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July 12, 2010

Mr. Shaun Bollers
Division of Environmental Remediation
New York State Department of Environmental Conservation
One Hunters Point Plaza
47-40 21st Street
Long Island City, New York 11101

Subject: Sub-slab Depressurization System Remedial Action Report
Standard Motor Products, Inc. Site
Long Island City, New York
Class 2 Site No. 2-41-016

Dear Mr. Bollers:

Camp Dresser & McKee (CDM) is pleased to submit the Final Sub-slab Depressurization System (SSDS) Remedial Action (RA) Report for the Standard Motor Products (SMP) site located in Long Island City, New York.

If you have any questions regarding the Final SSDS RA Report, please contact me at (732) 590-4659.

Very truly yours,

Maria D. Watt, PE
Senior Project Manager
Camp Dresser & McKee Inc.

FINAL
SUB-SLAB DEPRESSURIZATION SYSTEM REMEDIAL ACTION REPORT
STANDARD MOTOR PRODUCTS, INC. SITE
(Site No. 2-41-016)
Long Island City, Queens, New York

Prepared for

Standard Motor Products, Inc.
37-18 Northern Boulevard
Long Island City, New York 11101

Prepared by

Camp Dresser & McKee Inc.
Raritan Plaza 1, Raritan Center
Edison, New Jersey

July 12, 2010

CERTIFICATIONS

I, Matthew D. Millias, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Interim Remedial Measure Work Plan was implemented and that all construction activities were completed in substantial conformance with the Department-approved Interim Remedial Measure Work Plan.

I certify that the data submitted to the Department with this Remedial Action Report demonstrates that the remediation requirements set forth in the Interim Remedial Measure Work Plan and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in for the remedy.

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, Matthew D. Millias, of Camp Dresser & McKee, Inc., am certifying as Owner's Designated Site Representative for the site.

077468	3/18/10	Matthew Millias
NYS Professional Engineer #	Date	Signature and Seal

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Acronyms

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Acronyms

amsl	above mean seal level
AS/SVE	air sparging/soil vapor extraction system
AWS	air water separator
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CDM	Camp Dresser and McKee, Inc.
cfm	cubic feet per minute
CVOC	chlorinated volatile organic compound
DCA	dichloroethane
DCE	dichloroethene
DER	Department of Environmental Remediation
FS	Feasibility Study
GAC	granulated activated carbon
gpm	gallons per minute
HOA	hand/off/auto
hp	horsepower
IRM	interim remedial measure
IWC	inches water column
lbs	pounds
LPGAC	liquid phase granulated activated carbon
MTA	Metropolitan Transportation Authority
MTBE	methyl tert-butyl ether
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	operation, maintenance and monitoring
P&ID	process and instrumentation diagram
PID	photoionization detector
PLC	programmable logic controller
PRAP	proposed remedial action plan
psi	pounds per square inch
PVC	polyvinyl chloride
RA	Remedial Action
RI	Remedial Investigation
ROD	record of decision
ROI	radius of influence
rpm	revolutions per minute
SB	sub-slab monitoring point
SMP	Standard Motor Products, Inc.
SSDS	sub slab depressurization system
TCA	trichloroethane
TCE	trichloroethene
TEFC	totally-enclosed fan-cooled
TSD	treatment, storage, and disposal

VC	vinyl chloride
VOC	volatile organic compound
VPGAC	vapor phase granulated activated carbon
WC	water column

Executive Summary

This Remedial Action (RA) report was prepared by Camp Dresser & McKee, Inc. (CDM) on behalf of Standard Motor Products, Inc. (SMP). The report presents the results of the Interim Remedial Measure (IRM) conducted at the SMP property (the Site), located in Long Island City, New York. The IRM included the construction and startup of a sub-slab depressurization system (SSDS) at the Site. The objectives of the SSDS are to mitigate the risk of soil vapor intrusion into the building and thereby minimize any potential future risk to human health. The SSDS works by creating a negative differential pressure between the basement atmosphere and the pressure below the concrete basement slab at the Site thus preventing migration of contaminant vapors into the building. This SSDS IRM is being conducted as part of the overall site remedy which is presented in the March 2009 Record of Decision (ROD) (NYSDEC 2009a).

The work was performed in accordance with the Final IRM Work Plan submitted on March 10, 2009 (CDM 2009a), and the results meet the requirements of New York State Department of Environmental Conservation's (NYSDEC's) *Draft Department of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation* dated November 2009 (NYSDEC 2009b).

This report details the Site location, Site history and the environmental conditions at the Site. The physical characteristics of the Site and surrounding area are important to understanding the current nature and extent of contamination and future transport of contaminants. These environmental characteristics can be described in terms of the surface features and drainage, geology, hydrogeology and the nature and extent of contamination. A site conceptual model is presented Section 2.

Section 3 includes a description of the radius of influence (ROI) testing performed in November 2008. The primary objectives of the test were to determine the flow characteristics of the sub-slab soils and observe the achievable ROI for vapor extraction sumps. As part of the ROI testing, step testing and constant rate testing were conducted to determine the effect of applied vacuum on the vapor flowrate and ROI. The extraction system was operated at varying vacuum and flowrate levels during the step test. During the constant rate step test, the system was conducted at the vacuum level which produced the highest ROI during the step test. Observations and monitoring were performed. The results were then used to design and implement the full scale SSDS performed as part of the IRM.

Construction of the SSDS was performed and is described in Section 3. Nine extraction sumps and associated trenching were installed beneath the building slab. The extraction sumps feed into a central system that includes two blowers, an air/water separator, a liquid granulated activated carbon (LPGAC) unit, and a vapor phase granulated activated carbon (VPGAC) unit. Startup activities were performed to ensure that the system was creating the desired pressure gradient across the slab. Monitoring was performed at sub slab monitoring points within the building footprint and at the extraction sumps. The startup activity results verified that with

one blower on and the dilution valve fully closed (Scenario 3 above), the system was able to achieve the primary goal stated in the work plan of -0.015 inches water column (IWC) pressure gradient across the slab throughout the basement area, with two exceptions. The pressure gradients at SB07 and SB25 were -0.009 and -0.008 IWC, respectively, which still meet the NYSDEC minimum requirement of -0.003 IWC.

Section 1
Introduction

Camp Dresser & McKee Inc. (CDM) is submitting on behalf of Standard Motor Products, Inc. (SMP) this Sub slab Depressurization System (SSDS) Interim Remedial Measure (IRM) Remedial Action (RA) Report. An Order on Consent Index (No. W2-0807-96-10) between New York State Department of Environmental Conservation (NYSDEC) and SMP was signed on March 30, 1998. This Order on Consent stipulates requirements for the development and implementation of a Remedial Investigation/Feasibility Study (RI/FS) for the SMP site located at 37-18 Northern Boulevard in Long Island City, New York (herein referred to as the "Site"). The RI/FS was developed in accordance with the New York State guidance entitled "*Draft DER-10 Technical Guidance for Site Investigation and Remediation*", dated December 2002 (NYSDEC 2002) and "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*", dated October 2006 (NYSDOH 2006). The "*Final Comprehensive Remedial Investigation Report, Standard Motor Products, Inc, Site*" (CDM 2009c) and the "*Final Feasibility Study, Standard Motors Products, Inc. Site*" documents were both completed on February 6, 2009.

This report presents the results of the SSDS IRM remedial action (RA) at the SMP Site located in Long Island City, New York. This report is organized into the following sections:

Section 1: Introduction. This section presents a description of the site location, background and history.

Section 2: Environmental Conditions. This section presents the physical characteristics of the study area and surrounding environment that are described in Section 3. Demography and land use, metrology, surface features, regional and site-specific geology, and hydrogeology are discussed in this section. The goal of this section is to gather sufficient data to evaluate potential transport pathways and receptors. This section presents data quality management, approach to evaluation of contamination, assessment of soil quality in Phase I and IV investigations, assessment of groundwater quality in all four phase investigations, and assessment of soil vapor quality in Phase III and IV investigations. This section identifies the potential migration pathways of the contaminants and evaluates the chemical and physical properties of those constituents whose concentrations exceed screening levels. These data are used to evaluate the environmental fate and transport mechanisms of contaminants. A conceptual site model is also presented in this section.

Section 3: Remedial Activities. This section presents the activities that were performed as part of the Interim Remedial Design. This includes the Radius of Influence Testing where step testing, constant rate testing and monitoring of the tests were performed. Additionally, the construction and set up of the sub-slab depressurization system is described including the equipment used, construction

activities, startup activities and site restoration. The goal of this section is to summarize the construction startup and implementation of the SSDS.

Section 4: Construction Issues. This section presents issues that were addressed during the construction of the SSDS. Additionally, it includes all incorporated deviations from the work plan due to site conditions.

Section 5: Recommendations. This section presents CDM's recommendations for future operation of the SSDS.

Section 6: References. This section documents the references cited in this report.

Appendix A: Operation and Maintenance Manual. This appendix provides instructions to maintain parts of the SSDS and to ensure proper care of the SSDS.

Appendix B: Site Monitoring Plan. This appendix presents the schedule for sampling of the SSDS system. This appendix also provides the relevant referenced documents that describe how to collect samples, the frequency of sample collection, and the analytical parameters.

Appendix C: "As-Built" Drawings. This appendix presents the "As-Built" drawings of the SSDS that was constructed for the IRM.

Appendix D: Photographs. This appendix presents photographs of the construction of the SSDS and some of the site features that required deviations from the work plan.

Appendix E: Start up Testing Data. This appendix provides all of the data that was collected after the construction of the SSDS when the system was initially put on-line. The data ensures that the system was properly functioning at startup.

Appendix F: Daily Construction Reports and Weekly Progress Reports. This appendix provides all the daily construction reports that describe daily activities and the weekly progress reports that were submitted to the NYSDEC.

Appendix G: Permit Exemption. This appendix provides the permit equivalencies for the Site.

1.1 Site Location

The SMP property is in the northwestern section of Queens County, New York and is located at 37-18 Northern Boulevard in Long Island City, New York (Figure 1-1). The property was owned and operated by SMP until March 2008 and is located in an urban and industrial area. The property is approximately rectangular in shape and occupies approximately one acre of land (Figure 1-2). The property contains a large, six-story, industrial building with approximately 42,000 square feet per floor. The building occupies most of the property. SMP manufactured car parts until March 2008 at this facility, and the SMP corporate headquarters are still located in the building.

Bordering the Site is Northern Boulevard to the north; Sunnyside Freight Railroad Yard (Sunnyside Yard) to the south; 39th Street, an automobile dealership, and a Hess (formerly Merit) gasoline station to the east; and commercial and industrial properties to the west (Figure 1-2). Various industrial and commercial properties are located across from SMP on Northern Boulevard. A narrow strip of land on the south side of the property contains a loading dock and a dirt access path for vehicles. This strip of land is owned by the Metropolitan Transportation Authority (MTA) and is part of a lease to SMP. Contamination has been identified in the soil adjacent to the loading dock. Thus, the Site includes the SMP property and the adjacent strip of land where contamination has been identified. This adjacent area is mostly dirt and gravel covered with some concrete remaining from a nearby road-paving project. Access to this area is limited. The means of access to this area is from doors at the rear of the SMP building, and a locked access gate from the adjacent automobile dealership at the east end of the area. A highly industrialized area with a wide variety of activities ranging from small-scale assembly to large-scale manufacturing is located within the general vicinity of the Site.

1.2 Site Background and History

The Site has historically been involved in industrial and manufacturing activities since 1919 (EnviroAudit 1996). SMP has occupied the on-site building since the mid-1900s. S. Karpen & Brothers occupied the building prior to that time.

