be measured and can be calculated directly by discharging into containers of known volume or can be calculated by multiplying rate of flow by time.

4.7 If a submersible or centrifugal pump is used, then the intake is set just below the dynamic (pumping) water level in the well. The rate of flow in gallons per minute (gpm) can be measured using a calibrated bucket (e.g., 5-gallon) if the rate is relatively low, or a 55-gallon drum if the rate is relatively high, and a watch capable of measuring time in second intervals. A precalibrated flow meter may also be used if available.

4.8 After the specified number of casing volumes have been evacuated from the well, the pump intake is lifted slowly until it breaks suction to confirm that any standing water above the intake has been purged.

4.9 If a bailer is used, then the bailer is lowered only deep enough to remove water from the top of the water column and a 5-gallon bucket is used to measure the volume of water evacuated.

4.10 If purging is not executed by evacuating a specified number of well volumes, then purging is performed by pumping or bailing the well until specific indicator parameters (e.g., specific conductance, pH, temperature) stabilize. The volume of water removed is documented on an appropriate field form or in the field notebook.

4.11 Water purged from the well will be disposed of in accordance with the appropriate method outlined in the site SAP.

4.12 If historic site data indicate that explosive gases could be present and accumulate in the well, then an explosimeter will be used to check vapor concentrations in wells at the site prior to beginning the purging procedure. Vapor concentrations in a well that exceed the 25 percent lower explosive limit (LEL) will require specific precautionary measures to allow purging the well without danger of explosion or fire (e.g., use of cotton cord for bailers or lowering pumping devices, non-electric powered pumps). These conditions will be addressed in the site health and safety plan (HASP) and/or SAP.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling of ground-water monitoring wells for dissolved constituents. As part of the SOP for the sampling of ground-water monitoring wells, sample collection equipment and devices must be considered, and equipment decontamination and pre-sampling procedures (e.g., measuring water levels, sounding wells, and purging wells) must be implemented. Sampling objectives must be firmly established in the work plan before considering the above.

Valid water-chemistry data are integral to a hydrogeologic investigation that characterizes ground-water quality conditions. Water-quality data are used to evaluate both current and historic aquifer chemistry conditions, as well as to estimate future conditions (e.g., trends, migration pathways). Water-quality data can be used to construct ground-water quality maps to illustrate chemical conditions within the flow system, to generate water-quality plots to depict conditions with time and trends, and to perform statistical analyses to quantify data variability, trends, and cleanup levels.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample ground water from monitoring wells, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Bailers (Teflon™ or stainless steel).

b. Pumps (centrifugal, peristaltic, bladder, electric submersible, bilge, hand-operated diaphragm, etc.).

c. Gas-displacement device(s).

d. Air-lift device(s).

e. Teflon™ tape, electrical tape.

f. Appropriate discharge hose.

g. Appropriate discharge tubing (e.g., polypropylene, teflon, etc.) if using a peristaltic pump.

h. Appropriate compressed gas if using bladder-type or gas-displacement device.

i. Portable generator and gasoline or alternate power supply if using an electric submersible pump.

j. Non-absorbent cord (e.g., polypropylene, etc.).

k. Plastic sheeting.

l. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (blue carpenter's).

m. Electronic water-level indicators (e.g., m-scope, etc.) or electric water-level/product level indicators.

n. Non-phosphate, laboratory-grade detergent.

o. Distilled/Deionized water.

p. Potable water.

q. Paper towels, clean rags.

r. Roux Associates' field forms (e.g., daily log, well inspection checklist, sampling, etc.) and field notebook.

s. Well location and site map.

t. Well keys.

u. Stop watch, digital watch with second increments, or watch with a second hand.

v. Water Well Handbook.

w. Calculator.

x. Black pen and water-proof marker.

y. Tools (e.g., pipe wrenches, screwdrivers, hammer, pliers, flashlight, pen knife, etc.).

z. Appropriate health and safety equipment, as specified in the site health and safety plan (HASP).

aa. pH meter(s) and buffers.

bb. Conductivity meter(s) and standards.

cc. Thermometer(s).

dd. Extra batteries (meters, thermometers, flashlight).

ee. Filtration apparatus, filters, pre-filters.

ff. Plasticware (e.g., premeasured buckets, beakers, flasks, funnels).

gg. Disposable gloves.

hh. Water jugs.

ii. Laboratory-supplied sample containers with labels.

jj. Cooler(s).

kk. Ice (wet, blue packs).

ll. Masking, duct, and packing tape.

mm. Chain-of-custody form(s) and custody seal(s).

nn. Site sampling and analysis plan (SAP).

oo. Site health and safety plan (HASP).

pp. Packing material (e.g., bubble wrap)

qq. "Zip-lock" plastic bags.

rr. Overnight (express) mail forms.

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods, summaries for bailers and pumps are provided below). Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form and in the field notebook.

a. Decontaminate a bailer by: 1) wearing disposable gloves, 2) disassembling (if appropriate) and scrubbing in a non-phosphate, laboratory-grade detergent and distilled/deionized water solution, and 3) rinsing first with potable water and then distilled/deionized water.

b. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing the pump and discharge hose (if not disposable) first with a non-phosphate, laboratory-grade detergent and potable water solution in an appropriate container (clean bucket, garbage can, or 55-gallon drum) and then with distilled/deionized water or potable water, and 3) wiping pump-related equipment (e.g., electrical lines, cables, discharge hose) first with a clean cloth and detergent solution and then rinsing or wiping with a clean cloth and distilled/deionized water or potable water.

3.2 Note that the decontamination procedures for bailers and pumps are the minimum that must be performed. Check the work plan to determine if chemicals specified by individual state regulatory agencies must also be used for decontamination procedures (e.g., hexane, nitric acid, acetone, isopropanol, etc.).

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment before use (e.g., thermometers, pH and conductivity meters, etc.). Refer to the specific SOP for field analysis for each respective piece of equipment. Document, and initial and date the calibration procedures on the appropriate field form, in the field notebook, and in the calibration log book.

5.0 PROCEDURE

5.1 Document, and initial and date well identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook as needed.

5.2 Inspect the protective casing of the well and the well casing, and note any items of concern such as a missing lock, or bent or damaged casing(s).

5.3 Place plastic sheeting around the well to protect sampling equipment from potential cross contamination.

5.4 Remove the well cap or plug and, if necessary, clean the top of the well off with a clean rag. Place the cap or plug on the plastic sheeting. If the well is not vented, allow several minutes for the water level in the well to equilibrate. If fumes or gases are present, then diagnose these with the proper safety equipment. Never inhale the vapors.

5.5 Measure the depth to water (DTW) from the measuring point (MP) on the well using a steel tape and chalk or an electronic sounding device (m-scope). Refer to the specific SOPs for details regarding the use of a steel tape or a m-scope for measuring water levels. Calculate the water-level elevation. Document, and initial and date the information on the appropriate field form and in the field notebook.

5.6 Measuring the total depth of the well from the MP with a weighted steel tape. Calculate and record the volume of standing water in the well casing on the appropriate field form and in the field notebook.

5.7 Decontaminate the equipment used to measure the water level and sound the well with a non-phosphate, laboratory-grade detergent solution followed by a distilled/deionized water rinse.

5.8 Purge the well prior to sampling (refer to the SOP for Purging a Well). The well should be pumped or bailed to remove the volume of water specified in the work plan. Usually three to five casing volumes are removed if the recharge rate is adequate to accomplish this within a reasonable amount of time.

If the formation cannot produce enough water to sustain purging, then one of two options must be followed. These include: 1) pumping or bailing the well dry, or 2) pumping or bailing the well to "near-dry" conditions (i.e., leaving some water in the well). The option employed must be specified in the work plan and be in accordance with regulatory requirements.

If the well is purged dry, then all the standing water has been removed and upon recovery the well is ready for sampling. However, depending on the rate of recovery and the time needed to complete the sampling round, one of the following procedures may have to be implemented: 1) the well may have to be sampled over a period of more than one day; 2) the well may not yield enough water to collect a complete suite of samples and only select (most important) samples will be collected; or 3) the well may not recover which will preclude sampling. Regardless of the option that must be followed, the sampling procedure must be fully documented. When preparing to conduct a sampling round, review drilling, development and previous sampling information (if available) to identify low-yielding wells in order to purge them first, and potentially allow time for the well to recover for sampling.

5.9 Record the physical appearance of the water (i.e., color, turbidity, odor, etc.) on the appropriate field form and in the field notebook, as it is purged. Note any changes that occur during purging.

5.10 If a bailer is used to collect the sample, then:

a. Flush the decontaminated bailer three times with distilled/deionized water.

b. Tie the non-absorbent cord (polypropylene) to the bailer with a secure knot and then tie the free end of the bailer cord to the protective casing or, if possible, some nearby structure to prevent losing the bailer and cord down the well.

c. Lower the bailer slowly down the well and into the water column to minimize disturbance of the water surface. If a bottom-filling bailer is used, then do not submerge the top of the bailer; however, if a top-filling bailer is used, then submerge the bailer several feet below the water surface.

d. Remove and properly discard one bailer volume from the well to rinse the bailer with well water before sampling. Again, lower the bailer slowly down the well to the appropriate depth depending on the bailer type (as discussed above in 5.11 c). When removing the bailer from the well, do not allow the bailer cord to rest on the ground but coil it on the protective plastic sheeting placed around the well. Certain regulatory agencies require that the first bailer volume collected be utilized for the samples.

5.11 If a pump is used to collect the sample, then use the same pump used to purge the well and, if need be, reduce the discharge rate to facilitate filling sample containers and to avoid problems that can occur while filling sample containers (as listed in Number 5.14, below). Alternately, the purge pump may be removed and a thoroughly decontaminated bailer can be used to collect the sample.

5.12 Remove each appropriate container's cap only when ready to fill each with the water sample, and then replace and secure the cap immediately.

5.13 Fill each appropriate, pre-labeled sample container carefully and cautiously to prevent: 1) agitating or creating turbulence; 2) breaking the container; 3) entry of, or contact with, any other medium; and 4) spilling/splashing the sample and exposing the sampling team to contaminated water. Immediately place the filled sample container in a ice-filled (wet ice or blue pack) cooler for storage. If wet ice is used it is recommended that it be repackaged in zip-lock bags to help keep the cooler dry and the sample labels secure. Check the work plan as to whether wet ice or blue packs are specified for cooling the samples because certain regulatory agencies may specify the use of one and not the other.

5.14 "Top-off" containers for volatile organic compounds (VOCs) and tightly seal with Teflon™-lined septums held in place by open-top screw caps to prevent volatilization. Ensure that there are no bubbles by turning the container upside down and tapping it gently.

5.15 Filter water samples (Procedure 4.6) collected for dissolved metals analysis prior to preservation to remove the suspended sediment from the sample. If water samples are to be collected for total metals analysis, then collect a second set of samples without field filtering.

In the event that the regulatory agency(ies) want unfiltered samples for metals analysis, a second set of filtered samples should also be collected. Because unfiltered samples are indications of total metals (dissolved and suspended) they are not representative of aquifer conditions because ground water does not transport sediment (except in some rare cases). Thus, the results for dissolved metals in ground water should be based on filtered samples even if both filtered and unfiltered sets are presented in a report.

5.16 Add any necessary preservative(s) to the appropriate container(s) prior to, or after (preferred), the collection of the sample, unless the appropriate preservative(s) have already been added by the laboratory before shipment.

5.17 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. Refer to the SOP for Collection of Quality Control Samples.

5.18 Conduct field analyses after sample collection is complete by measuring and recording the temperature, conductivity, pH, etc. (as called for in the work plan). Note and record the "final" physical appearance of the water (after purging and sampling) on an appropriate field form and in the field notebook.

5.19 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cover.

5.20 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," placed in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory.

5.21 Decontaminate bailers, hoses, and pumps as discussed in the decontamination SOP. Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard cords, rags, gloves, etc. in a manner consistent with site conditions.

5.22 Complete all necessary field forms, field notebook entries, and the chain-of-custody forms. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.23 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

END OF PROCUDURE

STANDARD OPERATING PROCEDURE 4.7 FOR MEASURING THE THICKNESS OF FLOATING SEPARATE-PHASE ORGANIC LIQUIDS

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for measuring the thickness of floating separate-phase organic liquids in a well, tank or drum. Measuring the thickness of floating, separate-phase organic liquids requires special health and safety considerations, equipment, and procedures.

Separate-phase layers can either be "floaters" or "sinkers". "Floaters" (non-aqueous phase liquids [NAPLs]) are separate-phase liquids that are less dense than water and float on the ground-water surface. "Sinkers" (dense non-aqueous phase liquids [DNAPLs]) are separate-phase liquids that are more dense than water and tend to migrate downward through aquifers due to gravitational forces until a low permeability layer is encountered (i.e., they accumulate at the bottom of the aquifer). For the purpose of this SOP, only measuring the thickness of floating separate-phase liquids will be addressed.

The objectives for measuring separate-phase organic liquids may include the following: 1) determination of the thickness of the free product in a well, tank or drum; 2) estimation of the volume of free product to be removed from a well before sampling, or from a tank or drum before removal; and 3) calculation of the "true" (non-free product depressed) elevation of the water table.

2.0 CONSIDERATIONS

The primary considerations when measuring the thickness of floating separate-phase liquids are health and safety, and proper equipment selection.

2.1 Health and Safety

All separate-phase products must be assumed to possess health and safety hazards equivalent to the most hazardous suspected on-site source. For example, if fuel oil is being measured in wells where polychlorinated biphenyls (PCBs) are known (or suspected) to be present, then the potential for PCBs to be present in the fuel oil must be considered. When measuring the thickness of flammable materials, it is imperative that all possible sources of ignition be eliminated. Minimum requirements include (NO EXCEPTIONS) no smoking or open flames, use of intrinsically safe downhole monitoring equipment, use of static free bailing cord (e.g., absorbent cord [cotton]), and use of properly vented and grounded product collection containers. When product collection containers will be stored onsite, the local fire code official must be consulted regarding product storage requirements (e.g. venting, grounding, labeling, permits, secondary containment, etc.). A detailed, comprehensive explanation of health and safety procedures must be outlined in the site health and safety plan (HASP).

2.2 Equipment Selection

There are several methods which may be employed to measure the thickness of separate-phase petroleum product in a monitoring well, tank or drum. The actual method to be utilized should be outlined in the work plan. Considerations in selecting a method shall include: the type and consistency of the product; the level of accuracy desired; the expected depth and thickness of the product; and the diameter of the well or port.

Measurements of floating separate-phase product thicknesses can be performed using 1) an electronic oil/water interface probe; 2) a graduated, clear acrylic bailer; or 3) a weighted steel measuring tape (or graduated "stick") in conjunction with oil and water paste.

An oil/water interface probe is capable of providing rapid and accurate (±0.01 foot) results under most field situations. However, viscous product or oil/water emulsions may interfere with performance by coating the probe and/or disguising the interface. In these situations, a clear, acrylic bailer may be used in wells, or oil and water paste in a tank or drum.

A clear, acrylic bailer may be used if simply the presence or absence of product or an approximate product thickness is desired. In certain situations (e.g., viscous product or product/water emulsions) a clear acrylic bailer may be the best available method. However, when product thicknesses are greater than approximately three feet, a bailer will be unable to provide approximate product thickness measurements. If the oil/water interface probe will not work, and the product thickness is too great to be measured by a bailer, then the best available technique may be oil and water paste.

A graduated "stick" or weighted steel tape in conjunction with oil and water paste may be appropriate for measuring residual water or product in a tank or drum. This method is not recommended for use in monitoring wells because of possible cross-contamination from the paste itself. In certain situations where no other method can provide the necessary data, oil and water paste may be used in monitoring wells containing product. This method is less accurate than an oil/water interface probe, but frequently more accurate than a clear, acrylic bailer.

It should be noted that erroneous data may be collected by all three methods when measurements are collected through the fill ports of tanks which are equipped with drop tubes. Whenever possible, product thickness measurements should be collected from ports with unobstructed access to the tank contents. When measurements must be collected from a fill port with a drop tube, it should be understood that there may be significant differences between the drop tube measurements and the actual thicknesses of the water and product in the tank.

3.0 CALIBRATION

3.1 Oil/Water Interface Probe

There is no specific calibration procedure for an oil/water interface probe. However, you should verify that the unit operates properly prior to taking it out in the field by testing it in a jar containing product and water. This jar should be stored in a flammable liquid cabinet and be dedicated to oil/water interface probe testing. Since most oil/water interface probes have a heavy probe assembly and a rigid graduated tape, kinking, stretching or twisting of the tape is not a significant concern. In order to ensure proper operation, the unit should be kept warm prior to use (e.g. hotel room or cab of truck).

3.2 Clear Acrylic Bailer

There is no specific calibration procedure for an acrylic bailer. However, since you only get one chance to measure the thickness correctly, you should verify that the check valve operates properly with distilled water. Based on previous data, if available, you should ensure that the length of the bailer is sufficient to measure the entire thickness of the product.

3.3 Oil/Water Paste

There is no specific calibration procedure for using oil and water paste. However, these pastes may not behave reliably if they are old or have been exposed to extreme temperatures. The pastes should be tested prior to taking them out in the field to confirm they work. The stick measure or weighted steel tape should be carefully examined to confirm that it is properly graduated and has not been damaged or modified.

4.0 DECONTAMINATION

4.1 Complete decontamination of a clear acrylic bailer which is dedicated to the measurement of separate-phase product thicknesses can be very difficult. Decontamination should involve removal of gross contamination before entering and exiting the site or moving to different areas of separate-phase product accumulation. Special care must be taken to make sure that a “product bailer” never enters a “clean” well which does not contain separate-phase product. This can be ensured by measuring separate-phase thickness in all wells before starting bailing operations. The oil/water interface probe must be thoroughly cleaned according to the field equipment decontamination SOP before entering each well. If historical data are available, then the order of measuring separate-phase thickness should be from the cleanest well to the dirtiest well to further reduce the potential for cross-contamination. If samples are also being collected for constituent or characterization analysis, then a disposable, dedicated bailer may be necessary for product collection.

5.0 EQUIPMENT AND MATERIALS

Depending on the method used to measure the thickness of separate-phase organic liquids, both method-specific and general equipment and materials are needed.

5.1 Regardless of the method used, general equipment and materials will include, but may not necessarily be limited to, the following:

a. Site Health and Safety Plan (HASP).

b. Appropriate health and safety equipment, as specified in the HASP.

c. Roux Associates' field forms and field notebook.

d. Non-phosphate, laboratory-grade detergent.

e. Distilled/deionized water.

f. Potable water.

g. Paper towels, clean rags.

h. Plastic sheeting.

i. Sorbent pads.

j. Well location and site map.

k. Well keys.

l. Disposable gloves.

m. Calculator.

n. Black pen and indelible marker.

o. Tools (e.g., pipe wrench, screw drivers, hammer, pliers, flashlight, pen knife, etc.).

p. Buckets for decontamination.

5.2 Clear Acrylic Bailer - the following will also be needed:

a. Clear acrylic bailer

b. Non-static cotton cord

c. Steel tape (10 foot)

5.3 Oil/Water Interface Probe - the following will also be needed:

a. Oil/water interface probe

5.4 Oil/Water Paste - the following will also be needed:

a. Oil paste

b. Water paste

c. Graduated stick or weighted steel tape

6.0 PROCEDURE

6.1 Oil/Water Interface Probe

6.1.1 Make sure the bottom five (5) feet of the probe and measuring tape have been decontaminated according to the field equipment decontamination SOP before entering each well.

6.1.2 Based on previous data, if any, ensure that non-product wells are measured prior to product wells to reduce the possibility of cross-contamination.

6.1.3 Remove the well cap or plug and clean the top of the well with a clean rag. Place the cap or plug on clean plastic on the ground to protect it from potential contamination.

6.1.4 Slowly lower the thoroughly decontaminated probe to the product surface. A distinct tone or beep will indicate the presence and level of product. The depth to product (DTP) from the measuring point will be recorded in the field notebook and on appropriate field forms. Continue lowering the probe until the tone or beep indicates the presence of water. The oil/water interface is best measured by lowering the probe about six inches into the water and then raising it to the interface. The depth to water (DTW) from the measuring point will be recorded in the field notebook and on appropriate field forms. The product thickness is the difference between the DTW and DTP.

6.1.5 Replace locking and/or protective caps on the well.

6.1.6 Thoroughly clean the probe and the portion of the tape which entered the product according to the field equipment decontamination SOP.

6.2 Clear Acrylic Bailer

6.2.1 Make sure all equipment is cleaned of gross contamination before entering and exiting the site or moving to different areas of product accumulation.

6.2.2 Remove the well cap or plug and clean the top of the well with a clean rag. Place the cap or plug on clean plastic on the ground to protect it from potential contamination.

6.2.3 Slowly lower a clear, decontaminated bottom-filling acrylic bailer into the well until the bottom of the bailer contacts the fluid surface.

6.2.4 Using a reference point on the bailer line, slowly lower the bailer into the fluid a distance less than the bailer length so that at its deepest point the top of the bailer remains above the air/fluid contact.

6.2.5 Slowly raise the bailer out of the well.

6.2.6 The thickness of the floating free product will be approximated by placing a tape measure along side the bailer. The data will be documented in the field notebook and on appropriate field forms.

6.2.7 Dispose of the product in an appropriate manner as specified in the work plan. This may include draining the product back into the well or tank, or containerization if the measurement is in conjunction with bailing for removal purposes.

6.2.8 Replace locking and/or protective caps on the well.

6.2.9 Thoroughly clean the bailer as described in Section 6.2.1. Discard the cotton cord in an appropriate manner. Wrap decontaminated bailer in a suitable material (e.g., clean plastic bag, aluminum foil).

6.2.10 If the free product is extensive or thicker than the height of the bailer, then an electronic interface probe should be used to measure product thickness.

6.3 Oil/Water Paste - (Generally not applicable for monitoring wells)

6.3.1 Make sure all equipment is decontaminated and cleaned before use according to the field equipment decontamination SOP.

6.3.2 Secure access to the tank or drum to be measured only after the contents are known and properly addressed in the HASP. Attempt to estimate the depth and thickness of product and the depth to water so the entire stick or weighted steel tape does not have to be coated with oil and water paste.

6.3.3 Coat one side of the stick or steel tape with oil paste and the other with water paste. Since these are typically different colors, confusion should not result. Depending upon information needs, lower the tape to just below the water interface or to the bottom of the tank or drum.

6.3.4 If only DTP and DTW data is required, then the top of the tape is held at an even-foot increment at the measuring point (MP). This is called the "held" value, and is recorded as such. If the depth to the bottom of the tank is also required, then the held value can't be specifically selected at an even-foot increment.

6.3.5 The steel tape or graduated stick is removed and the "water cut" and "product cut" levels are recorded. The difference between the "held" value and the "product cut" value is the DTP. The difference between the "held" value and the "water cut" is the DTW. The difference between the "product cut" and the "water cut" is the product thickness. If the diameter of a horizontal tank is desired, then the difference between the "held" value (to the bottom of the tank) and the depth of the fill pipe is required.

6.3.6 All pertinent data will be recorded in the field notebook and on appropriate field forms.

6.3.7 Make sure all equipment is decontaminated before use in the next tank or drum according to the field equipment decontamination SOP. All disposable materials must be discarded in a manner consistent with site conditions.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for hand bailing wells containing immiscible, separate-phase organic liquids. The hand bailing of immiscible, separate-phase organic liquids requires special health and safety considerations, equipment, and procedures.

Separate-phase layers can either be “floaters” or “sinkers.” “Floaters” (non-aqueous phase liquids [NAPLs]) are separate-phase liquids that are less dense than water and float on the ground-water surface. “Sinkers” (dense non-aqueous phase liquids [DNAPLs]) are separate-phase liquids that are more dense than water and tend to migrate downward through aquifers due to gravitational forces until a low permeability layer is encountered (i.e., they accumulate at the bottom of the aquifer). For the purpose of this SOP, only the hand bailing of floating separate-phase liquids will be addressed.

The objectives for hand bailing wells containing floating separate-phase liquids (e.g., petroleum, petroleum products) may include the following: 1) removal of product before ground-water sampling; 2) remediation technique; 3) sampling product for constituent or characterization analysis; and 4) conducting product recharge tests to evaluate “true” versus “apparent” product thickness.

2.0 CONSIDERATIONS

The primary considerations when conducting hand bailing of wells are health and safety, and waste collection and disposal.

2.1 Health and Safety

All separate-phase products must be assumed to possess health and safety hazards equivalent to the most hazardous suspected on-site source. For example, if fuel oil is being removed from wells where polychlorinated biphenyls (PCBs) are known (or suspected) to be present, then the potential for PCBs to be present in the fuel oil must be considered. When bailing flammable materials, it is imperative that all possible sources of ignition be eliminated. Minimum requirements include (NO EXCEPTIONS) no smoking or open flames, use of intrinsically safe downhole monitoring equipment, use of static free bailing cord (e.g., absorbent cord [cotton]), and use of properly vented and grounded product collection containers. When product collection containers will be stored onsite, the local fire code official must be consulted regarding product storage requirements (e.g. venting, grounding, labeling, permits, secondary containment, etc.). A detailed, comprehensive explanation of health and safety procedures must be outlined in the site health and safety plan (HASP).

2.2 Waste Collection and Disposal

All product and product-contaminated waste materials must be properly stored, characterized, and disposed. A detailed, comprehensive explanation of waste (product) collection and disposal must be developed in accordance with regulatory agency requirements and must be outlined in the work plan/scope of work. Minimum requirements will include:

a. Collection of solid waste materials in a Department of Transportation (DOT) approved open-top drum (17C).

b. Collection of separate-phase product in a properly grounded and vented, DOT approved closed-top drum (17E).

c. Appropriate labeling of all drums with THIS SIDE UP, FLAMMABLE, and HAZARDOUS WASTE labels in accordance with Resource Conservation and Recovery Act (RCRA) and DOT requirements.

d. Collection and analysis of product sample for characterization prior to disposal, as required.

Any bailing operations which generate more than 100 kilograms per month (or approximately half of a 55 gallon drum) or that involve the storage of more than 1,000 kg of a RCRA hazardous waste must meet additional RCRA storage and disposal requirements (see 40CFR 261.5).

3.0 EQUIPMENT AND MATERIALS

The list of equipment and materials which may be needed for hand bailing floating separate-phase product from a well includes, but may not be limited to, the following:

a. Site HASP.

b. Appropriate health and safety equipment, as specified in the HASP.

c. A work plan which describes bailing requirements.

d. Oil/water interface probe.

e. Clear, acrylic product bailer (graduated).

f. Absorbent, nonstatic cord (e.g., cotton).

g. Sorbent pads.

h. Disposable PVC gloves.

i. Well construction log(s).

j. Two graduated buckets and funnels (dedicated to separate-phase product activities).

k. DOT approved product collection drum(s) (properly grounded).

l. DOT approved solid waste collection drum(s).

m. Roux Associates’ field forms and field notebook.

n. Non-phosphate, laboratory-grade detergent.

o. Distilled/deionized water.

p. Potable water.

q. Paper towels, clean rags.

r. Calculator.

s. Black pen and indelible marker.

t. Well location and site map.

u. Tools (e.g., pipe wrench, screwdrivers, hammer, pliers, flashlight, pen knife, etc.)

v. Extra batteries (probe, flashlight).

w. Steel tape measure with 0.01-foot measurement increments, graduated measurement stick.

x. Plastic sheeting.

y. Specific gravity instruments.

4.0 DECONTAMINATION

4.1 Complete decontamination of a clear acrylic bailer which is dedicated to the removal of separate-phase product can be very difficult. When the primary task is the removal of product as a remedial technique, then decontamination should involve removal of gross contamination before entering and exiting the site or moving to different areas of separate-phase product accumulation. Special care must be taken to make sure that a “product bailer” never enters a “clean” well which does not contain separate-phase product. This can be ensured by measuring separate-phase thickness in all wells before starting bailing operations. The oil/water interface probe must be thoroughly cleaned according to the field equipment decontamination SOP before entering each well. Based on historical data, the order of measuring separate-phase thickness should be from the cleanest well to the dirtiest well to further reduce the potential for cross-contamination. If bailing is being conducted for product samples, it may be necessary to utilize a dedicated, disposable bailer as defined in the work plan.

5.0 PROCEDURE

5.1 Document, and initial and date the monitoring well identification and any problems encountered on the appropriate field form and in the field notebook.

5.2 Inspect the product collection drum or tank, and note any items of concern such as dents, holes, leaks, deformation, unauthorized access, etc. Document, and initial and date findings on an appropriate field form and in the field notebook.

5.3 Ensure that all equipment is properly decontaminated and cleaned.

5.4 Place plastic sheeting adjacent to the well to protect decontaminated equipment.

5.5 Remove the well cap and clean it off with a clean rag. Place the cap on the plastic sheeting. If fumes or gases are present, then diagnose these with the proper safety equipment. Never inhale the vapors.

Refer to Section 2.1 for the minimum health and safety considerations to prevent fire or explosion. Additional health and safety precautions based on site specific considerations must be outlined in the site HASP.

5.6 Place sorbent pads around the well to be bailed to prevent any loss of product in the event of spillage.

5.7 Determine the depth to product (DTP), depth to water (DTW), and product thickness within the well using an oil/water interface probe. Refer to the SOP for Measuring the Thickness of Floating Separate-phase Layers for the procedure to measure product thickness.

5.8 Lower the bailer into the product zone using absorbent, nonstatic cord (e.g., cotton). Refer to the work plan/scope of work to determine the method for draining off any excess water collected in the bailer (i.e., into the well or in a bucket). Drain off the water by slightly dislodging the capture ball (check valve) from the bailer seat with your finger; PVC gloves must be worn. Drain the product only into a separate, dedicated bucket.

5.9 Continue bailing until product thickness as observed in the bailer is reduced to less than ¼ inch (0.02 feet). If possible, then bail until no product is evidenced in the well (i.e., no more product is entering the well). Verify thickness measurements in the well using an oil/water interface probe. When bailing is completed, dispose of any excess water collected according to the specifications in the work plan/scope of work.

5.10 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cover.

5.11 If required in the work plan, collect specific gravity measurements on representative samples of the product collected.

5.12 Transfer the product collected in the bucket to an on-site storage vessel. Record the volume of product collected and confirm by measuring the on-site storage vessel contents with an oil/water interface probe both before and after transferring the product from the bucket.

5.13 Place all contaminated sorbent pads, cord, and other solid waste materials into the open top drum and secure the lid.

5.14 Report any significant problems or deviations in product thickness measurements immediately (e.g., significant increase in product thickness or a substantial change in appearance).

5.15 Document all data (e.g., MP, DTP, DTW, product thickness, volume of product removed and disposed) on an appropriate field form and in the field notebook, and initial and date entries.

5.16 Secure storage containers and verify integrity.

5.17 Decontaminate all equipment as discussed in the decontamination section (4.0). Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard cords, rags, gloves, etc. in a manner consistent with accepted procedures.

END OF PROCEDURE

STANDARD OPERATING PROCEDURE 5.4
FOR SCREENING SOIL SAMPLES FOR VOLATILE ORGANIC VAPORS USING A PORTABLE PHOTOIONIZATION DETECTOR

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for screening soil samples for volatile organic vapors using a portable photoionization detector (PID). This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, and grab samples from stockpiled soils.

2.0 CONSIDERATIONS

The primary objective of photoionization screening of soil samples is to obtain a qualitative understanding of the distribution of volatile organic compounds (VOCs) in soil. The proper design of an organic vapor screening program requires an understanding of site hydrogeology, potential source areas, and potential constituents of concern. Sample locations and frequency must be fully defined in the work plan. The work plan should outline the type of lamp to be utilized in the PID based on the ionization potentials and response factors of the constituents of concern. The work plan must also clearly describe the heating or equilibration procedures to be employed if they differ from those described in this SOP. Regardless of the specific equilibration procedure employed, it is imperative that each sample be treated identically to allow the photoionization results from different locations to be compared. Observations such as water, clay, and organic content should be noted to facilitate interpretation of the data. Every effort should be made to collect a representative portion of soil from the sampling device.

3.0 MATERIALS/EQUIPMENT

a. A work plan which outlines photoionization screening requirements.

b. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents [e.g., acetone, nitric acid, hexane, etc.], aluminum foil, plastic sheeting, etc.).

c. Field notebook, field form(s), maps, chain-of-custody forms.

d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

e. Stainless steel spoons or spatulas.

f. Disposable plastic spoons.

g. Plastic sheeting.

h. Aluminum foil.

i. Mason jars or driller's jars.

j. Water bath (hot plate, extension cord, water tray, thermometer).

k. Photoionization detector with charging unit.

l. Calibration gases with regulator.

m. Indelible marker.

n. Masking tape.

o. Disposable sampling gloves.

4.0 DECONTAMINATION

Where possible, thoroughly pre-cleaned and wrapped sampling equipment must be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and sample jars will be changed after each use and discarded in an appropriate manner. If only photoionization results are to be obtained, then split-spoon samples and hand augers may be cleaned with a soap and water wash and potable water rinse or steam cleaning, and a final distilled water rinse. However, if samples are to be collected concurrently for laboratory analytical results, then all reusable sampling equipment must be thoroughly decontaminated according to the SOP for decontamination of field equipment.

5.0 CALIBRATION

The PID must be calibrated according to the manufacturer's specifications at a minimum frequency of once per day prior to collecting photoionization readings. In addition, periodic checks (e.g., every 2 hours or every ten samples) with the standard gas will be conducted to confirm that the calibration has not drifted. The time, date, and calibration procedure must be clearly documented in the field notebook and the calibration log. If at any time the photoionization results appear erratic or inconsistent with field observations, then the unit must be recalibrated. If calibration is difficult to achieve, then the unit's lamp should be checked for dirt or moisture and cleaned, as necessary. During humid or wet conditions, the unit should be calibrated on a more frequent basis as determined by field personnel.

6.0 PROCEDURE

6.1 Extract the soil sample from the sampler, quickly measure the recovery, and separate the wash from the true sample by using a dedicated, stainless steel spatula. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

6.2 Place the sample in a pre-cleaned glass jar (as quickly as possible to avoid loss of VOCs) filling the jar half full. Place an aluminum foil seal between the glass and metal cap and screw tight.

6.3 Label jars with the boring number, depth of sample, date of collection and blow counts. In addition, the field personnel will ensure the following: samples are taken at appropriate depths; unrepresentative portions of the sample are discarded properly; that the sampler is decontaminated properly between use; and the driller uses proper methods during sample collection and does not use oil or grease on tools entering the borehole.

6.4 Log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, and layering).

6.5 After the sample has been collected, heat the sample under controlled conditions in a water bath for a 2 minute period.

6.6 Ensure that the PID has been calibrated and that the calibration information is documented in the field book. Pierce the aluminum foil seal with the probe from the PID and measure the relative concentration of VOCs in the headspace of the soil sample. The initial (peak) reading must be recorded.

6.7 Record the PID reading in the field notebook, on an appropriate field form, and on the base map, if appropriate.

6.8 Place any material not representative of the interval sampled in a pile with the other cuttings from the borehole.

6.9 If only photoionization results are to be obtained, then reusable sampling devices may be cleaned with a soap and water wash and a potable water rinse. The sampler will then be rinsed with distilled water, assembled and placed on plastic sheeting for reuse. A more rigorous decontamination procedure is required when samples are also being collected for laboratory analysis. Refer to the SOP for collection of soil samples for laboratory analysis for additional information.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during drilling, and soil and water sampling. The objective of decontamination is to ensure that all drilling, and soil-sampling and water-sampling equipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements and because of variability in the requirements of individual states. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

2.1 The rig and all associated equipment should be properly decontaminated by the contractor before arriving at the test site.

2.2 The augers, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with the soil, will be steam cleaned onsite prior to set up for drilling to ensure proper decontamination.

2.3 The same steam cleaning procedures will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the study.

2.4 All on-site steam cleaning (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc.

2.5 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.6 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federal procedures.

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.2 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.3 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.4 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.5 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.6 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.7 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.8 Reassemble the cleaned sampler, as necessary.

3.9 Transfer the sampler to the driller (or helper) making sure that this individual is also wearing clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil.

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble bailer (if applicable) and discard cord in an appropriate manner, and scrub each part of the bailer with a brush and solution.

d. Rinse with potable water and reassemble bailer.

e. Rinse with copious amounts of distilled or deionized water.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

h. Rinse bailer at least three times with distilled or deionized water before use.

4.2 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

STANDARD OPERATING PROCEDURE 10.3 FOR SOIL BORING AND/OR MONITORING OR OBSERVATION WELL DRILLING, FORMATION SAMPLING AND BOREHOLE ABANDONMENT IN UNCONSOLIDATED FORMATIONS

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to describe the considerations and procedures, and to establish the guidelines for drilling (soil borings, wells, or piezometers) and formation sampling activities in unconsolidated formations. There are several drilling techniques available which include hollow-stem auger, cable tool, hydraulic rotary, cased-hole rotary, and air rotary. Formation (sediment/soil) sample collection include disturbed (drill cuttings), intact (split-spoon), and undisturbed (Shelby-tube or Denison-core). Borehole abandonment (closure) procedures will also be addressed in this SOP.

The objective of drilling is to collect accurate subsurface information and to prepare a borehole for potential completion as a well or piezometer. Consequently, the lithologic data is the all important, most essential information that can be collected. The lithologic data characterizes subsurface conditions, describes hydrogeologic coefficients qualitatively and/or quantitatively, and identifies optimum locations for screen zones if wells are constructed.

Data can be obtained through the physical examination and testing of formation samples, as well as knowledge regarding ground-water levels. Thus, drill fluid mix, fluid loss, rate of drilling, lengths of split-spoon and Shelby-tube/Denison-core recovery, etc. must be monitored by the on-site hydrogeologist or geologist.