SMP maintained a small plating line for chrome plating of small machine parts from approximately 1975 to 1984. The wastes generated from the chrome plating process were temporarily stored on-site prior to off-site disposal. In addition, SMP was previously engaged in painting automobile parts prior to distribution. In 1984, aqueous based paints replaced the previously used solvent-based paints. All painting operations were gradually eliminated between 1990 and 1991. SMP performed several other processes that also generated hazardous wastes. These included die-casting operations that ceased in the 1970s; rubber production that was eliminated around 1985; and degreasing which utilized chlorinated solvents that ended in 1990.

Until March 2008, SMP produced automobile parts and components at the Long Island City facility primarily in the basement within recent years. The manufacturing operations included metal fabrication and machining, plastic injection molding, and assembly. SMP also operated a small photography laboratory for production of newsletters, brochures, etc. Hazardous or toxic materials involved in plant operations are lubricating oils for machinery, caustics for degreasing, phenolics used in molding processes, epoxies for coil production, and water-based inks involved in their small-scale printing. All wastes were temporarily stored on-site in secure containers prior to off-site disposal at a licensed treatment, storage, and disposal (TSD) facility.

The building and associated property was sold by SMP in March 2008 to XEXII Northern Boulevard Acquisition, LLC, who will continue to operate this facility as commercial office space. SMP continues to occupy most of the office space within this building.

Section 2
Environmental Conditions

The following section provides an overview of the environmental conditions at the SMP Site in Long Island City, New York. The physical characteristics of the Site and surrounding area are important to understanding the current nature and extent of contamination and future transport of contaminants. These environmental characteristics can be described in terms of the surface features and drainage, geology, hydrogeology and the nature and extent of contamination. A site conceptual model is presented at the end of this section. This section describes the physical characteristics of the Site and surrounding environment.

2.1 Site Topography and Drainage

Sand and gravel cover the surface of the Site beneath the 39th street overpass and south of the open loading dock near the former excavation that was completed during the Summit Environmental Evaluations, Inc. investigation in September 1990. Underneath the 39th street overpass, a drain spout channels storm water from the bridge into the back yard and drains into the manhole that is in the vicinity of the former excavation (Figure 2-1). Storm water runoff also drains into the manhole located south of the covered portion of the loading dock area. These manholes allow surface runoff to drain freely into the storm sewer line. The manholes located south of the SMP building are interconnected by a 36-inch pipe and are a part of the primary sewer subsystem that drains over 90 percent of the Sunnyside Yard**.**

Even though the general storm water runoff drains from east to west, a slight topographic high point exists between the central and eastern manholes in the location of SG03. During heavy precipitation events, storm water runoff collected in the previous excavation area (near the eastern manhole) and the central manhole in the vicinity of SG05 (Figure 2-1). There is a significant quantity of vegetation around the western manhole preventing measurable soil erosion.

A petroleum sheen has been observed on the storm water runoff from the bridge and other portions of the Sunnyside Yard as noted in previous investigations. The NYSDEC representative was made aware of this situation during a routine site walk.

The sewer system is located at an approximate depth of 12 feet below land surface. Currently, the water table elevation is usually between 4 and 5 feet below ground surface (bgs); thus, the sewer system is below 8 feet of water during a high water table. Historically, prior to public water being supplied, the quantity of private drinking water wells in the area significantly depressed the water table by almost eight feet. The sub-basement of the SMP building must have been constructed during this period since an intermittent sump pump is currently needed to keep the groundwater table from rising to a level of eight feet above the sub-basement slab**.** The sump discharges directly into the sewer line located along Northern Boulevard and not into the Sunnyside Yard storm water drainage system.

2.2 Site Geology

The site geology was characterized based on published reports and observations made during previous investigations and during the Phase I, II, and IV Field Investigations. Observations made during the historical and recent field investigations at the Site indicate the presence of fill, including sand, silt, concrete fragments, and wood railroad ties, from the ground surface to approximately two feet below ground surface. Below the fill material, sands and gravel were observed to a depth of approximately 40 feet bgs. These observations were consistent with published information on subsurface geology in the area.

According to logs of borings drilled on the Site and the adjacent Sunnyside Yard during investigation of the Site, the area is underlain by the following units (in order by increasing depth): fill, Upper Pleistocene glacial deposits (including both till and channel deposits), and bedrock. Figures 2-2 through 2-6 present the borings performed during the Phase IV field investigation. The fill is predominantly comprised of reworked glacial deposits (sand, silt, clay, and gravel) and railroad ballast with minor amounts of construction debris and other materials. The Upper Pleistocene glacial deposits consist mainly of ground moraine deposits; unstratified, poorly sorted mixtures of sand, silt, clay, and gravel. In addition, a cobble layer was encountered in three soil borings drilled at the Site and three deep borings drilled at the Sunnyside Yard. This unit may represent a relict stream channel that was formed by glacial melt-water. One borehole was drilled to the bedrock surface beneath the Sunnyside Yard. In this soil boring located within the Sunnyside Yard due west of the Site, bedrock was encountered at a depth of 74 feet below land surface (i.e., 53 feet below mean sea level). In the southwestern portion of the Sunnyside Yard, a Holocene wetland deposit was encountered below the fill and above the Upper Glacial formation. This deposit consisted of organic silty clay and meadow mat and is associated with a buried stream channel (Roux Associates, Inc. 1995).

2.3 Site Hydrogeology

The hydrogeology of the Site has been characterized based on previously published reports and observations made during historical and recent field investigations at the Site. The hydrogeologic units correspond to the previously discussed geologic units.

The groundwater beneath the Site occurs under water table (unconfined) conditions. The depth to groundwater in the vicinity of the Site is approximately 5 feet bgs but may be influenced by surface runoff that results in standing water across most of the Site during rain events. The water table occurs in either fill or glacial deposits. Beneath the Site, the saturated fill deposits and the shallow Upper Glacial aquifer were not always distinguishable and are therefore, collectively referred to as shallow deposits.

Previous investigations performed at the Sunnyside Yard document groundwater flow to the west. The groundwater eventually discharges to the East River or one of its tributaries. Vertical groundwater movement is restricted by the Gardiners Clay

where present or by the Precambrian bedrock which is considered to be the bottom hydrogeologic boundary of the groundwater flow system.

Groundwater elevation data collected in February 2008 were consistent with data from previous investigations and show that, underneath the Site, flow is primarily from east to west (Figures 2-7, 2-8 and 2-9). Due to the proximity to the East River, the hydraulic gradients are gentle which is consistent with the regional groundwater contour map (Figure 2-10) and the groundwater contours present in the Sunnyside Yard (Roux Associates, Inc. 1999). For example, the February 2008 elevation contours ranged from a maximum of 16.3 feet amsl on the east side of the Site to 16 feet amsl at the west side of the Site. A gradient of 0.001 was calculated using data from monitoring wells MW10 and MW08. Based on the aquifer testing performed at the Site during the Phase II Field Investigation, the geometric mean hydraulic conductivity was calculated as 233 feet/day. The published horizontal hydraulic conductivity of the Upper Glacial aquifer in Queens County ranges from 214 feet/day (McClymonds and Franke 1972) to 270 feet/day (Franke and Cohen 1972).

Using this data a groundwater flow rate of 0.78 feet/day was estimated.

A sump pump is located in the basement of the SMP building. As previously stated, published regional data and historical investigations at the adjacent Sunnyside Yard site have documented groundwater flow to the west. The previous H2M 1992 RI Report speculated that groundwater flow direction in the immediate vicinity of the Site was to the north toward the basement sump pump. During the Phase IV investigation, three sumps were inspected. The flow rates for Sump 1 and Sump 2 were measured as 65 gallon per minute (gpm) and 130 gpm during maximum pumping capacity, respectively. These two pumps are operated intermittently. The pumps within the sumps are controlled via a level indicator. After initial drawdown, the water level is allowed to recover prior to the level indicator triggering activation of the pumps. The flow rate for Sump 3 was not measured since the pump was not running. Based on the hydrogeologic properties of the underlying formation, it is not anticipated that the operation of the sump pump has a major effect on the groundwater flow in the vicinity of the Site.

2.4 Nature and Extent of Contamination

A comprehensive evaluation and discussion of the nature and extent of contamination identified at the SMP site is contained in the "*Final Comprehensive Remedial Investigation Report, Standard Motor Products, Inc, Site*" dated February 6, 2009 (CDM 2009c). A brief summary of this evaluation is presented here to provide the background and rationale for the development and implementation of this SSDS IRM.

Elevated chlorinated volatile organic concentrations (trichloroethene [TCE], 1,1,1-trichloroethane [TCA], 1,1-dichloroethane [DCA], 1,1-dichloroethene [DCE], chloroethane, and vinyl chloride [VC]) were detected in the groundwater adjacent to the loading dock of the SMP building. The majority of the highest chlorinated volatile organic concentrations detected during the Remedial Investigation are in the samples

collected from the groundwater table interface. The highest concentrations of chlorinated solvents in the groundwater are located immediately adjacent to the loading dock approximately 120 feet west of the southeast corner of the building. These results are also consistent with the historical soil and groundwater data in that they indicate a "hot spot." Figure 2-11 presents the TCE groundwater isoconcentration contour map developed from groundwater analytical data from direct push samples collected in 2008. TCE was chosen as an "indicator" constituent since it was the most prevalent in the direct push groundwater samples.

A vapor intrusion investigation was also conducted in 2008. Soil gas samples collected above the exterior groundwater "hot spot" contained elevated concentrations of chlorinated volatile constituents (Figure 2-12). Sub-slab air samples displaying the highest concentrations of chlorinated volatile constituents are located to the east of the exterior localized "hot spot" in the vicinity of a six-story stair well that may be impacting pressure gradients across the building. Vapor constituents detected diminish in the western side of the building and loading dock. The soil vapor results confirm the previously identified "hot spot" location. The chlorinated volatile constituent concentrations overall have diminished over time, from 2006 to 2008. This decrease in concentrations of Site-related contaminates suggest significant degradation of the source over time.

2.5 Fate and Transport

The fate of a constituent in the environment is a function of its chemical properties and the physical nature of the Site. The potential for environmental transport was examined by reviewing the topographic and hydrogeologic characteristics of the Site and a review of the available physical constants and chemical characteristics of each constituent. The following summarizes the most significant fate and transport processes for the Site:

- The greatest potential for transport of contaminants at the Site is via groundwater migration. Volatile organic compounds, including chlorinated compounds (i.e., *cis*-1,2-DCE, 1,1-DCA, chloroethane, VC, PCE, TCE, and 1,1,1-TCA) and non-chlorinated VOCs, (i.e., benzene, isopropyl benzene, methyl tert-butyl ether [MTBE], toluene, and xylenes) have been detected in groundwater plumes indicating their ongoing transport.

- Biodegradation has likely occurred over time due to an elevated carbon source from the commingled benzene, toluene, ethylbenzene, and xylene [BTEX] contamination.

- Volatilization is considered significant based on the results of the soil gas and sub-slab vapor results.

2.6 Conceptual Site Model

The Site is located in an industrial/commercial area. The Site is bordered to the north by a car dealership, to the south by the High Speed Rail station, to the west by a

commercial building, and to the east by the Hess station. The chlorinated contamination originates from the Site. Based upon an extensive amount of data, it has been determined that the chlorinated groundwater "hot spot" is located external to the building, along the loading dock northeast of MW11, approximately 120 feet west of the southeast corner of the building. Unsaturated soil contamination is minimal and previously detected soil contamination has been flushed into the saturated zone.

Chlorinated constituents are present in the groundwater along the eastern portion of the building, whereas the western portion of the building remains relatively uncontaminated even though groundwater flow is from east to west (Figure 2-13). Also, the highest levels of contamination exist in the capillary fringe of the water table interface on the eastern side of the building. Even though contamination has been relatively stagnant in the capillary fringe along the eastern side of the building, contamination has biodegraded over time when comparing monitoring well data collected from 2003 through 2008. Biodegradation can be enhanced with the addition of nutrients provided proper site-specific conditions are present.

In addition to groundwater transport and biodegradation, vapor migration is currently occurring at the Site. Vapors from the "hot spot" are being transported from the water table interface and are being drawn upward during the heating season due to stack effects. Also, the underground subway that runs along the northern side of the building significantly impacts sub slab pressure gradients each time a train passes. However, even though sub-slab concentrations are elevated, primarily along the south east perimeter of the building, current indoor air concentrations do not exceed guidance values. In order to ensure potential future vapor intrusion does not occur, a SSDS IRM was proposed in the *Final Feasibility Study, Standard Motors Products, Inc. Site*" dated February 6, 2009 (CDM 2009b).

Section 3
Remedial Activities

Once the RI/FS documents were finalized in February 2009, a Proposed Remedial Action Plan (PRAP) was developed and released to the public document repository located at the Queens Public Library, Broadway Branch, 40-20 Broadway, Long Island City, New York. The local community was provided a 30-day comment period during which a public meeting was held on February 25, 2009 to present the PRAP and answer any questions. After address public comments, a ROD was signed in March 2009. The 2009 ROD selected a remedy for the SMP Site. Below are the components of the ROD:

1. Installation of a sub-slab depressurization system as part of the IRM

2. Installation of an air sparge/soil vapor extraction (AS/SVE) system

3. Continued implementation and operation, maintenance, and monitoring (OM&M) of the on-site IRM to mitigate threat of soil vapor intrusion into the building

4. Imposition of an institutional control in the form of an environmental easement

5. Development of a Site Management Plan that includes institutional and engineering controls

6. Periodic certification of institutional and engineering controls by the property owner until the Department notifies the property owner in writing that this certification is no longer needed

7. Operation of the AS/SVE systems until the remedial objectives are achieved or until the Department determines that continued operation is technically impracticable or not feasible

The overall objective of this IRM is to mitigate the threat of soil vapor intrusion into the building thereby decreasing human health risk. This engineering control is being implemented to prevent exposure to contaminated soil vapor. The IRM objective will be accomplished by the continued operation of the SSDS, which creates a negative pressure gradient across the building basement's slab (i.e., a lower pressure beneath the slab than above the slab). This negative pressure gradient is achieved by extracting soil vapor from beneath the slab. Following installation and initial operation of the SSDS, long-term monitoring will be performed to support engineering control efforts, providing an understanding of changes in contaminant concentrations, degradation, and distribution over time.

The IRM was not designed to be the remedy to remove VOC contamination from soil. The IRM is solely being implemented to mitigate the potential future threat of soil vapor intrusion into the site building. The AS/SVE system will be constructed and

installed to treat the contaminated groundwater in situ and capture and remove the contaminated soil vapor thereby preventing it from migrating offsite.

The Final IRM Work Plan submitted February 6, 2009 was approved by NYSDEC and details the work that was to be performed under IRM remedial action. Remedial activities for the IRM consisted of obtaining permits prior to construction, constructing a SSDS, and performing startup activities to ensure that the SSDS is performing effectively. The work performed for the IRM was performed in accordance with the Final IRM Work Plan (CDM 2009a) and NYSDEC's *Draft DER-10 Technical Guidance for Site Investigation and Remediation* dated November 2009 (NYSDEC 2009b).

3.1 SSDS IRM Design

3.1.1 Radius of Influence Testing

CDM conducted pilot testing at the Site from November 17 to 19, 2008. The primary objectives of the test were to determine the flow characteristics of the sub-slab soils and observe the achievable ROI for vapor extraction sumps. Observations and data gathered during the pilot test were used as a basis for the full-scale SSDS design. A step test and a constant rate test were performed during the pilot testing. Field monitoring data was collected, and extracted vapors were analyzed for VOCs using a photoionization detector (PID). The results of the pilot testing are provided in Table 3-1. A more detailed description of the pilot testing results is provided in the Final IRM Work Plan (CDM 2009a).

Step Testing

Step testing was conducted to determine the effect of applied vacuum on the vapor flowrate and ROI. The extraction system was operated at varying vacuum and flowrate levels, and observations were noted. Each step had a one-hour duration. Only one blower was necessary for the ROI testing.

When the blower was initially turned on, the dilution valve was completely open. The valve was then slowly closed until flow was observed from ES01. The first step was conducted at this setting. After the end of the first step, the dilution valve was slowly closed to increase the vacuum at the extraction sump by approximately 5" water column (WC), and the 2nd step will be conducted. Steps were conducted every 60 minutes, approximately every 5" WC, until either the vacuum reaches 50" WC at the extraction sump or the flowrate stops increasing or begins to decrease. For each step, flow velocity readings, extraction sump vacuum, and sub-slab monitoring point (SB) vacuums were recorded initially, at 30 minutes, and after 60 minutes.

Constant Rate Testing

Following step testing, a constant rate test was performed. The constant rate step test was conducted at the vacuum level which produced the highest ROI during the step test, as indicated by the SB vacuum readings. For the constant rate test, the system was allowed to run for the duration of the day and overnight. Readings were

recorded every 30 minutes while on site, and again before shutting off the system the following morning.

Monitoring

System parameters and vacuum readings at all SBs were collected at the following times:

- Prior to extraction sump installation (SB vacuums only)
- Prior to initial operation of the system (SB vacuums only)
- During step testing and constant rate testing, minimum every 30 minutes
- Immediately prior to system shutdown
- Following (at least one hour after) system shutdown (SB vacuums only)

One continuous Omniguard 4 unit was hooked up to measure the pressure at the baseline sub-slab monitoring point (RT01). A second unit was hooked up to another SB to be determined in the field. The third unit was used to take manual readings at the remaining 15 SBs.

3.1.2 Scope of Interim Remedial Measure Remedial Action

The IRM remedial action is the implementation of a full-scale SSDS at the Site. Using the results from the pilot testing performed in November 2008, a full scale SSDS was designed to maintain a negative pressure below the entire foundation and mitigate vapor intrusion into the building. The IRM remedial action was not implemented with the intention to remediate contaminated soil and groundwater beneath the Site. Soil and groundwater remediation will be performed using an AS/SVE system.

3.2 SSDS IRM Remedial Action

The work performed under the SSDS IRM RA included the following major elements:

- Installation of vapor extraction sumps
- Installation of vapor extraction piping beneath the slab, along the interior walls and ceiling, and on the south exterior wall of the building
- System connection to the existing electric at the Site
- Construction of an enclosed, pre-packaged vapor extraction and treatment system

The project personnel contacts for the SSDS IRM RA include:

- ***Standard Motor Products, Inc. Contacts:***

  Building Manager
  37-18 Northern Boulevard
  Long Island City, NY 11105
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- ***Consulting Engineer:***
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- ***Construction Subcontractor:***
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  Pipersville, PA 18947
  Contact: Joseph Jacobsen
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3.2.1 Extraction Sumps

Extraction sumps were installed to create vacuum influence beneath the slab of the entire building based on a 60-foot ROI. The "As-Built" drawings in Appendix C show the extraction sump locations and construction details. A total of nine (9) extraction sumps were installed and named ES-01 through ES-09. Six-inch concrete cores were removed from the slab; the sub-slab soil was removed to create a hole; a 2-foot screen was placed in the hole; and the annular space was filled with well gravel. Photographs of extraction sump installation are included in Appendix D.

3.2.2 Vapor Extraction Piping

The "As-Built" drawings, provided in Appendix C, show a plan view of the "As-Built" piping layout, including the dimensions for each pipe run. Vapor extraction pipe and fittings are socket-weld Schedule 40 polyvinyl chloride (PVC), and all connections were made using PVC primer and cement. Piping was installed with a 1.0% minimum pitch toward the air/water separator (AWS) inlet or toward the

extraction sump when slope when slope toward the AWS was not possible. One minor exception is described in Section 4 Construction Issues.

The four-inch effluent pipe from each sump follows a trench to the nearest wall, where a riser pipe brings the extracted vapor to a six or eight-inch trunk line at the ceiling. Each riser pipe is equipped with a sample port, vacuum gauge, and a full-bore PVC ball valve to control the applied vacuum at each sump.

The above-slab pipe was constructed of six and eight-inch PVC pipe supported from the walls and/or ceiling. Details of the pipe supports are shown on the "As-Built" drawings in Appendix C.

Outdoor piping was insulated with one inch of fiberglass pipe insulation and then wrapped with aluminum cover. A photograph of the finished outdoor piping with the insulation and aluminum cover is included in Appendix D.

Following complete installation of the piping system, the above-slab portion of the piping network was isolated to perform pneumatic pressure testing for leaks. Two pin-hole leaks identified during the test were repaired without issue.

3.2.3 Trenching

Trenching was performed for all sub-slab conveyance piping. Trench locations are shown on the "As-Built" drawings in Appendix C. Concrete was neatly saw cut for trench installation using a walk-behind road saw. Potable water was used to cool the saw as well as reduce dust in the building. Concrete was restored to match the existing slab construction.

3.2.4 Extraction and Treatment System

A single extraction and treatment system was constructed offsite and delivered as a package to the Site. The system is capable of continuous unsupervised operation. The system is located in the eastern covered portion of the loading dock on the south side of the building. The process & instrumentation diagram (P&ID) for the system is presented in the "As-built" drawings of Appendix C.

The major pieces of equipment installed are described in below:

1. Blowers – Two rotary-lobe blowers were installed to extract the air from the nine extraction sumps. The blowers are equipped with silencers at the influent and effluent, and the shipping container is fitted with acoustical insulation to reduce nuisance noise exposure to building occupants. Each blower is capable of approximately 1,000 cfm when operated at 1,514 rotations per minute (rpm) and is driven by a 20 horsepower (hp) totally-enclosed fan-cooled (TEFC) motor. Specifications of the blowers are provided in the O&M manual of Appendix A.
2. Vapor-phase granular activated carbon (VPGAC) Unit - A Calgon HFVS2000 VPGAC adsorber was installed to remove VOCs from the blower effluent prior to atmospheric discharge. The unit contains 2,000 pounds (lbs) of virgin

coconut shell activated carbon. The VPGAC unit is a box-type, top-load carbon steel rated for a maximum flow of 2,000 cubic feet per minute (cfm). A photograph of the VPGAC unit is included in Appendix D.

3. Air/Water Separator (AWS) - An AWS was installed inline prior to the blowers to remove entrained moisture in the extracted vapor stream. The Gasho GX-120 is rated for a flow of up to 2,000 cfm, contains a sight glass and has low, high, and high-high level sensors. There is a transfer pump with a totalizer that pumps the water from the AWS to surface water discharge at the south end of the yard.
4. Liquid-phase granular activated carbon (LPGAC) Unit - A Carbonair PC1 LPGAC adsorber was installed to remove VOCs from the effluent water accumulated in the AWS prior to surface discharge to the south yard. The unit is rated for a maximum flow of 10 gpm and holds 90 pounds (lbs) of carbon.
5. Control Panel – A single control panel was installed to manage the SSDS. The panel shall include hand/off/auto (HOA) switches for each blower motor and the pump. It also has several display lights to indicate the status of the system.
6. Programmable Logic Controller (PLC) – The system is equipped with a PLC and cellular autodialer. The PLC dials the system operator on detection of a fault condition. The PLC was programmed to operate the blowers and pump in accordance with the conditions set forth in the IRM Work Plan. The control panel includes displays for equipment run-hours and the vapor discharge flowrate.

The system includes additional space and proper piping for the installation of an air compressor and a third blower that may be required to support future AS/SVE activities at the Site. The system is enclosed in a locked shipping container to provide protection from the weather and prevent access by trespassers. With the exception of the VPGAC adsorber, all equipment and the control panel are located in the enclosure. The enclosure is equipped with passive louvers and a fan controlled by a thermostat to provide ventilation as required to exhaust heat. A photograph of the enclosure is included in Appendix D.