2.0 DRILLING TECHNIQUE-SELECTION

Verify that the drilling technique is the one specified in the investigation work plan, and that the drilling equipment mobilized by the driller is in good condition and proper working order. Do not permit the driller to use a drilling rig that appears to be substandard, in disrepair, etc., and/or is questionable as to whether or not the rig has the capabilities to accomplish the goals of the drilling program. The drilling rig must be capable of:

a. Penetration of all anticipated subsurface materials and formations at a desired rate, and construction of a borehole of desired diameter (for the anticipated well, if applicable, including the placement of a gravel or sand pack through a tremie pipe and necessary formation sealing material such as bentonite or cement).

b. Identification of lithology for development of a geologic log of all unconsolidated formations and materials penetrated, including physical characteristics and visual description of color, grain sizes, sorting and mineralogy.

c. Collection of samples of aquifer fluids during the drilling process and prior to well construction, while at the same time minimizing potential for cross-contamination. The method used should prevent cross-contamination between surface soils and ground water or between different hydrogeologic units.

d. Collection of intact and/or undisturbed soil samples from the center line or sidewall of the borehole. This objective requires the drilling to be halted while soil samples are taken from the bottom or side of the incomplete borehole.

e. Completion of the borehole into a well (monitoring or observation) or piezometer during the initial construction process (i.e., constructing a well or piezometer as the borehole is drilled, or constructing a well or piezometer in the borehole immediately after the drilling tools are removed).

f. Implementation of borehole geophysical logging (when applicable and possible) to enable more accurate vertical and horizontal extrapolation of borehole data to the lithology of the hydrogeologic system.

g. Completion of a well or piezometer, if applicable, in the borehole following a time lapse for interpretation of geologic or geophysical data from the borehole.

3.0 DRILLING TECHNIQUE - DESCRIPTION

3.1 Hollow-Stem Auger - This drilling method is rapid and extremely effective in most cohesive sediments but less so in loose sandy material. Penetration may be up to 150 feet below land surface (bls) depending on the size of the rig, drilling conditions, and the diameter of the auger flight; however, depths up to 250 feet bls have been achieved under compatible conditions. A major advantage of this technique is that normally no fluids are introduced into the formation. If the auger flights can be removed and the integrity of the borehole maintained, then electrical and radiation (e.g., gamma, neutron, etc.) geophysical logs can be run. If the auger flights must remain in the borehole, then only radiation geophysical logs can be run. Casing, screen, and sampling devices can then be lowered through the hollow stem by removing the removable plug at the bottom of the auger flights, and gravel packing and cementing can be accomplished within the hollow stem. However, this can be difficult especially below the water table. Auger flight outside diameters (OD) range from 5 inches (in.) to 12 in. The diameter of a well that can be constructed inside the hollow stem is limited, however, to about 4 in.

3.2 Cable Tool (Percussion) - This drilling method is slow because the borehole is advanced by lifting and dropping a heavy string of drilling tools. Cuttings accumulate in the drill casing and are removed by a sand bailer. A steel casing is driven in as the hole is deepened. Cable-tool rigs can be used in unconsolidated sediment and bedrock to depths of hundreds or thousands of feet and often employ telescoping techniques for drilling deep boreholes. Electrical geophysical logs cannot be run through the steel cased borehole, but radiation logs (e.g., gamma, neutron, etc.) can be run. Well casing and screen can be installed within the cased hole after which the outer casing is pulled back (removed). Because the boring is cased as it is being drilled, cross-contamination between various depths is practically eliminated. The method provides an excellent means to collect good, representative formation samples.

3.3 Hydraulic Rotary - This drilling method uses a rotating bit to drill (advance) the borehole. Drill cuttings are removed using a recirculating drilling fluid (mud or water). Although setting up the drilling equipment is slow, the drilling process is reasonably fast. In the mud-rotary method, drilling mud forms a cake on the borehole wall which prevents excessive loss of fluid to the formation being drilled. The hydrostatic pressure combined with the weight and density of the mud slurry keeps the hole open. This allows the drill rods to be removed from the borehole and geophysical logs (electric and radiation) to be run in the open borehole.

In reverse hydraulic rotary drilling, the drilling fluid moves downward through annular space and then upward inside the drill pipe. If the drilling fluid does not contain mud, then sufficient water flow is required as make-up water because the borehole wall is not sealed; therefore, significant water loss can occur to the formation being drilled. The borehole is held open by hydrostatic pressure only. A serious obstacle to this drilling method occurs when the static water level is less than 15 feet below land surface because of insufficient hydrostatic head difference between the borehole and the water table. However, the problems of excessive water loss and shallow depths to water may be overcome by using mud as the drilling fluid.

In mud-rotary drilling, the drilling fluid (mud) moves downward through the drill pipe and then upward through the annular space. Therefore, the borehole is held open by hydrostatic pressure and the mud cake lining the wall of the borehole. The mud-rotary method can be used to construct moderate to deep wells in unconsolidated (and consolidated material), while the reverse rotary technique can be used to construct moderate to deep wells in unconsolidated materials. The principal disadvantage may be the difficulty in removing mud cake from the formation at the screened zone. Extensive well development may be required to remove the mud cake.

3.4 Cased-Hole Rotary - Several new rotary drilling techniques have been developed in which a steel casing is advanced with an air-rotary or mud-rotary drill. This technique is highly desirable for use in exploratory drilling at monitoring sites because water and soil samples may be collected under conditions which preclude contamination from shallower depths. Furthermore, this technique is extremely effective in boulder or cavernous zones which would inhibit or preclude drilling using other techniques. Drilling results are comparable to cable-tool drilling but with greatly enhanced speeds. In all the cased-hole techniques, the main benefit is that the only portion of the borehole which is open, is at the bottom of the drill casing; thus, no soil or water from shallower depths can move down and impact the depth drilled and/or sampled. Electrical geophysical logs cannot be run through the steel-cased borehole, however, radiation logs (e.g., gamma, neutron, etc.) can be run.

Presently, there are three cased-hole rotary techniques which include:

a. The drill-thru casing hammer technique in which the casing is advanced by percussion with a casing hammer or vibratory driver similar to the method used in a borehole drilled by the air-rotary method. The casing hammer can also pull out the casing (air drilling only).

b. The Odex™ Drilling System (European system) which “pulls” the casing using a fixture attached to an air-hammer type drill bit (air drilling only).

c. The Barber™ Drilling System in which drilling is done with a top-head drive and a rotary table that spins casing into the ground. Casing can be fitted with a carbide “shoe” to cut boulders and an air hammer can be used above the bit. Air or mud rotary can be used to lift cuttings.

Two potential problems may be encountered using the cased-hole rotary technique which include: 1) “sand heave” when drilling stops (which can be quickly drilled or bailed out) and 2) possible aeration of water in the cased borehole if volatiles are being tested (which can be overcome by pumping or bailing the standing water out before sampling). The minimum drill casing diameter is 6 inches and depth is limited to approximately 450 feet.

3.5 Air Rotary - This drilling method uses a rotating bit to drill, and high-velocity compressed air to remove cuttings from the borehole. A pneumatic down-hole hammer is often used to add percussion to the rotary drilling action. This drilling method is very fast and, although it is most suitable for penetrating hard bedrock, it can be used in unconsolidated formations. The borehole may be cased or uncased depending on geologic conditions. If an open borehole is drilled, then electrical and radiation (e.g., gamma, neutron, etc.) geophysical logs can be run. If a cased borehole is drilled, then only radiation geophysical logs can be run.

Four potential problems may be encountered when using the air-rotary technique:

a. When a prolific aquifer is tapped, the compressed air may not be able to lift the water to the surface.

b. Aeration of water in the borehole (and finished well) immediately prior to sampling can interfere with a number of inorganic and organic water-quality parameters.

c. Low yield water entry zones may not be identified because the air pressure prevents water from entering the borehole. Care should be taken to prevent overdrilling of the borehole.

d. Air rotary drilling can induce the migration of volatile organics to the surface or adjacent structures causing potential aesthetic or health and safety concerns.

If the air-rotary technique is used then the following special procedures will be implemented:

a. The type of air compressor and lubricating oil will be documented on an appropriate field form and in the field notebook and a 1-pint sample of the oil will be retained for characterization in the event organic compounds are detected in a well sample.

b. An air line oil filter will be required and changed per manufacturer’s recommendations during operation with documentation of this maintenance on an appropriate field form and in the field notebook. More frequent oil filter changes will be made if oil is visibly detected in the filtered air.

c. The use of any additive will be prohibited, except approved water (e.g., potable water) for dust control and cuttings removal.

4.0 DECONTAMINATION

Drilling equipment decontamination procedures are outlined in the field equipment decontamination SOP. Proper decontamination in accordance with regulatory guidelines must be clearly documented in the field notebook.

5.0 PROCEDURE FOR DRILLING

5.1 Document all drilling-related activities (e.g., starting, stopping, footage, problems, decontamination, etc.) on the daily log form and in the field notebook. Record dates and times of activities, and names of Roux Associates personnel providing oversight.

5.2 Monitor and record drill fluid mix, speed of rotation, pressure on the drill fluid, rate of drilling, and length of drill rods or casing in the borehole.

5.3 Confirm that the drill rods and core barrel are straight, or discontinue drilling.

5.4 Pay particular attention to the advancement of the boring because differences in the rate of drilling may be indicative of differences in subsurface geologic conditions (e.g., sand and gravel versus clay).

5.5 Maintain a continuous dialogue with the driller to track and keep informed of all drilling activities (e.g., the speed of the drill and drilling pressure, difficult and easy drilling conditions, etc.).

5.6 Collect formation samples as described below in Section 6.0. Sample jars must be labeled appropriately (e.g., project number and name, site location, boring number, date, sample interval, blow counts, and initials of Roux Associates personnel collecting sample).

5.7 Record geologic information in the geologic log form and in the field notebook.

5.8 Handle and ship split-spoon sample jars carefully to avoid breakage and handle and ship tubes or cores carefully to prevent disturbance.

6.0 PROCEDURE FOR FORMATION SAMPLING

6.1 Intact formation sampling will be implemented using split-spoon samplers (which are driven), Shelby-tube samplers (which are pushed), or Denison-core samplers (which are rotated) depending on the drilling technique employed. Formation samples will be retained in suitable size (e.g., 1-pint or 0.5-pint) jars for physical descriptions and potential physical and chemical analysis. The appropriately labeled jars and tubes will be stored in a safe place to avoid breakage, agitation, and freezing. Intact formation samples will be collected as described in the work plan at specified intervals (e.g., at 5-foot increments below land surface) and at each major change in subsurface materials. Hydrogeologic information will be recorded on a geologic log form and in the field notebook. Detailed descriptions of the type(s) of intact sample(s) collected, sampling intervals and conditions, and objective(s) of the sample collection will be provided in the work plan.

6.2 Disturbed formation samples (drill cuttings) will be examined continuously throughout the entire depth of the borehole. If applicable to the study and/or stated in the work plan, borehole cuttings will be collected from the circulating auger flights which lift cuttings to land surface (hollow-stem auger technique), from the sand bailer (cable-tool technique), from the recirculating drilling fluid (mudflume) which transports cuttings to land surface (mud-rotary and related techniques), or from the compressed air used to carry cuttings to land surface (air-rotary and related techniques). Formation samples will be retained in appropriate size (e.g., 1-pint or 0.5-pint), properly labeled jars and stored in a safe place to avoid breakage, agitation, and freezing. Hydrogeologic data will be recorded on a geologic log form and in the field notebook.

6.3 The soil cores from the wells drilled at the site are used for lithologic identification. The first 18 inches of soil for each borehole will be collected intact using a split-spoon sample, Shelby-tube sampler, or Denison-core sampler. Split-spoon samples may be collected continuously from boreholes for cluster wells; single well and/or piezometer boreholes may be split-spooned throughout drilling or at specified intervals or changes in lithology. The conditions for sampling will be specified in the work plan.

6.4 Before collecting and retaining soil and/or sediments collected with the split-spoon sampler, the top several inches will be removed from the sampler and discarded to eliminate any sediment that may have caved into the bottom of the borehole.

6.5 Sediment sampling equipment such as split-spoon samplers, spatulas, etc. (but not including Shelby-tube or Denison-core samplers, which area not re-usable) will be decontaminated by steam cleaning and/or a non-phosphate, laboratory-grade and distilled/deionized wash followed by a distilled/deionized water rinse. (Refer to the SOP for Decontamination of Field Equipment for a detailed description of minimum and special decontamination procedures.) Decontamination of sediment sampling equipment will take place prior to the collection of the first sample and following the collection of each subsequent sample.

7.0 BOREHOLE ABANDONMENT OR CLOSURE

7.1 Upon the completion of the investigation, a determination will be made as whether to maintain the borehole (for a well or piezometer) or to close it (i.e., abandon and seal it). If the client and Roux Associates agree to abandon the borehole, then the state will be notified and a request will be presented for borehole abandonment. Upon state approval to seal the borehole, appropriate state borehole abandonment forms will be completed, if required. Following state approval, the abandonment of any borehole (or boring) will be in accordance with local, state and/or Federal regulations.

7.2 For each abandoned borehole, the procedure will be documented on an appropriate field form or in the study notebook. Documentation may include, where appropriate, the following:

a. Borehole designation.

b. Location with respect to the replacement borehole, if replaced (e.g., 30 ft north and 40 ft west of Borehole B-1). A location sketch should be prepared.

c. Open depth prior to grouting and any other relevant circumstances (e.g., formation collapse).

d. Drill casing left in the borehole by depth, size, and composition.

e. A copy of the geologic log.

f. A revised diagram of the abandoned borehole using a supplemental geologic log form.

g. Additional items left in hole by depth, description, and composition (e.g., lost tools, bailers, etc.).

h. A description and daily quantities of grout used to compensate for settlement.

i. The date of grouting.

j. The level of water or mud prior to grouting and the date and time measured.

k. Any other state or local well abandonment reporting requirements.

END OF PROCEDURE

Attachment 2

Chain of Custody Form

NEW YORK CHAIN OF CUSTODY

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

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

Page
of

Date Rec'd in Lab

ALPHA Job #

Client Information

Client:
Address:
Phone:
Fax:
Email:

Project Information

Project Name:
Project Location:
Project #
(Use Project name as Project #) ☐
Project Manager:
ALPHAQuote #:

Turn-Around Time

Standard ☐ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A
☐ EQuIS (1 File)
☐ Other
☐ ASP-B
☐ EQuIS (4 File)

Billing Information

☐ Same as Client Info
PO #

Regulatory Requirement

☐ NY TOGS
☐ AWQ Standards
☐ NY Restricted Use
☐ NY Unrestricted Use
☐ NYC Sewer Discharge
☐ NY Part 375
☐ NY CP-51
☐ Other

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ **Done**
☐ **Lab to do**
Preservation
☐ **Lab to do**

(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials									Sample Specific Comments	Total Bottle
		Date	Time												

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type								
Preservative								

Relinquished By:	Date/Time	Received By:	Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

Attachment 3

USEPA Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUNDWATER SAMPLES FROM MONITORING WELLS

Quality Assurance Unit
U.S. Environmental Protection Agency – Region 1
11 Technology Drive
North Chelmsford, MA 01863

This document contains direction developed solely to provide guidance to U.S. Environmental Protection Agency (EPA) personnel. EPA retains the discretion to adopt approaches that differ from these procedures on a case-by-case basis. The procedures set forth do not create any rights, substantive or procedural, enforceable at law by party to litigation with EPA or the United States.

Prepared by: Charles Porfert 1/19/10
(Charles Porfert, Quality Assurance Unit) Date

Approved by: Gerard Sotolongo 1-19-10
(Gerard Sotolongo, Quality Assurance Unit) Date

Revision Page

Date	**Rev #**	**Summary of changes**	**Sections**
7/30/96	2	Finalized	
01/19/10	3	Updated	All sections

TABLE OF CONTENTS

USE OF TERMS

Equipment blank: The equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank needs only to include the pump in subsequent sampling rounds. If the pump and tubing are dedicated to the well, the equipment blank is collected prior to its placement in the well. If the pump and tubing will be used to sample multiple wells, the equipment blank is normally collected after sampling from contaminated wells and not after background wells.

Field duplicates: Field duplicates are collected to determine precision of the sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

Indicator field parameters: This SOP uses field measurements of turbidity, dissolved oxygen, specific conductance, temperature, pH, and oxidation/reduction potential (ORP) as indicators of when purging operations are sufficient and sample collection may begin.

Matrix Spike/Matrix Spike Duplicates: Used by the laboratory in its quality assurance program. Consult the laboratory for the sample volume to be collected.

Poteniometric Surface: The level to which water rises in a tightly cased well constructed in a confined aquifer. In an unconfined aquifer, the potentiometric surface is the water table.

QAPP: Quality Assurance Project Plan

SAP: Sampling and Analysis Plan

SOP: Standard operating procedure

Stabilization: A condition that is achieved when all indicator field parameter measurements are sufficiently stable (as described in the "Monitoring Indicator Field Parameters" section) to allow sample collection to begin.

Temperature blank: A temperature blank is added to each sample cooler. The blank is measured upon receipt at the laboratory to assess whether the samples were properly cooled during transit.

Trip blank (VOCs): Trip blank is a sample of analyte-free water taken to the sampling site and returned to the laboratory. The trip blanks (one pair) are added to each sample cooler that contains VOC samples.

SCOPE & APPLICATION

The goal of this groundwater sampling procedure is to collect water samples that reflect the total mobile organic and inorganic loads (dissolved and colloidal sized fractions) transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. This standard operating procedure (SOP) for collecting groundwater samples will help ensure that the project's data quality objectives (DQOs) are met under certain low-flow conditions.

The SOP emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations. Indicator field parameters (e.g., dissolved oxygen, pH, etc.) are monitored during purging in order to determine when sample collection may begin. Samples properly collected using this SOP are suitable for analysis of groundwater contaminants (volatile and semi-volatile organic analytes, dissolved gases, pesticides, PCBs, metals and other inorganics), or naturally occurring analytes. This SOP is based on Puls, and Barcelona (1996).

This procedure is designed for monitoring wells with an inside diameter (1.5-inches or greater) that can accommodate a positive lift pump with a screen length or open interval ten feet or less and with a water level above the top of the screen or open interval (Hereafter, the "screen or open interval" will be referred to only as "screen interval"). This SOP is not applicable to other well-sampling conditions.

While the use of dedicated sampling equipment is not mandatory, dedicated pumps and tubing can reduce sampling costs significantly by streamlining sampling activities and thereby reducing the overall field costs.

The goal of this procedure is to emphasize the need for consistency in deploying and operating equipment while purging and sampling monitoring wells during each sampling event. This will help to minimize sampling variability.

This procedure describes a general framework for groundwater sampling. Other site specific information (hydrogeological context, conceptual site model (CSM), DQOs, etc.) coupled with systematic planning must be added to the procedure in order to develop an appropriate site specific SAP/QAPP. In addition, the site specific SAP/QAPP must identify the specific equipment that will be used to collect the groundwater samples.

This procedure does not address the collection of water or free product samples from wells containing free phase LNAPLs and/or DNAPLs (light or dense non-aqueous phase liquids). For this type of situation, the reader may wish to check: Cohen, and Mercer (1993) or other pertinent documents.

This SOP is to be used when collecting groundwater samples from monitoring wells at all Superfund, Federal Facility and RCRA sites in Region 1 under the conditions described herein. Request for modification of this SOP, in order to better address specific situations at individual wells, must include adequate technical justification for proposed changes. <u>All changes and modifications must be approved and included in a revised SAP/QAPP before implementation in field.</u>

BACKGROUND FOR IMPLEMENTATION

It is expected that the monitoring well screen has been properly located (both laterally and vertically) to intercept existing contaminant plume(s) or along flow paths of potential contaminant migration. Problems with inappropriate monitoring well placement or faulty/improper well installation cannot be overcome by even the best water sampling procedures. This SOP presumes that the analytes of interest are moving (or will potentially move) primarily through the more permeable zones intercepted by the screen interval.

Proper well construction, development, and operation and maintenance cannot be overemphasized. The use of installation techniques that are appropriate to the hydrogeologic setting of the site often prevent "problem well" situations from occurring. During well development, or redevelopment, tests should be conducted to determine the hydraulic characteristics of the monitoring well. The data can then be used to set the purging/sampling rate, and provide a baseline for evaluating changes in well performance and the potential need for well rehabilitation. Note: if this installation data or well history (construction and sampling) is not available or discoverable, for all wells to be sampled, efforts to build a sampling history should commence with the next sampling event.

The pump intake should be located within the screen interval and at a depth that will remain under water at all times. It is recommended that the intake depth and pumping rate remain the same for all sampling events. The mid-point or the lowest historical midpoint of the saturated screen length is often used as the location of the pump intake. For new wells, or for wells without pump intake depth information, the site's SAP/QAPP must provide clear reasons and instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected. If the depths to top and bottom of the well screen are not known, the SAP/QAPP will need to describe how the sampling depth will be determined and how the data can be used.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection may still take place provided the indicator field parameter criteria in this procedure are met. If after 2 hours of purging indicator field parameters have not stabilized, one of three optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization), c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may reflect a sampling bias and therefore, the data may not meet the data quality objectives of the sampling event).

It is recommended that low-flow sampling be conducted when the air temperature is above 32°F (0°C). If the procedure is used below 32°F, special precautions will need to be taken to prevent the groundwater from freezing in the equipment. Because sampling during freezing temperatures may adversely impact the data quality objectives, the need for water sample collection during months when these conditions are likely to occur should be evaluated during site planning and special sampling measures may need to be developed. Ice formation in the flow-through-cell will cause the monitoring probes to act erratically. A transparent flow-through-cell needs to be used to observe if ice is forming in the cell. If ice starts to form on the other pieces of the sampling equipment, additional problems may occur.

HEALTH & SAFETY

When working on-site, comply with all applicable OSHA requirements and the site's health/safety procedures. All proper personal protection clothing and equipment are to be worn. Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc.

CAUTIONS

The following cautions need to be considered when planning to collect groundwater samples when the below conditions occur.

If the groundwater degasses during purging of the monitoring well, dissolved gases and VOCs will be lost. When this happens, the groundwater data for dissolved gases (e.g., methane, ethene, ethane, dissolved oxygen, etc.) and VOCs will need to be qualified. Some conditions that can promote degassing are the use of a vacuum pump (e.g., peristaltic pumps), changes in aperture along the sampling tubing, and squeezing/pinching the pump's tubing which results in a pressure change.

When collecting the samples for dissolved gases and VOCs analyses, avoid aerating the groundwater in the pump's tubing. This can cause loss of the dissolved gases and VOCs in the groundwater. Having the pump's tubing completely filled prior to sampling will avoid this problem when using a centrifugal pump or peristaltic pump.

Direct sun light and hot ambient air temperatures may cause the groundwater in the tubing and flow-through-cell to heat up. This may cause the groundwater to degas which will result in loss of VOCs and dissolved gases. When sampling under these conditions, the sampler will need to shade the equipment from the sunlight (e.g., umbrella, tent, etc.). If possible, sampling on hot days, or during the hottest time of the day, should be avoided. The tubing exiting the monitoring well should be kept as short as possible to avoid the sun light or ambient air from heating up the groundwater.

Thermal currents in the monitoring well may cause vertical mixing of water in the well bore. When the air temperature is colder than the groundwater temperature, it can cool the top of the water column. Colder water which is denser than warm water sinks to the bottom of the well and the warmer water at the bottom of the well rises, setting up a convention cell. "During low-flow sampling, the pumped water may be a mixture of convecting water from within the well casing and aquifer water moving inward through the screen. This mixing of water during low-flow sampling can substantially increase equilibration times, can cause false stabilization of indicator parameters, can give false indication of redox state, and can provide biological data that are not representative of the aquifer conditions" (Vroblesky 2007).

Failure to calibrate or perform proper maintenance on the sampling equipment and measurement instruments (e.g., dissolved oxygen meter, etc.) can result in faulty data being collected.

Interferences may result from using contaminated equipment, cleaning materials, sample containers, or uncontrolled ambient/surrounding air conditions (e.g., truck/vehicle exhaust nearby).

Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment and/or proper planning to avoid ambient air interferences. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

Clean and decontaminate all sampling equipment prior to use. All sampling equipment needs to be routinely checked to be free from contaminants and equipment blanks collected to ensure that the equipment is free of contaminants. Check the previous equipment blank data for the site (if they exist) to determine if the previous cleaning procedure removed the contaminants. If contaminants were detected and they are a concern, then a more vigorous cleaning procedure will be needed.

PERSONNEL QUALIFICATIONS

All field samplers working at sites containing hazardous waste must meet the requirements of the OSHA regulations. OSHA regulations may require the sampler to take the 40 hour OSHA health and safety training course and a refresher course prior to engaging in any field activities, depending upon the site and field conditions.

The field samplers must be trained prior to the use of the sampling equipment, field instruments, and procedures. Training is to be conducted by an experienced sampler before initiating any sampling procedure.

The entire sampling team needs to read, and be familiar with, the site Health and Safety Plan, all relevant SOPs, and SAP/QAPP (and the most recent amendments) before going onsite for the sampling event. It is recommended that the field sampling leader attest to the understanding of these site documents and that it is recorded.

EQUIPMENT AND SUPPLIES

A. Informational materials for sampling event

A copy of the current Health and Safety Plan, SAP/QAPP, monitoring well construction data, location map(s), field data from last sampling event, manuals for sampling, and the monitoring instruments' operation, maintenance, and calibration manuals should be brought to the site.

B. Well keys.

C. Extraction device

Adjustable rate, submersible pumps (e.g., centrifugal, bladder, etc.) which are constructed of stainless steel or Teflon are preferred. Note: if extraction devices constructed of other materials are to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

If bladder pumps are selected for the collection of VOCs and dissolved gases, the pump setting should be set so that one pulse will deliver a water volume that is sufficient to fill a 40 mL VOC vial. This is not mandatory, but is considered a "best practice". For the proper operation, the bladder pump will need a minimum amount of water above the pump; consult the manufacturer for the recommended submergence. The pump's recommended submergence value should be determined during the planning stage, since it may influence well construction and placement of dedicated pumps where water-level fluctuations are significant.

Adjustable rate, peristaltic pumps (suction) are to be used with caution when collecting samples for VOCs and dissolved gases (e.g., methane, carbon dioxide, etc.) analyses. Additional information on the use of peristaltic pumps can be found in Appendix A. If peristaltic pumps are used, the inside diameter of the rotor head tubing needs to match the inside diameter of the tubing installed in the monitoring well.

Inertial pumping devices (motor driven or manual) are not recommended. These devices frequently cause greater disturbance during purging and sampling, and are less easily controlled than submersible pumps (potentially increasing turbidity and sampling variability, etc.). This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

D. Tubing

Teflon or Teflon-lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics. Note: if tubing constructed of other materials is to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for metal and other inorganics analyses.

The use of 1/4 inch or 3/8 inch (inside diameter) tubing is recommended. This will help ensure that the tubing remains liquid filled when operating at very low pumping rates when using centrifugal and peristaltic pumps.

Silastic tubing should be used for the section around the rotor head of a peristaltic pump. It should be less than a foot in length. The inside diameter of the tubing used at the pump rotor head must be the same as the inside diameter of tubing placed in the well. A tubing connector is used to connect the pump rotor head tubing to the well tubing. Alternatively, the two pieces of tubing can be connected to each other by placing the one end of the tubing inside the end of the other tubing. The tubing must not be reused.

E. The water level measuring device

Electronic "tape", pressure transducer, water level sounder/level indicator, etc. should be capable of measuring to 0.01 foot accuracy. Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level "tape" at the start and end of each sampling event.

F. Flow measurement supplies

Graduated cylinder (size according to flow rate) and stopwatch usually will suffice.

Large graduated bucket used to record total water purged from the well.

G. Interface probe

To be used to check on the presence of free phase liquids (LNAPL, or DNAPL) before purging begins (as needed).

H. Power source (generator, nitrogen tank, battery, etc.)

When a gasoline generator is used, locate it downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate samples.

I. Indicator field parameter monitoring instruments

Use of a multi-parameter instrument capable of measuring pH, oxidation/reduction potential (ORP), dissolved oxygen (DO), specific conductance, temperature, and coupled with a flow-through-cell is required when measuring all indicator field parameters, except turbidity. Turbidity is collected using a separate instrument. Record equipment/instrument identification (manufacturer, and model number).

Transparent, small volume flow-through-cells (e.g., 250 mLs or less) are preferred. This allows observation of air bubbles and sediment buildup in the cell, which can interfere with the operation of the monitoring instrument probes, to be easily detected. A small volume cell facilitates rapid turnover of water in the cell between measurements of the indicator field parameters.

It is recommended to use a flow-through-cell and monitoring probes from the same manufacturer and model to avoid <u>incompatibility</u> between the probes and flow-through-cell.

Turbidity samples are collected before the flow-through-cell. A "T" connector coupled with a valve is connected between the pump's tubing and flow-through-cell. When a turbidity measurement is required, the valve is opened to allow the groundwater to flow into a container. The valve is closed and the container sample is then placed in the turbidimeter.

Standards are necessary to perform field calibration of instruments. A minimum of two standards are needed to bracket the instrument measurement range for all parameters except ORP which use a Zobell solution as a standard. For dissolved oxygen, a wet sponge used for the 100% saturation and a zero dissolved oxygen solution are used for the calibration.

Barometer (used in the calibration of the Dissolved Oxygen probe) and the conversion formula to convert the barometric pressure into the units of measure used by the Dissolved Oxygen meter are needed.

J. Decontamination supplies

Includes (for example) non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.

K. Record keeping supplies

Logbook(s), well purging forms, chain-of-custody forms, field instrument calibration forms, etc.

L. Sample bottles

M. Sample preservation supplies (as required by the analytical methods)

N. Sample tags or labels

O. PID or FID instrument

If appropriate, to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

P. Miscellaneous Equipment

Equipment to keep the sampling apparatus shaded in the summer (e.g., umbrella) and from freezing in the winter. If the pump's tubing is allowed to heat up in the warm weather, the cold groundwater may degas as it is warmed in the tubing.

EQUIPMENT/INSTRUMENT CALIBRATION

Prior to the sampling event, perform maintenance checks on the equipment and instruments according to the manufacturer's manual and/or applicable SOP. This will ensure that the equipment/instruments are working properly before they are used in the field.

Prior to sampling, the monitoring instruments must be calibrated and the calibration documented. The instruments are calibrated using U.S Environmental Protection Agency Region 1 *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity),* January 19, 2010, or latest version or from one of the methods listed in 40CFR136, 40CFR141 and SW-846.

The instruments shall be calibrated at the beginning of each day. If the field measurement falls outside the calibration range, the instrument must be re-calibrated so that all measurements fall within the calibration range. At the end of each day, a calibration check is performed to verify that instruments remained in calibration throughout the day. This check is performed while the instrument is in measurement mode, not calibration mode. If the field instruments are being used to monitor the natural attenuation parameters, then a calibration check at mid-day is highly recommended to ensure that the instruments did not drift out of calibration. Note: during the day if the instrument reads zero or a negative number for dissolved oxygen, pH, specific conductance, or turbidity (negative value only), this indicates that the instrument drifted out of calibration or the instrument is malfunctioning. If this situation occurs the data from this instrument will need to be qualified or rejected.

PRELIMINARY SITE ACTIVITIES (as applicable)

Check the well for security (damage, evidence of tampering, missing lock, etc.) and record pertinent observations (include photograph as warranted).

If needed lay out sheet of clean polyethylene for monitoring and sampling equipment, unless equipment is elevated above the ground (e.g., on a table, etc.).

Remove well cap and if appropriate measure VOCs at the rim of the well with a PID or FID instrument and record reading in field logbook or on the well purge form.

If the well casing does not have an established reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook (consider a photographic record as well). All water level measurements must be recorded relative to this reference point (and the altitude of this point should be determined using techniques that are appropriate to site's DQOs.

If water-table or potentiometric surface map(s) are to be constructed for the sampling event, perform synoptic water level measurement round (in the shortest possible time) before any purging and sampling activities begin. If possible, measure water level depth (to 0.01 ft.) and total well depth (to 0.1 ft.) the day before sampling begins, in order to allow for re-settlement of any particulates in the water column. This is especially important for those wells that have not been recently sampled because sediment buildup in the well may require the well to be redeveloped. If measurement of total well depth is not made the day before, it should be measured after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe may not be necessary unless analytical data or field analysis signal a worsening situation. This SOP cannot be used in the presence of LNAPLs or DNAPLs. If NAPLs are present, the project team must decide upon an alternate sampling method. All project modifications must be approved and documented prior to implementation.

If available check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). If changes are made in the intake depth or extraction rate(s) used during previous sampling event(s), for either portable or dedicated extraction devices, record new values, and explain reasons for the changes in the field logbook.

PURGING AND SAMPLING PROCEDURE

Purging and sampling wells in order of increasing chemical concentrations (known or anticipated) are preferred.

The use of dedicated pumps is recommended to minimize artificial mobilization and entrainment of particulates each time the well is sampled. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

A. Initial Water Level

Measure the water level in the well before installing the pump if a non-dedicated pump is being used. The initial water level is recorded on the purge form or in the field logbook.

B. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the appropriate depth (may not be the mid-point of the screen/open interval). The Sampling and Analysis Plan/Quality Assurance Project Plan should specify the sampling depth (used previously), or provide criteria for selection of intake depth for each new well. If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures. Heating may cause the groundwater to degas, which is unacceptable for the collection of samples for VOC and dissolved gases analyses.

C. Measure Water Level

Before starting pump, measure water level. Install recording pressure transducer, if used to track drawdowns, to initialize starting condition.

D. Purge Well

From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Check equipment for water leaks and if present fix or replace the affected equipment. Try to match pumping rate used during previous sampling event(s). Otherwise, adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" somewhat as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. If the initial water level is above the top of the screen do not allow the water level to fall into the well screen. The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Avoid the use of constriction devices on the tubing to decrease the flow rate because the constrictor will cause a pressure difference in the water column. This will cause the groundwater to degas and result in a loss of VOCs and dissolved gasses in the groundwater samples.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (e.g., bladder, peristaltic), and/or the use of dedicated equipment. For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP. If this type of problematic situation persists in a well, then water sample collection should be changed to a passive or no-purge method, if consistent with the site's DQOs, or have a new well installed.

E. Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow-through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell, in order to minimize particulate buildup in the cell (This is a judgment call made by the sampler). Water level drawdown measurements should be made as usual. If possible, the pump may be installed the day before purging to allow particulates that were disturbed during pump insertion to settle.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
Specific Conductance (3%),
Temperature (3%),
pH (± 0.1 unit),
Oxidation/Reduction Potential (±10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Samples for turbidity measurements are obtained before water enters the flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities. Record start and stop times and give a brief description of cleaning activities.

The flow-through-cell must be designed in a way that prevents gas bubble entrapment in the cell. Placing the flow-through-cell at a 45 degree angle with the port facing upward can help remove bubbles from the flow-through-cell (see Appendix B Low-Flow Setup Diagram). All during the measurement process, the flow-through-cell must remain free of any gas bubbles. Otherwise, the monitoring probes may act erratically. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

F. Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve.

VOC samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

If the pump's flow rate is too high to collect the VOC/dissolved gases samples, collect the other samples first. Lower the pump's flow rate to a reasonable rate and collect the VOC/dissolved gases samples and record the new flow rate.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

For bladder pumps that will be used to collect VOC or dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods (e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter (transparent housing preferred) is required, and the filter size (0.45 μm is commonly used) should be based on the sampling objective. Pre-rinse the filter with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Preserve the filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in groundwater for human health or ecological risk calculations.

Label each sample as collected. Samples requiring cooling will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

G. Post Sampling Activities

If a recording pressure transducer is used to track drawdown, re-measure water level with tape.

After collection of samples, the pump tubing may be dedicated to the well for re-sampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth annually is usually sufficient after the initial low stress sampling event. However, a greater frequency may be needed if the well has a "silting" problem or if confirmation of well identity is needed.

Secure the well.

DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well and then following sampling of each well. Pumps should not be removed between purging and sampling operations. The pump, tubing, support cable and electrical wires which were in contact with the well should be decontaminated by one of the procedures listed below.

The use of dedicated pumps and tubing will reduce the amount of time spent on decontamination of the equipment. If dedicated pumps and tubing are used, only the initial sampling event will require decontamination of the pump and tubing.

Note if the previous equipment blank data showed that contaminant(s) were present after using the below procedure or the one described in the SAP/QAPP, a more vigorous procedure may be needed.

Procedure 1

Decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump and tubing. The pump may be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Optional - flush with isopropyl alcohol (pesticide grade; must be free of ketones {e.g., acetone}) or with methanol. This step may be required if the well is highly contaminated or if the equipment blank data from the previous sampling event show that the level of contaminants is significant.

Flush with distilled/deionized water. This step must remove all traces of alcohol (if used) from the equipment. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the groundwater samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. Quality control samples include field duplicates, equipment blanks, matrix spike/matrix spike duplicates, trip blanks (VOCs), and temperature blanks.

FIELD LOGBOOK

A field log shall be kept to document all groundwater field monitoring activities (see Appendix C, example table), and record the following for each well:

Site name, municipality, state.

Well identifier, latitude-longitude or state grid coordinates.

Measuring point description (e.g., north side of PVC pipe).

Well depth, and measurement technique.

Well screen length.

Pump depth.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and detection method.

Pumping rate, drawdown, indicator parameters values, calculated or measured total volume pumped, and clock time of each set of measurements.

Type of tubing used and its length.

Type of pump used.

Clock time of start and end of purging and sampling activity.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analyses.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions, including approximate ambient air temperature.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling/monitoring equipment used, including trade names, model number, instrument identification number, diameters, material composition, etc.

DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, field indicator parameters measured during purging, field instrument calibration information, and whatever other field logbook information is needed to allow for a full evaluation of data usability.

Note: the use of trade, product, or firm names in this sampling procedure is for descriptive purposes only and does not constitute endorsement by the U.S. EPA.

REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, *DNAPL Site Evaluation*; C.K. Smoley (CRC Press), Boca Raton, Florida.

Robert W. Puls and Michael J. Barcelona, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, April 1996 (EPA/540/S-95/504).

U.S. Environmental Protection Agency, 1992, *RCRA Ground-Water Monitoring: Draft Technical Guidance*; Washington, DC (EPA/530-R-93-001).

U.S. Environmental Protection Agency, 1987, *A Compendium of Superfund Field Operations Methods*; Washington, DC (EPA/540/P-87/001).

U.S Environmental Protection Agency, Region 1, *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity),* January 19, 2010 or latest version.

U.S Environmental Protection Agency, EPA SW-846.

U.S Environmental Protection Agency, 40 CFR 136.

U.S Environmental Protection Agency, 40 CFR 141.

Vroblesky, Don A., Clifton C. Casey, and Mark A. Lowery, Summer 2007, Influence of Dissolved Oxygen Convection on Well Sampling, *Ground Water Monitoring & Remediation* 27, no. 3: 49-58.

APPENDIX A
PERISTALTIC PUMPS

Before selecting a peristaltic pump to collect groundwater samples for VOCs and/or dissolved gases (e.g., methane, carbon dioxide, etc.) consideration should be given to the following:

- The decision of whether or not to use a peristaltic pump is dependent on the intended use of the data.
- If the additional sampling error that may be introduced by this device is NOT of concern for the VOC/dissolved gases data's intended use, then this device may be acceptable.
- If minor differences in the groundwater concentrations could effect the decision, such as to continue or terminate groundwater cleanup or whether the cleanup goals have been reached, then this device should NOT be used for VOC/dissolved gases sampling. In these cases, centrifugal or bladder pumps are a better choice for more accurate results.

EPA and USGS have documented their concerns with the use of the peristaltic pumps to collect water sample in the below documents.

- "Suction Pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.
- "The agency does not recommend the use of peristaltic pumps to sample ground water particularly for volatile organic analytes" *RCRA Ground-Water Monitoring Draft Technical Guidance*, EPA Office of Solid Waste, November 1992.
- "The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and volatiles loss", *Low-flow (Minimal drawdown) Ground-Water Sampling Procedures*, by Robert Puls & Michael Barcelona, April 1996, EPA/540/S-95/504.
- "Suction-lift pumps, such as peristaltic pumps, can operate at a very low pumping rate; however, using negative pressure to lift the sample can result in the loss of volatile analytes", USGS Book 9 Techniques of Water-Resources Investigation, Chapter A4. (Version 2.0, 9/2006).

APPENDIX B

SUMMARY OF SAMPLING INSTRUCTIONS

These instructions are for using an adjustable rate, submersible pump or a peristaltic pump with the pump's intake placed at the midpoint of a 10 foot or less well screen or an open interval. The water level in the monitoring well is above the top of the well screen or open interval, the ambient temperature is above 32°F, and the equipment is not dedicated. Field instruments are already calibrated. The equipment is setup according to the diagram at the end of these instructions.

1. Review well installation information. Record well depth, length of screen or open interval, and depth to top of the well screen. Determine the pump's intake depth (e.g., mid-point of screen/open interval).

2. On the day of sampling, check security of the well casing, perform any safety checks needed for the site, lay out a sheet of polyethylene around the well (if necessary), and setup the equipment. If necessary a canopy or an equivalent item can be setup to shade the pump's tubing and flow-through-cell from the sun light to prevent the sun light from heating the groundwater.

3. Check well casing for a reference mark. If missing, make a reference mark. Measure the water level (initial) to 0.01 ft. and record this information.

4. Install the pump's intake to the appropriate depth (e.g., midpoint) of the well screen or open interval. Do not turn-on the pump at this time.

5. Measure water level and record this information.

6. Turn-on the pump and discharge the groundwater into a graduated waste bucket. Slowly increase the flow rate until the water level starts to drop. Reduce the flow rate slightly so the water level stabilizes. Record the pump's settings. Calculate the flow rate using a graduated container and a stop watch. Record the flow rate. Do not let the water level drop below the top of the well screen.

If the groundwater is highly turbid or colored, continue to discharge the water into the bucket until the water clears (visual observation); this usually takes a few minutes. The turbid or colored water is usually from the well being disturbed during the pump installation. If the water does not clear, then you need to make a choice whether to continue purging the well (hoping that it will clear after a reasonable time) or continue to the next step. Note, it is sometimes helpful to install the pump the day before the sampling event so that the disturbed materials in the well can settle out.

If the water level drops to the top of the well screen during the purging of the well, stop purging the well, and do the following:

> Wait for the well to recharge to a sufficient volume so samples can be collected. This may take awhile (pump maybe removed from well, if turbidity is not a problem). The project manager will need to make the decision when samples should be collected and the reasons recorded in the site's log book. A water level measurement needs to be performed and recorded before samples are collected. When samples are being collected, the water level must not drop below the top of the screen or open interval. Collect the samples from the pump's tubing. Always collect the VOCs and dissolved gases samples first. Normally, the samples requiring a small volume are collected before the large volume samples are collected just in case there is not sufficient water in the well to fill all the sample containers. All samples must be collected, preserved, and stored according to the analytical method. Remove the pump from the well and decontaminate the sampling equipment.

If the water level has dropped 0.3 feet or less from the initial water level (water level measure before the pump was installed); proceed to Step 7. If the water level has dropped more than 0.3 feet, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are be collected.

7. Attach the pump's tubing to the "T" connector with a valve (or a three-way stop cock). The pump's tubing from the well casing to the "T" connector must be as short as possible to prevent the groundwater in the tubing from heating up from the sun light or from the ambient air. Attach a short piece of tubing to the other end of the end of the "T" connector to serve as a sampling port for the turbidity samples. Attach the remaining end of the "T" connector to a short piece of tubing and connect the tubing to the flow-through-cell bottom port. To the top port, attach a small piece of tubing to direct the water into a calibrated waste bucket. Fill the cell with the groundwater and remove all gas bubbles from the cell. Position the flow-through-cell in such a way that if gas bubbles enter the cell they can easily exit the cell. If the ports are on the same side of the cell and the cell is cylindrical shape, the cell can be placed at a 45-degree angle with the ports facing upwards; this position should keep any gas bubbles entering the cell away from the monitoring probes and allow the gas bubbles to exit the cell easily (see Low-Flow Setup Diagram). Note,

make sure there are no gas bubbles caught in the probes' protective guard; you may need to shake the cell to remove these bubbles.

8. Turn-on the monitoring probes and turbidity meter.

9. Record the temperature, pH, dissolved oxygen, specific conductance, and oxidation/reduction potential measurements. Open the valve on the "T" connector to collect a sample for the turbidity measurement, close the valve, do the measurement, and record this measurement. Calculate the pump's flow rate from the water exiting the flow-through-cell using a graduated container and a stop watch, and record the measurement. Measure and record the water level. Check flow-through-cell for gas bubbles and sediment; if present, remove them.

10. Repeat Step 9 every 5 minutes or as appropriate until monitoring parameters stabilized. Note at least one flow-through-cell volume must be exchanged between readings. If not, the time interval between readings will need to be increased. Stabilization is achieved when three consecutive measurements are within the following limits:

Turbidity (10% for values greater than 5 NTUs; if three Turbidity values are less than 5 NTUs, consider the values as stabilized),
Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
Specific Conductance (3%),
Temperature (3%),
pH (± 0.1 unit),
Oxidation/Reduction Potential (±10 millivolts).

If these stabilization requirements do not stabilize in a reasonable time, the probes may have been coated from the materials in the groundwater, from a buildup of sediment in the flow-through-cell, or a gas bubble is lodged in the probe. The cell and the probes will need to be cleaned. Turn-off the probes (not the pump), disconnect the cell from the "T" connector and continue to purge the well. Disassemble the cell, remove the sediment, and clean the probes according to the manufacturer's instructions. Reassemble the cell and connect the cell to the "T" connector. Remove all gas bubbles from the cell, turn-on the probes, and continue the measurements. Record that the time the cell was cleaned.

11. When it is time to collect the groundwater samples, turn-off the monitoring probes, and disconnect the pump's tubing from the "T" connector. If you are using a centrifugal or peristaltic pump check the pump's tubing to determine if the tubing is completely filled with water (no air space).

All samples must be collected and preserved according to the analytical method. VOCs and dissolved gases samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

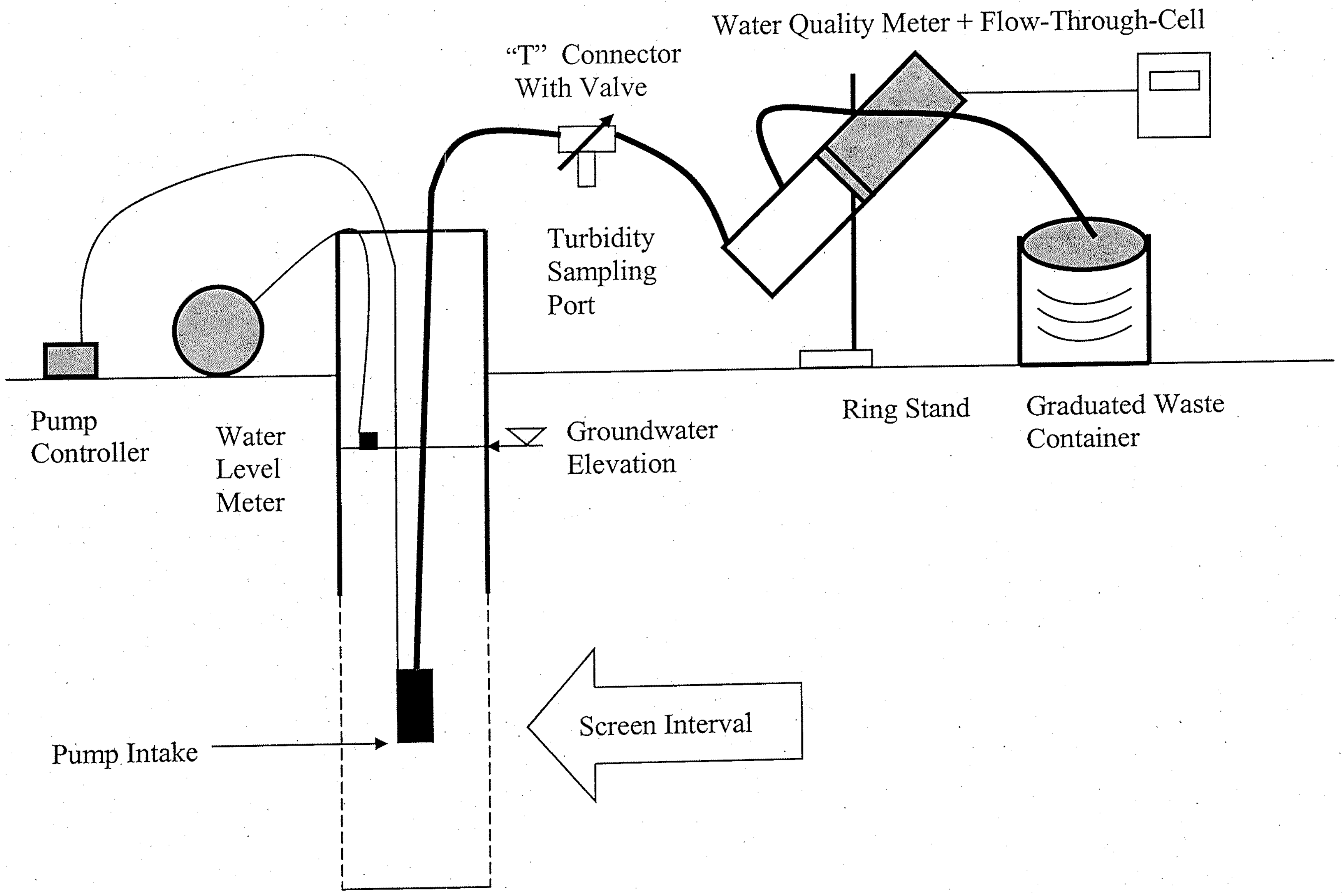
If the pump's tubing is not completely filled with water and the samples are being collected for VOCs and/or dissolved gases analyses using a centrifugal or peristaltic pump, do the following:

> All samples must be collected and preserved according to the analytical method. The VOCs and the dissolved gases (e.g., methane, ethane, ethene, and carbon dioxide) samples are collected last. When it becomes time to collect these samples increase the pump's flow rate until the tubing is completely filled. Collect the samples and record the new flow rate.

12. Store the samples according to the analytical method.

13. Record the total purged volume (graduated waste bucket). Remove the pump from the well and decontaminate the sampling equipment.

Low-Flow Setup Diagram



APPENDIX C
EXAMPLE (Minimum Requirements)
WELL PURGING-FIELD WATER QUALITY MEASUREMENTS FORM

Location (Site/Facility Name)____________________
Well Number____________Date____________
Field Personnel____________________
Sampling Organization____________________
Identify MP____________________

Depth to ________/________ of screen
(below MP) top bottom
Pump Intake at (ft. below MP)__________
Purging Device; (pump type)__________
Total Volume Purged __________

Clock Time 24 HR	Water Depth below MP ft	Pump Dial[1]	Purge Rate ml/min	Cum. Volume Purged liters	Temp. °C	Spec. Cond.[2] µS/cm	pH	ORP[3] mv	DO mg/L	Turb-idity NTU	Comments
Stabilization Criteria					3%	3%	±0.1	± 10 mv	10%	10%	

1. Pump dial setting (for example: hertz, cycles/min, etc).
2. µSiemens per cm(same as µmhos/cm)at 25°C.
3. Oxidation reduction potential (ORP)

APPENDIX J

O&M Manual

March 31, 2016

OPERATIONS AND MAINTENANCE MANUAL

Paragon Paint and Varnish Corp. Site
Long Island City, Queens, New York

Prepared for

VERNON 4540 REALTY, LLC
45 Carleton Avenue
Larchmont, New York

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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

TABLE OF CONTENTS

FIGURES

APPENDICES

LIST OF ACRONYMS

AC	alternating current
EC	Engineering Control
HASP	Health and Safety Plan
LNAPL	light non-aqueous phase liquid
O&M	Operation and Maintenance
Roux Associates	Roux Associates, Inc.
Vernon 4540	Vernon 4540 Realty, LLC

1.0 INTRODUCTION

This Operation and Maintenance (O&M) Manual has been prepared by Roux Associates, Inc. (Roux Associates), on behalf of Vernon 4540 Realty, LLC (Vernon 4540), for the Engineering Control (EC) recovery system that has been constructed for the recovery of light non-aqueous phase liquid (LNAPL) present subsurface beneath the recently excavated courtyard and driveway area at the Former Paragon Paint and Varnish Manufacturing Facility located in Long Island City, Queens, New York (hereinafter referred to as the "Site"). A Site location map is attached as Figure 1. There is currently one LNAPL recovery system at the Site. This LNAPL recovery system consists of five (5) LNAPL skimmer pumps (Geotech A/C Sipper) and a 55-gallon drum for LNAPL storage.

This O&M Manual is a reference for operating and maintaining the LNAPL recovery system in conformance with the design, applicable regulations, and permit requirements. Detailed operation and maintenance manuals prepared by the equipment manufacturers for each major component of the LNAPL recovery system are also included within this O&M Manual. This O&M Manual also presents the O&M activities, which will occur from the time of system start-up and throughout the operation of the system. Should these activities be changed, modifications to this O&M Manual shall be documented through the preparation of revisions or addenda. Vernon 4540 assumes the overall responsibility for the operation and maintenance of the LNAPL recovery system. Equipment specific maintenance or those activities that would not be considered routine will be contracted out by Vernon 4540, as required.

2.0 SITE DESCRIPTION

The following sections describe the FPOW Site and IRMs currently operating within the Site.

2.1 Site Description

The Site is located in Long Island City, Queens County, New York and is identified as Block 26 and Lot 4 on the Long Island City Tax Map. The Site is an approximately 0.76-acre area and is bounded by a one-story commercial property and Anable Basin to the north, 46th Avenue to the south, Vernon Boulevard and multi-story residential/commercial buildings to the east, and a two-story warehouse to the west (see Figure 2 – Site Layout Map). The boundaries of the Site are more fully described in the Environmental Easement, which is included as Appendix A of the SMP.

3.0 SYSTEM PROCESS DECRIPTION

This section provides a description of the major components of the LNAPL recovery system.

3.1 LNAPL Recovery System

There is currently one (1) LNAPL recovery system at the Site. The LNAPL recovery system is comprised of five (5) automated compressor-powered pumps (Geotech A/C Sipper) and a 55-gallon LNAPL storage drum. Details for the Geotech A/C Sipper components are provided in the sections below. As-built diagrams of LNAPL recovery system were included under separate cover in the Final Engineering Report.

3.1.1 Geotech A/C Sipper

The Geotech AC Sipper is a Single-Phase, 110-220V AC, powered remediation system, designed for recovery applications where electrical power is available. The AC Sipper uses a unique downwell pump to recover hydrocarbons through a floating oleophilic/hydrophobic intake filter. Once the pump canister is filled via the vacuum cycle, the pump reverses, pressurizes the system and pumps the recovered fluid to the surface and into a storage vessel.

The Geotech AC Sipper recovers LNAPL from recovery wells using an AC powered pressure/vacuum pump. The A/C Sipper features a product intake assembly that incorporates both a density float and an oleophilic/hydrophobic filter that differentiates between floating hydrocarbons and water. The skimmer floats just above the oil/water interface to collect and remove hydrocarbons from the well into an optional above ground storage tank.

The density float assembly mounted above the skimmer attachment is designed to adjust the pump intake depth as LNAPL is recovered from the well. The controller can be used to adjust the pump cycle duration to set the average pump flow rate at a recovery rate that is less than the observed recharge rate of LNAPL into the well. The operator’s manual for the Geotech A/C Sipper Pump is provided in Appendix A.

3.1.2 LNAPL Storage Drum

Recovered LNAPL is conveyed from the Geotech A/C Sipper pumps to a single 55-gallon storage drum via 1/4-inch flexible hose and then 3/8-inch nylon tubing with fiber-reinforced plastic and /

or galvanized steel piping secondary containment. Each Geotech A/C Sipper has its own dedicated flexible hosing which is led into the 55-gallon storage drum by way of a bung opening

Once the 55-gallon drum is full, the LNAPL is disposed of within the 55-gallon drum to an approved facility off-Site.

The LNAPL 55-gallon storage drum is equipped with the following:

- High level alarm float switch or sensor (80% Maximum Capacity);
- High level backup (high high) float switch (90% Maximum Capacity);
- 2-inch vent line;
- Grounding to the nearby distribution panel; and
- A 125-gallon capacity spill containment pallet.

3.2 Passive Recovery

Absorbent socks will be installed in monitoring wells observed with LNAPL thicknesses too low to be recovered using the A/C Sipper. All used absorbent materials will be disposed of in labeled 55-gallon drums for transport off-Site.

4.0 OPERATIONS AND CONTROLS

The overall responsibility for the operation and maintenance of the LNAPL recovery system will be assumed by Vernon 4540 and Roux Associates. This O&M Manual is a reference for operating and maintaining the LNAPL recovery system and associated components in conformance with their design, applicable regulations, and permit requirements. Detailed operation and maintenance manuals prepared by equipment manufacturers for each major component of the LNAPL recovery system is maintained within this O&M Manual and will be stored on-Site.

4.1 Geotech A/C Sipper

A thorough understanding of the operating requirements and procedures for all of the system components is required prior to start-up of the system. In addition to the operation and maintenance information found in this document, supporting documentation can be found in the manufacturer's equipment manual provided in Appendix B. The LNAPL recovery system is designed to be operating continuously and should only be shut down during system maintenance or an emergency.

4.1.1 System Start-Up

Prior to starting up any recovery system, there must be no alarm conditions that exist in the Geotech A/C Sipper secondary containment components. The following sequence assumes all electrical, pneumatic, influent, and effluent piping connections have been maintained and are in operational condition. The following procedures are performed to start-up the LNAPL recovery systems:

1. Ensure that the Geotech A/C Sipper pump is installed within the well casing and can freely move up and down the well.

2. Verify that all of the float switches or sensors are hanging freely and in the correct position within the recovery drum.

3. Apply power to the control panels.

4. The System Power Switch governs all power to the system when it is connected to an alternating current (AC) power source, including the Control Box Geotech A/C Sipper pump.

5. A green lamp will light on the Geotech A/C Sipper control panel indicating that the system power is ON.

6. From the Main Menu, press the right arrow button until the following display appears:

   Start with well: n

   The Start with Well display allows the user to choose the well to pump first upon startup. The well number selection is limited by the number of channels in use. Use the up and down arrow buttons to change the well number to start with.

7. Press the right arrow button one more time to start the Sipper. The Sipper controller will begin cycling the first A/C sipper pump in the series.

4.1.2 System Shutdown

The following procedures are performed prior to a scheduled shutdown of the LNAPL recovery systems for routine maintenance:

1. If further adjustments are needed to the cycle time of a particular pump or when the Sipper controller needs to be shut down, press the left arrow button once during the Runtime mode.

2. Once the pressure phase of the cycle completes, the unit will stop all processes and display the Main Menu. Further adjustments can then be made to the pump cycle times, information retrieved from the Status Displays, or the unit can be turned off for service.

3. Turn the system power switch to the OFF position.

4. Disconnect and lock out power at the main breaker to the Geotech A/C Sipper control panel.

Note: If the system is to remain off for any extended period of time, all air compressors, and piping lines should be drained of any accumulated liquids. Be aware that devices contained within the piping can hold small quantities of liquid within their bodies. If a potential freeze condition exists, this liquid should be removed.

5.0 SYSTEM MONITORING AND RECORD KEEPING

In order to properly maintain the LNAPL recovery system and minimize downtime, record keeping must be performed. This section summarizes monitoring and record keeping requirements for the Former Paragon Paint and Varnish Manufacturing Facility LNAPL recovery system.

5.1 Field Book and Recovery Sheets

A field book is kept for a time-specific record of all maintenance and operations of the LNAPL recovery system. The field book is kept by the Roux technicians whenever personnel are on-Site.

The information recorded in the field book includes, but is not limited to:

- Date and time of arrival;
- Personnel present on-Site;
- Objective of Site visit;
- Weather conditions;
- Operating status of the LNAPL recovery system;
- O&M performed; and
- Addition LNAPL recovery details.

Copies of the field book and any additional Site records are kept on the Roux network and include, but are not limited to, drum disposal, Geotech A/C Sipper recovery log, and LNAPL recovery system inspection logs.

5.2 System Monitoring

System monitoring is achieved through system trend monitoring, and a critical safety device checklist. A description of each can be found in the subsections below.

5.2.1 System Trend Monitoring

System trends are logged in the field book and recovery sheets to monitor and evaluate the performance of the LNAPL recovery system. Roux technicians monitor the system trends on a routine basis in an effort to optimize system recovery. Recovery rates of the Geotech A/C Sipper systems are evaluated and altered, if necessary, and any changes are recorded in the field book.

6.0 MAINTENANCE AND INSPECTIONS

All aspects of the recovery system are visually inspected on a weekly basis to ensure proper function. Important maintenance tasks and the proposed frequency required to ensure proper system function are described herein.

6.1 Geotech A/C Sipper Maintenance

On a monthly basis the Spill Buster™ housing, filter, probe, and pump are cleaned of debris and natural biofilms. Complete the maintenance shut-off procedures defined in Section 4.1.2.

1. Prepare a work area at standing height with spill pads and spray cleaner (e.g., Simple Green).
2. Remove the probe housing from the monitoring well.
3. Clean the probe housing with spray cleaner and spill pads.
4. Carefully pinch locking buttons located at the bottom of the probe housing to release the pump, spring, and locking mechanism.
5. Clean the filter, inlets, pump, and electrical connections with spray cleaner and spill pads; if the filter is severely clogged, soak the filter in cleaning solution.
6. The probe and sensor band array is now exposed within the probe housing; carefully clean the probe and sensor band array with spray cleaner and spill pads.
7. Reinstall the pump, filter, spring, and locking mechanism into the probe housing; note, the pump components must be aligned with the discharge seal and electrical contacts of the probe housing. If firm contact is not made, the pump will not function.
8. Return the probe housing to the well and begin system start-up procedures as seen in Section 4.1.1.

7.0 SAFETY PRECAUTIONS

Site-specific safety precautions and protocols will be considered for all activities associated with the Site. All activities on the Site will be performed in accordance with the Site-Specific Health and Safety Plan (HASP). Safety Considerations for Site Operations section within the HASP provides relevant standards and procedures that will be followed during inspection activities. The HASP will be kept on-Site in conjunction with this O&M Manual.

7.1 Emergency Shut-Off

An emergency shutdown is one that the operator initiates to stop the treatment equipment if an immediately dangerous or potentially dangerous condition exists and the equipment has to stop operating immediately. If a situation occurs in which an emergency shut-off is necessary, the first responder will activate the emergency stop push-button located at the control panel located inside the Former Paint Factory Building.

The first responder should contact the appropriate personnel. These personnel will then evaluate the situation and determine the need for additional notifications or remedies.

Emergency agency contact information is provided in Section 10.0.

8.0 OWNER AND RESPONSIBILITIES

The designated owner of this O&M Manual for operating and maintaining the systems described herein is Roux Associates. The key personnel involved in the operations and maintenance at Former Paragon Paint and Varnish Manufacturing Facility located in Long Island City, Queens, New York are as follows:

1. Omar Ramotar – Project Principal
2. Jordanna Kendrot – Project Engineer
3. Alfredo Fernandez – Senior Technician
4. Michael Sarni – Technician

9.0 AUTHORIZATIONS

Roux Associates' personnel and Roux Associates' subcontractors authorized to enter the Site must be approved by the Project Manager. Approval will require demonstrable evidence of the completion of appropriate training courses and medical examination requirements as specified by OSHA 29 CFR 1910.120, and review and sign-off of the HASP.

The following Roux Associates' personnel are authorized to adjust system operating parameters:

5. Omar Ramotar – Project Principal
6. Jordanna Kendrot – Project Engineer
7. Alfredo Fernandez – Senior Technician
8. Michael Sarni – Technician

10.0 EMERGENCY CONTACT LIST

Agency	**Phone Number**
FDNY (Queens)	911 or (718)-999-5555
NYSDEC Spill Hotline (Call within 2 Hours)	1-800-457-7362
US Coast Guard	(718) 354-4353
NYCDEP	1-888-426-7433
EMS	911
Police – 108th Precinct	911

Medical

City MD Urgent Care Center	(718) 414-2013
National Response Center	1-800-424-8802
Poison Control Center	1-800-222-1222

NYSDEC

Jane H. O'Connell (Regional Remediation Engineer)	(718) 482-4599
Sondra Martinkat (NYSDEC DER Project Manager)	(718) 482-4891
Kelly Lewandowski (Site Control)	(518) 402-9553

4540 Vernon Realty, LLC

Brent Carrier (Site Owner, 4540 Vernon LLC)	(917) 847-9876
Ravi Reddy (Owner Representative, 4540 Vernon LLC)	(201) 798-4470/Cell (917) 575-9370
Sive, Paget & Riesel P.C.% Michael Bogin (Remedial Party Attorney)	(212) 421-2150 ext. 210

Roux

Joseph Duminuco (Project Director)	(631) 232-2600/Cell (631) 921-6279
Omar Ramotar (Project Principal)	(631) 630-2382/Cell (631) 553-9274
Jordanna Kendrot (Project Engineer)	(631) 630-2356/Cell (631) 741-7142
Alfredo Fernandez (Senior Technician)	Cell (201) 310-4505
Joseph Gentile (Corporate Health and Safety Manager)	(856) 832-3768/Cell (610) 844-6911

Utility

National Grid	(718)-643-4050
Con Edison	(800) 752-6633

Systematic

Luke Sorensen	(631) 239-1523 x101
Rylan Blanchard	(631) 875-9279

11.0 FIELD TEAM REVIEW / TRAINING SECTION

Each person performing work or visiting at this Site shall sign this section after Site-specific training is completed and before being permitted to access the Site.

I have read and understand this O&M Manual. I will comply with the provision contained therein.

Name Printed	Signature	Date

12.0 PLAN APPROVAL

This O&M Manual is reviewed on an annual basis for changes to equipment and procedures.

I have read and understood this O&M Manual. I authorize the operation and maintenance practices described in this manual for the operation of system equipment.

Jordanna Kendrot on behalf of Brent Carrier
Name Printed

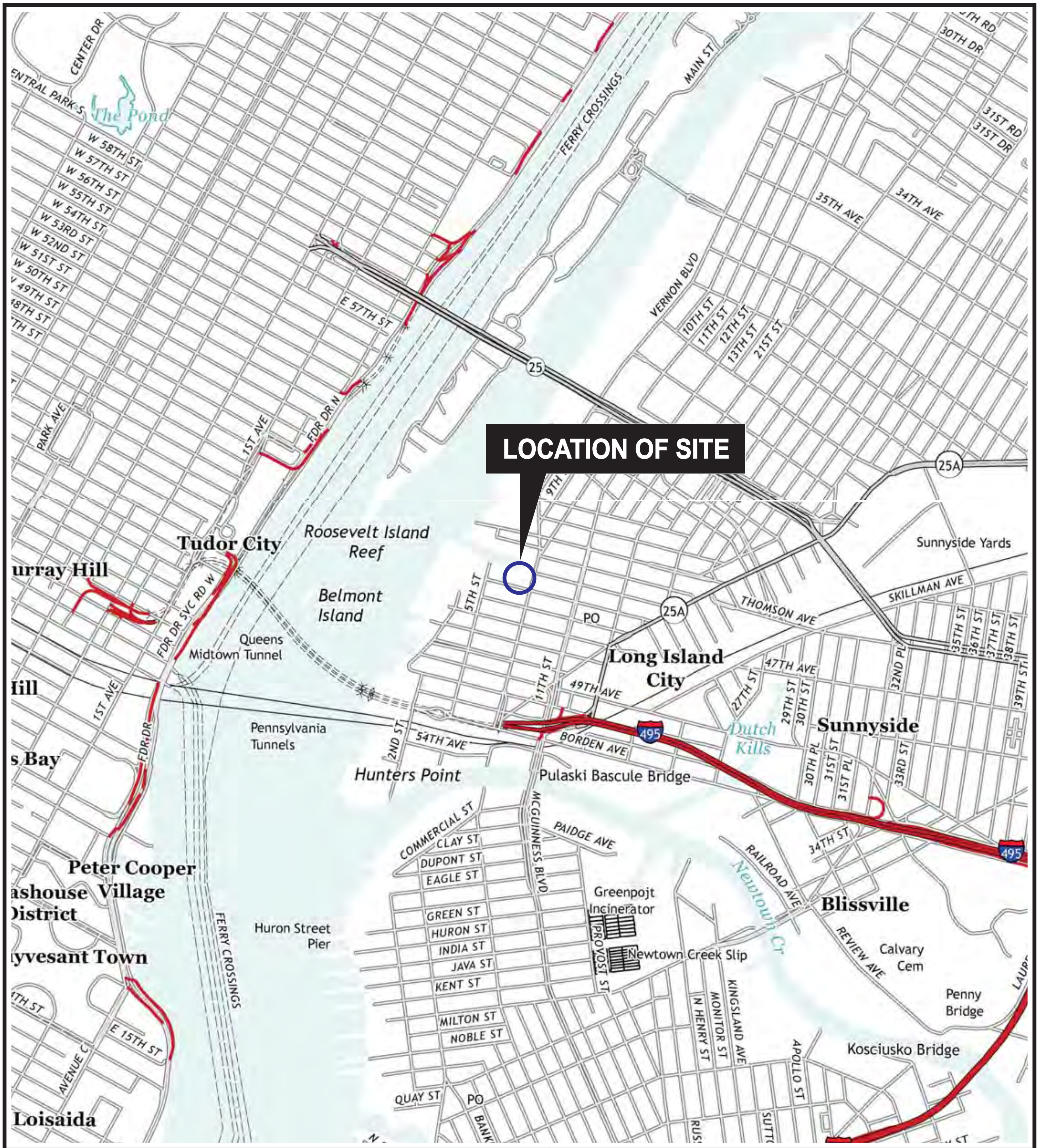
Signature

Project Engineer
Title

Roux Associates, Inc.
Company

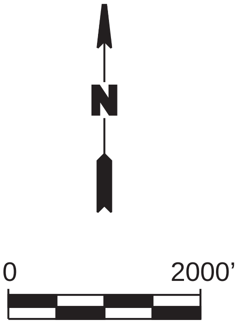
11/11/2016
Date

FIGURES



V:\CAD\PROJECTS\2051Y\0001Y\204\2051.0001Y204.07.CDR

QUADRANGLE LOCATION



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

Title:

SITE LOCATION MAP

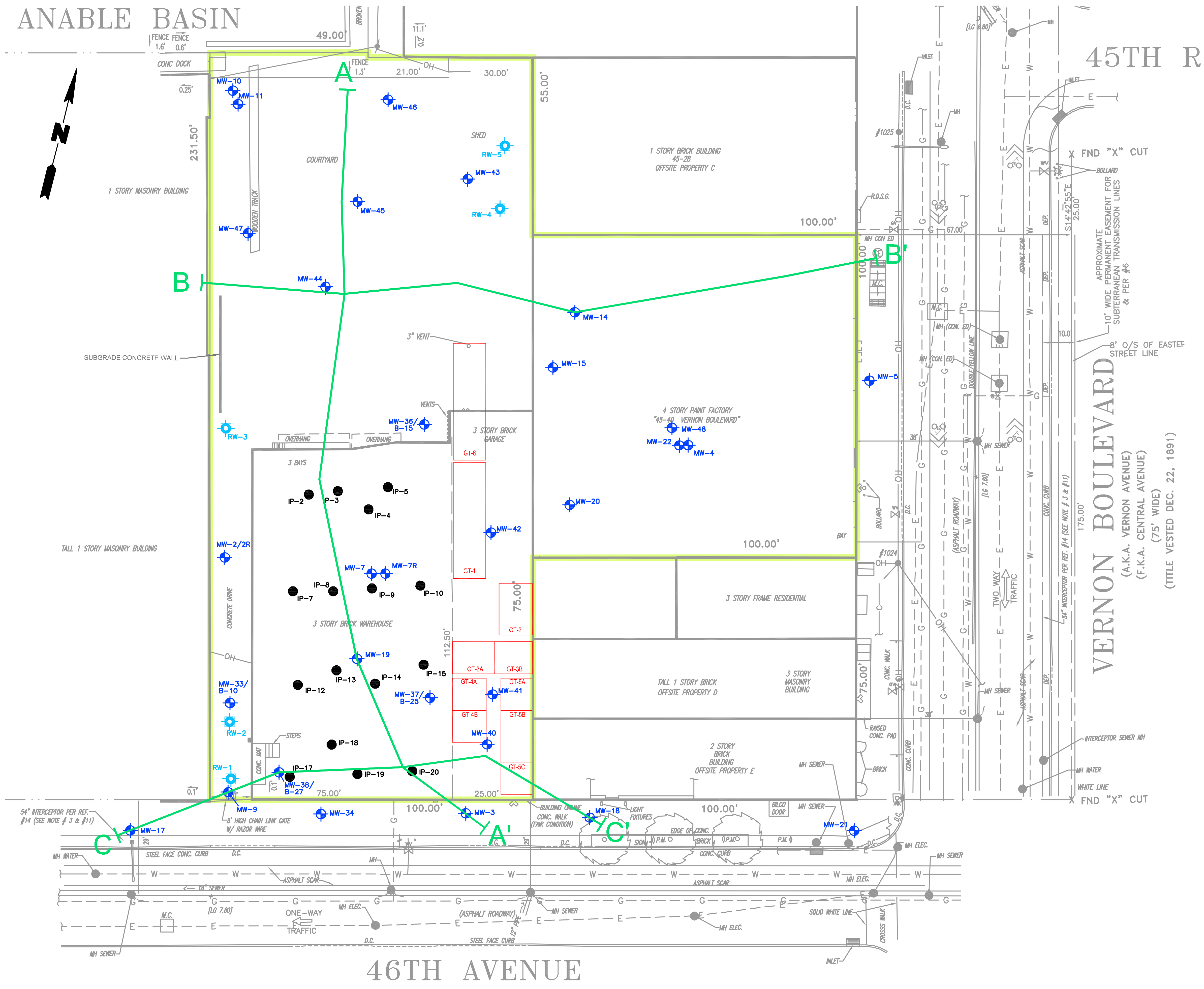
SITE MANAGEMENT PLAN
PARAGON PAINT AND VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared for:

VERNON 4540 REALTY LLC

Remedial
REMEDIAL ENGINEERING, P.C.
ENVIRONMENTAL ENGINEERS

Compiled by: J.K.	Date: 15JUN16	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	1
Project Mgr.: R.M.	Project No.: 2051.0001Y000	
File: 2051.0001Y204.07.CDR		



LEGEND

MW-5 ⊕	LOCATION AND DESIGNATION OF MONITORING WELL
RW-1 ⊕	LOCATION AND DESIGNATION OF LNAPL RECOVERY WELL
IP-2 ●	LOCATION AND DESIGNATION OF PERMANENT ISCO INJECTION POINT
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
ISCO	IN-SITU CHEMICAL OXIDATION
□	CONCRETE VAULT
🟩	PROPERTY BOUNDARY
GT-5	APPROXIMATE LOCATION AND DESIGNATION OF UNDERGROUND STORAGE TANK (ABANDONED IN PLACE)
A ⊢⊣ A'	LINE OF GEOLOGIC CROSS SECTION

Title:

SITE LAYOUT MAP

SITE MANAGEMENT PLAN
PARAGON PAINT & VARNISH CORPORATION
LONG ISLAND CITY, NEW YORK

Prepared For:
VERNON 4540 REALTY LLC

Remedial REMEDIAL ENGINEERING, P.C. ENVIRONMENTAL ENGINEERS	Compiled by: R.M.	Date: 15SEP16	FIGURE
	Prepared by: J.A.D.	Scale: AS SHOWN	
	Project Mgr: R.M.	Project: 2051.0001Y000	2
	File: 2051.0001Y204R.01.DWG		

V:\CAD\PROJECTS\2051Y\0001Y\204R\2051.0001Y204R.01.DWG

APPENDICES

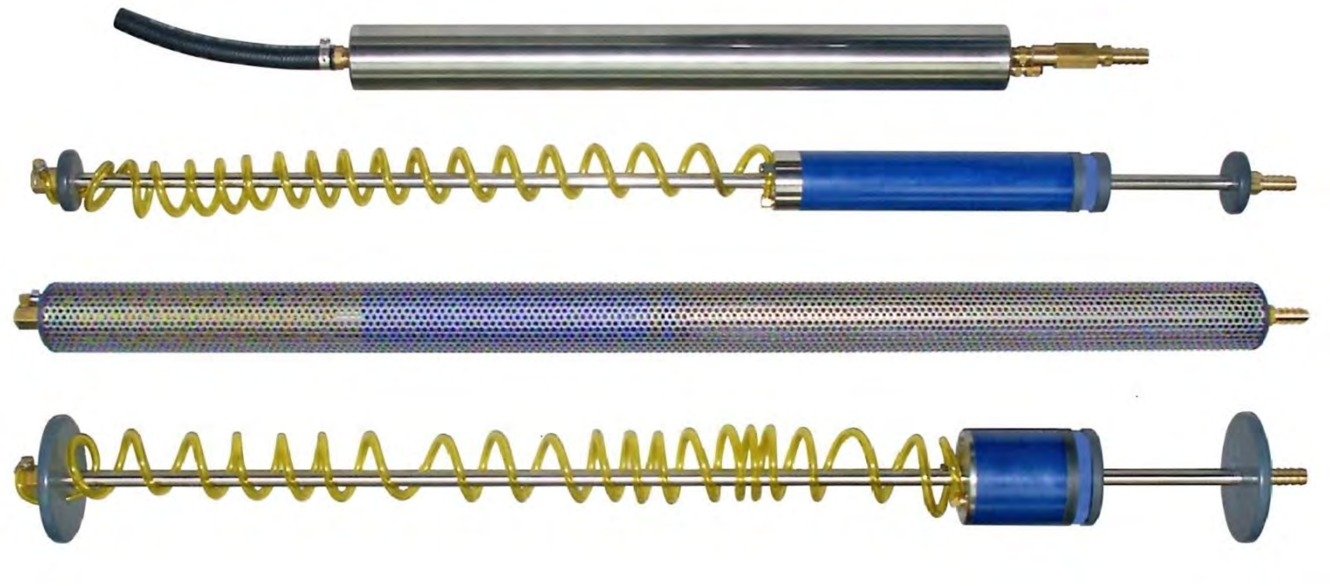
A. Geotech Sipper Pump and Skimmer Assembly Manual
B. Geotech A/C Sipper Installation and Operator's Manual

APPENDIX A

Geotech Sipper Pump and Skimmer Assembly Manual

Geotech
Sipper Pump & Skimmer Assembly

Installation and Operation Manual



Rev 01/05/15 Part # 16550181

TABLE OF CONTENTS

DOCUMENTATION CONVENTIONS

This document uses the following conventions to present information:

WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The Geotech Pump and Skimmer assembly (Skimmer), when used in conjunction with the Geotech Sipper Controller, is designed to efficiently collect free-floating hydrocarbons in 2” (5 cm) or larger recovery wells. The system consists of a Solar or AC Sipper controller, a stainless steel pump assembly, an attached Skimmer with floating intake cartridge (or buoy), and a Tankfull probe.