3.2.5 Sub-slab Monitoring Points

Additional sub-slab monitoring points were installed during the pilot testing performed in November 2008. Three additional sub-slab monitoring points were also installed during under the IRM to further monitor the pressure differential and ensure that the SSDS is functioning properly.

3.2.6 Permitting

A building permit was obtained prior to construction from the New York City Department of Buildings. Also, a letter was prepared by NYSDEC that exempts SMP from the requirement to obtain Department-issued permits for the SSDS but all substantive technical requirements pursuant to an applicable permit must be complied. Copies of these documents are provided in Appendix G.

3.2.7 Testing and Startup Activities

The SSDS unit and VPGAC were delivered to the Site and placed in the eastern covered portion of the loading dock on the south side of the building. After installation and hookup of the SSDS was complete, startup testing of the extraction and treatment system was conducted. The flow control valves at the extraction sumps were closed, and the dilution air valve was opened to test the system with atmospheric air. The blowers were first run individually and then together to verify proper operation of the system. Potable water was used to test operation of the AWS, condensate transfer pump, and LPGAC unit.

Subsequently, system optimization was achieved by monitoring sub-slab vacuum influence at the sub-slab monitoring points under six different scenarios:

1. Operation of one blower with dilution valve completely open
2. Operation of one blower with dilution valve partially open
3. Operation of one blower with dilution valve completely closed
4. Operation of two blowers with dilution valve completely open
5. Operation of two blowers with dilution valve partially open
6. Operation of two blowers with dilution valve completely closed

The startup activity results verified that with one blower on and the dilution valve fully closed (Scenario 3 above), the system was able to achieve the primary goal stated in the work plan of -0.015 inches water column (IWC) pressure gradient across the slab throughout the basement area, with two exceptions. The pressure gradients at SB07 and SB25 were -0.009 and -0.008 IWC, respectively, which still meet the NYSDEC minimum requirement of -0.003 IWC. The field monitoring data gathered during startup activities are summarized in Appendix E.

3.3 O&M Manual

An operation and maintenance manual was developed to detail procedures for system start-up and operation and scheduled preventative maintenance. A copy of this O&M manual is provided in Appendix A. The O&M manual was completed in accordance with Section 3.3.8 of the IRM Work Plan.

3.4 Waste Characterization Sampling and Disposal

No materials were disposed of offsite. Soil excavated during trenching was backfilled and compacted into the same excavated trenches. Concrete was removed during trenching to place pipe. The concrete was re-used onsite to fill in an existing equipment vault in the basement. The vault was finished to grade with newly poured concrete. Photographs of the concrete cuttings placed in the vault are shown in Appendix D.

Previous soil sampling underneath the building did not indicate any contamination, and contaminated soil was determined to exist only outside the building foundation. Additionally, a PID was used at the Site to screen trench spoils prior to onsite re-use.

3.5 Sample Handling and Analytical Methods

This Section is not applicable since samples were not collected.

Samples will be collected as part of a system performance monitoring program that is in accordance with NYSDEC DER-10. CDM will perform semi-annual vacuum/pressure measurements at sub-slab monitoring points to ensure that the system is providing negative pressure across the basement slab. Additionally, vapor sample collection of SSDS influent, i.e. before granular activated carbon (GAC) vapor treatment, and SSDS effluent, i.e. after GAC treatment, and analysis for VOCs via USEPA method TO-15 will be performed as well as influent and effluent water (condensate) sample collection and analysis for VOCs. Table 3-2 provides maintenance activities and sampling to be performed. A progress report will be prepared for submittal to NYSDEC after 12 months of SSDS operation. This report will be prepared in accordance with NYSDEC DER-10 guidance, where applicable. The report will include, where applicable: description of remedial actions completed during the reporting period; description of any deviations or modifications during the reporting period (should be approved by NYSDEC prior to implementation); implementation problems or delays, if any; schedule changes, if any; remedial actions to be completed during the next reporting period; tabulation of all results received during the reporting period.

3.6 Site Restoration

Trenches for the extraction well sumps were backfilled with the excavated soil and approximately four cubic yards of concrete were used to restore the concrete back to pre-remediation conditions and to fill in a basement vault as shown in Appendix D. Concrete cuttings were used to help fill in existing equipment recesses/vaults in the basement and the remainder was filled with fresh concrete. All equipment not associated with the SSDS was demobilized and the Site was restored to pre-construction conditions.

Section 4
Construction Issues
4.1 Deviations from Work Plan

- Minor adjustments were made to the trenching layout due to unanticipated site conditions encountered during construction. Based on field conditions, the routing of the piping was needed to avoid various obstructions. The final piping locations are shown in the "As-Built" drawings in Appendix C.

- The location of ES-05 was moved approximately 2 feet south due to site conditions. A steel beam was encountered beneath the concrete. A photograph of the steel beam encountered is shown in Appendix D.

- The location of ES-07 moved approximately 2 feet east due to site conditions. A sub-slab wall from a recessed equipment vault was encountered. A photograph of the trench pathway is provided in Appendix D.

- For the header pipe that carries extracted vapor from ES03, ES04, and ES05 to the south side of the building, the specified pitch of 1 percent was not feasible due to overhead space constraints. Under the engineer's direction, the pitch was reduced to allow installation. However, the pitch still met 0.5 percent minimum pitch stated in the Final IRM Work Plan.

- During pressure testing that was performed, two pinhole leaks were identified and subsequently repaired.

Section 5
Recommendations

The IRM RA should continue to operate to ensure the SSDS is preventing migration of soil vapors into the building. The construction, installation, and initial operation of the SSDS were completed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009 (CDM 2009a).

The construction and operation and maintenance of an AS/SVE system should be implemented to reduce VOC source concentrations. The other components of the ROD should be implemented to supplement work performed under this IRM.

Section 6
References

Camp Dresser and McKee Inc. (CDM). 2009a. *Final Interim Remedial Measure Work Plan, Standard Motor Products, Inc Site.* February 6.

Camp Dresser and McKee Inc. (CDM). 2009b. *Final Feasibility Study Report, Standard Motor Products, Inc Site.* February 6.

Camp Dresser and McKee Inc. (CDM). 2009c. *Final Comprehensive Remedial Investigation Report, Standard Motor Products, Inc Site.* February 6.

EnviroAudit Ltd. 1996. *A Phase II EnviroAudit Subsurface Investigation and Summary Report of a Portion of an Industrial Property Located at 37-18 Northern Boulevard in Long Island City, New York,* prepared for Standard Motor Products, Inc., Long Island City, NY.

Franke, O.L, and Philip Cohen. 1972. *Regional Rates of Ground-Water Movement on Long Island, New York*, U.S. Geological Survey Professional Paper 800-C, p. C-271 – C-277.

H2M Group. 1992. *Remedial Investigation Report*, prepared for Standard Motor Products, Inc., Long Island City, NY.

McClymonds, N.E. and O.L. Franke. 1972. *Water-Transmitting Properties of Aquifers on Long Island, New York.*

New York State Department of Environmental Conservation (NYSDEC). 2009a. *Record of Decision, Standard Motor Products, Inc Site.* March.

New York State Department of Environmental Conservation (NYSDEC). 2009b. *Draft Department of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation*. November.

New York State Department of Environmental Conservation (NYSDEC). 2002. *Draft Department of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation*. December.

New York State Department of Health (NYSDOH). 2006. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October.

Roux Associates, Inc. 1999. *Operable Unit 6 Remedial Investigation Report*, Sunnyside Yard, Queens, New York.

Roux Associates. Inc., 1995. *Phase II Remedial Investigation*, Sunnyside Yard, Queens, New York.

Table 3-1
Field Monitoring Data
Standard Motor Products
ROI Testing

Date		11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/18/2008	11/19/2008	11/19/2008	11/19/2008
Time		11:10[1]	11:50	12:30	13:50	14:30[5]	14:50	16:00	16:45	17:40	18:10	7:35	8:05	9:10[8]
ES01 Vacuum (in. WC)		NA	-1.8	-2.5	-4.5	-6.7	-7.0	-8.9	-11.3	-17.0	-21.0	-20.8	NR	NA
ES01 Flowrate (ft/min)		NA	830[2]	1300[2]	2110[2]	3060[2]	3280[2]	900[6]	1100[6]	1590[6]	1910[6]	2040[6,7]	1920[6]	NA
Vapor Temperature (˚F)		NA	66	67	66	64	67	61	59	57	56	59	NR	NA
Annubar ΔP (in. WC)		NA	0.1	0.2	0.2	0.5	0.5	1.15	1.95	4.0	6.7	6.7	NR	NA
ES01 Flow[9] (cfm)		NA	19	30	48	70	75	99	128	185	240	240	NR	NA
ES-1 PID Reading (ppm)		1350	193	9.3	5.9	7.2	8.5	7.3	19.7	81.0	76.0	423	NR	NR
GAC PID Reading (ppm)		NA	0.8	0.3	0.0	NR	NR	0.8	1.0	0.5	2.0	16.5	NR	NA
GAC Inlet Pressure (in. WC)		NA	1.0	1.8	1.8	NR	NR	7.0	3.4	2.4	2.1	1.8	NR	NA
Sub-Slab Monitoring Point Vacuum (inches WC)	SB01	0.014	-0.003	-0.002	-0.004	NR	-0.004	-0.007	-0.017	-0.026	-0.034	-0.029	NR	0.000
	SB03	0.010	-0.032	-0.059	-0.107	NR	-0.173	-0.229	<-0.250	<-0.250	<-0.250	<-0.250	NR	0.000
	SB04	0.016	0.014	0.006	0.000	NR	-0.003	-0.011	-0.007	-0.043	-0.052	-0.052	NR	0.006
	SB05	0.010	-0.004	-0.015	-0.015	NR	-0.025	-0.033	-0.036	-0.063	-0.079	-0.071	NR	-0.001
	SB06	0.014	-0.010	-0.162	<-0.250[4]	NR	<-0.250	<-0.250	-0.400	-0.800	-1.150	-1.000	NR	0.005
	SB07	0.009	0.000	-0.008	-0.008	NR	-0.009	-0.008	-0.012	-0.011	-0.011	-0.009	NR	-0.010
	SB08	0.010	-0.005	-0.018	-0.018	NR	-0.023	-0.022	-0.028	-0.048	-0.054	-0.056	NR	-0.016
	SB11	0.023	-0.006	-0.013	-0.028	NR	-0.050	-0.074	-0.093	-0.157	-0.209	-0.190	NR	0.000
	SB12	0.010	0.050	0.020	0.010	NR	0.018	0.014	-0.015	-0.003	0.000	-0.002	NR	0.003
	SB13	0.010	0.019	0.005	0.021	NR	0.005	0.002	-0.025	-0.001	0.000	-0.006	NR	0.002
	SB16	0.016	0.030	0.021	0.001	NR	0.008	-0.007	-0.004	-0.028	-0.043	-0.035	NR	0.011
	SB17	0.015	-1.300	-1.450	-3.050	NR	-5.100	-6.400	-8.200	-12.400	-14.800	-14.800	NR	0.001
	SB18	0.014	-0.180	-0.248	<-0.250	NR	-0.350	-0.650	-0.800	-1.500	-1.800	-1.800	NR	0.000
	SB19	0.008	NR[3]	-0.072	-0.117	NR	-0.202	<-0.250	<-0.250	<-0.250	<-0.250	-0.246	NR	0.000
	SB20	0.012	-0.007	-0.017	-0.022	NR	-0.040	-0.056	-0.068	-0.111	-0.152	-0.130	NR	0.000
	SB21	0.014	0.000	-0.017	-0.024	NR	-0.037	-0.054	-0.065	-0.085	-0.109	-0.101	NR	0.000
	SB22	0.016	0.000	-0.017	-0.019	NR	-0.030	-0.036	-0.038	-0.061	-0.064	-0.065	NR	-0.011
	SB23	0.016	NR[3]	0.000	-0.004	NR	-0.008	-0.012	-0.016	-0.038	-0.055	-0.040	NR	0.003

Notes:

1. Round collected prior to system startup. Pressure values were recorded immediately after attaching quick connects (i.e., they were not allowed to stabilize). System startup at 11:45 with one blower on.
2. Velocity measured in 2" schedule 40 PVC.
3. No reading collected. Anchoring cement at these probes was still setting.
4. The vacuum was too high to be measured with the Omniguard unit and too low to get a reliable reading with the Dwyer digital manometer.
5. The second blower was turned on at 14:30.
6. Velocity measured in 4" schedule 40 PVC.
7. Suspected high reading due to thermal mass of anemometer.
8. System shut down at 08:10. Readings collected approximately 1 hour after shutdown.
9. Flowrates up to 75 cfm were calculated from the anemometer velocity data. Flowrates above 75 cfm were calcuted from the annubar differential pressure data.