The Sipper controller regulates, or cycles, the pump and Skimmer assembly with three timer settings (vacuum, pressure, and delay) which vary the cycle time and recovery rate of the Skimmer. See the Geotech Sipper User Manual for more details on Sipper operation.

Timed vacuum and pressure is applied to the pump to draw product from the Skimmer attachment, which is then discharged into an optional above ground recovery tank. The standard Skimmer features a unique product intake assembly that incorporates both a density float and an oleophilic/ hydrophobic membrane that differentiates between floating hydrocarbons and water.

The intake assembly follows the water table fluctuations and places the screen at the water/product interface, skimming LNAPL (light, non-aqueous phase liquid) down to a sheen within the range of the float travel. As the system cycles, product is drawn through the intake screen and is transferred to the pump through a coiled hose and the Skimmer’s transfer shaft. Optional heavy oil and high temperature Skimmers, using intake buoys, are also available to recover product in 4” (10 cm) diameter and larger wells.

The stainless steel pump is primarily an air driven reservoir with upper and lower check valves. The pump is designed to provide a two-phase pumping cycle. During the first phase, or pump intake phase, vacuum is applied to the pump. This vacuum closes the top discharge check valve while opening the bottom, intake check valve, causing product to be drawn through the Skimmer intake screen and into the pump reservoir.

During the second phase, or pump discharge phase, the same air line is pressurized with air. This action closes the bottom, intake check valve on the pump and opens the discharge check valve, forcing the recovered product from the pump reservoir, into the product discharge line, up to the surface, and eventually into a recovery tank. See Figure 1-2 for an example of a typical stainless steel pump cycle.

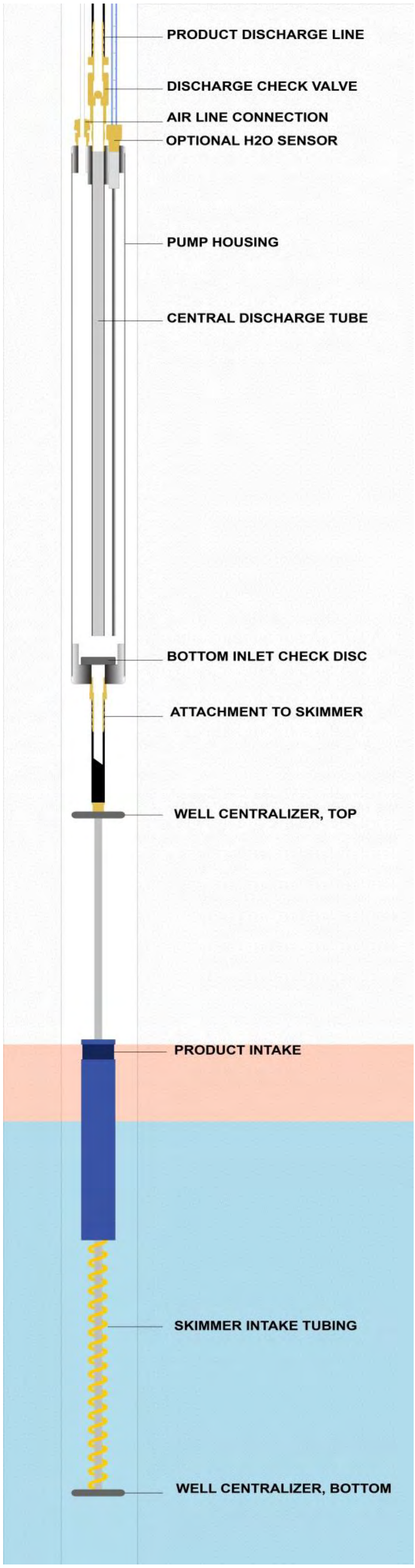


Figure 1-1: Example of a downwell pump assembly

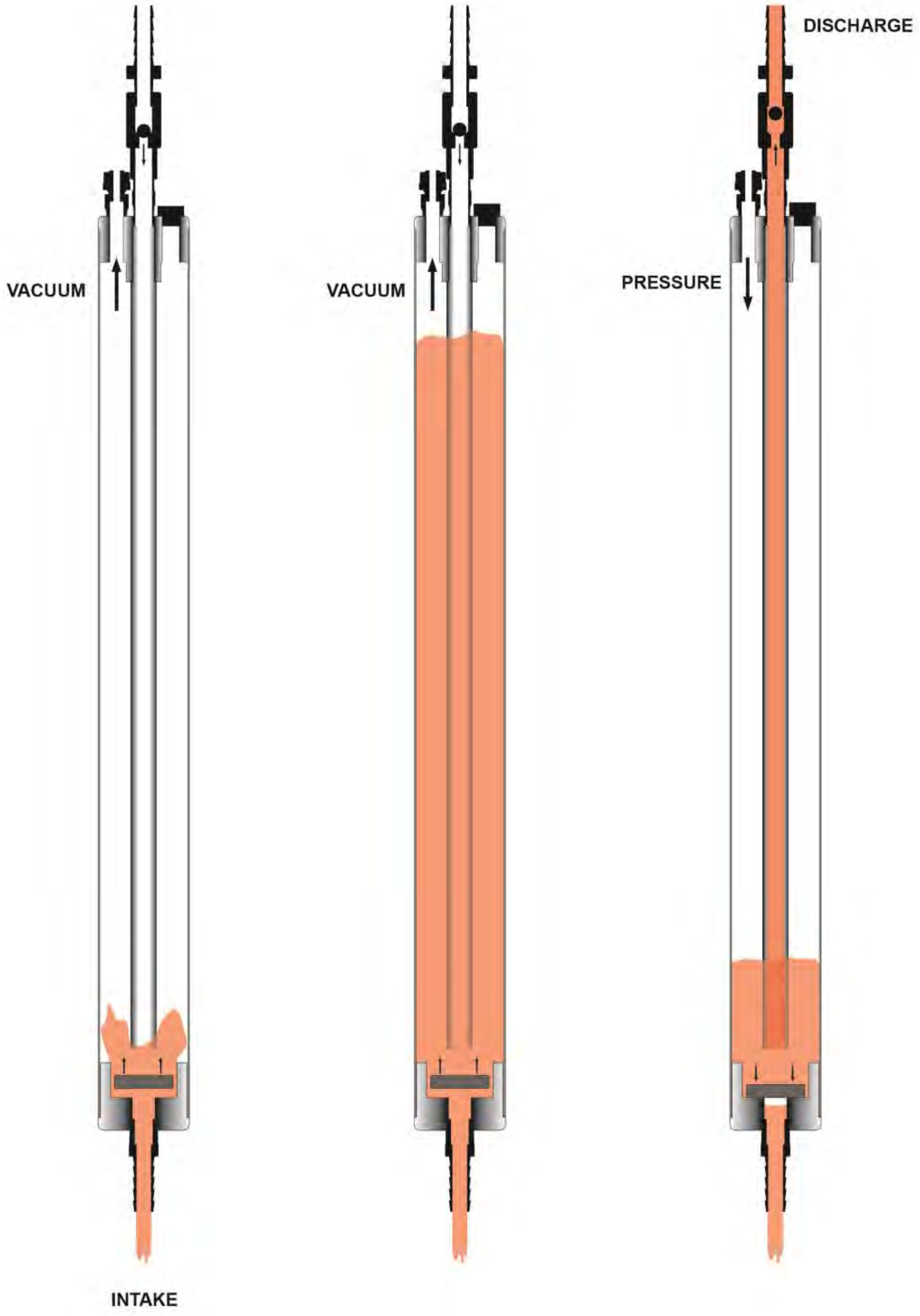


Figure 1-2: Typical Product Recovery Cycle in Stainless Steel pump

The stainless steel pump can be equipped with an optional Water (H2O) Sensor, which minimizes water intake by immediately purging the pump when water is present in the stainless steel housing. See Section 3: System Operation for more details.

Specific Gravity and Viscosity Limitations of Skimmer

The specific gravity of the product to be recovered with a Skimmer must be less than 1.0 and its viscosity less than 50 SSU for use with the "light" oil membrane, and 400 SSU for use with the "heavy" oil membrane cartridge. Geotech application engineers may be consulted for product recovery operations with viscosities outside that range. See Geotech Manual, "Hydrocarbon Viscosity Test Kit" for more information on choosing the correct intake membrane.

This type of membrane technology is designed to be used in wells with free product of at least 1/8" (3 mm) thickness.

The presence of surfactants or detergents in the product requires careful application. Surfactants and detergents may interfere with oil/water interface surface tension. This may interfere with pumping product layers of less than 1/8" as the oil water interface may become mixed. *The system will continue to operate and pump oil/water mixtures. When confronted with these contaminants please consult Geotech.

**If using water sensor in stainless steep pump, the sensor may need to be temporarily removed/disconnected to allow oil/water mix to be pumped.*

Other Applications for Stainless Steel Pump

The typical configuration of Stainless Steel Pump with attached Skimmer is implemented when floating hydrocarbons with density less than 1, or water, are pumped. Without the Skimmer, the stainless steel pump can be used either as a stand alone total fluids pump or a DNAPL recovery pump.

DNAPL or Dense Non Aqueous Liquids, are liquids that have a specific gravity greater than 1, or water. Sources of DNAPL contamination are typically chlorinated solvents leaked from industrial processing and storage. DNAPL is particularly difficult to find in free phase in ground water aquifers. Typically when free phase DNAPL is found it is at a solid rock barrier or a very low permeability material, such as tight clay. In either case the recharge rate of the free phase DNALP layer at the bottom of a recovery well will typically be slow.

The stainless steel pump, when equipped with a Water Sensor and a screened intake is an effective way of pumping DNAPL. The water sensor will reduce the amount of non-DNAPL (water) pumped, and the screen intake will ensure proper operation of the pump's check valves in a potentially gritting environment. See Figure 1-3 for a DNAPL pumping configuration.

The system can be easily changed in the field from DNAPL recovery to a total fluid system by simply disconnecting the water sensing system.

Follow Skimmer attachment guidelines when connecting the DNAPL intake, see Section 2: System Installation.

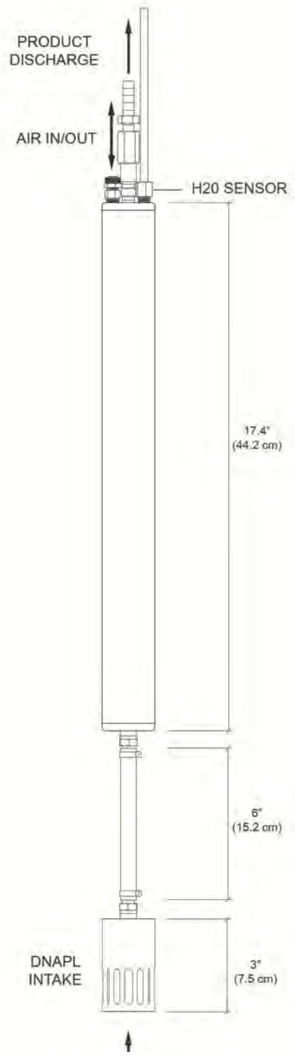


Figure 1-3: DNAPL recovery configuration for Stainless Steel Pump

System Components

Stainless Steel Pump Assembly

An air operated stainless steel pump is attached to the upper portion of the Skimmer. The pump consists of a stainless steel outer housing with top and bottom check valves.

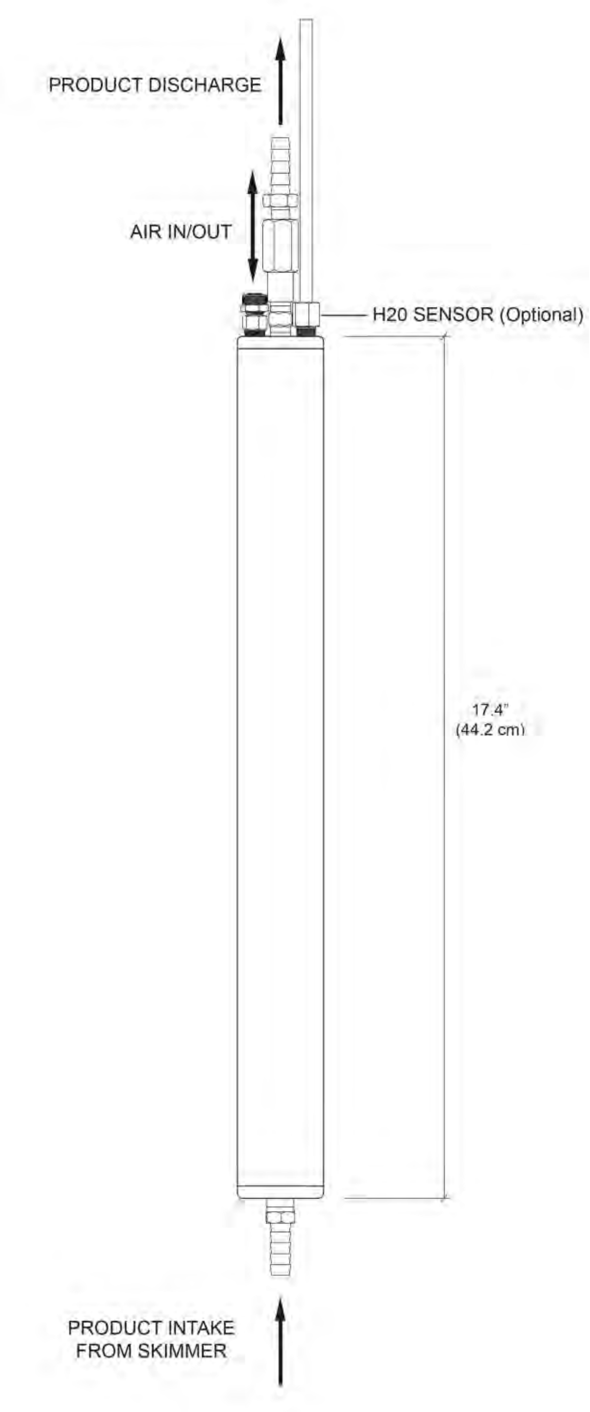


Figure 1-4: Stainless Steel Pump Assembly

Skimmer Attachments

A standard Skimmer attachment (when connected to the stainless steel pump assembly) is designed for use in either 2” (5 cm) diameter wells or 4” (10 cm) diameter and larger wells. Figure 1-5 shows an example of the two most common Geotech Skimmers. These Skimmers come with a standard 100 mesh intake screen. A 60 mesh intake screen is also available for use with higher viscosity fluids. See Geotech Manual “Hydrocarbon Viscosity Test Kit” for more information on choosing the correct intake cartridge.

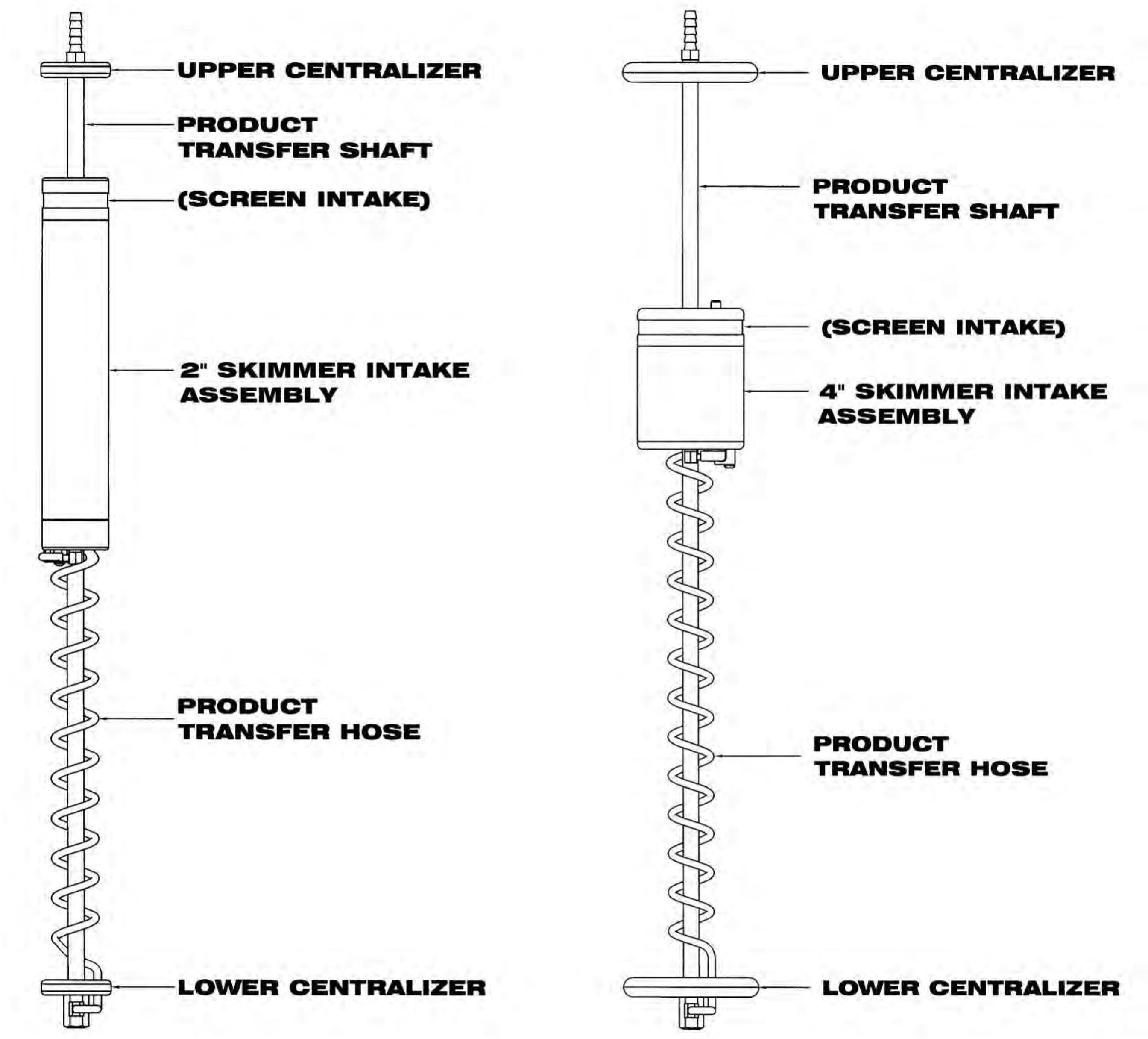


Figure 1-5: Standard 2” and 4” Skimmer Attachments

The Skimmer assembly is connected to the bottom of the stainless steel pump with a 6” piece of durable, fuel grade hose. The Skimmer consists of a product intake float, a coiled product transfer hose, and a transfer shaft. Well centralizers are placed at the top and bottom of the Skimmer shaft to protect the intake float and to allow unobstructed travel within the well. Standard Skimmers can provide 12” (30 cm) to 24” (61 cm) of intake travel. Geotech can provide up to 5’ (1.5 m) of travel (4” Skimmers only) on a custom order basis.

A Skimmer assembly will not draw water unless the intake cartridge is forcibly submerged, surfactants are present, or when the “conditioning” of the intake screen has been removed. See Section 4 for information on reconditioning the intake

Heavy Oil Skimmer Attachment

The optional heavy oil Skimmer attachment is designed to recover a range of fluids from gasoline to gear oil, skimming the product down to .01 feet (3 mm) in 4” (10 cm) diameter and larger wells. This option is best suited when the viscosity of the hydrocarbon is greater than the capability of the membrane screen technology (screen can no longer pass the hydrocarbon fluid).

The heavy oil Skimmer consists of a polypropylene intake buoy, a coiled product transfer hose, and a transfer shaft with well centralizers placed at the top and bottom. The intake buoy on the heavy oil Skimmer is designed to “ride” at the oil water interface and has a travel range of 24” (61 cm).

This assembly is ideal for use where the oil/water interface is broken down by detergents or is emulsified.

The intake buoy can also be “fine-tuned” by adjusting the intake fitting on the top of the buoy. Turning the fitting clockwise will lower the intake fitting relative to the product/water interface. Turning the fitting counter-clockwise will raise the intake fitting away from the interface. Figure 1-6 is an example of a heavy oil Skimmer assembly.

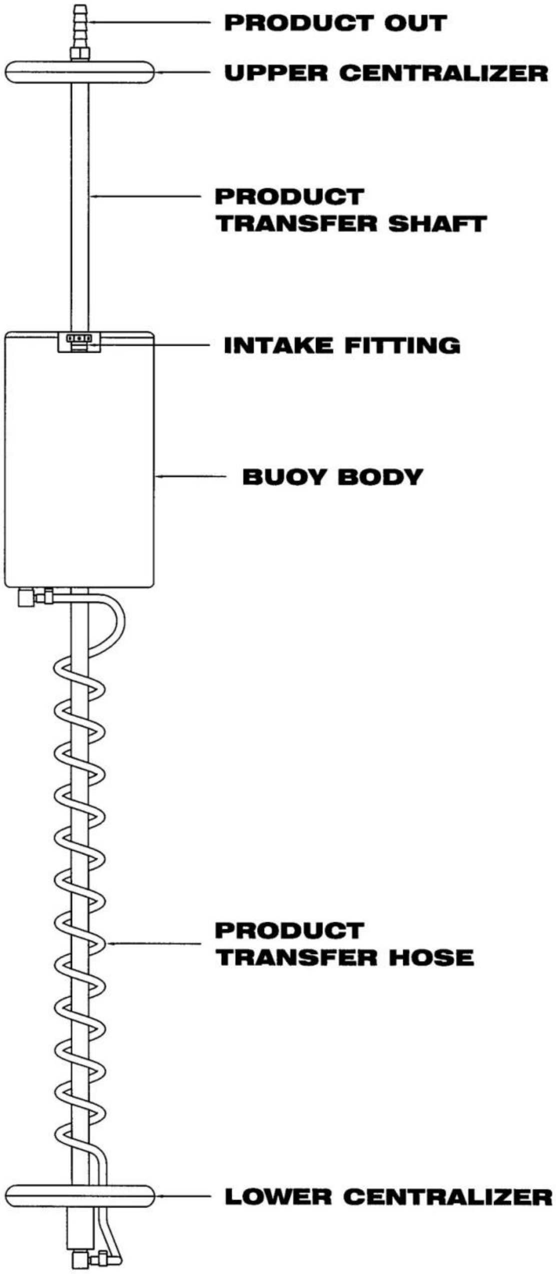


Figure 1-6: Heavy Oil Skimmer Attachment (optional)

High Temperature, Heavy Oil/Aggressive Chemical Skimmer Attachment

For high temperature well environments, Geotech provides a high temperature, heavy oil (HTHO) Skimmer that incorporates an ultra high molecular weight (UHMW) polyethylene intake buoy. The HTHO Skimmer has stainless steel end caps placed at the top and bottom of a stainless steel screen to keep out debris. The intake buoy of the HTHO Skimmer has a travel range of 26” (66 cm).

Like the heavy oil Skimmer, the intake buoy can be “fine tuned” by adjusting the intake fitting on the top of the buoy. Turning the fitting clockwise will lower the intake fitting relative to the product/water interface. Turning the fitting counter-clockwise will raise the intake fitting away from the interface. Figure 1-7 is an example of the high temperature, heavy oil Skimmer.

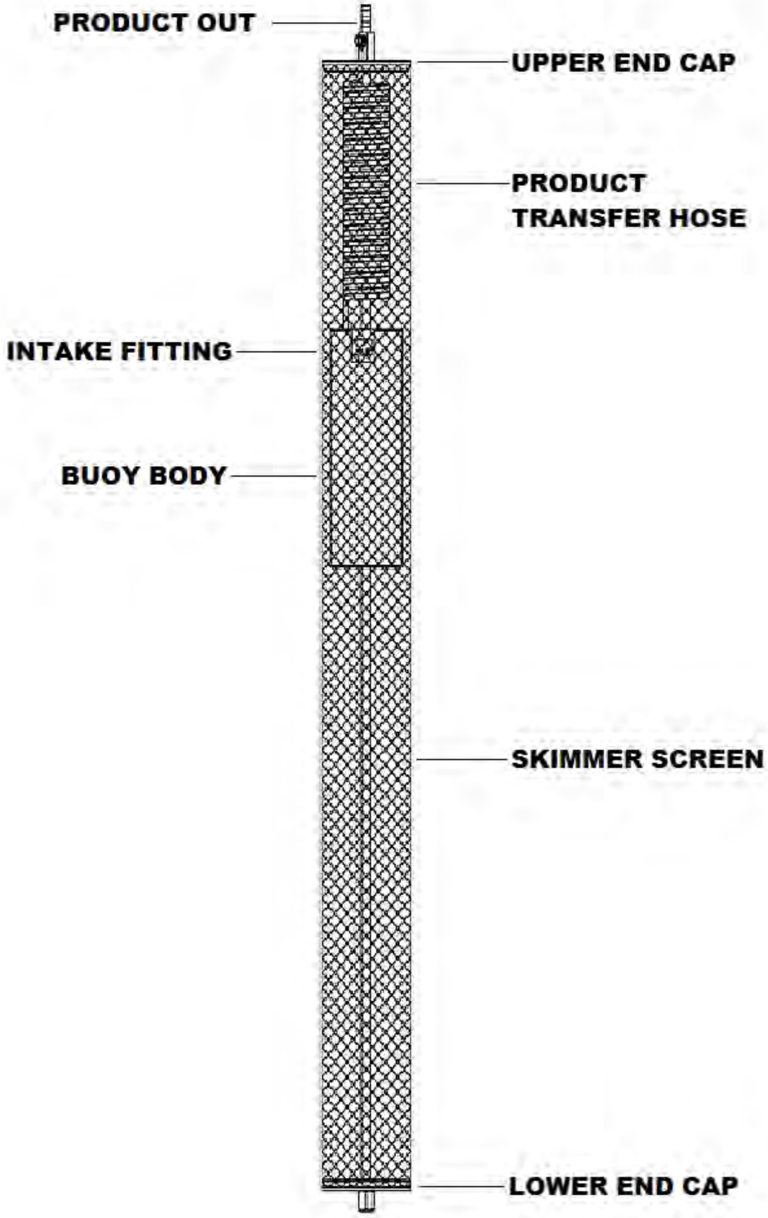


Figure 1-7: High Temp, Heavy Oil Skimmer Attachment (optional)

Section 2: System Installation

Prior to installation, ensure that the intake screen is “conditioned” (or primed, with diesel fuel or a similar hydrocarbon.) The optimum fluid would be to use the same downwell hydrocarbon to be recovered. Use a soft, bristle brush to avoid damaging the screen intake.

Install well cap as per manufacturors guidelines.

Calculate the tubing lengths required to install the Skimmer. Normal tubing lengths are around 180’ (55 m) in well depth, suggested maximum is around 500’ (152 m) total system length. Longer systems can be accomidated if care is taken to protect tubing and account for longer cycle timers.

To calculate the amount of air line and discharge hose required to suspend the pump and Skimmer in the well, first determine the following lengths:

- Measure the static water depth in the well using a Geotech Interface Probe.
- Measure the distance between the wellhead and the Sipper controller.
- Measure the distance between the wellhead and the product recovery tank.

See Figure 2-1 for a view of the Skimmer in relation to the well cap and static water level.

Do not make any cuts to the tubing until all measurements, between the controller and wellhead, and from the wellhead to recovery tank have been made.

If need be, attach the Skimmer or intake to the bottom of the stainless steel pump using the 6” (15 cm) piece of rubber fuel hose and hose clamps provided.

Ensure both ends of the hose are placed as far as they can go on each hose barb and then tighten the hose clamps in place.

Check connection by gently tugging at each hosebarb. The tubing should be secure.

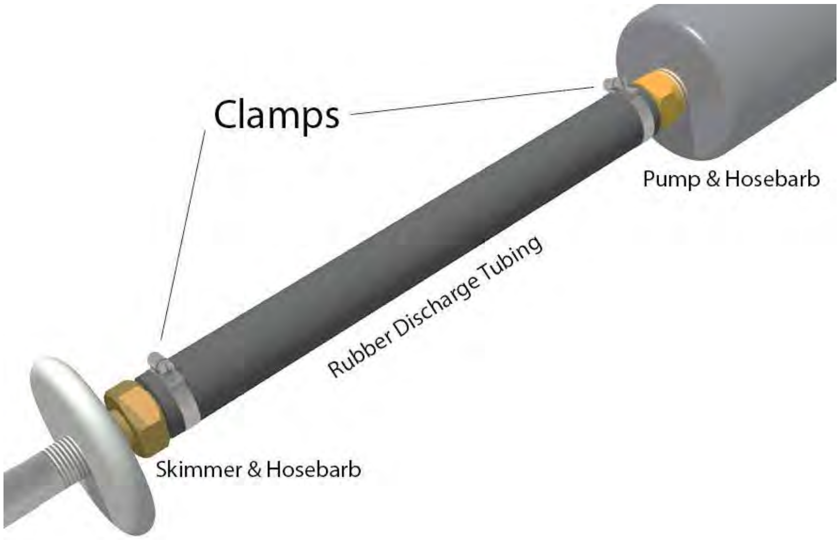


Figure 2-1: Connection between stainless steel pump and intake

This hose connection is important. An old or brittle piece of fuel hose or a loose hose clamp between the pump and Skimmer could eventually cause the Skimmer to detach and fall into the well. Always inspect this connection prior to use.

Pull the measured lengths of air line and discharge hose through the fittings on the well cap (when applicable). Fully tighten the compression fittings around the hose and tubing at the well cap. The well cap is designed to suspend the pump and Skimmer assembly by the sturdier discharge hose.

For system over 50’ in well depth, a safety cable is highly suggested.

Attach the air line and discharge hose to the pump and Skimmer assembly with hose clamps. After attaching the needed lengths of tubing, place the pump and Skimmer assembly into the well so that the midpoint of the intake float travel lies on the static water level measured.

Connect the air line from the pump to the Sipper controller. Connect the product discharge hose from the pump to the product recovery tank. Ensure that both lines are kept level and that there are no kinks or sags in the lines. When possible, enclose the lines within a secondary pipe or conduit to protect them from damage.

Install the Tankfull probe in the recovery tank and connect the probe connector to the Sipper controller.

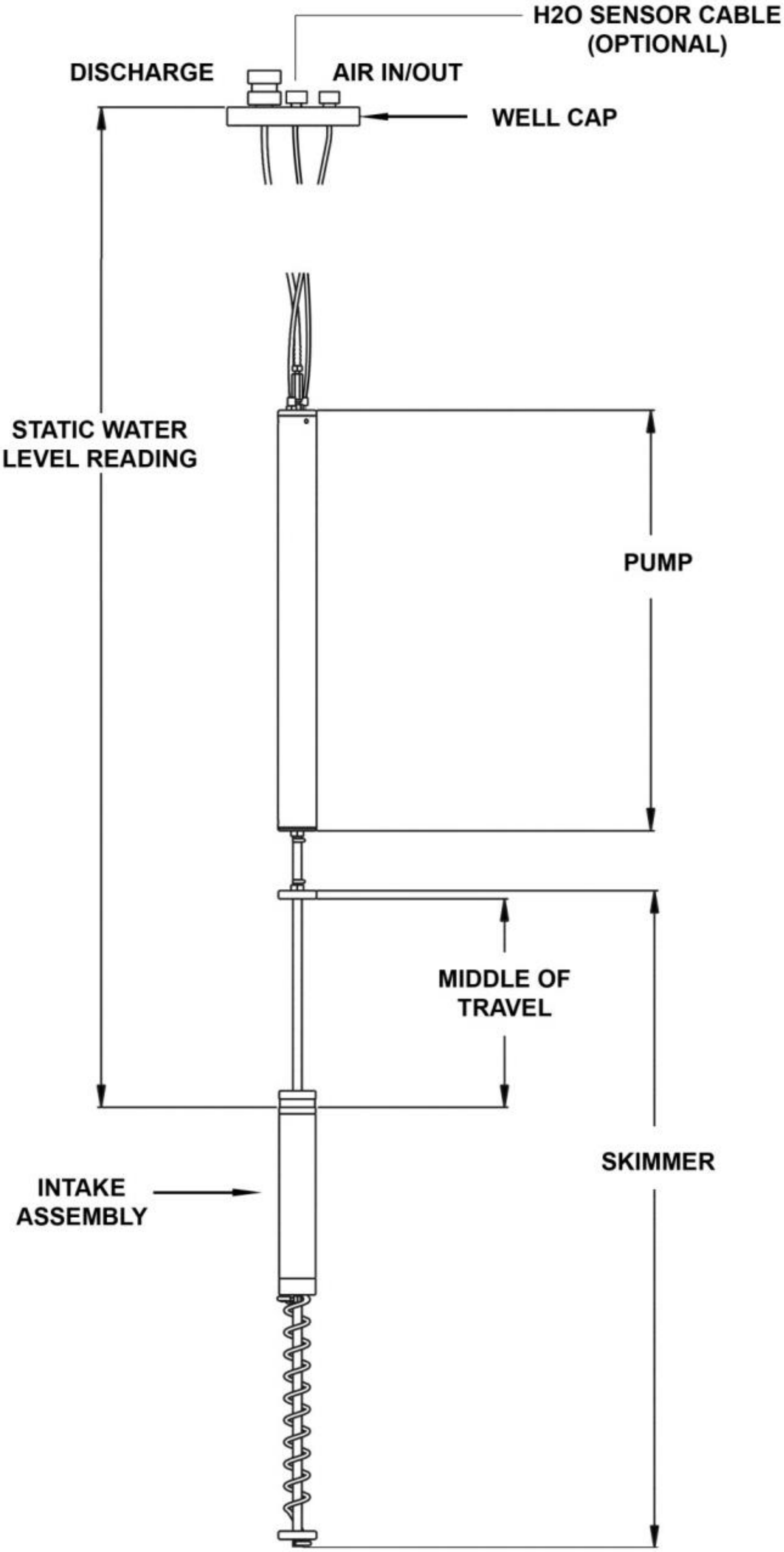


Figure 2-2: Pump and Skimmer Assembly with generalized Well Cap

Section 3: System Operation

The stainless steel pump assembly with Skimmer is designed to operate with the Geotech Sipper Controller. After all connections have been made, set the vacuum, pressure, and delay times for the pump and allow the unit to run. Make any needed adjustments to the timing before leaving the system. Read the Geotech Sipper User Manual (P/N 16550176) in conjunction with this manual to establish the operational requirements of your Sipper system.

The stainless steel pump can be equipped with an optional H2O sensor. Figure 3-1 is an example of a typical stainless steel pump cycle when water is sensed and then purged:

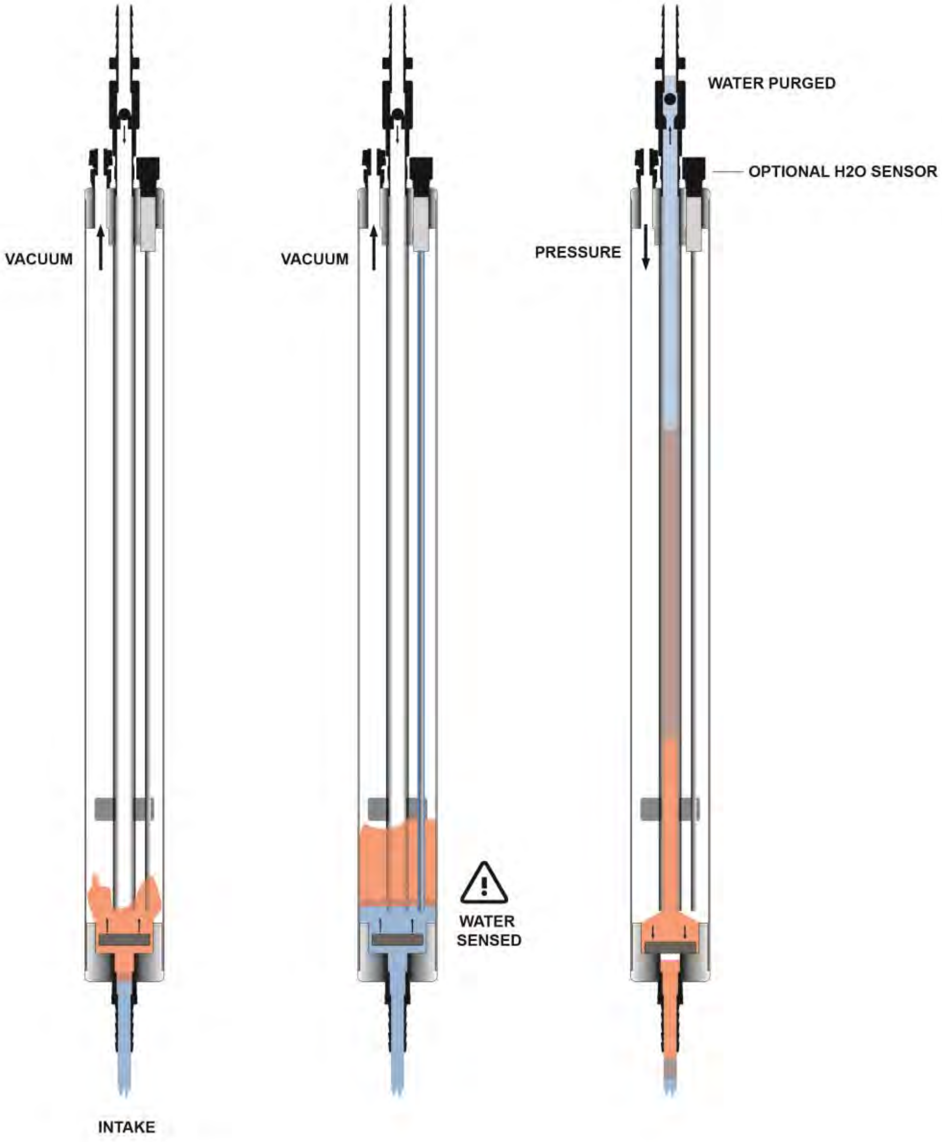


Figure 3-1: Active H2O Sensor Cycle in Stainless Steel Pump

The amount of water purged/pumped is minimal, <10mL, relative to the stainless steel pump's internal volume, which is around 200mL.

Section 4: System Maintenance

Always ensure all hose and tubing fittings at the pump and between the pump and Skimmer are tight prior to deploying the unit into the well.

Monthly (or per Site Visit, at minimum) Maintenance

- Pull the pump and Skimmer from the well.
- Inspect all tubing for cracks, kinks and damage. Replace any old and brittle tubing.
- Inspect the coiled tubing for physical damage or obstructions. Verify the intake assembly moves freely over its travel range.
- Inspect the float (buoy) and intake screen. Clean the intake screen and float using the method described in this section.
- Inspect the Skimmer assembly for signs of physical damage. Scrapes or dents in the screen intake may cause the Skimmer to take on water. If such damage is found, a new 2” or 4” intake assembly may be necessary.
- Clear away any debris collected in the well vault (or above ground casement).
- Measure the well and record product layer thickness and depth to water from top of well casing.
- Verify pump vacuum, pressure, and delay settings are adjusted for the recharge rate of the well.
- Place a pump positioning mark or zip tie on the discharge hose (usually black) even with the top of well casing.
- Re-deploy pump, aligning new depth to water mark on discharge hose with top of well casing.
- Check the Tankfull probe for proper operation.

Quarterly Maintenance

- Pull pump and Skimmer.
- Clean the well screen (site specific, primarily to clear bio growth and keep thick degraded product from impeding conductivity to the well at the product layer. Frequency to be determined by user.)
- Place float assembly in water to verify the screen stays out of the water at the top of the traverse range. If it does not, replace the coiled tubing and retest. If it still does not, replace the float assembly.

Yearly Maintenance

- Pull the pump and Skimmer from the well.
- Open pump and clean interior and parts with soapy water.
- Degrease the check disk and check ball seats. Spray with WD40 or kerosene.
- Clean and prime intake screen using the method described in this section.

Cleaning the Skimmer and Intake Screen

Standard 2” and 4” Skimmers will usually come with a float containing a 100 or 60 mesh intake screen. When required, gently clean the screen with WD40 or kerosene, using a soft, bristle brush, to remove emulsified product, bio growth or other debris. Take care to avoid damaging the screen intake. Rinse the product intake assembly with clean water and make sure it is completely dry before reconditioning the intake screen.

For heavy oil Skimmers, use warm soapy water first, followed by WD40 or kerosene to remove debris or bio growth from the buoy body, then rinse and let dry.

Using warm soapy water, clean all debris and bio growth from the Skimmer shaft and coiled tubing.

Conditioning the Skimmer Intake Screen

Prior to initial deployment, and after every cleaning, the intake screen must be conditioned (or primed) with diesel fuel or other similar hydrocarbon. Use a soft, bristle brush to saturate the screen portion of the intake thoroughly. The optimum fluid would be to use the downwell hydrocarbons being recovered. Take care to avoid damaging the screen intake.

Section 5: System Troubleshooting

Additional troubleshooting measures can be found in the Solar Sipper User Manual.

Problem:
The pump is only discharging water, not product.

Solutions:
The water level has risen above the travel range of the Skimmer.
- Pull the pump and Skimmer out of the well. Purge the water out of the intake and pump by allowing the system to cycle for several minutes, prime the intake cartridge screen, then reset the Sipper controller.

The pump position has slipped, or the pump was installed below the water level in the well.
- Prime the intake cartridge screen , re-position the pump and Skimmer, then reset the Sipper controller.

The intake assembly will not slide freely, or the coiled hose is tangled.
- Inspect the Skimmer assembly and repair as necessary.

Loose hose or tubing on fittings below intake level.
- Check all fitting connections.

Problem:
The pump discharges air only, no product.

Solutions:
Product has been removed.
- Recalculate and reduce the pumping rate at the Sipper controller.

The Product layer is below the bottom of the Skimmer's travel range.
- Adjust the position of the Skimmer assembly within the well and then reset the Sipper controller.

The Skimmer assembly has detached from the pump (due to a cut hose or loose hose clamp.)
- If the Skimmer assembly cannot be “fished” from the well then a new Skimmer will be needed.

Problem:
The pump cycles but does not discharge product.

Solutions:
One or both of the pump check valves are malfunctioning.
- Remove and clean pump assembly from particulates, or replace check valve components.

The viscosity of the product is too thick for the Skimmer.
- Contact Geotech to discuss other Skimmer options for the type of product in the well.

The intake screen is obstructed or the coiled hose is kinked.
- Verify that the intake is clean of debris and bio growth
- Check the condition of the coiled hose.

Problem:
The pump does not operate.

Solutions:
The product recovery tank is full.
- Empty the recovery tank, inspect the Tankfull probe float and then restart the Sipper controller.

The intake float switch is high.
- Drain the intake float switch assembly (on the side of the controller) and inspect all lines and solenoids for fluid vacuumed into the controller. Blow out all lines and parts, adjust vacuum timing and then restart the Sipper controller.

Problem:
Applicable if pump is equipped with optional H2O Sensor: pump is having to purge water with every cycle.

Solutions:
The skimmer is submerged in water.
- The product layer has been fully recovered or the water table has raised beyond the skimmer's travel capabilities. Reset the pump position so that the intake screen and top of the hydrocarbon layer is in the middle of the skimmer's travel distance.

Section 6: System Specifications

Application:	2” (5 cm) or larger recovery wells
Recovery Rate:	.2 gallons (.76 liters) per cycle
Maximum Depth	180 feet (54.9 m)
Maximum Pressure:	100 PSIG (6.9 bar)
Oil/Water Separation:	Oleophilic/hydrophobic mesh screen

Stainless Steel Pump

Size:	23.5”L x 1.75” OD (59.7 cm L x 4.5 cm OD)
Weight:	4.5 lbs. (2 kg)
Materials:	303 and 304 SS, flexible tubing, PVC, and Brass
Air Line:	.170” ID x .25” OD (Polyethylene)
Discharge Line:	.375” ID x .5” OD (Polyethylene or fuel grade Synthetic Rubber)

Stainless Steel Pump with H20 Sensor

Size:	23.5”L x 1.75” OD (59.7 cm L x 4.5 cm OD)
Weight:	5 lbs. (2 kg)
Materials:	303 and 304 SS, flexible tubing, PVC, and Brass
Air Line:	.170” ID x .25” OD (Polyethylene)
Discharge Line:	.375” ID x .5” OD (Polyethylene or fuel grade Synthetic Rubber)
H2O Sensor cable:	Polyurethane insulated cable (28AWG), Acetal Resin

2” Skimmer Assembly

Size:	35.5” L x1.75” OD (90 cm L x 4.5 cm OD)
Weight:	1.75 lbs. (0.8 kg)
Materials:	304 SS, Polyethylene, PVC, Polypropylene, and Brass Fittings
Effective Travel:	12” (30.5 cm) Standard Travel
Operating Temperature:	32º to 100º F (0° to 38° C)

Minimum fluid level to activate Skimmer = 15” (38 cm)

4” Skimmer Assembly

Size:	35.5” L x 3.75” OD (90 cm L x 9.5 cm OD)
Weight:	2.25 lbs. (1 kg)
Materials:	304 SS, Polyethylene, PVC, Polypropylene, and Brass Fittings
Effective Travel:	24” (61 cm) Standard Travel, up to 5 feet (1.5 m) available
Operating Temperature:	32º to 100º F (0° to 38° C)

Minimum fluid level to activate Skimmer = 9” (23 cm)

4” Heavy Oil Skimmer Assembly

Size:	40” L x 3.75” OD (102 cm L x 9.5 cm OD)
Weight:	2.5 lbs. (1.1 kg)
Materials:	304 SS, PP, and Brass Fittings
Effective Travel:	24” (61 cm) Standard Travel
Operating Temperature:	32º to 100º F (0° to 38° C)

Minimum fluid level to activate Skimmer = 15” (38 cm)

4” High Temperature, Heavy Oil Skimmer Assembly

Size:	40” L x 3.75” OD (102 cm L x 9.5 cm OD)
Weight:	2.5 lbs. (1.1 kg)
Materials:	304 SS, HDPE, and Brass Fittings
Effective Travel:	24” (61 cm) Standard Travel
Operating Temperature:	32º to 212º F (0° to 100° C)

Minimum fluid level to activate Skimmer = 15” (38 cm)

Section 7: System Schematics

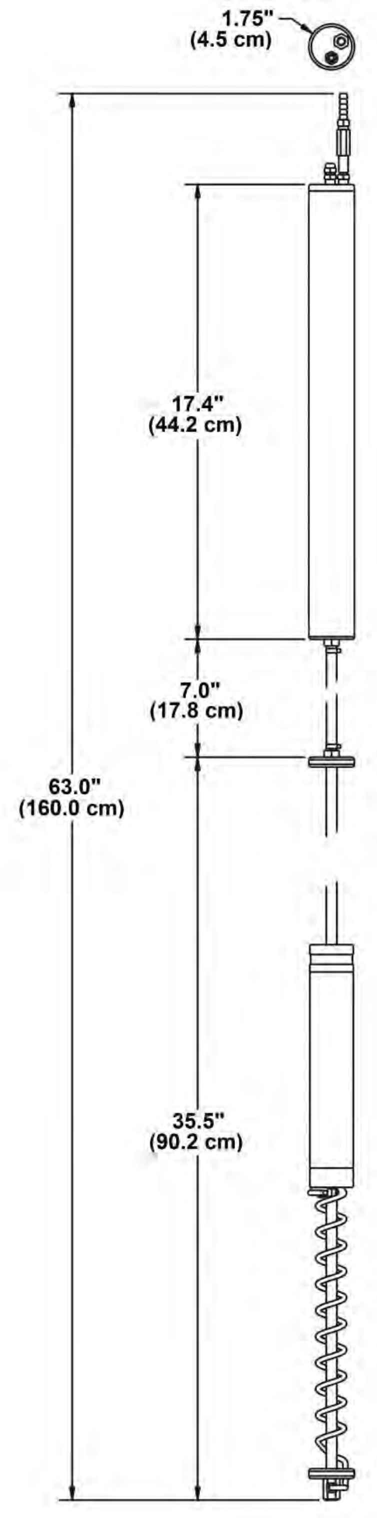
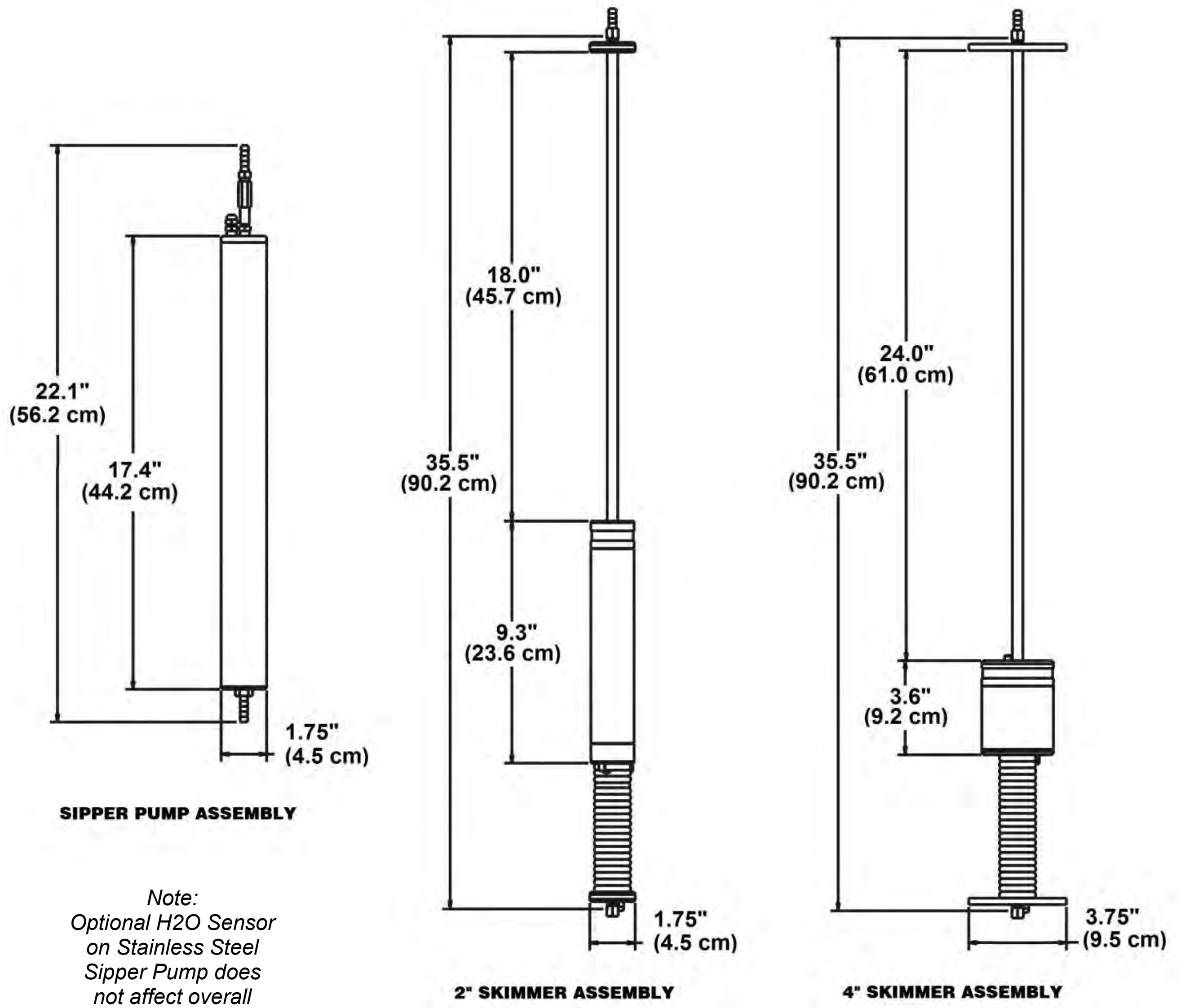


Figure 7-1: Stainless Steel Pump with Skimmer Dimensions



SIPPER PUMP ASSEMBLY

2" SKIMMER ASSEMBLY

4" SKIMMER ASSEMBLY

Note:
Optional H2O Sensor
on Stainless Steel
Sipper Pump does
not affect overall
dimensions

Figure 7-2 – Standard Pump and Skimmer Dimensions

Section 8: Parts and Accessories

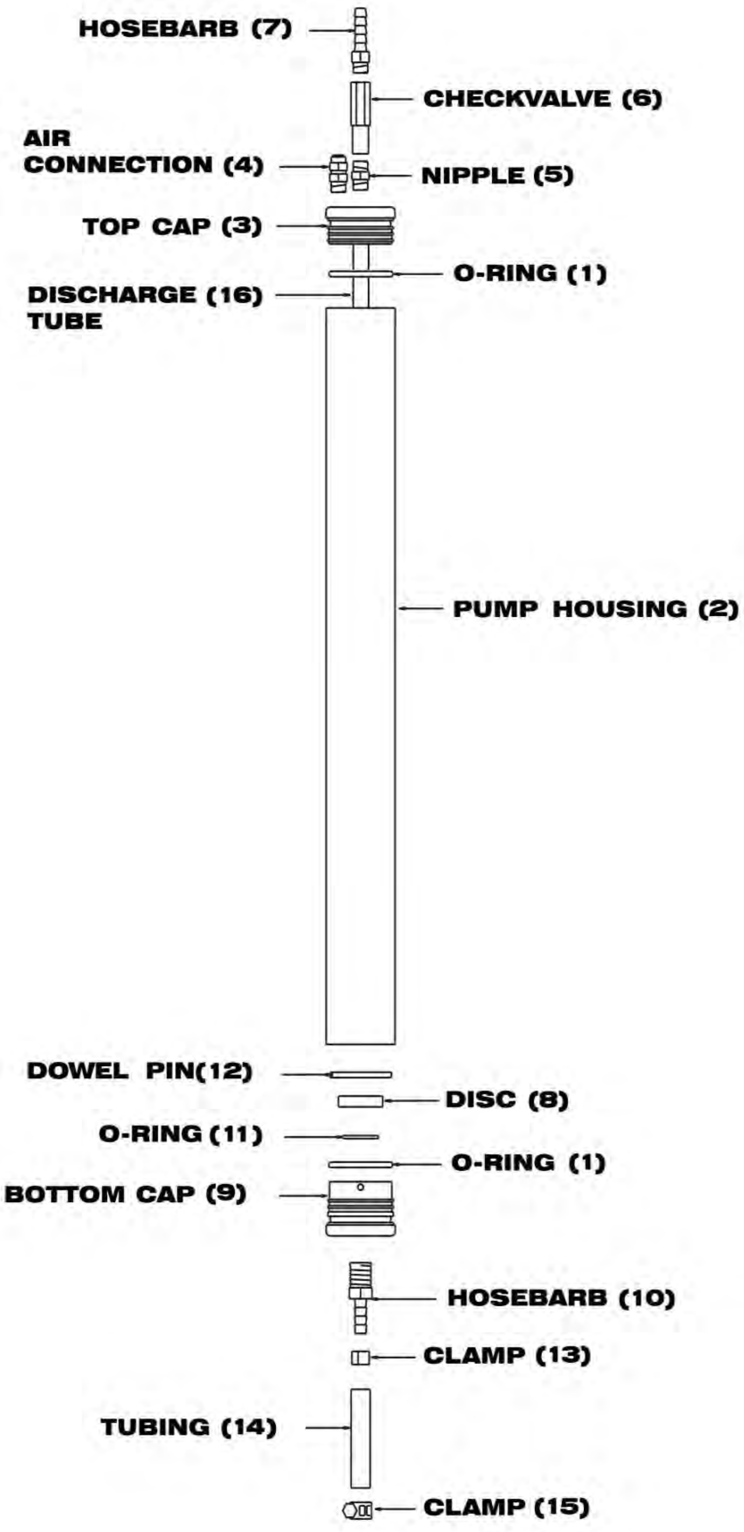


Figure 8-1: Stainless Steel Pump Assembly

Sipper Stainless Steel Pump Assembly (56600050)

Item #	Parts Description	Parts List
1	O-RING,VITON,#128	16600030
2	HOUSING,SS,PUMP,CRS/PRS	26600013
3	CAP,TOP,SS,CRS	26600019
4	TUBE,CONN,1/4X1/8MPT,POLYTITE PUMP	16600037
5	NIPPLE,BRS,HEX,1/8NPT	17500151
6	VALVE,CHECK,PRODUCT DISCHARGE CRS/PRS PUMP	26600157
7	HOSEBARB,BRS,3/8"X1/8MPT	16650310
8	DISC,PVC,CHECK	26600017
9	CAP,SS,BOTTOM,CRS/PRS	26600018
10	HOSEBARB,BRS,3/8"X1/4MPT	16650323
11	O-RING,VITON,#208	16600023
12	PIN,SS,DOWEL,CHK DISK CRS/PRS	26600162
13	CLAMP,SS,STEPLESS EAR,17MM	16600004
14	TUBING,RBR,3/8x5/8,FT PRODUCT DISHCARGE	16600019
15	CLAMP,SS6,WORM,7/32-5/8"	16600063
16	TUBE,INTERNAL,SIPPER PUMP	26600170

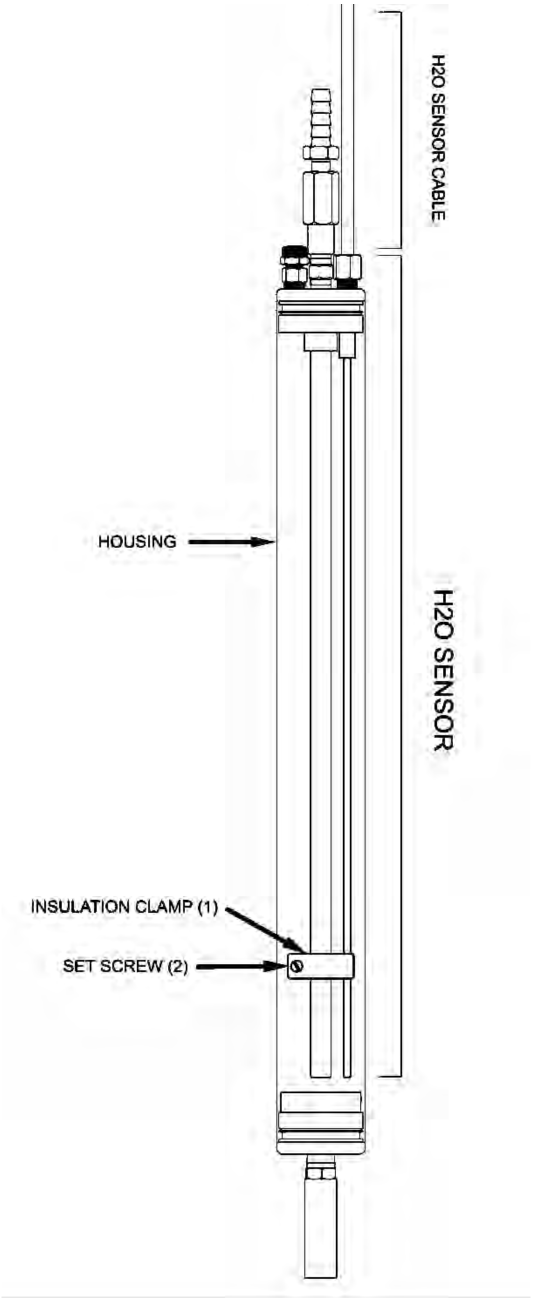


Figure 8-2: Stainless Steel Pump Assembly with optional H2O Sensor

Sipper Stainless Steel Pump with optional H2O Sensor Assembly* (56600059)

In addition to previously listed parts for Sipper Stainless Steel Pump Assembly (56600050):

-	*SENSOR, H2O, REPLACEMENT	56600085
-	CABLE, 28AWG, 8COND, URETH	ORS418005
-	CLAMP,INSULATOR,PRS, W/H2O SENSOR	26600270
-	SCREW,SS6,6-32x.75",PNH	PPF013012

*Requires specified cable length, maximum 500ft

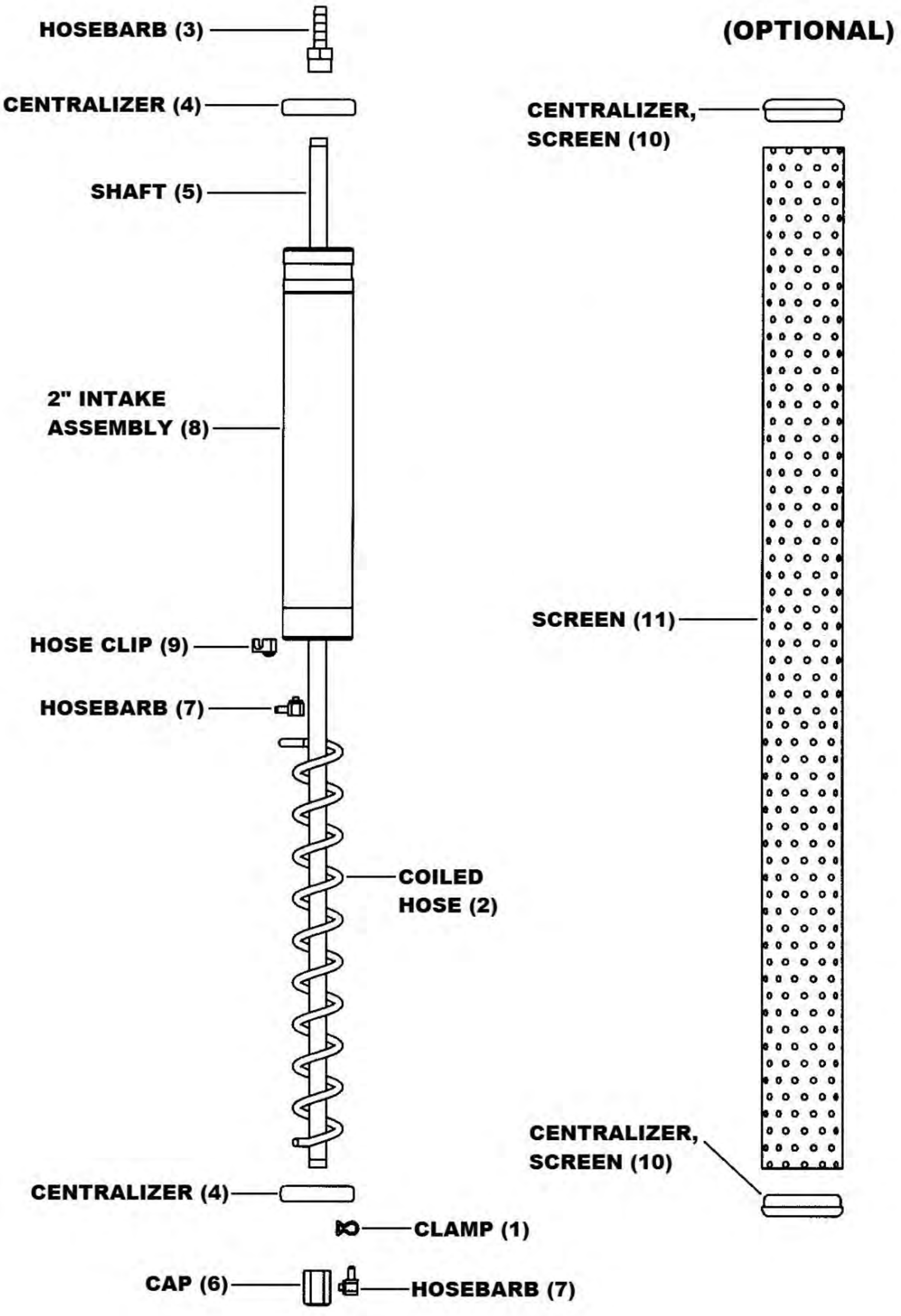


Figure 8-3: Standard 2” Skimmer Assembly

2” Skimmer Assembly – 100 mesh (56600003)

Item #	Parts Description	Parts List
1	CLAMP,SS,STEPLESS EAR,7MM	16600005
2	HOSE,COILED,PR2	26650304
3	HOSEBARB,BRS,3/8"X1/8FPT	16650308
4	CENTRALIZER,PVC,SKIMMER,2"	26650306
5	SHAFT,SS,SKIMMER,33.5",PRC	26600002
6	CAP,BRS,1/8FPTx10-32 90 DEG	16600064
7	HOSEBARB,BRS,1/8"X10-32,90DEG	17500149
8	ASSY,BUOY,SKIMMER,2"100MESH	56650309
9	HOSE CLIP,SKIMMER FLOAT	26650028

2" Skimmer Options

8	ASSY,BUOY,SKIMMER,2" 60 MESH	56650312
10	CENTRALIZER,PVC,SCREENED PR2	26600186
11	SCREEN,SS,1.88"ODX32.7" STRAIGHT WELD	26600188

Additional 2" Skimmers

HOUSING,RECLAIMER,1.66,SS4,36"	56600064
ASSY,SKIMMER,2",60 MESH	56600069
ASSY,SKIMMER,2",60M,W/SCREEN	56600071

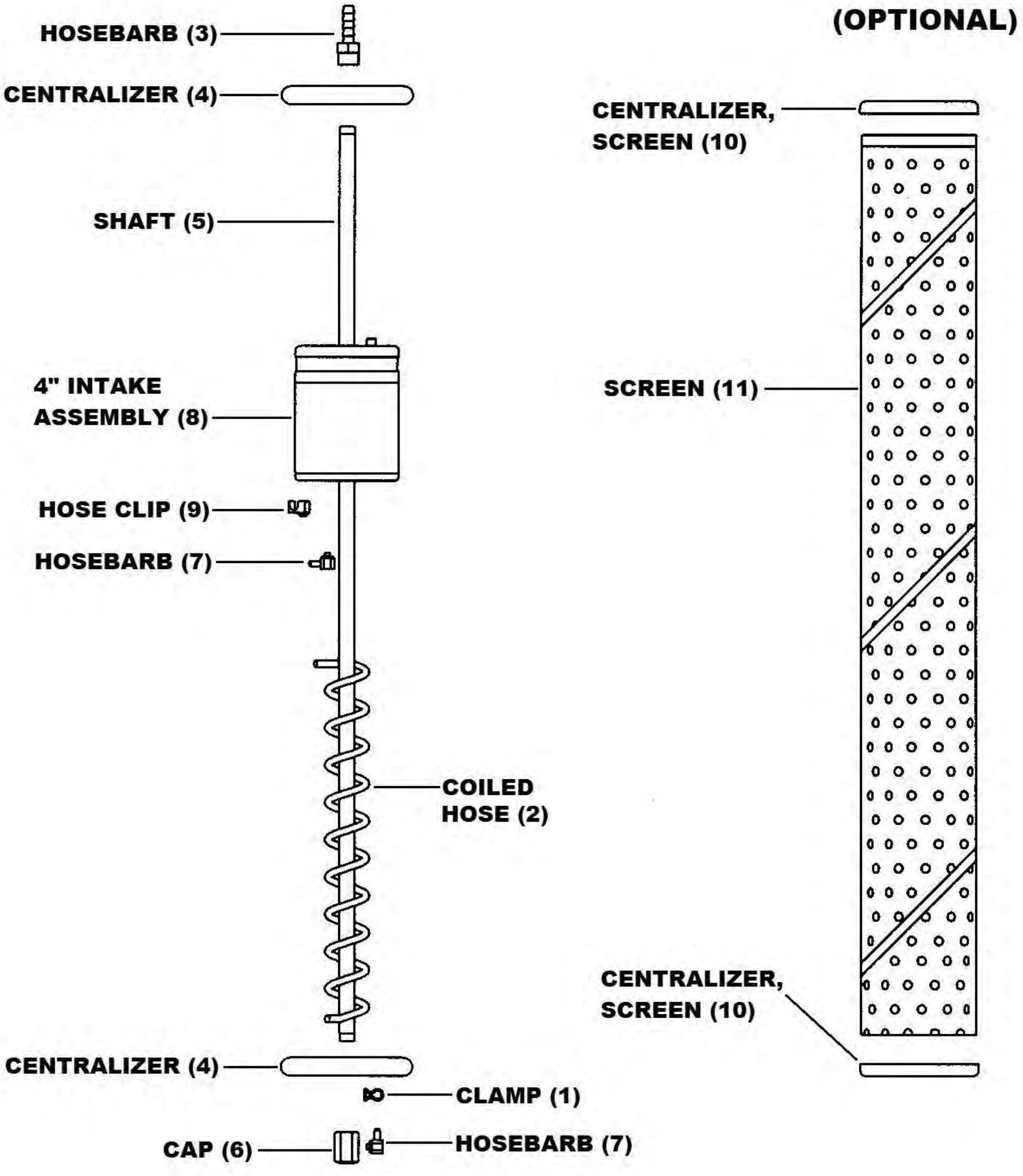


Figure 8-4: Standard 4” Skimmer Assembly

4” Skimmer Assembly – 100 mesh (56600004)

Item #	Parts Description	Parts List
1	CLAMP,SS,STEPLESS EAR,7MM	16600005
2	HOSE,COILED,PR4	16650312
3	HOSEBARB,BRS,3/8"X1/8FPT	16650308
4	CENTRALIZER,SKIMMER,PR4	16600048
5	SHAFT,SS,SKIMMER,33.5",PRC	26600002
6	CAP,BRS,1/8FPTx10-32 90 DEG	16600064
7	HOSEBARB,BRS,1/8"X10-32,90DEG	17500149
8	ASSY,BUOY,SKIMMER,4"100 MESH	56650310
9	HOSE CLIP,SKIMMER FLOAT	26650028

4" Skimmer Options

8	ASSY,BUOY,SKIMMER,4" 60 MESH	56650313
10	CENTRALIZER,PVC,SCREENED PR4	26600187
11	SCREEN,SS,3.67" DIAM X32.7"	26600189

Additional 4" Skimmers

ASSY,SKIMMER,4",100M,W/SCREEN	56600055
ASSY,SKIMMER,4",100 MESH,5 FT EXTENDED TRAVEL	56600008
ASSY,SKIMMER,4",60 MESH	56600070
ASSY,SKIMMER,4",60M,W/SCREEN	56600072
ASSY,SKIMMER,4",60 MESH,5 FT EXTENDED TRAVEL	56600073