Table 3-2
SSDS Annual Monitoring Plan
Standard Motor Products

	Month After Startup of Sub-slab Depressurization System											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Collect pressure readings from sub-slab depressurization system vacuum/pressure monitoring points						X					X	
System check of vacuum, blowers, and control system. Adjust flow at blowers and extraction points as necessary	X	X	X	X	X	X	X	X	X	X	X	X
Site inspection to conduct maintenance activities including oil changes, air filter changes, moisture separator inspection and other activities as specified in OM&M Manual	X	X	X	X	X	X	X	X	X	X	X	X
Sample Influent Air (Before GAC) for VOCs						X					X	
Sample Effluent Air (After GAC) for VOCs						X					X	
Sample Influent Water (Before LPGAC) for VOCs						X					X	
Sample Effluent Water (After LPGAC) for VOCs						X					X	

Notes:

1.) X indicates that activity shall be performed.

2.) Air VOC samples will be analyzed via EPA method TO-15 and aqueous VOC samples will be analyzed via EPA method 8260.

Abbreviations:

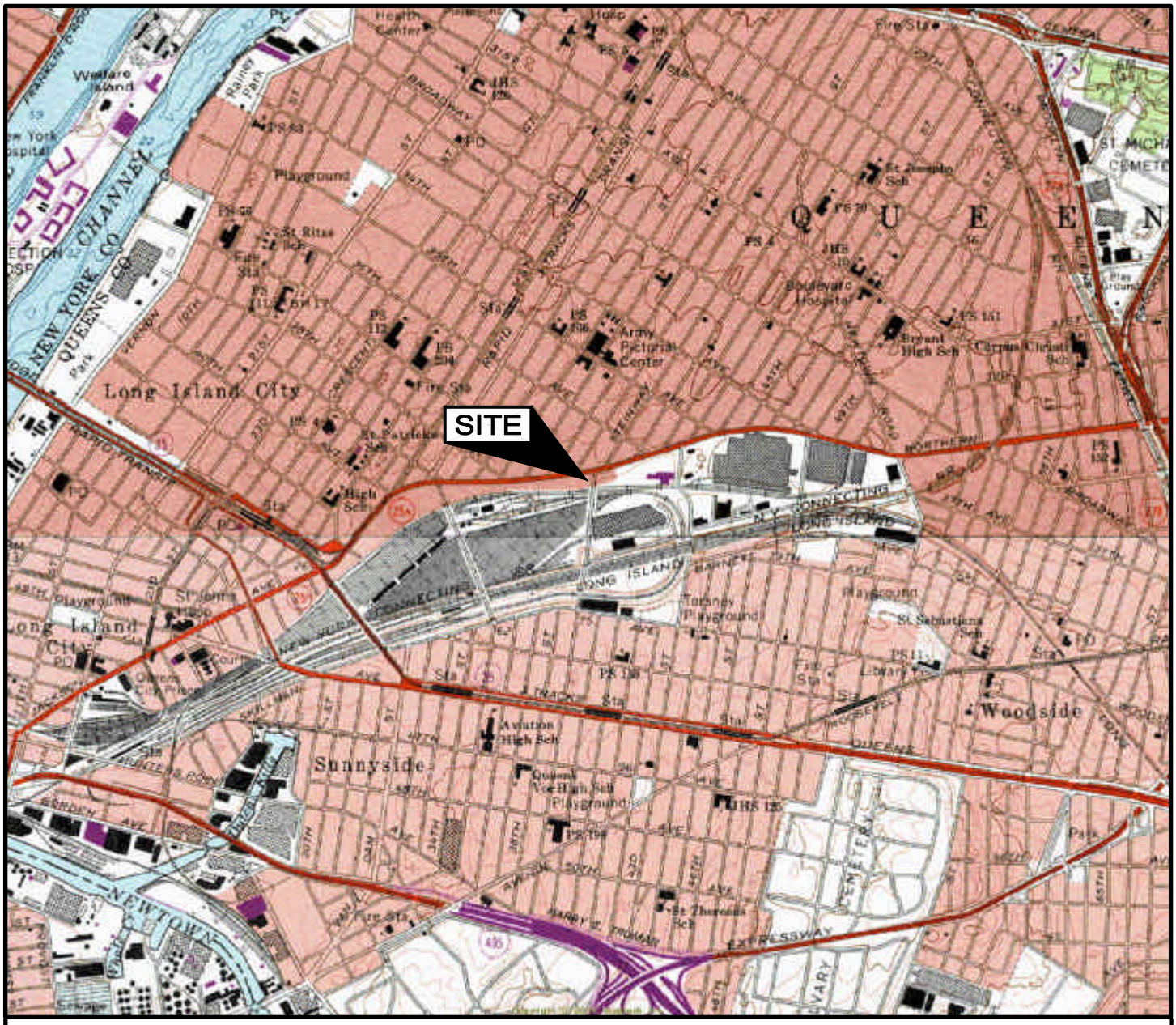
GAC: Granulated activated carbon

LPGAC: Liquid phase activated carbon

OM&M: Operation maintenance and monitoring

SSDS: Sub-slab depressurization system

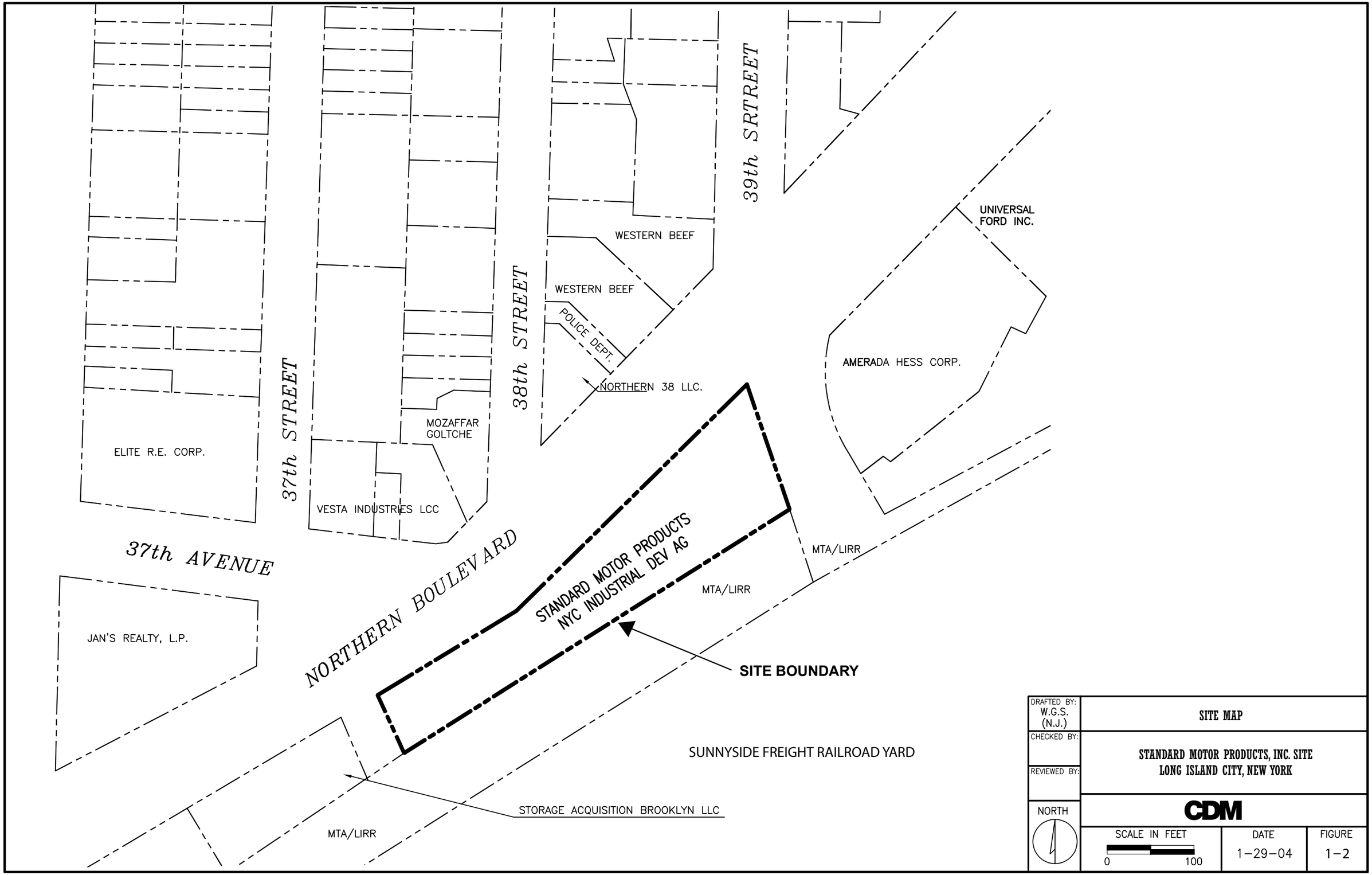
VOC: Volatile organic compound



SOURCE: USGS 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE 1979
CENTRAL PARK, N.Y. – N.J.
CONTOUR INTERVAL = 10'

QUADRANGLE LOCATION

DRAFTED BY: W.G.S. (N.J.)	SITE LOCATION
CHECKED BY:	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY:	
NORTH	CDM
SCALE IN FEET: 0 – 2000	DATE: 1–29–04
	FIGURE: 1-1



DRAFTED BY: W.G.S. (N.J.)	SITE MAP
CHECKED BY:	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY:	
NORTH	CDM
SCALE IN FEET 0 100	DATE 1-29-04 / FIGURE 1-2

- INDOOR AIR (IA) SAMPLE LOCATION
- AMBIENT AIR (AA) SAMPLE LOCATION
- DESTROYED MONITORING WELLS (MW)
- MONITORING WELL (MW)
- SUB-SLAB (SB) SAMPLE LOCATION
- SOIL GAS (SG) SAMPLE LOCATION
- (M) SEWER MANHOLE (APPROX 12' DEEP)
- (D) APPROX LOCATION OF DRAIN SPOUT
- R.O.W. RIGHT OF WAY
- SUPPORT COLUMN
- FENCE LINE
- UNDERGROUND STORM SEWER
- APPROX. VICINITY OF PREVIOUSLY EXCAVATED SOILS
- RECESS EQUIPMENT PAD/VAULT
- A — A' CROSS SECTION

NOTES:
SB07* - AIR SAMPLE
SB07** - SOIL/GW SAMPLE

DRAFTED BY: CJ	**CROSS SECTION LOCATION MAP**
CHECKED BY:	**STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK**
REVIEWED BY:	CDM

NORTH	SCALE IN FEET	DATE	FIGURE
	0 50	9-30-08	2-1

West

A

East

A'

Loading Dock

MW14D
MW14S
SG10
SG09
SG05
MW12
SG03
MW11S
MW11D
SG01
SG07
MW10

Elevation (feet above mean sea level)

Vertical Scale (feet)

Distance Along Baseline (ft)

Cross Section Location

Site Map Scale 1 inch equals 130 feet

LEGEND:

- USCS Poorly-graded Sand
- USCS Well-graded Sand
- USCS Well-graded Gravel
- Fill (made ground)
- USCS Low Plasticity Clay
- USCS Silty Sand
- USCS Poorly-graded Gravel
- USCS Peat
- USCS Clayey Sand
- Blank Riser Pipe
- Well Screen
- Ground surface elevation created using the minimum curvature algorithm in Surfer.
- Water table elevation created in Surfer using the minimum curvature algorithm. Data from the following wells were used: MW06, 10, 11S, 12, 14S, 15, 16.

Groundwater (GW) Sample Results
Trichloroethene
cis-1,2-Dichloroethene
Total Xylenes

All GW sample results in micrograms per liter, µg/L

U - not detected, detection limit is value to left
J - estimated concentration
D - sample diluted

Approximate location of sub-basement as projected onto cross-section (sub-basement is to the north).

Water Level Elevation (feet above mean sea level)
Date: 2/25/2008

Water Level in Shallow Well Representative of Water Table
Date: 2/25/2008

Groundwater Sample Interval

Potentiometric Contours

Groundwater Isoconcentration Contours, µg/L
Trichloroethene
Total Xylenes

NOTE: Data from MW11S, MW11D and MW12 were not used to draw isoconcentration contours.

Screened Interval

Vertical Exaggeration: 2.5x

DRAFTED BY: CNR	SITE CROSS SECTION A TO A'
CHECKED BY: JND	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY: MW	CDM
NORTH	SCALE IN FEET 0 25 (Horizontal)
	DATE 6-18-2008
	FIGURE 2-2

SMP CROSS SECTION SMP1.GPJ SMP1.GPJ 6/5/08 REV.

West
B

East
B'

Building

Loading Dock

SB15 MW06 SB02 SB10 SB09 SB07 MW15 SB01 SB11 SB06 SB03 SB05

Elevation (feet above mean sea level)

Vertical Scale (feet)

Distance Along Baseline (ft)

Cross Section Location

N

SB 15 MW 06 SB 02 SB 10 SB 09 SB 07 MW 15 SB 01 SB 11 SB 06 SB 03 SB 05

Site Map Scale 1 inch equals 155 feet

Vertical Exaggeration: 3x

LEGEND:

- USCS Well-graded Sand
- Asphalt
- USCS Poorly-graded Sand
- Fill (made ground)
- USCS Silty Sand
- Blank Riser Pipe
- Well Screen
- Ground surface elevation created using the minimum curvature algorithm in Surfer.
- Water table elevation created in Surfer using the minimum curvature algorithm. Data from the following wells were used: MW06, 10, 11S, 12, 14S, 15, 16.
- Approximate location of sub-basement as projected onto cross-section (sub-basement is transected by B - B').

Groundwater (GW) Sample Results
Trichloroethene
cis-1,2-Dichloroethene
Total Xylenes

All GW sample results in micrograms per liter, µg/L

U - not detected, detection limit is value to left
J - estimated concentration
D - sample diluted

Water Level Elevation (feet above mean sea level) Date: 2/25/2008

Screened Interval

Water Level in Shallow Well Representative of Water Table Date: 2/25/2008

Groundwater Sample Interval

Potentiometric Contours — 16.1 —

Groundwater Isoconcentration Contours, µg/L
Trichloroethene
Total Xylenes

NOTE: Data from MW15 were not used to draw isoconcentration contours.

DRAFTED BY: CNR	SITE CROSS SECTION B TO B'
CHECKED BY: JND	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY: MW	CDM
NORTH	SCALE IN FEET 0 30 (Horizontal)
	DATE 6-18-2008
	FIGURE 2-3

CDM

SMP CROSS SECTION SMP1.GPJ SMP1.GPJ 6/5/08 REV.

North
C

South
C'

Building

Loading Dock

SB13

SB08

SB05

MW10

SG08

GW
25 U
25 UJ
4,100 D

GW
25 U
25 UJ
4,700 D

GW
12 U
12 U
6,000 D

GW
5 U
5 U
880 DJ

16.37

GW
0.5 U
0.5 U
10.2 J

5000

5000

1000

100

10

Elevation (feet above mean sea level)

Vertical Scale (feet)

Distance Along Baseline (ft)

Cross Section Location

SB 13

SB 08

SB 05

MW 10

SG 08

N

Site Map Scale
1 inch equals 75 feet

Vertical Exaggeration: 1.5x

LEGEND:

- USCS Poorly-graded Sand
- USCS Well-graded Sand
- Fill (made ground)
- USCS Poorly-graded Gravel
- USCS Low Plasticity Clay
- Blank Riser Pipe
- Well Screen
- Ground surface elevation created using the minimum curvature algorithm in Surfer.
- Water table elevation created in Surfer using the minimum curvature algorithm. Data from the following wells were used: MW06, 10, 11S, 12, 14S, 15, 16.

Groundwater (GW) Sample Results
Trichloroethene
cis-1,2-Dichloroethene
Total Xylenes

All GW sample results in micrograms per liter, µg/L

U - not detected, detection limit is value to left
J - estimated concentration
D - sample diluted

Approximate location of sub-basement as projected onto cross-section (sub-basement is to the west).

Water Level Elevation (feet above mean sea level)
Date: 2/25/2008

Screened Interval

Water Level in Shallow Well Representative of Water Table
Date: 2/25/2008

Groundwater Sample Interval

Groundwater Isoconcentration Contours, µg/L

Total Xylenes

DRAFTED BY: CNR	SITE CROSS SECTION C TO C'
CHECKED BY: JND	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY: MW	CDM
NORTH	SCALE IN FEET 0 15 (Horizontal) / DATE 6-18-2008 / FIGURE 2-4

CDM

SMP CROSS SECTION SMP1.GPJ SMP1.GPJ 6/5/08 REV.

North
D

South
D'

Building

Loading Dock

SB04 SB06 SB11 MW15 SB01 SG03 MW11D MW11S SG04

Elevation (feet above mean sea level)

Vertical Scale (feet)

Distance Along Baseline (ft)

Cross Section Location

SB 04
SB 06
SB 11
MW 15
SB 01
SG 03
SG 04
MW 11D
MW 11S
N

Site Map Scale
1 inch equals 75 feet

Vertical Exaggeration: 1.5x

LEGEND:

- USCS Well-graded Sand
- USCS Poorly-graded Sand
- USCS Poorly-graded Gravel
- Blank Riser Pipe
- Well Screen
- USCS Well-graded Gravel
- Fill (made ground)
- Asphalt
- USCS Silty Sand

Ground surface elevation created using the minimum curvature algorithm in Surfer.

Water table elevation created in Surfer using the minimum curvature algorithm. Data from the following wells were used: MW06, 10, 11S, 12, 14S, 15, 16.

Groundwater (GW) Sample Results
Trichloroethene
cis-1,2-Dichloroethene
Total Xylenes

All GW sample results in micrograms per liter, µg/L

U - not detected, detection limit is value to left
J - estimated concentration
D - sample diluted

Approximate location of sub-basement as projected onto cross-section (sub-basement is to the west).

Water Level Elevation (feet above mean sea level)
Date: 2/25/2008

Screened Interval

Water Level in Shallow Well Representative of Water Table
Date: 2/25/2008

Groundwater Sample Interval

Groundwater Isoconcentration Contours, µg/L
Trichloroethene
Total Xylenes

CDM

DRAFTED BY: CNR	SITE CROSS SECTION D TO D'
CHECKED BY: JND	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY: MW	CDM
NORTH	SCALE IN FEET 0 15 (Horizontal)
	DATE 6-18-2008
	FIGURE 2-5

SMP CROSS SECTION SMP1.GPJ SMP1.GPJ 6/5/08 REV.

North E

South E'

Building

Loading Dock

SB14 SB10 SB02 SB09 MW14S MW14D

GW 1.1 0.5 U 0.5 U

GW 5 U 5 U 5 U

GW 0.87 4.1 0.5 U

GW 5.6 0.5 UJ 0.5 U

15.89 GW 5 U 14 J 5 U

16.06 GW 5.1 J 21 J 5 UJ

5

Elevation (feet above mean sea level)

30 25 20 15 10 5 0 -5 -10 -15 -20 -25

0 20 40 60 80 100 120 140 160 180

Distance Along Baseline (ft)

0 10

Vertical Scale (feet)

Cross Section Location

N

SB 14 SB 02 SB 10 SB 09 MW 14D MW 14S

Site Map Scale 1 inch equals 75 feet

Vertical Exaggeration: 1.5x

LEGEND:

- Fill (made ground)
- USCS Poorly-graded Sand
- USCS Well-graded Sand
- USCS Low Plasticity Clay
- USCS Silty Sand
- Blank Riser Pipe
- Well Screen
- Ground surface elevation created using the minimum curvature algorithm in Surfer.
- Water table elevation created in Surfer using the minimum curvature algorithm. Data from the following wells were used: MW06, 10, 11S, 12, 14S, 15, 16.

Groundwater (GW) Sample Results
Trichloroethene
cis-1,2-Dichloroethene
Total Xylenes

All GW sample results in micrograms per liter, µg/L

U - not detected, detection limit is value to left
J - estimated concentration
D - sample diluted

Approximate location of sub-basement as projected onto cross-section (sub-basement is to the east).