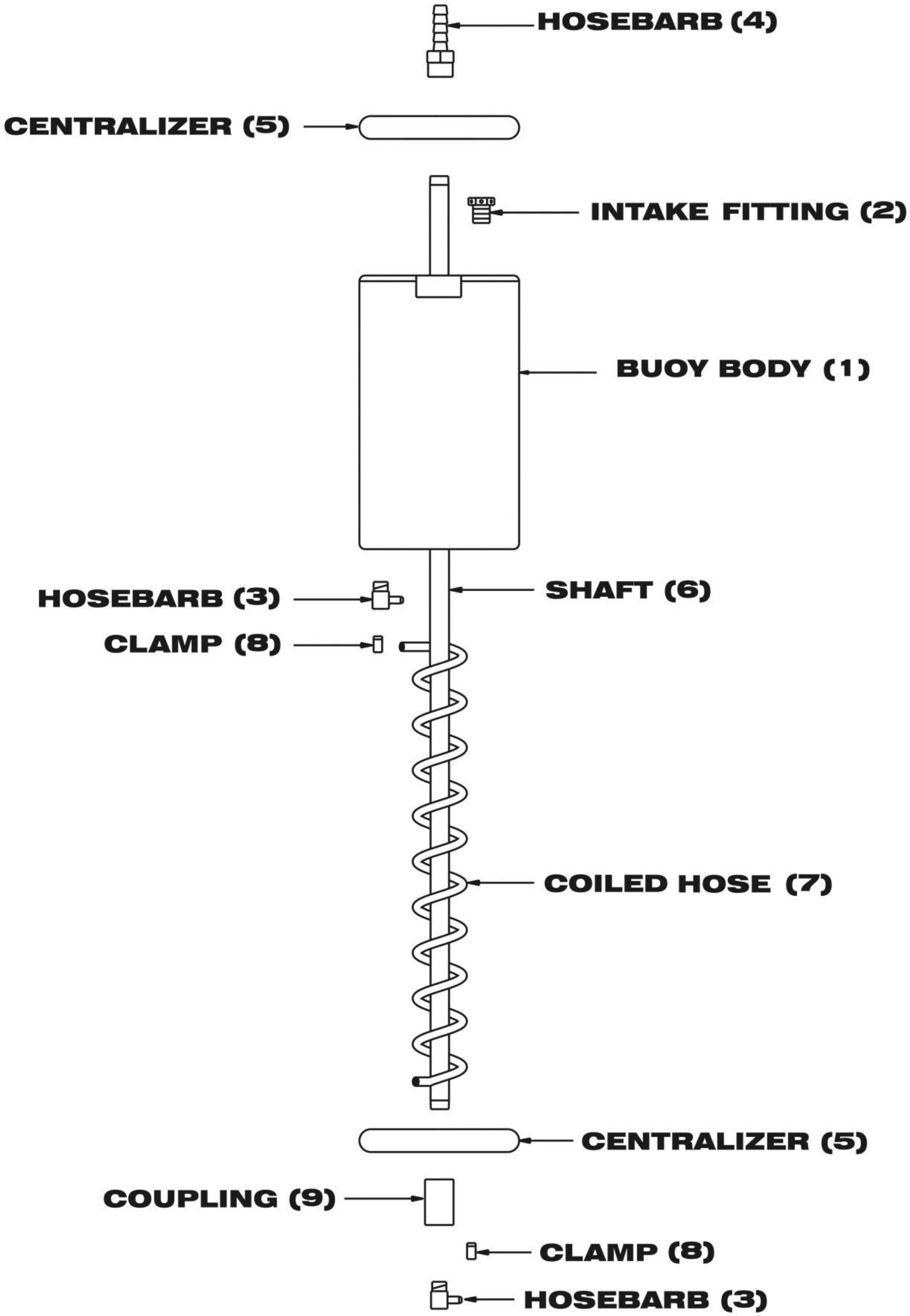


Figure 8-5: 4” Heavy Oil Skimmer Assembly

4” Heavy Oil Skimmer (56600005)

Item #	Parts Description	Parts List
1	BUOY,PP,HEAVY OIL	26600004
2	FTG,INTAKE,OIL BOUY	26600005
3	HOSEBARB,BRS,.170"X1/8MPT,90D	17500148
4	HOSEBARB,BRS,3/8"X1/8FPT	16650308
5	CENTRALIZER,SKIMMER,PR4	16600048
6	SHAFT,SS,OIL SKIMMER,38"	26600006
7	HOSE,COILED,OIL SKIMMER	26600007
8	CLAMP,SS,DBL PINCH,9/32-23/64"	11200273
9	COUPLING,SS4,.125"	16600006

4" Heavy Oil Skimmer Options

	ASSY,BUOY,OIL SKIMMER,4"	56600060

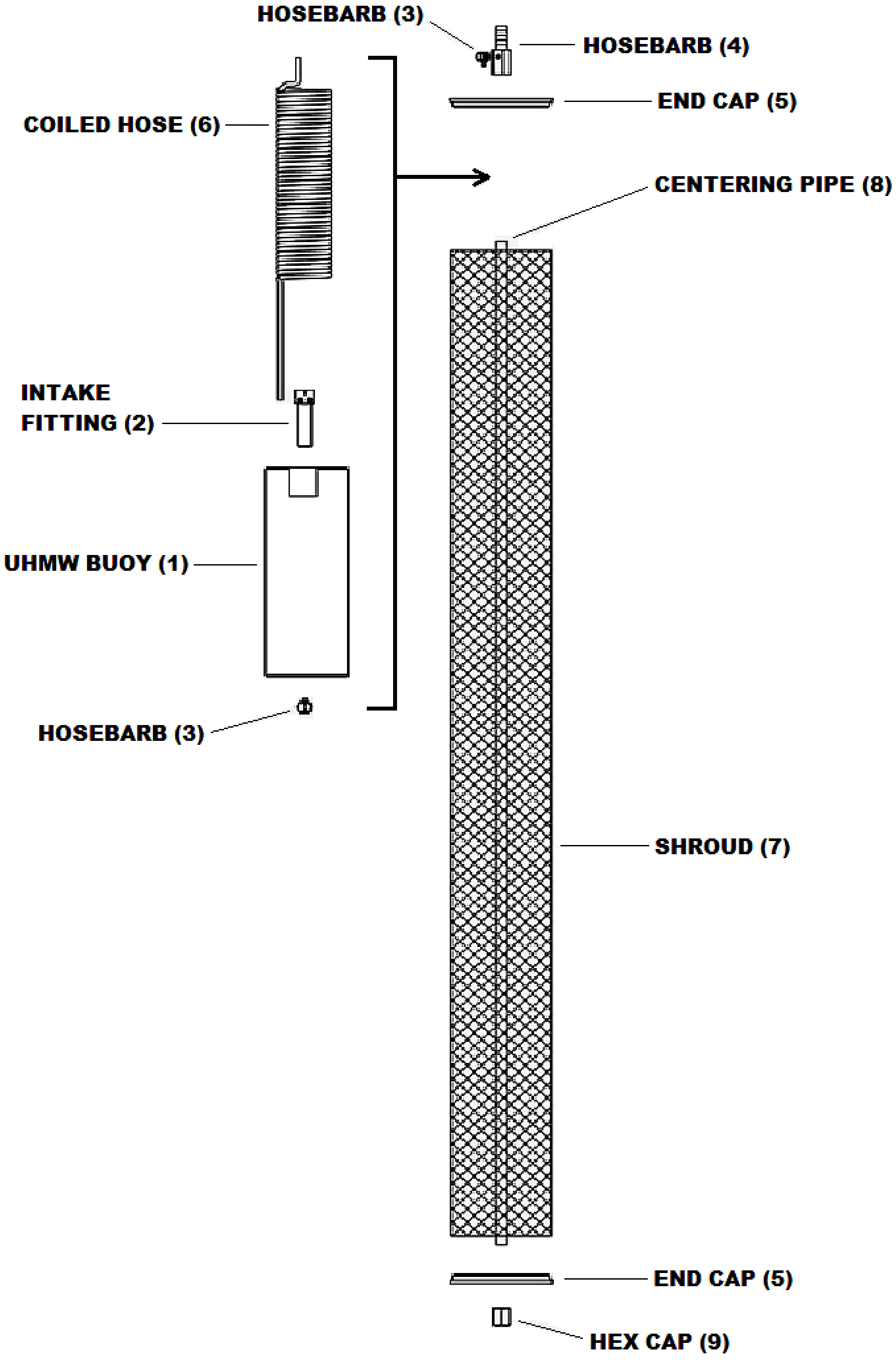


Figure 8-6: 4" High Temperature, Heavy Oil Skimmer Assembly

4”, High Temp, Heavy Oil Skimmer (56600012)

Item #	Parts Description	Parts List
1	BUOY,UHMW,HEAVY OIL,HI-TEMP	26600206
2	FITTING,BUOY INTAKE,HTHO	26600207
3	HOSEBARB,BRS,1/8"X10-32,90DEG	17500149
4	HOSEBARB,EXT,1/8M/F NPT,10-32	27200012
5	END CAP,BUOY INTAKE,HTHO	26600209
6	TUBING, COILED, PTFE, HTHO	56600074
7	SKIMMER,SHROUD,4",HTHO	26600210
8	PIPE,CENTERING,SCH80,1/8",HTHO	27500005
9	FITTING,HEX CAP,1/8FPT,HTHO	27200013

Sipper and Skimmer Accessories

Parts Description	Parts List
MANUAL, SIPPER PUMP & SKIMMER ASSEMBLY	16550181
MANUAL, SOLAR SIPPER	16550176
MANUAL,TEST KIT,HYDROCARBON VISCOSITY	26030001
TEST KIT,HYDROCARBON VISCOSITY	86020001
WELL CAP,2",SLIP W/ CMPRSN FTG SIPPER	86600061
WELL CAP,4",SLIP W/ CMPRSN FTG SIPPER	86600062
TUBING,PE,.170x1/4,FT POLYETHYLENE	87050501
TUBING,TLPE,.170x1/4,FT FEP LINED POLYETHYLENE	87050529
TUBING,FEP,.170x1/4,FT FEP	87050509
TUBING,RBR,3/8x5/8,FT PRODUCT DISHCARGE	16600019
TUBING,TLPE,3/8x1/2,FT FEP LINED POLYETHYLENE	87050506
TUBING,FEP,3/8x1/2,FT FEP	87050511
CLAMP,NYL,1/4" SNAPPER	11150259
CLAMP,SS,STEPLESS EAR,17MM	16600004
CLAMP,SS6,WORM,7/32-5/8"	16600063

DOCUMENT REVISIONS		
EDCF#	DESCRIPTION	REV/DATE
-	Previous Release	06/05/2012
-	Updated manual to include PRS with H2O Sensor option – SP	6/12/2014
-	Clarify H2O Sensor as optional – SP	9/2/2014
-	General updates and clarifications, included DNAPL information – SP, JL	01/05/15

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR
SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: ________________

Serial Number: ________________

Date of Purchase: ________________

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

APPENDIX B

Geotech A/C Sipper Installation and Operator's Manual

geotech

Geotech Sipper

Installation and Operation Manual

Rev 01/05/2015 Part # 16550176

Table of Contents

DOCUMENTATION CONVENTIONS

This manual uses the following conventions to present information:

WARNING

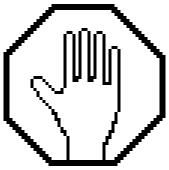
An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.



In order to ensure your Solar Sipper has a long service life and operates properly, adhere to the following cautions and read this manual before use.

- **Controller power input source must not exceed specified ratings.**
- **Controller may not operate properly with wiring not supplied by manufacturer.**
- **Avoid spraying fluid directly at controller.**
- **Never submerge controller.**
- **Avoid pulling on wires to unplug controller wiring.**
- **Avoid using a controller with obvious physical damage.**
- **To prevent damage, DO NOT drop the controller.**

WARNING

Do not operate this equipment if it has visible signs of significant physical damage other than normal wear and tear.

Notice for consumers in Europe:

This symbol indicates that this product is to be collected separately.

The following applies only to users in European countries:

- This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.
- For more information, contact the seller or the local authorities in charge of waste management.

Section 1: System Description

Function and Theory

The Geotech Solar Sipper (Sipper) is a unique solar powered hydrocarbon recovery system used for operating an active downwell remediation pump with an attached Skimmer. It is designed for applications where electrical power is not available or not economically feasible. Electrical power used to run the Solar Sipper is generated on-site by solar panels. The internal compressor is capable of producing up to 20-inches Hg vacuum and 100 psig pressure. This alternating vacuum/pressure process allows the user to recover a wide range of fluids, from very viscous to ultra light Non-Aqueous Phase Liquid (NAPL), from depths as deep as 180 feet below ground surface. Optional multiple channel controllers can operate up to eight pumps in separate recovery wells.

In this manual, a stainless steel pump with Skimmer, or any other downwell assembly used with a Sipper system, will be referred to as a pump. A chart containing a range of viscous products can be found in Section 4.

The standard Solar Sipper uses a 12VDC, 75 amp hour battery that is charged with an attached 85 Watt solar panel. Systems can be expanded to utilize several solar panels and larger capacity batteries. Multiple channel controllers can be implemented in areas where there are multiple recovery wells within close proximity of each other. Up to eight separate wells can be operated per controller.

In general, Geotech recommends a maximum distance of 500 feet (including the well depth) between the Sipper controller and the pump. Longer runs can be accommodated but are not recommended. Careful consideration must be given to additional power requirements as well as protecting the tubing from damage. In certain situations, multiple controllers with separate solar panels and batteries may be a better solution on sites of a relatively larger area. The optional AC Sipper is designed for locations where line voltage is readily available.

Ease of Deployment

The Solar Sipper can reduce overall project costs and dramatically improve deployment as follows:

- Reduces the time and cost for a power line to be run to a site.
- Eliminates the need for electricians to do install work and permitting.
- The simple and safe low voltage system can be installed without special training or licensing and requires minimal experience.
- No trenching or transformer equipment is required.
- Relocating equipment to follow a plume or to adjust to new site characterization information is fast and easy.

Sipper Operation

The Sipper controller has an integrated programmable cycle timer for controlling the internal compressor vacuum, pressure, and the time between cycles. This allows the user to calibrate the Sipper to run at its most efficient rate based on the downwell product recharge rate, product viscosity, and Skimmer depth.

During the vacuum timer cycle, vacuum is applied to the air line tubing, stainless steel pump, and intake; helping the product to flow through the oleophilic/hydrophobic mesh screen and into the pump cavity. When the programmed vacuum time expires, the system initiates the pressure timer cycle. During the pressure timer cycle, air is compressed into the air line tubing, evacuating the product from the pump. Once the programmed pressure time has expired the compressor shuts down and the system initiates the programmed delay timer. Upon expiration of the delay timer the process is repeated.

On multiple channel Sippers the vacuum, pressure, and delay cycles are set individually per well. This accommodates recharge and recovery rates unique to individual wells on the same site. A variety of timer setups can be implemented to maximize recovery. For example; different wells can be pumped more or less often than others to maximize recovery. The programming prioritizes the pumps so one pump is operational at a time.

The Sipper controller has several feedback data recording mechanisms that can be used to gauge effectiveness of the remediation system. Two cycle counter screens are available, one records the total lifetime cycles of the controller, the other counter is resettable by the user for monitoring purposes. These cycle counts can be compared with total recovered fluid to determine how much fluid is being recovered per pump cycle. There is also a runtime clock which only increments when the battery is charged and when the system is operating. This clock can be compared with actual recorded deployment time to determine if more solar panels are required to keep the system up and running. More on this can be found within the troubleshooting section of this manual.

The Solar Sipper Controller is dependent upon the annual average solar resources, which can vary from region to region. Geotech can assist in determining how much potential recovery can be expected depending on where the site is and how many solar panels will be required. More information about solar panel location can be found in Section 2.

Recovery Rates

The available solar energy and number of solar panels will determine how quickly available product can potentially be recovered. Recovery will ultimately be limited by the recharge rate of the product layer in the well. Repeatedly removing the entire product layer can reduce fluid conductivity to the well and in turn reduce recovery rates overall.

When the product layer is completely depleted, air is invited into the well screen and surrounding sub surface soil or strata. This air can act to block fluid conductivity as well as to promote bacteria growth and breakdown of the product being recovered. This will eventually ‘clog’ the fluid path to the well and so reduce the product layer recharge rate. Geotech recommends recovering smaller amounts of product more frequently. This will promote continued fluid conductivity to the well.

In the event that the intake screen, discharge line or check valve should get blocked, remove the Skimmer and clean the intake cartridge and connections as described within the System Maintenance Section of the Geotech Pump and Skimmer Assembly Manual.

Geotech offers a variety of tools and training to provide you with information on properly maintaining your Sipper system and on obtaining a recharge rate. Contact Geotech to discuss your specific application in detail.

Section 2: System Installation

The standard Geotech Sipper is designed for installation and operation in a non-hazardous, non-classified location with intrinsically safe extension into a hazardous classified location. Geotech does not determine classification of a location. Classification of location is subject to local jurisdiction enforcement of NFPA regulations. All installations should be performed in accordance with NEC.

FPN: NEC 2008 section 500.5 (A) classification of locations says:
Through the exercise of ingenuity in the layout of electrical installations for hazardous (classified) locations, it is frequently possible to locate much of the equipment in an unclassified location and, thus, to reduce the amount of special equipment required. FPNs are informational only and are not enforceable as requirements of the NEC.

Sipper installations are to be performed by qualified personnel. If you are not familiar with electrical power equipment, contact a qualified technician to assist you with your installation.

Solar Sipper systems can be modularized and delivered on pallets that can be quickly and easily deployed. This can simplify deployment where existing concrete pads or other infrastructure, which could serve as a mounting base for the equipment, do not already exist. It is more efficient to have the equipment ready for immediate deployment upon delivery. Geotech also offers training on proper installation of your Sipper system at its Denver, Colorado manufacturing headquarters.

Installation of the Solar Sipper

AC Sipper Controller - Ensure the main line is turned off at the breaker and that the ON/OFF switch for the control panel is in the OFF position before proceeding with ANY external or internal wiring.

Because the solar array and battery have live voltage, caution should be exercised when dealing with either item. Special attention is required to ensure that the correct polarity is observed when making connections to the battery and solar panels. Even though the system runs on a safe low voltage, the battery is capable of storing very large amounts of energy from a low impedance source. This can pose a fire and burn hazard.

Special care must be taken to avoid shorting out (making contact between both positive and negative terminals) the battery with any tool or bare grounding wire. Leave protective caps in place and only terminate a wire when you have verified it is the correct polarity (positive or negative.) The system can tolerate reverse polarity connections as long as the ON/OFF switch remains in the OFF position.

Solar Panel Location

The annual average solar resources will vary from region to region. Geotech can assist you in determining how much recovery you can expect (depending on where the site is located in the world) and how many solar panels will be required. The site latitude will determine seasonal differences in recovery rate. For example, in the northern hemisphere recovery rates will decline over the winter months and increase during the summer months.

Other location specific information must be considered as well. Large objects like trees or building structures can block sunlight from reaching the solar panels. In such cases the solar panels can be mounted atop poles or other available structures to maximize sun exposure. Other unpredictable factors, such as more or less cloud cover, must also be considered when estimating potential recovery rates.

Pick a location with a maximum exposure to sunlight. Avoid shadows, especially during the middle of the day. Orient the module so that the surface will receive the maximum sun exposure over the year for your particular site. The general guideline for positioning is as follows:

- Solar panels should face south in the northern hemisphere and north in the southern hemisphere.
- A solar panel's angle should be set to the equivalent of your location's latitude; plus 15 degrees during the winter or minus 15 degrees in the summer.

For example; Denver, Colorado's latitude is around 39 degrees. In winter the panel should be raised to 54 degrees (from 0°) for optimum sun. For permanent installations, setting the panel angle equal to your latitude will suffice.

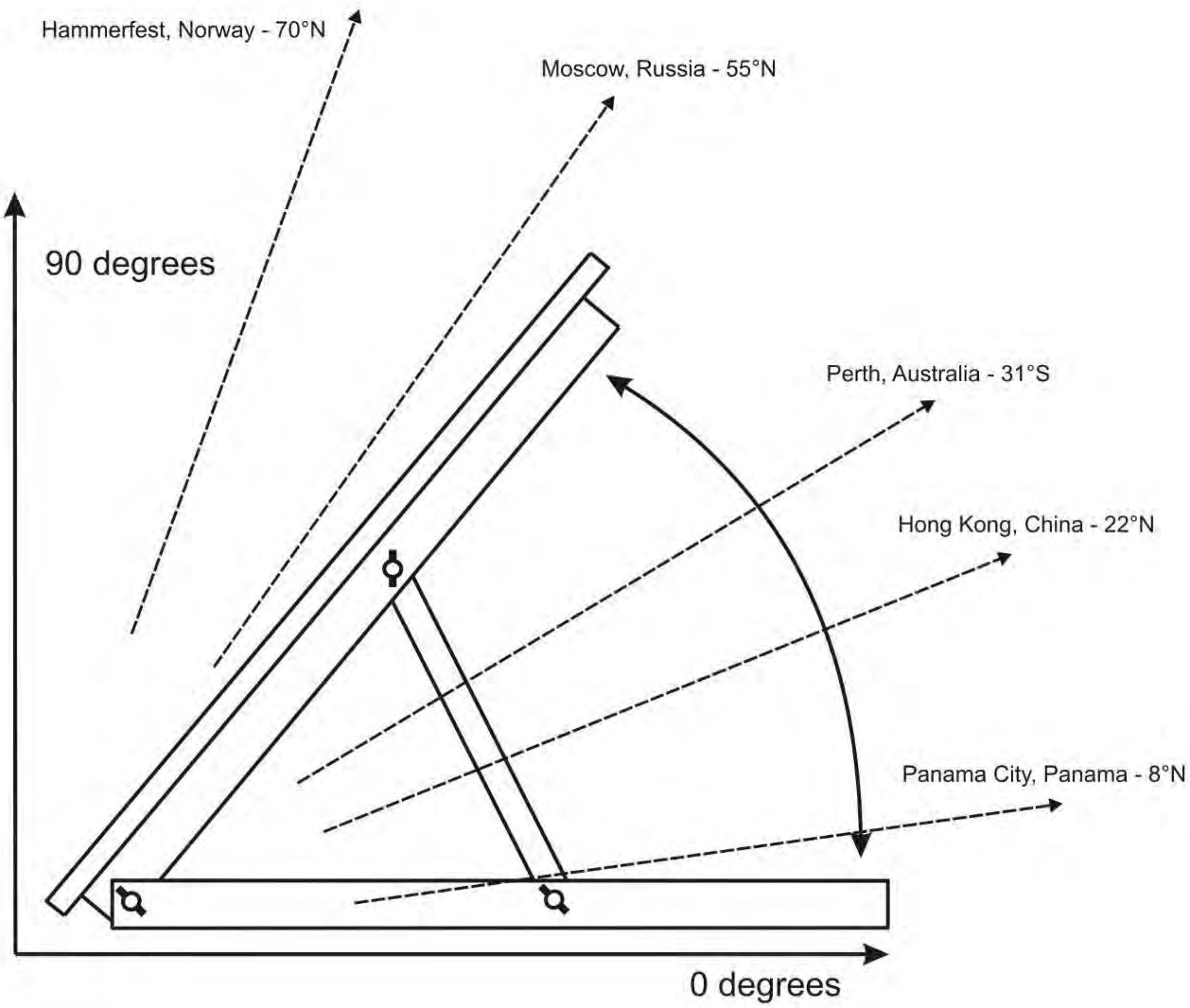


Figure 2-1 – Side view of solar panel assembly.

Mounting the Control Panel

The enclosure for the Solar Sipper allows the customer the option to place the control panel in a convenient and accessible location. If possible, it is recommended the control panel enclosure be placed out of the direct path of weather and sun light whenever possible. If power is to be plumbed to the enclosure, then all conduit runs are to be rigid metal and grounded to an equipment conductor common for non-current carrying metal parts.

The enclosure also needs to be elevated above the height of the well heads to prevent kinks to the exhaust line and the various air lines to the pumps. When selecting a location for your Sipper controller, consider the placement of air lines to and from the unit to prevent kinks, damage, or the buildup of fluid in sagging lines.

Figure 2-2 is an example of a Sipper control panel mounted to a back panel with 2" u-bolts. Using a back panel will support the enclosure while giving you the ability to pole mount the unit.

NEVER drill mounting holes from, or through the inside of the enclosure when attaching the controller to another surface. It is advised that you mount the enclosure to a strong back panel, using the brackets supplied, before attaching the unit to a pole or other surface.

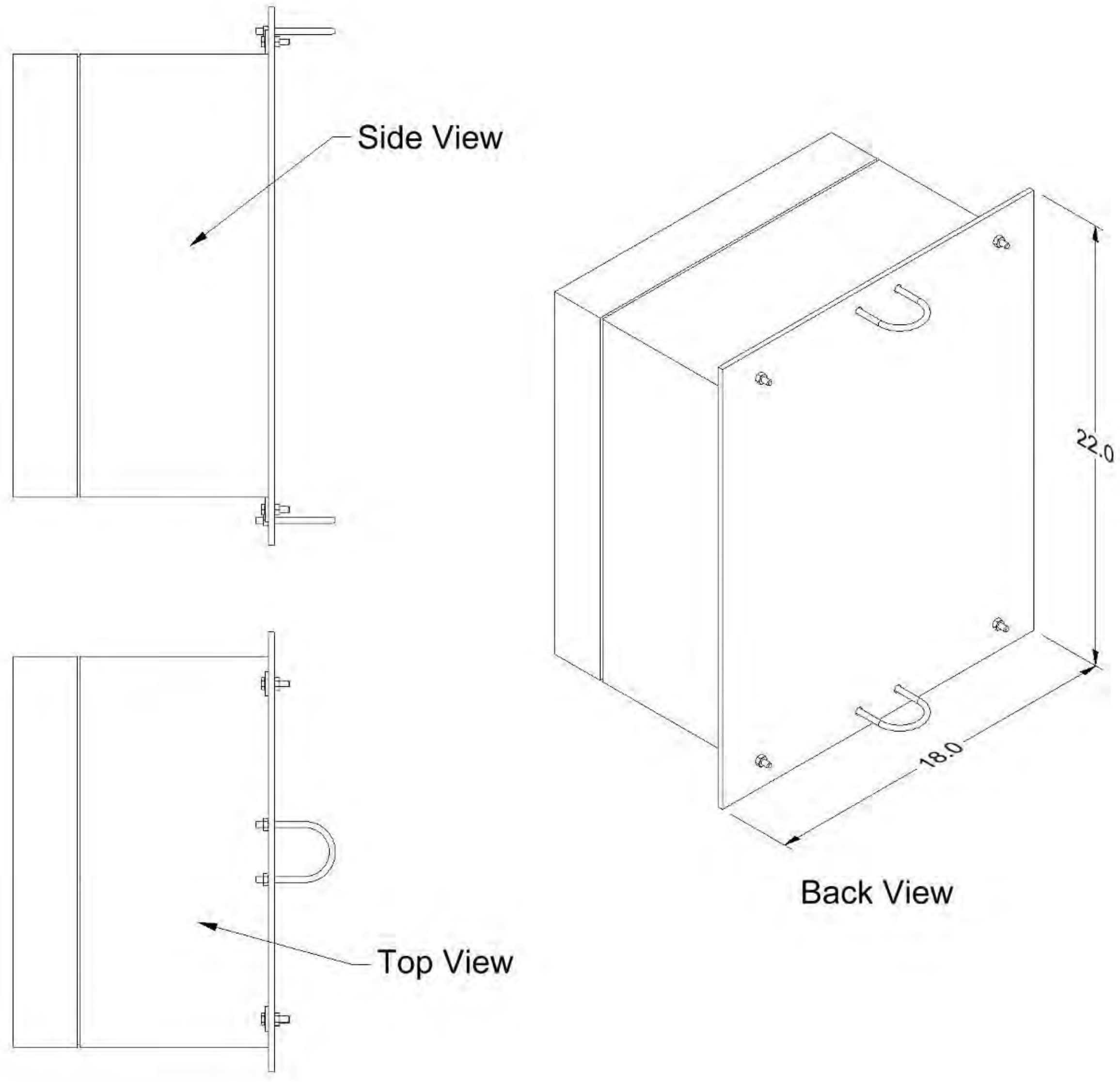


Figure 2-2 – Example of Sipper enclosure mounted to back panel with additional u-bolts for pole attachment.

Diagram is an example only. Mounting hardware shown is available through Geotech – see Section 9: Parts and Accessories . Always avoid drilling through the enclosure body.

Solar Sipper Wiring

A full size, internal wiring diagram accompanies new Sipper controllers when delivered (pg. 39 or 40). Also, operational flow charts are affixed to the inside door of each controller (pg. 22). Contact Geotech for a replacement wiring diagram as

Before installing the solar panel for the Solar Sipper controller, cover the array with an opaque material before making your wiring connections. This will prevent the modules from producing electricity while making the connections and reduce the risk of sparks. Observe safe electrical practices at all times. Make connections in well-ventilated areas free from flammable gas vapors and open flames.

Solar Sipper systems are supplied with 25 feet of 4 conductor 14 AWG cable. DO NOT extend or add to the length of this power cable. After ensuring the power switch on the controller is set to OFF, make all external power connections as shown in Figure 2-3.

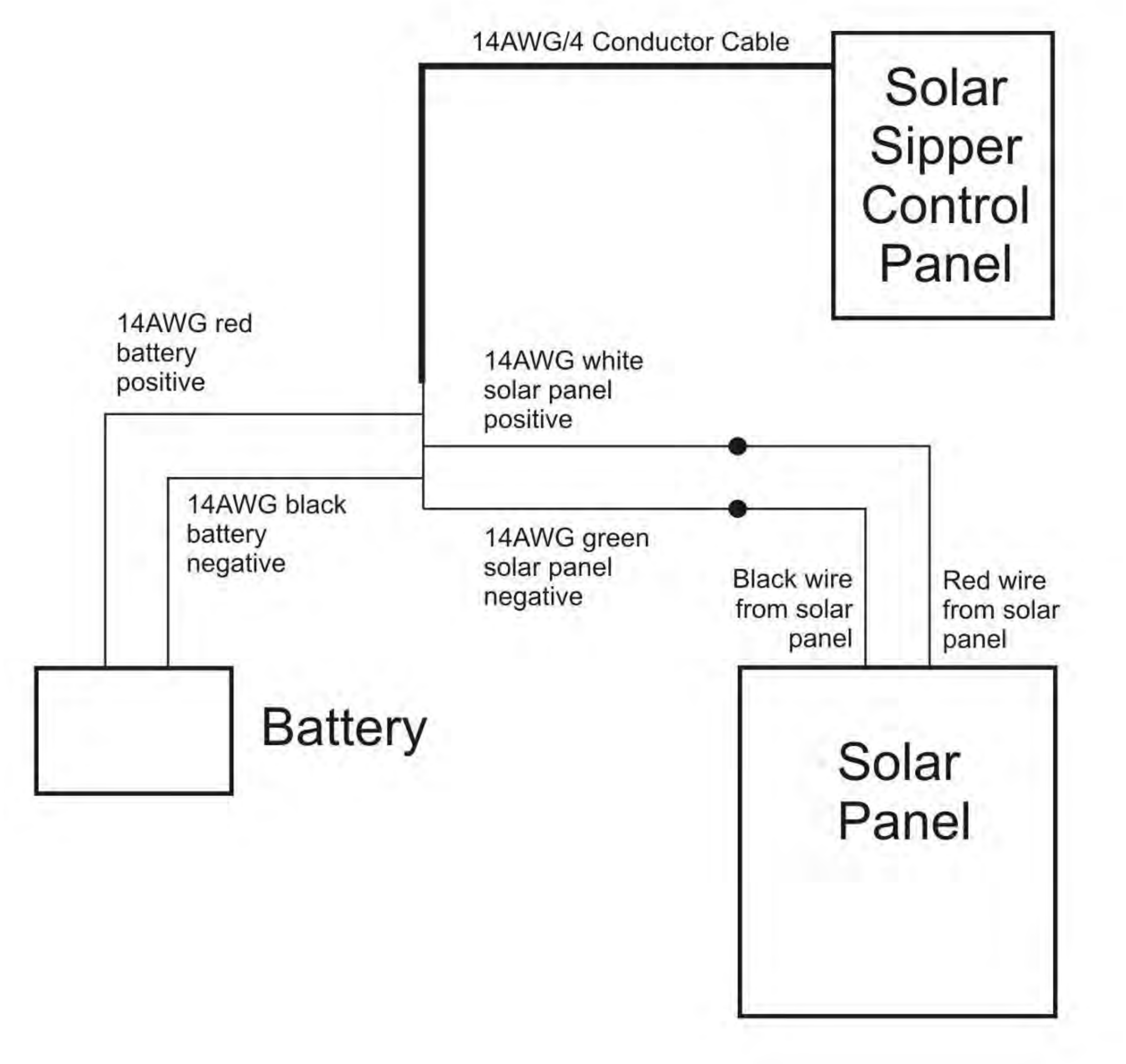


Figure 2-3 – Example of external wiring for a Solar Sipper system.

A brand new or replacement battery may not be fully charged. This will cause the Solar Sipper to go into low voltage shutdown when initially powered up. Allowing the battery to fully charge before deployment will accelerate initial startup. Otherwise, the system could take several days to begin operating depending on the number of solar panels used and the amount of sun exposure. If freeze conditions exist, insulate your battery. A frozen battery will not charge until it is thawed. See Section 3 for minimum voltage requirements.

Adding Additional Panels

During the winter months when the sunlight decreases, additional solar panels can easily be added to the Solar Sipper system. The addition of one or two more panels will boost production during the winter months, with fewer hours of sunlight, and the excess energy will not be used in the summer. As a general guideline, up to 4 – 80W panels may be connected to the Solar Sipper System.

To wire an additional panel to the system configuration, use the wiring diagram shown in Figure 2-3. Using insulated wire nuts, connect all red wires (positive) from the solar panel(s) to the white wire on the Sipper controller, then connect all black wires (negative) from the solar panel to the green wire on the Sipper controller.

AC Sipper Wiring

AC Sipper systems are supplied with 25 feet of 3 conductor 12 AWG cable. DO NOT extend or add to the length of this power cord. After ensuring that the power switch is set to OFF, make the power connections using the following wiring diagram:

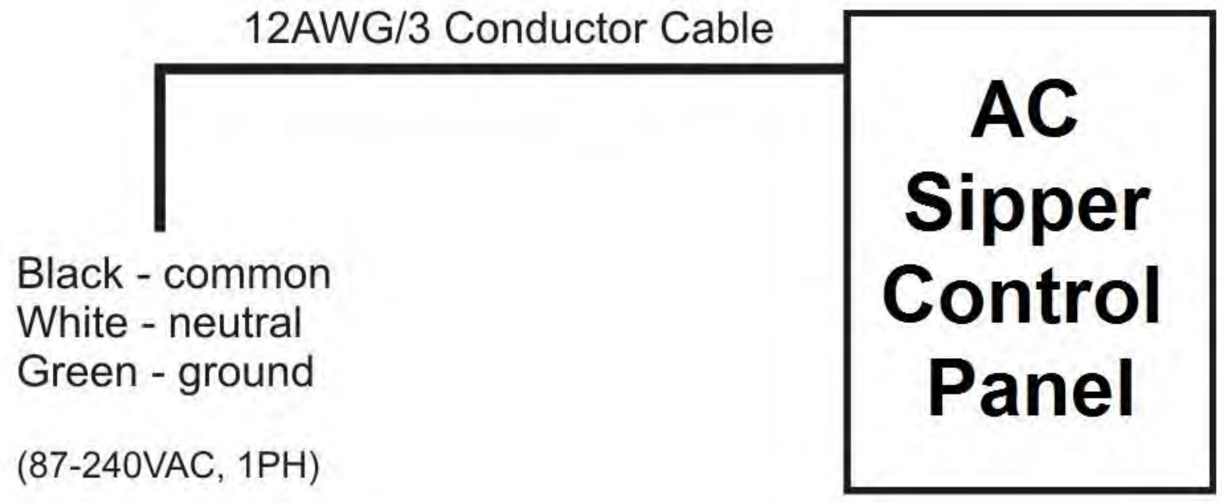


Figure 2-4 – Example of external wiring for a AC Sipper system.

Dangerous shock and fire hazard will exist with any line/mains voltage wiring termination. Sipper installations are to be performed by qualified personnel. If you are not familiar with electrical power equipment, contact a qualified electrician to assist you with your installation.

Always double-check that live voltage is not present at terminals to be worked on. Shut off all circuit breakers and disconnects and use a volt meter or voltage detector to verify power has been removed. Verify the meter is functional by turning the power on and off once or twice before proceeding. Only proceed wiring to AC power terminals when you are certain it is safe.

Grounding

If no earth ground terminal is available, then a ground spike must be installed. Connect all non-current carrying metal parts to the common ground. An earth ground terminal can be purchased from Geotech with your Sipper. See Section 9 for a complete listing of available accessories.

Connect All Tubing Runs

Lay out all tubing lengths to the well heads and secure the ends to the hose barbs using adequate clamps. Geotech can supply your Sipper system with a variety of tubing and clamp choices. See Section 9 for a list of available parts.

When installing your tubing runs, DO NOT hang or situate air lines in such a way that they are left sagging with low points in which fluid can collect. Avoid sharp bends which can kink your line.

It is recommended that air lines and hoses be protected. Conduit or PVC pipe can provide protection. However, check local and state regulations regarding fuel transmission lines before installing the product discharge lines.

If there is a chance the Sipper system will be exposed to freezing conditions (see temperature range in Section 7, System Specifications), then it is suggested all discharge lines, including the battery, be insulated or your system be kept within a temperature controlled shelter during operation.

The last line connected will be from the compressor air intake and exhaust port, on the side of the Sipper controller, to the top of the recovery tank. The Sipper controller will use this line as an air source and as a failsafe should product be vacuumed into the compressor and solenoids.

Deploy the Stainless Steel Pump and Skimmer

Read User Manual “Geotech Pump and Skimmer Assembly” (P/N 16550181) for more information on Skimmers, their parts, and functions.

The oleophilic/hydrophobic mesh screen discriminates between water and product when it is properly “conditioned”. To condition (or prime) a cartridge, use a soft brush and coat the mesh screen with the same or a like product found in the well. DO NOT use baby oil, lamp oil or other similar dyed, perfumed or hydrogenated oils.

Special care must be taken not to damage the float or screened intake before or during deployment. Use a scrap piece of plywood or card board (something that can be properly disposed of if contaminated) on which to set the pump and Skimmer assembly on instead of the ground.

Good site characterization is important for successfully placing the pump and Skimmer assembly at the optimal level in the well. If seasonal or tidal fluctuations in the groundwater table exceed the travel of the Skimmer, periodic manual adjustment may be required. Otherwise, and in most cases, the Skimmer should be placed such that its center of travel is at the nominal ground water level (refer to Figures 8-1 and 8-2.) If the groundwater table level is unknown, Geotech can provide you with an oil/water interface probe to determine the current water level and product layer thickness. Contact Geotech for more information on this important device for site characterization.

Using a separate measuring tape, measure from the middle of the center rod on the Skimmer (also the center of vertical travel of the Skimmer intake float) to where the discharge tubing will exit the well cap. Using contrasting tape or chalk, mark the discharge tubing at this point. The lower end of the Skimmer assembly will displace fluid in the well causing the fluid level to rise initially. The float travel will accommodate this rise in fluid level. The fluid level will take some time to return to normal depending on permeability/hydraulic conductivity of the formation surrounding the well.

Read User Manual “Geotech Pump and Skimmer Assembly” (P/N 16550181) for more information on Skimmer operation, float travel, and other dimensions.

In some cases the initial displacement of fluid can ‘displace’ the product layer from the well and back into the formation. This can happen especially where there is low fluid conductivity surrounding the well. It’s best to trust the site characterization data and test with a Geotech oil/water interface probe to verify that the float is at the expected level within the well. If you cannot access an oil/water interface probe, or are deploying pumps in a 2” well without enough clearance for the probe, you can judge productivity by how much product is in the recovery tank.

Simply guessing or feeling for placement of the Skimmer within the well column is a recipe for failure. Use a Geotech oil/water interface probe to measure water level and product layer thickness, then record this information to your remediation/characterization log.

Implementing the use of a Geotech oil/water interface probe and keeping a record of the water level and product layer thickness is recommended for maintaining optimal system performance.

Product Recovery Tank

A product recovery tank is not provided with the Solar Sipper system. A tank, preferably a 55 gallon drum or larger, must be provided by the customer with the following attributes:

- A ¾” or 2” threaded bung opening in which the Tankfull probe will be attached.
- A product inlet opening for the system discharge hose.
- A vent opening.
- A fluid discharge fitting for draining.

A Tankfull probe, shown in Figure 2-5, is provided with new Solar Sipper systems. Additional probes can be ordered from Geotech. See Section 9, Parts and Accessories.

Ensure that the compressor air intake and exhaust air line is secured to the top of the recovery tank prior to turning on the Sipper controller. Do not allow the end of this tubing to reach the product already collected.

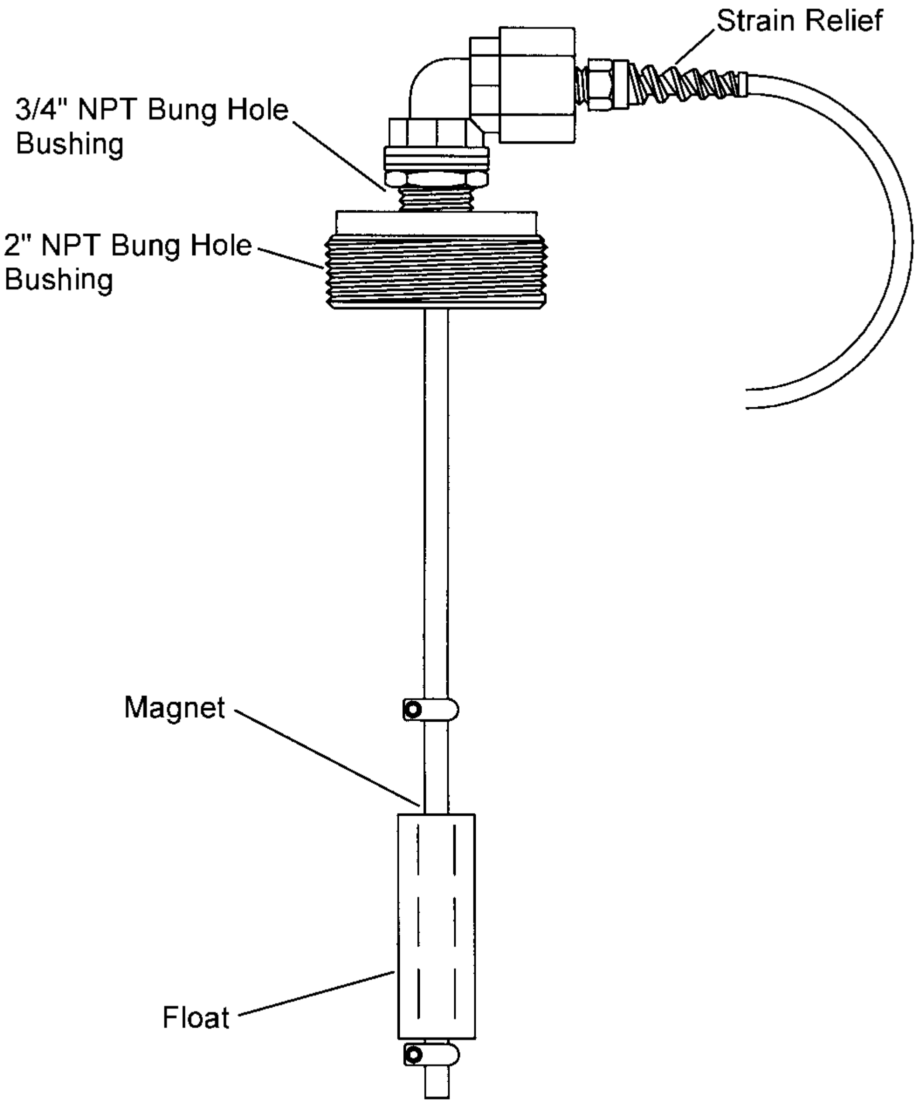


Figure 2-5 – Example of Tankfull Probe

Section 3: Timer/Cycle Settings and Display Descriptions

This section describes the display functions and the operation of the Sipper controller. Each controller comes with a User Interface Flowchart (shown in Figure 3-1) inside the enclosure lid. The flowchart, used in conjunction with the arrow buttons on the control panel (shown in Figure 3-2) is designed to provide the following operator functions:

- Setting the cycle time (vacuum, pressure, and delay) for each pump and Skimmer assembly.
- Initiating the run time for Sipper system.
- Accessing system status and diagnostic displays.

The following pages show examples of all controller displays and a brief description of their function. Contact Geotech Technical Sales for any assistance in operating your Sipper controller.

Setup Displays

Once the Sipper system has been installed and all wiring to the controller is complete, turn on the main power switch to the Sipper controller. The unit will perform a quick internal self check and memory configuration, after which the Main Menu will appear on the display as follows:

```
Geotech Sipper
L=Setup  R=Start
```

If the internal self check fails then the screen will display the appropriate alarm condition. See Alarm (condition) and Fault Displays on page 21.

The first task will be to set your timer/cycle settings using the Setup displays. The Setup displays allow you to select each pump individually and assign a unique cycle time (vacuum, pressure, and delay) for the pump based on the performance of the well it resides. (See Section 4 on System Operation for more information on evaluating the appropriate cycle time.) The cycle time range for each function is as follows:

Vacuum	0 second minimum to a 30 second maximum.
Pressure	30 second minimum to a 4 minute maximum.
Delay	30 second minimum to a maximum of 24 hours.

Factory default for all timer settings, for each pump installed, are: 1 second of vacuum, 30 seconds of pressure, 5 minutes of delay.
Please set timers based on site requirements.

To access the Setup displays, press the left arrow button. The following display will appear:

```
Select Well
n  L=Main Menu
```

where n = the well number

Using the up and down arrow buttons, select the well number for which cycle time you wish to set (the number of wells per Sipper controller can be between 1 and 8, depending on the configuration.) After selecting a well number, press the right arrow. The Vacuum display will appear:

```
Set Vacuum mm:ss
00:10
```

Using the up and down arrow buttons, scroll to the time required for the vacuum phase of the cycle, then press the right arrow button. The Pressure display will appear:

```
Set Pres   mm:ss
00:30
```

Using the up and down arrow buttons, scroll to the time required for the pressure phase of the cycle, then press the right arrow button. The Delay display will appear:

```
Set Del hh:mm:ss
00:05:00
```

Using the up and down arrow buttons, scroll to the time required for the delay time of the cycle, then press the right arrow button one more time. The system will return you to the Select Well display from which you can set the cycle time for any remaining wells.

If the left arrow button is pressed at any time while setting the vacuum, pressure, and delay times, the new or adjusted setting entered will not be retained. To lock in the cycle time entered, press the right arrow button.

After all cycle times have been entered, press the left arrow button (while on the Select Well display) to return to the Main Menu.

Start (Runtime) Displays

The Start (Runtime) displays allow you to:

- Reset the cycle count and runtime (see also “Runtime” display under System Status).
- Turn ON/OFF the low temperature shutoff.
- Set the well number to start pumping with.
- Start and activate the preset cycle times for all the pumps attached.

Once the Sipper has been started (Runtime activated for all pumps), you can do one of two things:

- Press the down arrow button (to review and page through the System Status displays).
- Press the left arrow button (which will complete the current pump’s cycle time, then return you to the Main Menu).

To start the Solar Sipper and activate the runtime to all pumps attached, proceed as follows:

From the Main Menu, press the right arrow button. The following display will appear:

```
Reset Timer?
     YES
```

The Reset Timer display allows you to clear the cycle count and runtime shown in both the system Runtime and the Status Runtime displays. Use the up and down arrow buttons to change this setting to YES or NO then press the right arrow button for the next screen.

```
Low Temp ShutOff
     OFF
```

The Low Temp Shutoff display (when enabled), will shutdown the Sipper controller at 0°C (32°F). Since the Sipper system primarily operates above ground, this feature prevents the controller from operating during a time when product lines could freeze. The Sipper will automatically restart at a temperature of 3.3°C (38°F). Use the up and down arrow buttons to change this setting to ON or OFF.

```
Start with Well
     n
```

Where n = the number of well (between 1 and 8).

The Start with Well display allows the user to choose the well to pump first upon startup. The well number selection is limited by the number of channels in use. Use the up and down arrow buttons to change the well number to start with.

The Sipper system is now ready for Start up (Runtime). However, before proceeding, thoroughly read Section 4 on System Operation to better understand the required timer adjustments needed for the product being recovered.

Once all cycle times have been entered and the previous three screens have been entered, press the right arrow button one more time to start the Sipper. The Sipper controller will begin cycling the first pump in the series and give you the following Runtime display:

```
00:00:00      nn
0000:00:00:00 wf
```

Where nn = the total number of cycles since activation (1 to 99999)
w = the well number currently activated
f = the pump function currently in progress (V for vacuum, P for pressure, D for Delay)

After verifying all pumps are running, you can re-verify the System Status at any time by pressing the down arrow button during operation. After viewing the status displays, leave the last display as is and the system will automatically return to the Runtime display.

Stopping Sipper Operation (Runtime)

If further adjustments are needed to the cycle time of a particular pump or when the Sipper controller needs to be shut down, press the left arrow button once during the Runtime mode. If the Sipper is currently in the middle of a pump's cycle time, it will give you the following display:

```
Please wait for
Main Menu mm:ss
```

This display will show how much time is left with the current well. Once the pressure phase of the cycle completes, the unit will stop all processes and display the Main Menu. Further adjustments can then be made to the pump cycle times, information retrieved from the Status Displays, or the unit can be turned off for service.

System Status and Diagnostic Displays

The value “nn” within this section can represent a count anywhere from 1 to 99999.

While at the Main Menu, system Status Displays can be viewed by pressing the up and down arrow buttons. These displays contain a variety of information which can be used to record important activity to your Solar Sipper system. These displays can also be viewed during the system’s Runtime by pressing the up or down arrow buttons at any time during operation. After viewing a status display, leave the system as is. Within 20 seconds the Main Menu (or Runtime display) will reappear.

The following status displays (as shown on the Interface Flowchart) will appear with each press of the down arrow button. The following pages will show you an example of each status display (as they appear) followed by a definition and use of the display.

```
Runtime: nn
0000:00:00:00
```

The Runtime display shows the number of completed cycles (for all pumps attached) along with the total runtime of the Sipper system since the controller was last reset. These values can be cleared with the Reset Timer display during initial startup.

```
Lifetime: nn
0000:00:00:00
```

The Lifetime display shows the total number of completed cycles (for all pumps attached) along with the total runtime of the Sipper system since the unit was first put into service. Lifetime values cannot be cleared. Many of the status displays will retrieve their time stamps from this display when something occurs, such as the last time there was a low battery, the last time a tankfull alarm was activated, the last time a low temp shutoff occurred, etc.

```
Well n Delay:
hh:mm:ss
```

Where n = the Delay time for the well number shown (between 1 and 8) followed by the time.

The Well Delay display shows how much delay time is left for each well assigned to the Sipper. Use the down arrow button to page through all eight displays. Channels not in use will have a display value of 0.

```
Power Ons: nn
0000:00:00:00
```

The Power Ons display shows the total number of times the unit has been powered ON/OFF (since being put into service) along with a time record of when the unit was last powered on.

```
Tankfulls: nn
0000:00:00:00
```

The Tankfulls display shows the total number of times the tankfull alarm has been activated (since being put into service), due to a full recovery tank, along with a time record of when the unit last had a tankfull alarm. This display can be used to determine how long it takes the recovery tank to fill or if a larger tank is required.

```
Low Batts: nn
0000:00:00:00
```

The Low Batts display shows the total number of times the unit has experienced a low battery condition (since being put into service) along with a time record of when the unit last had a low battery condition. This display can help in evaluating battery usage (in comparison to how much product is being recovered) showing the need for either a cycle adjustment or the need for additional solar panels. It can also help in determining if the battery is losing its ability to maintain a charge.

The Solar Sipper controller is designed to shut itself down when the battery voltage reaches 11.4V and will resume operation when the battery charge reaches 12.1V. The Solar Sipper is designed to charge the battery to a maximum of 14.5V. The system will also display a low battery condition when the battery becomes frozen. Allow the battery to thaw prior to re-charging.

```
Low Temps: nn
0000:00:00:00
```

The Low Temps display (when Low Temp Shutoff is enabled during the Start up process) shows the total number of times the unit has experienced a low temperature condition (since being put into service) along with a time record of when the unit last had a low temperature condition. A low temperature shutoff (when enabled) will occur at 0°C (32°F).

```
Temperature:
nnC  xxx
```

The Temperature display shows the current temperature of the unit in Celsius followed by a diagnostic number.

```
Battery Voltage:
nn.nV  xxxx
```

The Battery Voltage display shows the current battery voltage for the Sipper system followed by a diagnostic number.

```
Ver: v.v  Wls: n
ID: iii  SS: sss
```

This final display contains the following information for the Sipper controller:

Where v.v = software version
n = number of wells for which the unit was designed (1 thru 8)
iii = controller ID
SS = Signal Strength (used on wireless Sippers)
sss = signal strength in a numeric value (used on wireless Sippers)

Alarm (Condition) and Fault Displays

Besides low battery, low temperature, a blown fuse, or no battery connection, only a few other conditions will cause the Sipper controller to shut down. The following display alarms will require attention from the user before the system can be restarted:

```
TANKFULL
L=Main Menu
```

The TANKFULL display will appear when the recovery tank becomes full or when there is damage to the tankfull probe cable. When this display appears the Sipper controller will stop all activity until the alarm is addressed. To clear the alarm and restart the Sipper controller, press the left arrow button (to obtain the Main Menu), then initiate the Start up process.

```
INTAKE OVERRIDE
L=Main Menu
```

The INTAKE OVERRIDE display will appear when the float on the Intake Float Switch (located on the side of the control box) rises. This will usually happen when product is pulled through the air line from the well (due to an excessive vacuum time or when a directional solenoid becomes stuck on the compressor) or from an accumulation of moisture during operation. See Section 6, Trouble Shooting procedures, for information on resolving an Intake Float Switch alarm.

When the INTAKE OVERRIDE display appears, the Sipper controller will stop all activity until the alarm is addressed. After draining the Intake Float Switch and clearing all effected lines, clear the alarm and restart the Sipper controller by pressing the left arrow button (to obtain the Main Menu), then initiate the Start up process.

You may also need to clear the air line by setting the vacuum to 0 and allowing the pressure cycle to push any residual fluid out of the line and into the pump reservoir. See Section 6, Trouble Shooting, for more information.

```
Battery Fault
Check Cables
```

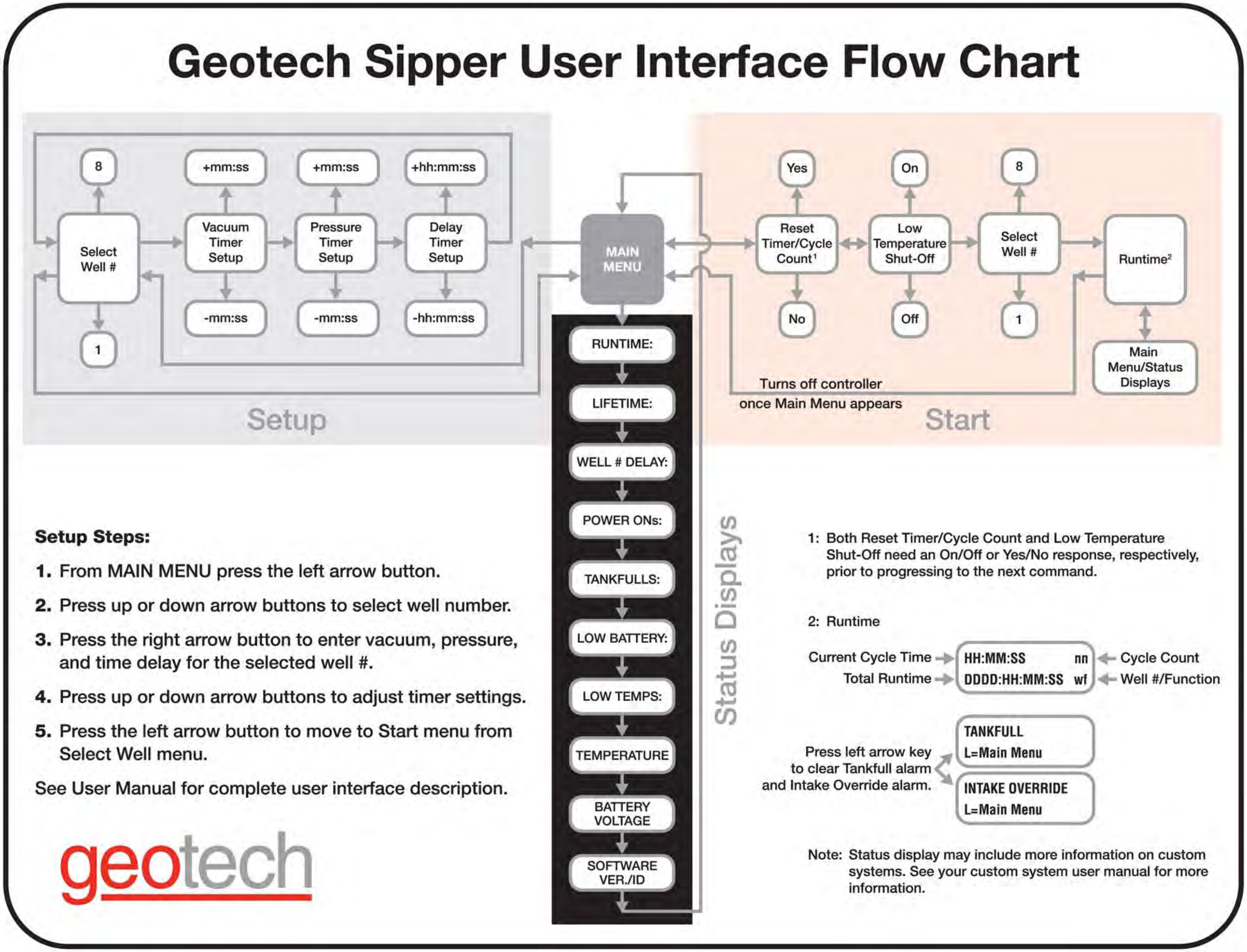
The Battery Fault display will appear when the voltage on the battery cables is 14.7VDC or greater. This may occur if the solar panel has been miss-wired to the battery input cables. This display will also appear if an overcharged battery has been installed. In any case, when this display is shown, turn the unit off and disconnect all voltage sources immediately. Review Solar Sipper Wiring on page 11. Contact Geotech with any questions on wiring and installation.

PCB Damage

On rare occasions the following display may appear:

```
Bad display val:
```

The Bad Display Value message will only appear when damage has occurred to the PCB within the Sipper controller. Should this display appear, contact Geotech about the fault. Inform the Geotech Technical Sales Representative of all conditions (weather, temperature, vibration, etc.) and when the fault occurred. A fault message of this kind will usually require the unit be sent to Geotech for diagnostics and repair.



Geotech Sipper User Interface Flow Chart

Setup Steps:

1. From MAIN MENU press the left arrow button.
2. Press up or down arrow buttons to select well number.
3. Press the right arrow button to enter vacuum, pressure, and time delay for the selected well #.
4. Press up or down arrow buttons to adjust timer settings.
5. Press the left arrow button to move to Start menu from Select Well menu.

See User Manual for complete user interface description.

1: Both Reset Timer/Cycle Count and Low Temperature Shut-Off need an On/Off or Yes/No response, respectively, prior to progressing to the next command.

2: Runtime

Note: Status display may include more information on custom systems. See your custom system user manual for more information.

Figure 3-1 – Flowchart of User Interface Label

Figure 3-2 – Example of Solar Sipper front panel.

Section 4: System Operation

If Sipper system is to be deployed in humid conditions, it is recommended to install the optional Desiccant Dryer to prevent frequent solenoid maintenance. See Section 9: Parts and Accessories for part information.

Establishing the Product Recovery Cycle Time

The first thing to consider will be a product recovery rate target. The maximum product amount that can be recovered is determined by the recharge rate of each individual well. You can size and adjust your system for optimal recovery rate potential based on the parameters obtained from the well.

The best measure of success is the average measured recovery of fluid in the recovery tank, over a specific time frame, compared to the recovery rate target. Due to seasonal and weather related variability in available solar energy it may be very difficult to schedule site visits to coincide with the system pumping product. If observation of the system in action is desired, schedule a visit in the mid afternoon. Otherwise, record your cycle counter value and total run time and compare these with the amount of product recovered.

The vacuum cycle pulls the product into the pump housing. The system compressor will then switch to pressure mode. The compressor is capable of providing up to 100 PSIG pressure to the pump and the discharge line. The pressure cycle pushes the intake valve shut and forces the product past the discharge valve and up the discharge line to the surface.

It is important that you verify that all product is being pushed out of the pump housing before the next vacuum cycle begins. If the vacuum time interval is set too long, or the pressure cycle set for too short of a period, it is possible for the pump to overfill and for the product to be pulled up the air line and into the Intake Float Switch. If this happens, set the vacuum time back to 0 seconds and the pressure to 30 seconds and evacuate all the fluid from the float switch housing. After the system is clear of excess fluid, try setting the vacuum time to a lower setting and increase your pressure time to a higher setting for better operation. It’s better to start with a higher pressure and lower vacuum setting and adjust over time.

The standard stainless steel pump is capable of holding .2 gallons (750 ml) or 46 cubic inches of fluid per cycle. That translates into over 14 inches of product layer in a 2 inch well and about 3.5 inches of product layer in a 4” well. This represents the minimum product layer thickness required to achieve one full pump housing of product per cycle. Even if there is that much product in the well, it is not advisable to pump the product layer all the way down. See Recovery Rates (pg. 6) in Section 1 for further explanation.

Initiating the Sipper Runtime

Once Runtime has been started, the Solar Sipper system will initiate the vacuum cycle for well number one (or whichever well is selected to start), complete that well's cycle, then continue on through any remaining wells as per the individual user input settings.

The vacuum timer limits are 0 seconds minimum, 30 second maximum.
The pressure timer limits are 30 seconds minimum, 4 minutes maximum.
Custom timer settings outside of these min/max parameters can be adjusted through restricted access menus (contact Geotech for more information.) Timer settings outside of the default min/max warrant special consideration to avoid damage to the equipment and otherwise unsatisfactory performance of the system.

As mentioned before, the amount of product per cycle will depend on how much product is in the well. Also, depending on the viscosity of the fluid and temperature, the product layer could have a somewhat slower recharge rate. This can make it difficult to determine what the best cycle times should be for a particular site.

If you have a less than one gallon per hour recharge rate, then simply increase the delay time proportionally. For example; if your product recharge rate is ½ gallon per hour, double the delay time.

- After you account for more or less recharge rate, you can account for additional tubing and depth to fluid.
- Add 2 seconds per 25 feet of tubing for vacuum and 3 seconds per 25 feet of tubing for pressure.
- Add an additional 2 seconds per 25 feet depth to product vacuum (the product only needs to be lifted at most to the top of the pump housing).
- Add an additional 3 seconds per 25 feet depth to product pressure to start. You will have to adjust this setting to account to the specific viscosity of the product and the amount of product in the discharge tubing.

It is tempting to want to see product at the recovery tank end of the discharge tube but it is not necessary to empty the entire length of discharge tubing per cycle. It will be a waste of energy to pump air through the lines when it isn't acting to move product. If you observe air flow from the discharge line after the product has stopped flowing, reduce your pressure time by approximately the same amount of time as the extra air flow.

Example: You have a pressure time of 50 seconds; it takes 20 seconds for product to reach the exit end of the discharge tube, product flows for only 20 seconds then air flows freely for 10 seconds. You can reduce your pressure time by 10 seconds. That's an immediate 20% reduction in pressure time. This will increase your battery life and, in turn, improve your recovery potential.

Fluid Viscosity

The following chart has been compiled based on lab testing as well as real world Sipper deployments. It is impossible to account for the many site specific variables in this manual. If you have a higher recharge rate and require higher production rates than those shown below, then please contact Geotech so that we can determine if more solar panels or batteries are necessary. In some cases, such as in the southwest United States, the standard Solar Sipper can easily outperform the rates shown in the following chart.

The viscosity range shown is based on an average ground water temperature of 50° to 70° F.

Depth to Fluid (feet)	Intake Type	Air Line Length (feet)	Product Weight/ Viscosity (SSU) @ 70° F	Product Recharge Rate (GPH)	Vacuum Time (mm:ss)	Pressure Time (mm:ss)	Delay Time (hh:mm:ss)
10	100 mesh	25	Gasoline - Light/27.7	1	0:00:15	0:00:30	0:11:00
10	100 mesh	25	Transformer Oil - Light/80	2	0:00:15	0:00:30	0:05:00
10	60 mesh	25	No. 4 Fuel Oil - Medium/170	1	0:00:30	0:01:00	0:11:00
10	60 mesh	25	Hydraulic Oil - Medium/200	2	0:00:30	0:01:00	0:05:00
10	Heavy oil	25	SAE 30 Oil - Heavy/1000	1	0:01:30*	0:03:00*	0:11:00
10	Heavy oil	25	SAE 50 Oil - Heavy/3000	2	0:01:30*	0:03:00*	0:05:00

*Contact Geotech for instructions on how to enable timer settings beyond the standard limits. The standard limits are in place to protect against accidentally setting vacuum or pressure times that could reduce system up time and potentially damage the equipment.

Recovery Tank is Full

When the tankfull probe detects a full recovery tank, the Sipper will complete the current cycle before shutting the Sipper controller off. The following message will appear:

```
TANKFULL
L=Main Menu
```

During this time the unit will continue to charge the battery, and if enabled, monitor the temperature. Once the recovery tank is emptied, press the left arrow button for the Main Menu and restart the unit as described in the beginning of Section 3.

Section 5: System Maintenance

Sipper controllers must be returned to Geotech for internal repairs or service.

Sipper Controller

Weekly Maintenance

- Turn the Sipper controller off and drain the Intake Float Switch (if needed).
- Record the level of the recovery tank (depending on the recovery rate).
- Visually inspect all air lines and power cords for damage.

Monthly Maintenance

- Rinse debris off the solar panel with clean water – DO NOT use anything abrasive on the panel surface. Clean the front surface of the solar panel and controller enclosure as needed with mild soap and water and a soft cloth.
- Inspect the product pump and Skimmer. Visually inspect the Skimmer, making sure that the coiled hose is not tangled and that the intake assembly moves freely over its travel range.
- Inspect the Intake Float Switch assembly and clean it as needed using the methods described within your Geotech Pump and Skimmer Assembly User Manual.
- Visually inspect the vent plugs in the bottom of the controller enclosure. Clean if obstructed with debris.
- Record the uptime counter from the Lifetime display monthly during the first year. This information can be used to schedule yearly maintenance for the least productive times of the year (due to local variations in the weather and solar exposure).
- Record the level of the recovery tank (depending on the recovery rate).
- Check to see if wildlife (insects, birds, mice, etc.) have not taken up residence in the controller or battery enclosures. Nests and debris can result in vent plug blockage in the battery box, allowing hazardous and explosive gas to build up. Build-up on the controls can result in overheating the electronics and possible failure of components.
- Verify fluid levels in the well using a Geotech Interface Probe. Make sure the pump and Skimmer are set at the correct interval for collection of product.
- Verify pump vacuum, pressure, and delay settings. Make sure the cycling rate of the system is correct for the amount of product available. If the well is slow to recharge and/or there is only a small volume of product to pump, the pumping rate should be decreased to conserve air and minimize controller and battery wear. Consult Geotech Technical Sales and this User Manual for guidance on how to properly set these times. DO NOT adjust if unsure.
- If using the optional Desiccant Dryer for the Sipper system, check the saturation of the desiccant packs and replace packs if necessary.

Quarterly Maintenance

- Verify fluid (or air flow if no product in the well) is being discharged into the recovery tank to ensure pump check valves and tubing are free from blockage and that the discharge hose is not kinked or cut.
- Verify that the Tankfull and Intake Switch floats move freely and operate to shut off the Sipper controller when activated.

- Inspect the exterior of the controller for loose fittings. Over time, vibration may cause some fittings to loosen and air leaks to develop. If uncorrected, excess air consumption and shortened controller life will result.
- Verify that your solar panel is correctly positioned for maximum sunlight. Panels can be out of place from either the wind, shade from tall structures near the panel, or sun position due to the time of the year.

Yearly Maintenance

- Turn off Sipper controller.
- Remove and test the battery. Replace it if needed.
- Replace the inline particle filters on the air lines if needed.
- Contact Geotech for solar panel warranty confirmation and extension.

For technical assistance, call Geotech Environmental Equipment, Inc. at 1-800-833-7958.

Stainless Steel Pump and Skimmer

In order to provide a full and long service life, keep the Skimmer intake cartridge clear of debris or bio growth. The floating intake cartridge on the Skimmer is the heart of the Sipper system. Therefore, the intake cartridge (oleophilic/hydrophobic screen, float, float shaft, flexible intake hose and clamps) should receive periodic thorough inspections. The floating height of the intake screen should always stay above the waterline. The intake cartridge screen will not pass water unless:

1. The intake cartridge has risen to the top of its travel allowing water to rise above the top of the cartridge (thus indicating that the system should be raised to a height at which the intake is floating within its 12” to 24” of working travel).
2. An inordinate amount of debris is allowed to build up on the surface of the screen.
3. A detergent (surfactant) contacts the screen. (A detergent will “wet” the screen and allow water to pass.)

If the screen is found to be clogged with debris or has been submerged in water, a gentle rinsing in kerosene or gasoline is recommended. When the presence of detergents is suspected, samples should be taken and tested.

Since the pump and Skimmer assembly must be removed from the well to perform maintenance on the intake screen, such occasions should be used to carry out a general inspection of the entire assembly.

Use the maintenance procedures found in the Geotech Pump and Skimmer Assembly User Manual to properly care for your pump and Skimmer assemblies.

Solar Panel

On Solar Sipper applications, it is important to keep all debris, dust and dirt from accumulating on the solar panel surface. Clean the front surface of the solar panel as needed with mild soap and water. **DO NOT use abrasive cleaners, solvents or pads.** Simply rinsing off the panel with clean, clear water will usually suffice.

Solenoid Maintenance (Stuck Solenoid)

The following procedure outlines how to remove, dis-assemble, and clean a stuck solenoid plunger.

1. Remove plug on solenoid with Phillips screwdriver (do not lose the gasket for the plug) (Figure 5-1).

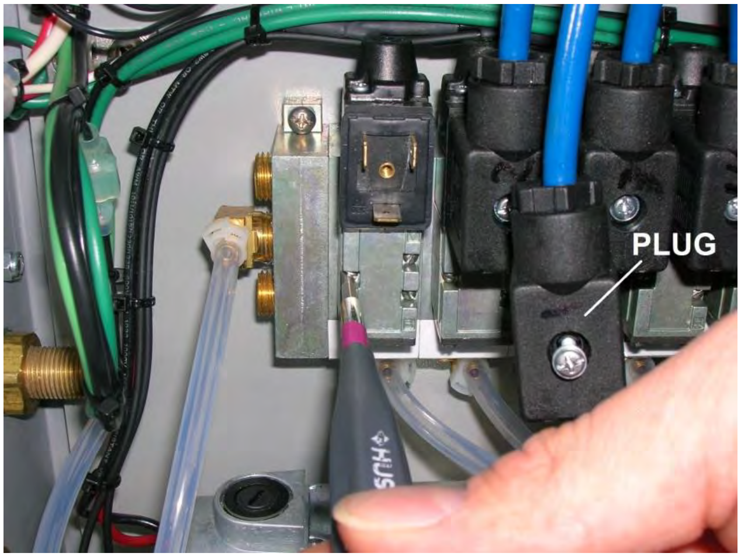


Figure 5-1

2. Remove the three screws and solenoid with a small flathead screwdriver (Figure 5-1). Note the black gasket on the underside Figure 5-2). **Do not lose or damage this gasket.**

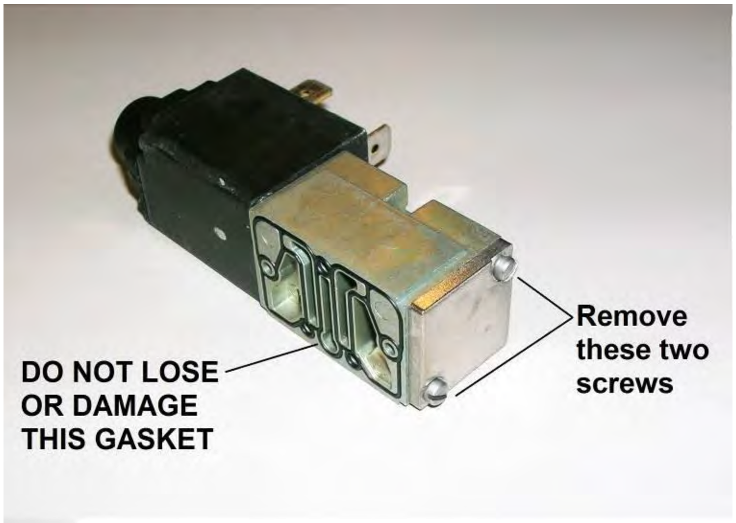


Figure 5-2

3. Using the small flathead screwdriver, remove the two screws to the square metal cap (Figure 5-2). Carefully remove the spring, the o-ring, the bushing, and the plunger (Figure 5-3). Clean the plunger and plunger cavity with a spray lubricant and cotton swab (silicon based or aerosol lubricant OK).

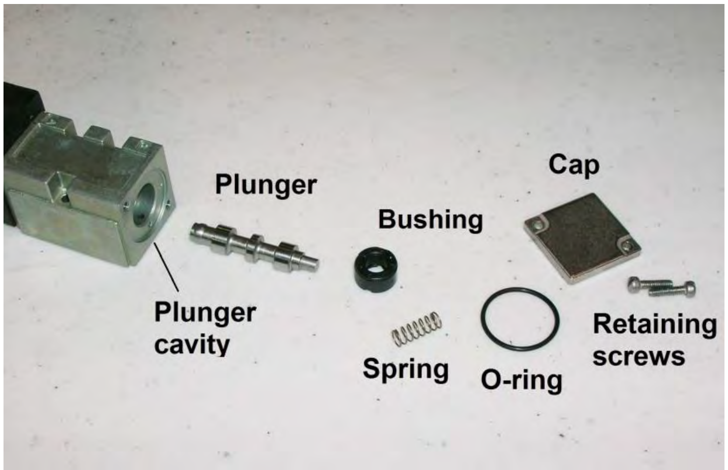


Figure 5-3

4. Orient and insert the plunger as shown in Figure 5-4. Place the o-ring and bushing back into the opening (no orientation needed) followed by the spring (Figure 5-5).

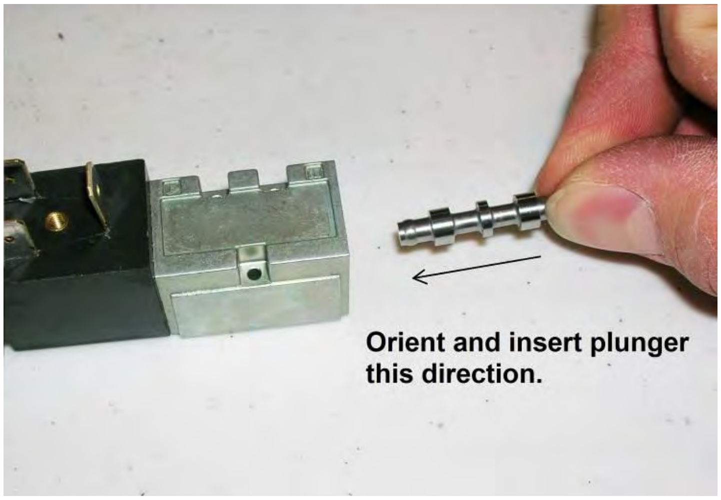


Figure 5-4

Figure 5-5

5. Carefully place the square cap onto the end, compressing the spring, and re-attach the two screws. Make the connection snug but do not over-tighten (Figure 5-6).

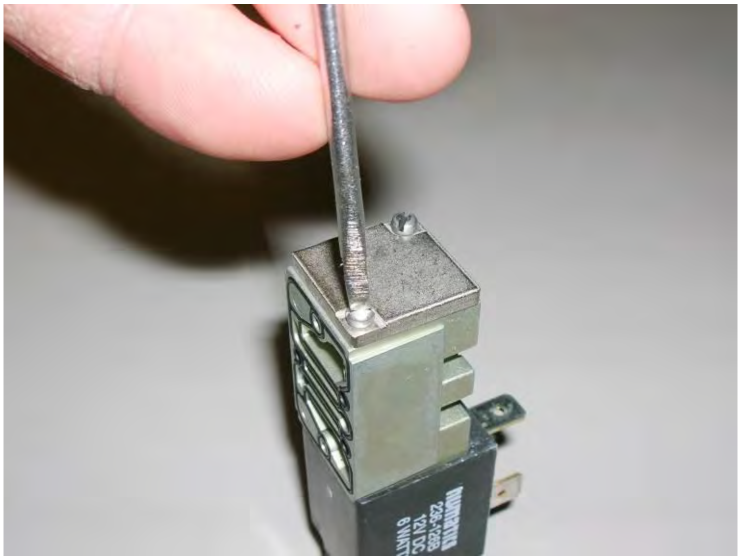


Figure 5-6

6. Verify that the plunger will move easily by depressing the small black button on the other end of the solenoid with a small Phillips screwdriver.
7. After verifying the solenoid gasket is in place, re-attach the solenoid with the three screws (be very careful not to lose or allow the gasket to fall out of place and get crushed.) After securing the solenoid, re-attach the plug with gasket to the solenoid.

If this procedure does not resolve a suspected vacuum/pressure problem, then please call Geotech Technical Sales for further troubleshooting advice @ 1-800-833-7953.

Section 6: System Troubleshooting

Problem:
No product is being recovered but system cycles and gauge indicates vacuum and pressure generation.

Solution:

- Inspect product hose for kinks and blockage. Replace if needed. If freezing conditions have occurred check the discharge lines for frozen product.
- Remove and inspect the check valve at the top of the stainless steel pump. If the check ball is stuck in the up position, clean and gently dislodge the ball. (Periodic replacement of the check valve may be required depending on duty cycle.)
- The check valve in the top of the pump may have been re-installed upside down. The arrow on the check valve should point away from the pump and toward the discharge tubing.
- The directional solenoid plumbed directly to the compressor could be stuck. If it is locked up it may be cleared by depressing the small button on the black end of the solenoid using a small Phillips screwdriver or paper clip to actuate the solenoid manually. If this doesn’t work, remove the small plate at the other end of the solenoid and clean the plunger and plunger cavity using the procedure found in Section 5.
- Visually inspect the wiring connections to see that they are not loose or otherwise compromised.

Problem:
System cycles but gauge does not indicate vacuum or pressure generation.

Solution:

- Verify the valve on the intake float assembly is closed.
- Inspect product hose for abrasion, cuts or open connections. Replace if needed.
- Make sure the air line connection goes to the pump and that the vent connection (the exhaust) is plumbed to the recovery tank.
- Verify that there is product in the well. If so, verify that the Skimmer intake is at the correct level in the well so that product is able to be recovered.
- Open the controller panel and verify that all air line connections are intact.

Problem:
A pump is stuck in either vacuum or pressure.

Solution:

- Inspect the solenoid for residue or debris. If it is locked up it may be cleared by depressing the small button on the black end of the solenoid using a small Phillips screwdriver or paper clip to actuate the solenoid manually. If this doesn’t work, remove the small plate at the other end of the solenoid and clean the plunger and plunger cavity using the procedure found in Section 5.
- Visually inspect the wiring connections to see that they are not loose or otherwise compromised.

Problem:
Solenoid continues to stick, even with frequent cleaning (as per Section 5 – Solenoid Maintenance).

Solution:

- System is operating in humid conditions which can cause residue or debris to accumulate within the solenoid. System may be installed with optional Desiccant Dryers. See Section 9: Parts and Accessories for Desiccant Dryer information, or contact Geotech Technical Sales for assistance.

Problem:
The screen is blank.

DO NOT TURN THE SIPPER SWITCH OFF AND ON AGAIN TO FORCE A CYCLE.

Solution:
- Press the up arrow button. If the system is currently in a low voltage shut down, a low voltage display will be present. If all equipment is functional, then allow the unit time to recharge. See also the low battery definition in Section 3.
- Check for loose or damaged battery connections and solar panel connections.
- Use a volt meter to test the battery voltage. If it is below 10 volts remove the battery and charge it on a separate charger to verify that a charge can be retained. Reconnect the battery and test the system. Otherwise, when the solar panel is exposed to enough sun, the battery will eventually recharge and the system will automatically resume normal operation.
- Turn off the power and check the main fuse.

Problem:
The screen shows unintelligible characters.

Solution:
- Use a volt meter and ensure the battery voltage is over 12.1 volts, if not, remove the battery and charge it on a separate charger. Otherwise, when the solar panel is exposed to enough sun the battery will eventually recharge and the system will automatically resume normal operation.
- The screen display has no effect on the other hardware functions. If the voltage is over 12.1 volts, turn the ON/OFF switch to OFF and wait 60 seconds before switching on again.

Problem:
System is displaying a Battery Fault Check Cables alarm.

Solution:

- Disconnect all voltage sources (battery, solar panel) and check Figure 2-3 and re-wire the solar panel and battery to the correct terminals.
- The fuse may have blown, check the fuse with a Multimeter and replace if necessary.
- Battery may have been overcharged by another charging system and may need to be replaced. Verify battery voltage with a volt meter.
- Visually inspect the wiring connections to see that they are not loose or otherwise compromised.

Problem:
System is displaying a TANKFULL alarm.

Solution:
- Recovery tank is full. Empty and restart the system.
- Tankfull probe is disconnected or cable is damaged. Inspect probe and cable. Replace if needed.
- Verify the tankfull float is not stuck in the up position.
- If the tankfull alarm will not clear then contact Geotech for assistance.

Problem:
System is displaying an INTAKE OVERRIDE alarm.

Solution:

- The float on the Intake Float Switch is high. This is caused when product or moisture is pulled through the air line due to:

    1. Too long of vacuum time in the cycle.
    2. The directional solenoid on the compressor is stuck.
    3. An accumulation of moisture in the air line during operation.

    Drain the intake and restart the system. Allow the system to clear product out of the manifold and past the air filter. Disconnect the line and use a standalone air source (with no more than 100 PSI of pressure) to finish evacuating the air line of product.

    Temporarily set the vacuum to 0 and the pressure to 30 or more seconds and allow the Sipper controller to force the line to empty, after which you can restore (or adjust) the vacuum and pressure to previous settings.

Problem:
A pump and Skimmer assembly is not functioning, or has been removed from service, on a multiple pump system.

Solution:

- Set the vacuum, pressure, and delay for the inoperable pump to the lowest setting possible. Then disconnect the air line at the air filter on the side of the Sipper enclosure. The unit will continue to run all pumps in sequence with minimal use of battery power on the out of service pump.

Problem:
Controller displays a low battery condition and the battery will not recharge.

Solution:

- If the system experienced freezing conditions, then the battery may be frozen. Place the battery in a warm spot and allow it time to thaw, then reconnect and let it re-charge as normal.
- Battery may need to be replaced. See wiring schematics in Section 2.
- Additional solar panels may be required to keep the system up and running.
- Turn unit off and back on to rest the clock crystal.

Problem:
Counters running slow.

Solution:

- Turn unit off and back on to reset the clock crystal.

If your solution cannot be found within this section, please call Geotech Technical Sales for expert troubleshooting advice @ 1-800-833-7958.

Section 7: System Specifications

Applications	2" (5.8cm) or larger recovery wells
Recovery Rate	.2 gallons (.750 ml) per cycle
Max. Operating Depth	180 feet (54.86m)
Max. Pressure	100 PSIG (7 bar)
Max. Vacuum	20" Hg @ MSL
Oil/Water Separation	Oleophilic/hydrophobic mesh screen

Power

Power Maximums	(AC Sipper) 87 to 240VAC, 2.7 to 1 Amp(s)
	(Solar Sipper) 12-15VDC input @ up to 14.5 Amps
	90 ~240 Watts continuous

Power usage will vary depending on application.

Controller

Operating Temperature	0° to 40° C (32° to 104º F)
Storage Temperature Range	-29° to 66° C (-20º to 150º F)
Humidity	90% non-condensing (max)
Size	10" D x 18" T x 16" W (25cm D x 46cm T x 40.5cm W)
Rating	NEMA 3R
Approximate Weight	35 lbs (single channel AC Sipper)
Approximate Weight	34 lbs (single channel Solar Sipper)
Approximate Weight	51 lbs (eight channel AC Sipper)
Approximate Weight	49 lbs (eight channel Solar Sipper)

Additional customizations and accessories could add more weight.

Pump Assembly

Size:	23.5"L x 1.75" OD (60cm L x 4.5cm OD)
Weight:	4.5 lbs. (2 kg)
Materials:	303 and 304 SS, flexible rubber tubing, PVC, Brass

Skimmer Assembly	**2" Model**	**4"Model**
Effective travel range:	12"	24"
Size:	35.5" L x 1.75" OD	35.5" L x 3.75" OD
Weight:	1.75 lbs. (.8 kg)	2.25 lbs. (1 kg)
Operating Temperature:	0° to 40° C (32° to 104º F)	
Storage Temperature:	-29° to 66° C (-20º to 150º F)	
Materials:	304 SS, Polyethylene, PVC, Polypropylene, Brass	
Tubing - Air:	.17" ID x .25" OD (4.32mm ID x 6.35mm OD)	
Tubing - Discharge:	.375" ID x .5" OD (9.53mm ID x 12.7mm OD)	

Solar Panel:

Rated Power	100 Watts (standard unit)
Operating Voltage	17.4 VDC
Maximum Voltage	21.5 VDC
Operating Amperage	4.88 Amps (standard unit)
Maximum Amperage	5.8 Amps
Size:	41.2” H x 27.5” W (105 cm H x 70 cm W)
Approx. Weight:	23.3 lbs (10.5 kg)

Mounting System:

Module Tilt Range	15 to 65 degrees
Pole Size	2", 4", and 6"
Max Wind Speed	90
Module Orientation	Landscape/Portrait
Wind Exposure	Category B & C
Materials	5052-H32 Aluminum Powder Coated Steel Stainless Steel Fasteners

Section 8: System Schematics

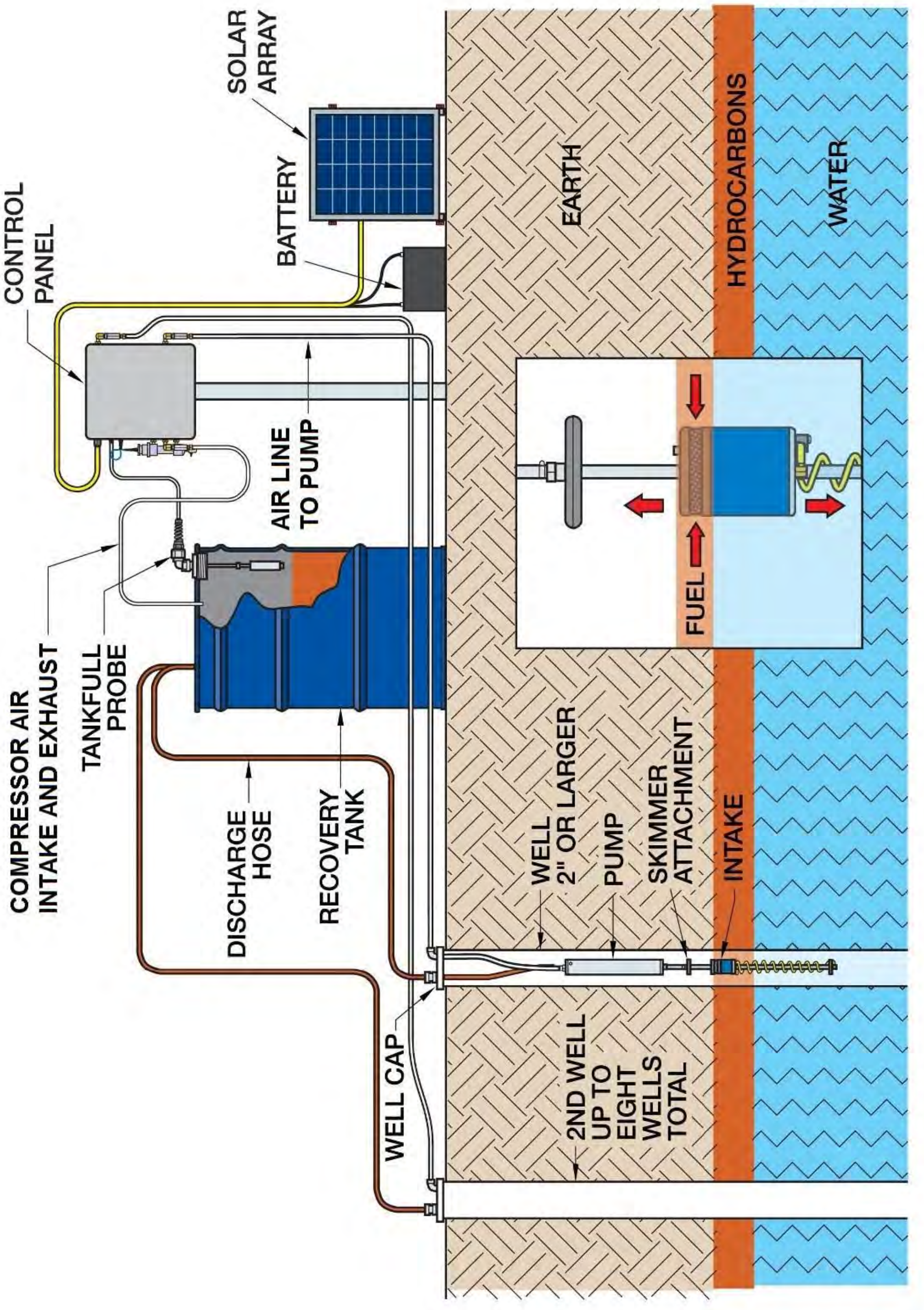


Figure 8-1 - Solar Sipper Schematic

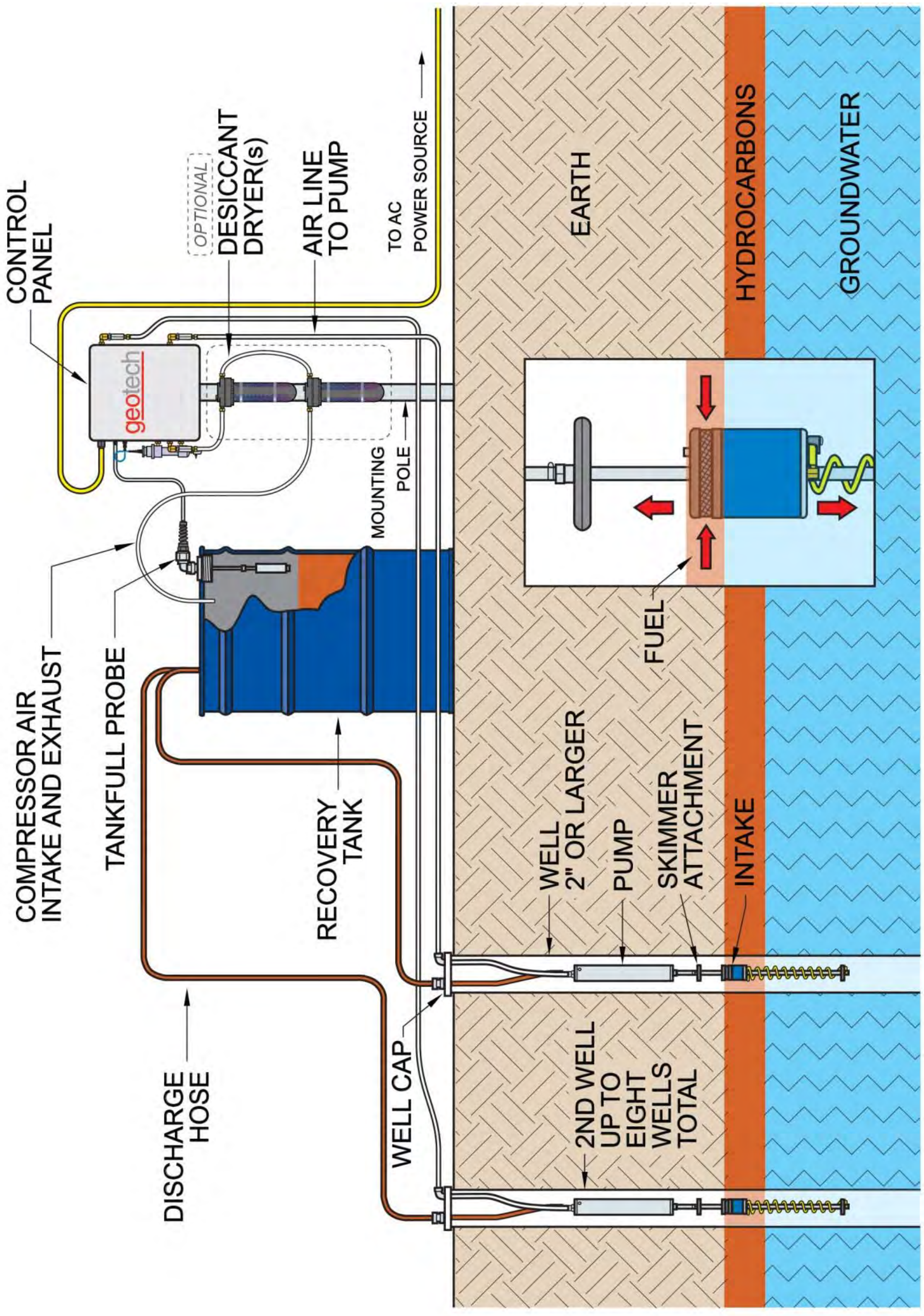


Figure 8-2 - AC Sipper Schematic, shown with optional Desiccant Dryers

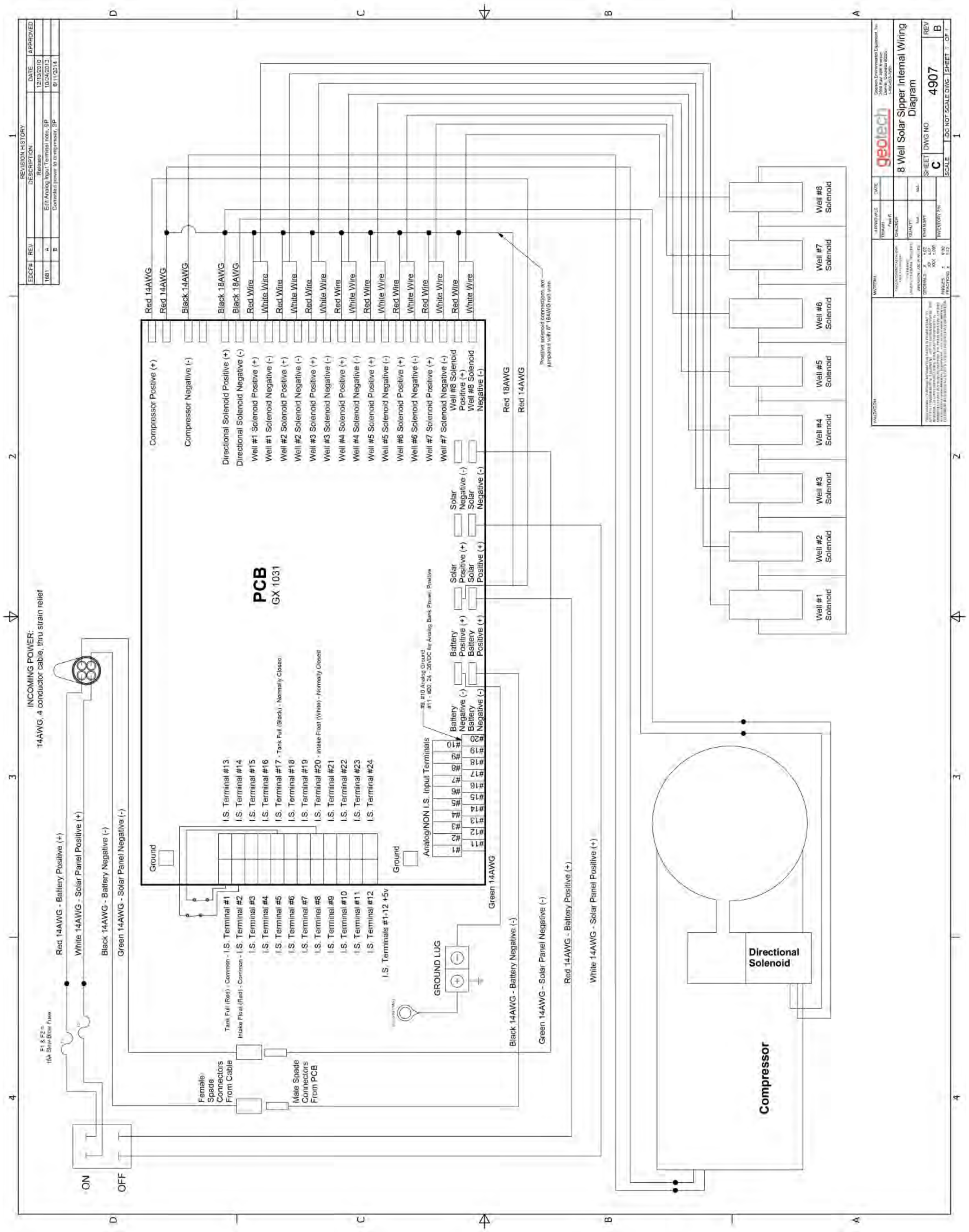
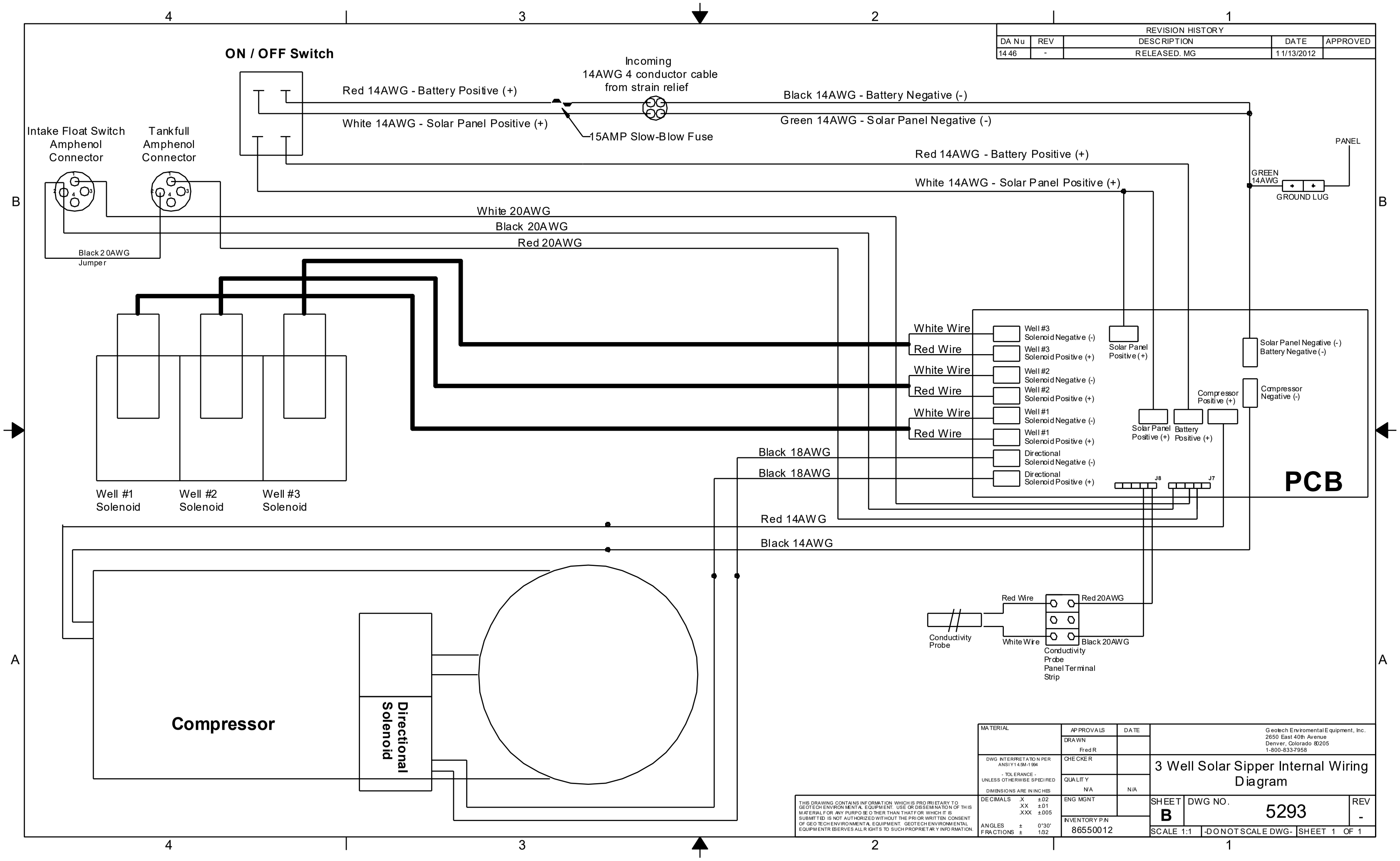


Figure 8-3 – 3 Well Solar Sipper Internal Wiring DiagraM


4
3
2
1
B
A
REVISION HISTORY
DA Nu
REV
DESCRIPTION
DATE
APPROVED
1446
-
RELEASED. MG
11/13/2012
ON / OFF Switch
Red 14AWG - Battery Positive (+)
White 14AWG - Solar Panel Positive (+)
Incoming
14AWG 4 conductor cable
from strain relief
15AMP Slow-Blow Fuse
Black 14AWG - Battery Negative (-)
Green 14AWG - Solar Panel Negative (-)
Red 14AWG - Battery Positive (+)
White 14AWG - Solar Panel Positive (+)
PANEL
GREEN
14AWG
GROUND LUG
Intake Float Switch
Amphenol
Connector
Tankfull
Amphenol
Connector
Black 20AWG
Jumper
White 20AWG
Black 20AWG
Red 20AWG
White Wire
Red Wire
White Wire
Red Wire
White Wire
Red Wire
Well #3
Solenoid Negative (-)
Well #3
Solenoid Positive (+)
Well #2
Solenoid Negative (-)
Well #2
Solenoid Positive (+)
Well #1
Solenoid Negative (-)
Well #1
Solenoid Positive (+)
Directional
Solenoid Negative (-)
Directional
Solenoid Positive (+)
Solar Panel
Positive (+)
Solar Panel
Positive (+)
Battery
Positive (+)
Compressor
Positive (+)
Solar Panel Negative (-)
Battery Negative (-)
Compressor
Negative (-)
J8
J7
PCB
Well #1
Solenoid
Well #2
Solenoid
Well #3
Solenoid
Black 18AWG
Black 18AWG
Red 14AWG
Black 14AWG
Red Wire
Red 20AWG
White Wire
Black 20AWG
Conductivity
Probe
Conductivity
Probe
Panel Terminal
Strip
Compressor
Directional
Solenoid
MATERIAL
APPROVALS
DATE
DRAWN
Fred R
CHECKER
QUALITY
N/A
N/A
ENG MGNT
INVENTORY P/N
86550012
DWG INTERPRETATION PER
ANSI Y14.5M-1994
- TOLERANCE -
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DECIMALS .X ±.02
.XX ±.01
.XXX ±.005
ANGLES ± 0°30'
FRACTIONS ± 1/32
THIS DRAWING CONTAINS INFORMATION WHICH IS PROPRIETARY TO GEOTECH ENVIRONMENTAL EQUIPMENT. USE OR DISSEMINATION OF THIS MATERIAL FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUBMITTED IS NOT AUTHORIZED WITHOUT THE PRIOR WRITTEN CONSENT OF GEOTECH ENVIRONMENTAL EQUIPMENT. GEOTECH ENVIRONMENTAL EQUIPMENT RESERVES ALL RIGHTS TO SUCH PROPRIETARY INFORMATION.
Geotech Enviromental Equipment, Inc.
2650 East 40th Avenue
Denver, Colorado 80205
1-800-833-7958
3 Well Solar Sipper Internal Wiring Diagram
SHEET
B
DWG NO.
5293
REV
-
SCALE 1:1
-DO NOT SCALE DWG-
SHEET 1 OF 1

Section 9: Parts and Accessories

Description	**Part Number**
MANUAL, SOLAR SIPPER	16550176
MANUAL, SIPPER PUMP & SKIMMER ASSEMBLY	16550181
MOUNTING HARDWARE TABS (FEET)	16110181
FUSE,15A,MDL TYPE	PPE011035
FUSE HOLDER ASSEMBLY	2010029
COMPRESSOR,PRO,SIPPER	11150325
SOL/SPRING,2POS,12VDC,1/8"NPT 031SA4004000060	16550262
SOLENOID,GEOCONTROL PRO	11150249
AC Sipper	
CABLE,MOTORLEAD,12/3,SEOPRENE SEOOW,YELLOW	17050002
POWER SUPPLY,12V,100W, CE APPROVED,GEOCONTROL PRO	11150010
Solar Sipper	
CABLE,SEO,14/4,YELLOW	10014
Solar Panel	
SOLAR PANEL WITH FRAME,100 WATT	86550007
SOLAR PANEL,100 WATT	16550251
MOUNTING RACK,SOLAR PANEL	16550252
CABLE,THW,12AWG SUBMERSIBLE PUMP,BLACK/RED,RIBBON	11200479
BATTERY,SOLAR AGM,104 AH,12V	16550253
Float Switch Assemblies	
SOLAR SIPPER INTAKE FLOAT SWITCH	86600095
PROBE, TANKFULL, SOLAR SIPPER 25'	56650100
Sipper Well Cap and Tubing Accessories	
WELL CAP,2",SLIP W/ CMPRSN FTG SIPPER	86600061
WELL CAP,4",SLIP W/ CMPRSN FTG SIPPER	86600062
Sipper Tubing (Air) – available by the foot or in 500’ rolls.	
TUBING,PE,.170x1/4,FT POLYETHYLENE	87050501
TUBING,TLPE,.170x1/4,FT FEP LINED POLYETHYLENE	87050529
TUBING,FEP,.170x1/4,FT FEP	87050509
Sipper Tubing (Discharge) – available by the foot or in 500’ rolls.	
TUBING,RBR,3/8x5/8,FT PRODUCT DISHCARGE	16600019
TUBING,TLPE,3/8x1/2,FT FEP LINED POLYETHYLENE	87050506
TUBING,FEP,3/8x1/2,FT FEP	87050511

Tubing Clamps

CLAMP,NYL,1/4" SNAPPER	11150259
CLAMP,SS,STEPLESS EAR,17MM	16600004
CLAMP,SS6,WORM,7/32-5/8"	16600063

Optional Parts and Accessories

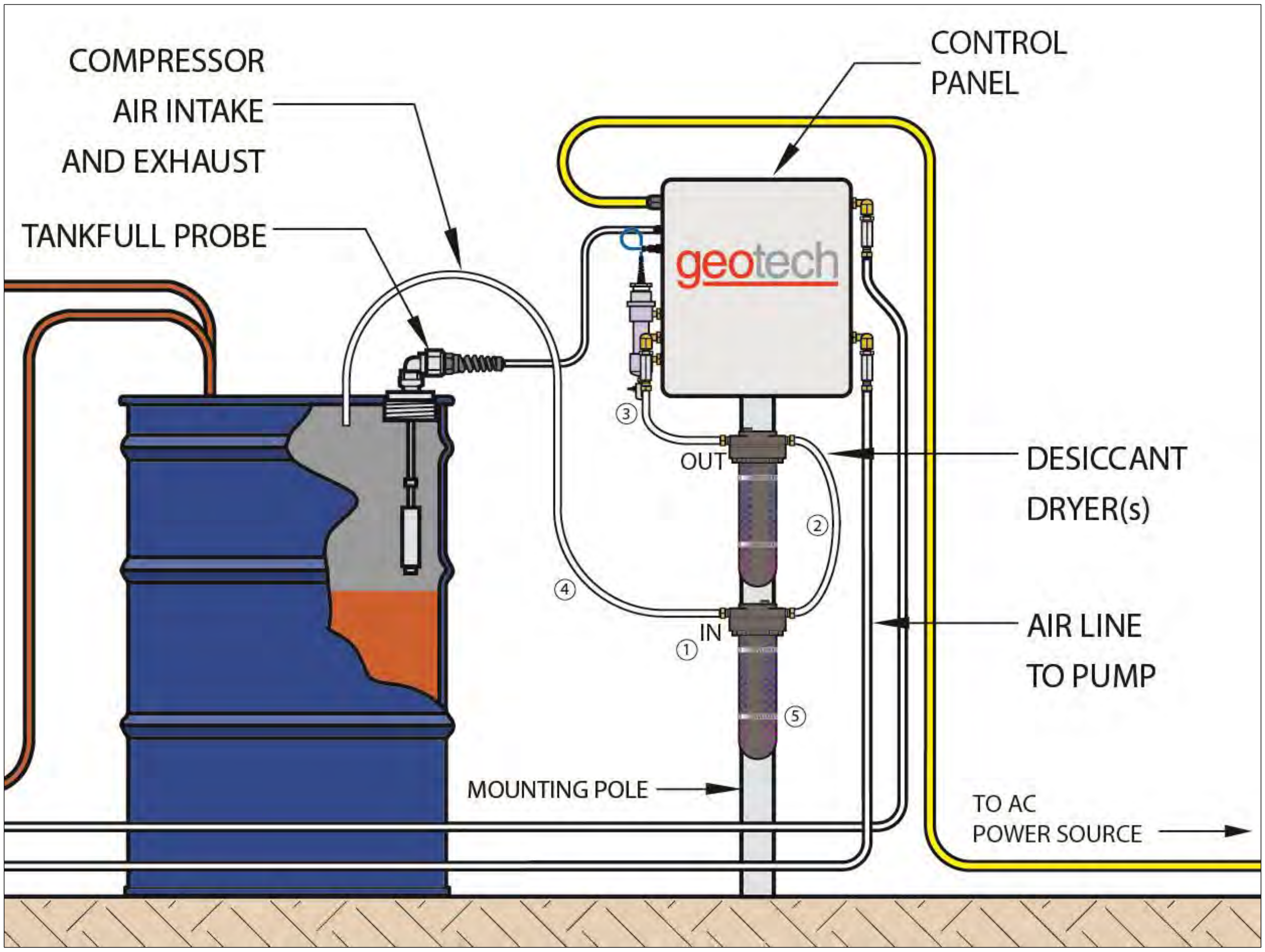
REBUILD KIT, COMPRESSOR, SIPPER PRO	11150334
DESICCANT DRYER, SIPPER	56550048
SILICA GEL, DESICCANT DRYER REFILL, 8 PACK	16600323

Sipper Pump and Skimmer Parts and Accessories

See “Geotech Pump and Skimmer Assembly Installation and Operation Manual” (P/N 16550181), for a complete description and listing of available pumps, skimmers, and their accessories.

Installation Guide: Desiccant Dryer Kit for Geotech Sipper (Solar or AC)

If operating in humid environments, it is recommended to install a desiccant dryer kit with the Geotech Sipper (Solar or AC) to minimize the amount of moisturized air that enters the pneumatic system. This will minimize solenoid maintenance and optimize compressor performance.



Install the desiccant dryers on the Compressor Air Intake and Exhaust line;

1. Locate the “IN” and “OUT” ports on the dryers.
2. Stack the two dryer’s together by connecting an “OUT” port on one dryer to an “IN” port on the other dryer using .17” ID tubing.
3. Connect the remaining “OUT” port to the Intake/Exhaust fitting on the Sipper Enclosure using .17” ID tubing.
4. Connect the .17” ID tubing to the remaining “IN” port on the dryer. The end of this tubing will terminate to the recovery tank (position above tankfull probe), or to where site requirements permit.
5. Mount the desiccant dryers to a pole using the provided worm-drive clamps. Desiccant dryers should remain vertical for optimal moisture recovery.

The Desiccant Dryer’s silicone beads will change from blue to pink as the dryer is saturated. Replace desiccant as necessary.

DOCUMENT REVISIONS		
EDCF#	DESCRIPTION	REV/DATE
-	Previous Release	02/15/2013
1583	Added Compressor Repair Kit to Replacement Parts List. Added Revision History Table - SP	05/24/2013
1713	Edited Section 9: Parts and Accessories – Solar Panel now 100 Watts (was 85 Watts), updated Solar Panel Specs - SP	12/18/2013
1725	Edited Section 3: Timer/Cycle Settings and Display Descriptions – Factory Default timers will be set to 0 seconds for vacuum, pressure, and delay – SP	1/10/2014
Project 1377	Added Desiccant Dryer Kit details to Section 4: System Operation, Section 6: System Troubleshooting, and Section 9: Parts and Accessories – SP	1/10/2014
Project 1411	Edited Section 3: Timer/Cycle Settings and Display Descriptions – Factory Default timers will be set to 1 second of vacuum, 30 seconds of pressure, 5 minutes of delay – SP	3/21/14
-	Added Desiccant Dryer Installation Guide, updated 8- well wiring diagram (rev B), SP	1/5/2014

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION,
PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958

Model Number: ________________

Serial Number: ________________

Date of Purchase: ________________

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.

Geotech Environmental Equipment, Inc
2650 East 40th Avenue Denver, Colorado 80205
(303) 320-4764 ● **(800) 833-7958** ● FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com