Water Level Elevation (feet above mean sea level)
Date: 2/25/2008

Screened Interval

Water Level in Shallow Well Representative of Water Table
Date: 2/25/2008

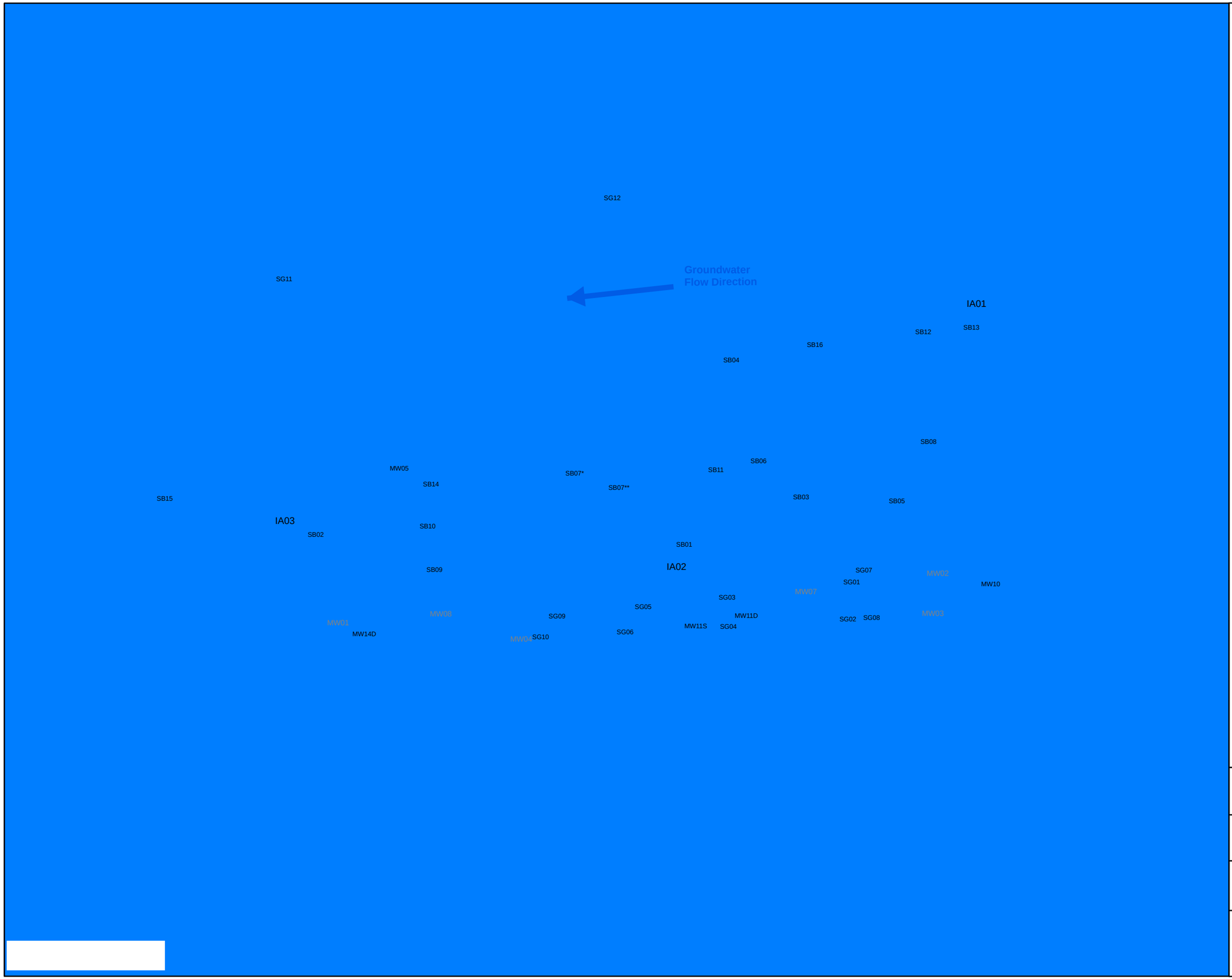
Groundwater Sample Interval

Groundwater Isoconcentration Contours, µg/L
Trichloroethene

CDM

DRAFTED BY: CNR	SITE CROSS SECTION E TO E'
CHECKED BY: JND	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK
REVIEWED BY: MW	CDM
NORTH	SCALE IN FEET 0 15 (Horizontal)
	DATE 6-18-2008
	FIGURE 2-6

SMP CROSS SECTION SMP1.GPJ SMP1.GPJ 6/5/08 REV.

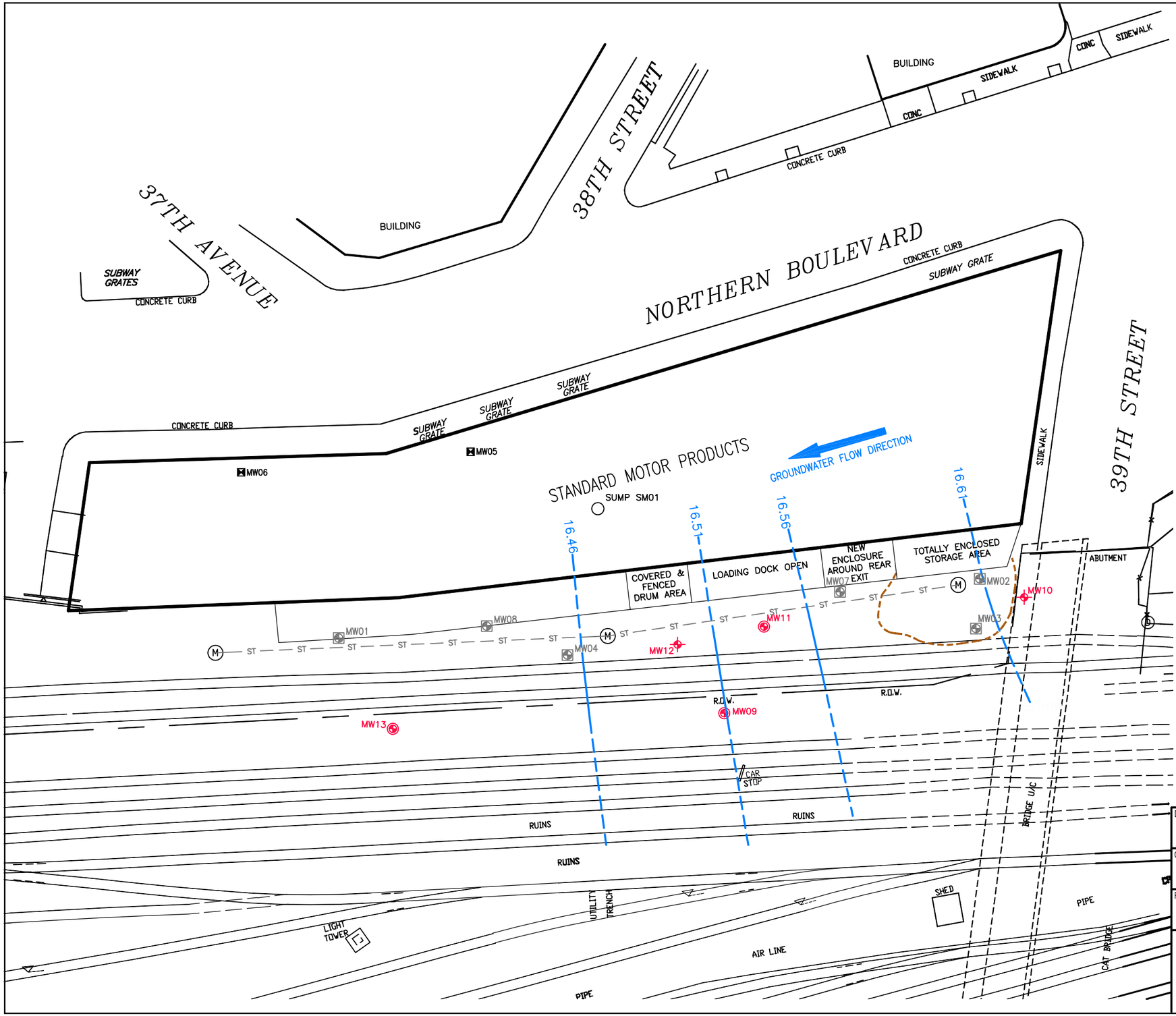


- INDOOR AIR (IA) SAMPLE LOCATION
- AMBIENT AIR (AA) SAMPLE LOCATION
- DESTROYED MONITORING WELLS (MW)
- MONITORING WELL (MW)
- SUB-SLAB (SB) SAMPLE LOCATION
- SOIL GAS (SG) SAMPLE LOCATION
- (M) SEWER MANHOLE (APPROX 12' DEEP)
- (D) APPROX LOCATION OF DRAIN SPOUT
- R.O.W. RIGHT OF WAY
- FENCE LINE
- UNDERGROUND STORM SEWER
- APPROX. VICINITY OF PREVIOUSLY EXCAVATED SOILS
- 16.3 POTENTIOMETRIC CONTOUR, FEET AMSL
- 16.37 WATER LEVEL ELEVATION, FEET AMSL

NOTES:
SB07* - AIR SAMPLE
SB07** - SOIL/GW SAMPLE

DRAFTED BY: CJ	**SITE GROUNDWATER CONTOUR MAP SHALLOW MONITORING WELLS FEBRUARY 2008**
CHECKED BY:	**STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK**
REVIEWED BY:	CDM

NORTH	SCALE IN FEET	DATE	FIGURE
	0 50	9-30-08	2-7



LEGEND

- DESTROYED MONITORING WELLS
- INTERIOR MONITORING WELL (INSIDE THE BUILDING)
- DEEP/SHALLOW MONITORING WELL CLUSTER
- SHALLOW MONITORING WELL
- SM — INTERIOR SUMP
- FENCE LINE
- D — APPROXIMATE LOCATION OF DRAIN SPOUT
- APPROXIMATE VICINITY OF PREVIOUS EXCAVATED & STOCKPILED SOILS
- ROW — RIGHT OF WAY
- M — SEWER MANHOLE (APPROX 12' DEEP)
- ST — UNDERGROUND STORM SEWER
- TOC — TOP OF CASING ELEVATION (feet)
- DTW — DEPTH TO WATER (feet)
- GW EL — GROUNDWATER ELEVATION (feet)
- WNS — WELL NOT SURVEYED
- 16.61 — GROUNDWATER CONTOUR LINE (feet)

MW	TOC	DTW	GW EL
6	WNS	6.11	WNS
9S	20.32	3.81	16.51
10	21.13	4.51	16.62
11S	20.76	4.21	16.55
12	20.33	3.85	16.48
13S	20.29	3.87	16.42

DRAFTED BY: W.G.S. (N.J.)

CHECKED BY:

REVIEWED BY:

NORTH

SITE GROUNDWATER CONTOUR MAP SHALLOW MONITORING WELLS JULY 28, 2003

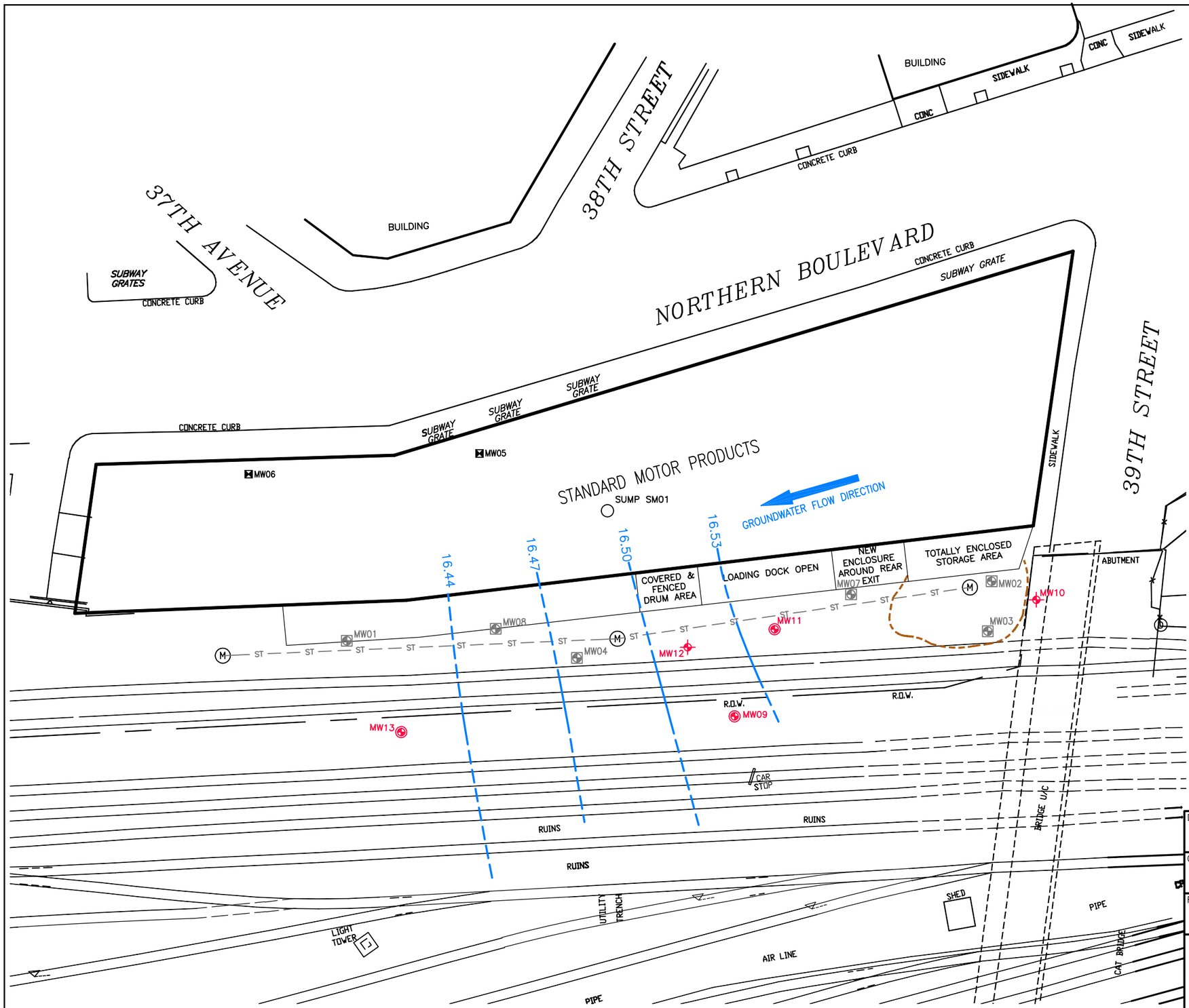
STANDARD MOTOR PRODUCTS, INC. SITE
LONG ISLAND CITY, NEW YORK

CDM

SCALE IN FEET: 0 — 50

DATE: 1-29-04

FIGURE: 2-8

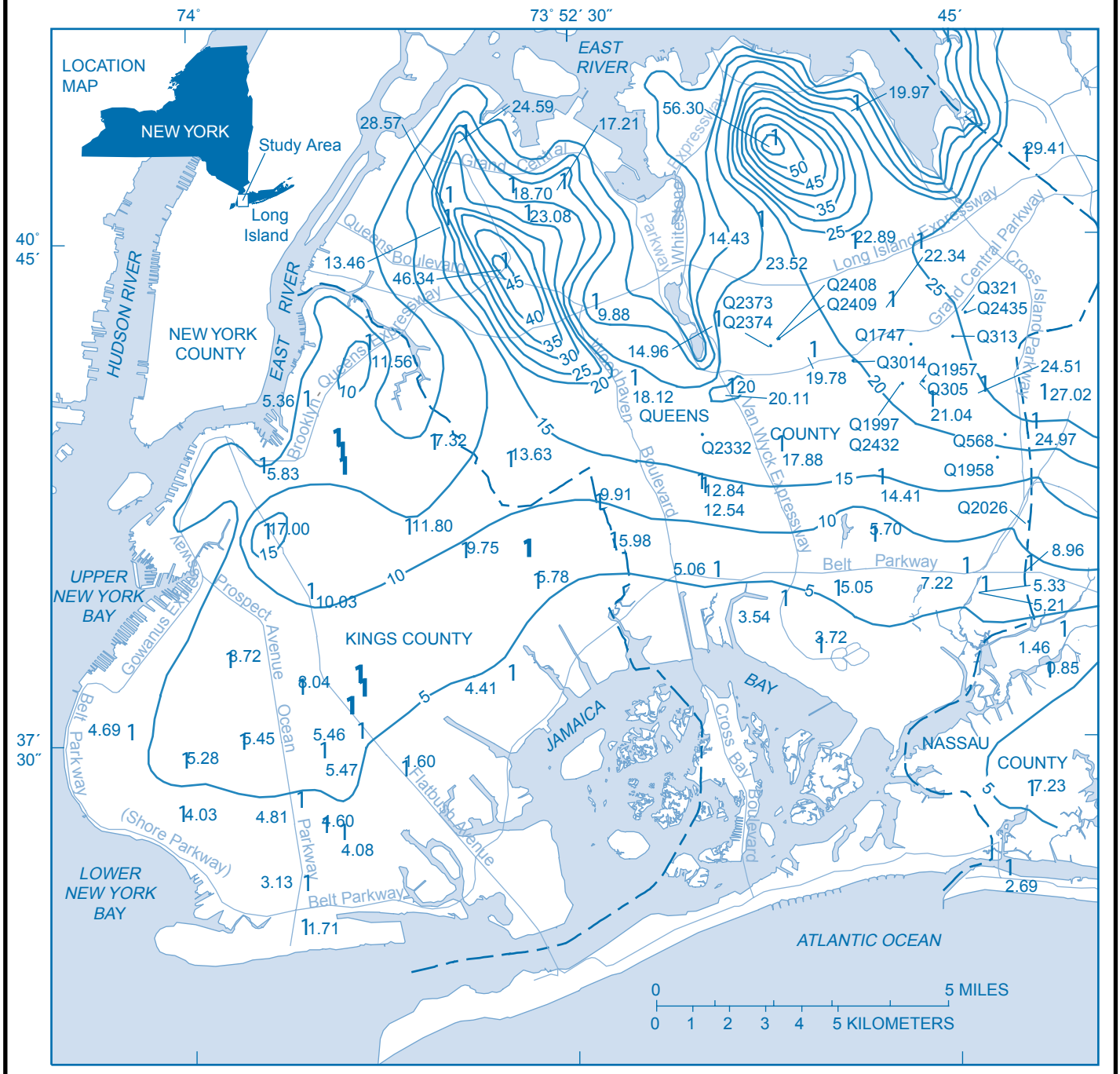


LEGEND

- DESTROYED MONITORING WELLS
- INTERIOR MONITORING WELL (INSIDE THE BUILDING)
- DEEP/SHALLOW MONITORING WELL CLUSTER
- SHALLOW MONITORING WELL
- SM — INTERIOR SUMP
- FENCE LINE
- D — APPROXIMATE LOCATION OF DRAIN SPOUT
- APPROXIMATE VICINITY OF PREVIOUS EXCAVATED & STOCKPILED SOILS
- ROW — RIGHT OF WAY
- M — SEWER MANHOLE (APPROX 12' DEEP)
- ST — UNDERGROUND STORM SEWER
- TOC — TOP OF CASING ELEVATION (feet)
- DTW — DEPTH TO WATER (feet)
- GW EL — GROUNDWATER ELEVATION (feet)
- 16.53 — GROUNDWATER CONTOUR LINE (feet)

MW	TOC	DTW	GW EL
9D	20.49	3.98	16.51
11D	20.75	4.20	16.55
13D	19.99	3.56	16.43

DRAFTED BY: W.G.S. (N.J.)	SITE GROUNDWATER CONTOUR MAP DEEP MONITORING WELLS JULY 28, 2003		
CHECKED BY:	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK		
REVIEWED BY:	CDM		
NORTH	SCALE IN FEET 0 50	DATE 1-29-04	FIGURE 2-9



Base from New York State Department of Transportation, 1:24,000

EXPLANATION

—5— WATER-TABLE CONTOUR- Shows altitude of water table. Contour interval 5 feet. Datum is sea level.

. Q2435 PUBLIC-SUPPLY WELL PUMPING IN MARCH 1997

1 22.76 OBSERVATION WELL- Number is water-level altitude, in feet above sea level.

1 DEWATERING SITE- Metropolitan Transit Authority subway

REGIONAL GROUNDWATER CONTOUR MAP

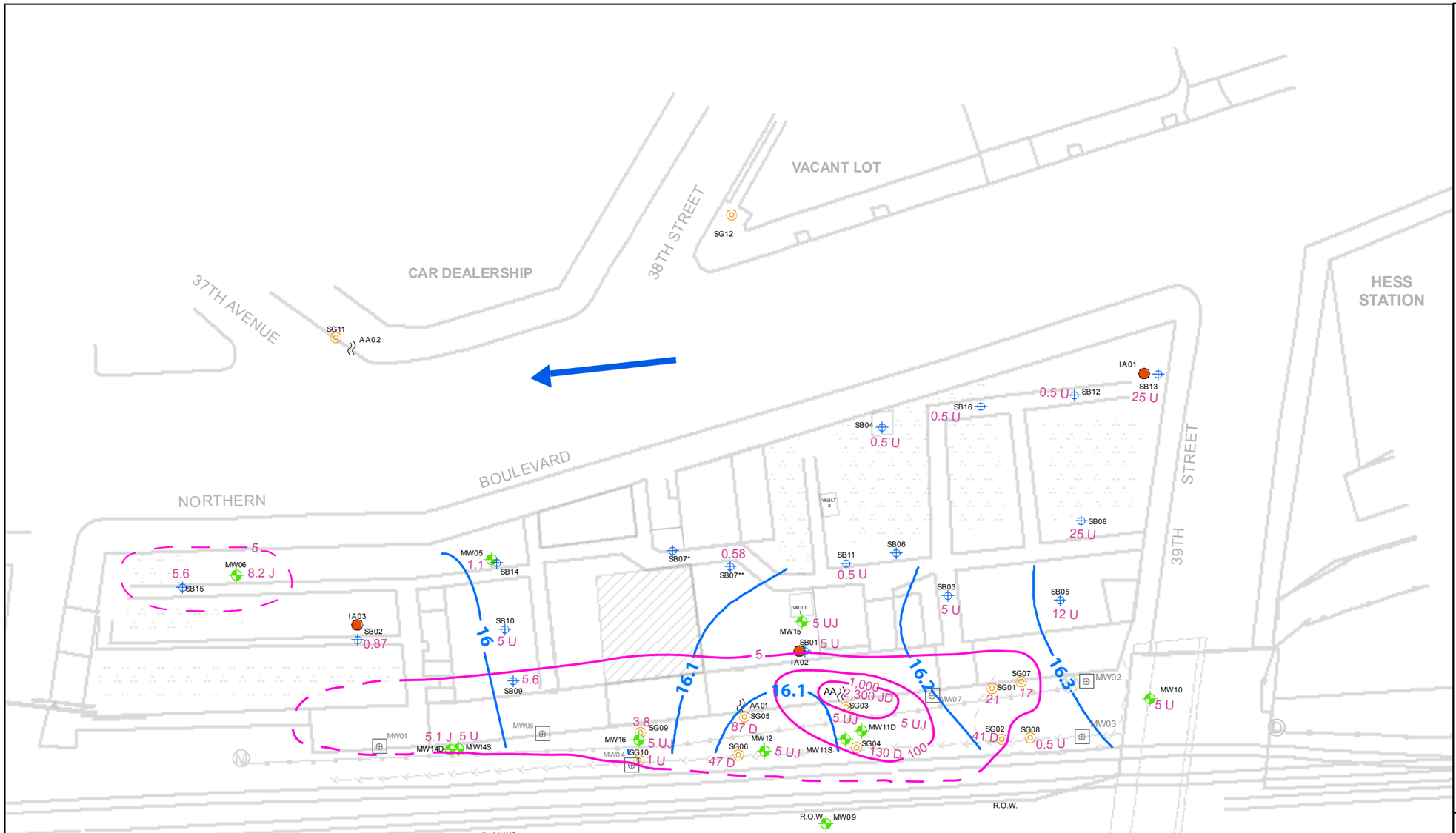
STANDARD MOTOR PRODUCTS, INC. SITE
LONG ISLAND CITY, NEW YORK

CDM

NORTH

DATE
6-18-2008

FIGURE
2-10



INDOOR AIR (IA) SAMPLE LOCATION

AMBIENT AIR (AA) SAMPLE LOCATION

DESTROYED MONITORING WELLS (MW)

MONITORING WELL (MW)

SUB-SLAB (SB) SAMPLE LOCATION

SOIL GAS (SG) SAMPLE LOCATION

(M) SEWER MANHOLE (APPROX 12' DEEP)

(D) APPROX LOCATION OF DRAIN SPOUT

R.O.W. RIGHT OF WAY

FENCE LINE

UNDERGROUND STORM SEWER

BUILDING - PROCESS EQUIPMENT

APPROX. VICINITY OF PREVIOUSLY EXCAVATED SOILS

16.3 POTENTIOMETRIC CONTOUR, FEET AMSL

TCE ISOCONCENTRATION CONTOUR (MICROGRAMS/LITER) (MAXIMUM TOTAL TCE CONCENTRATION AT EACH LOCATION WERE USED TO CREATE CONTOURS)

2,300 JD TCE, MICROGRAMS/LITER

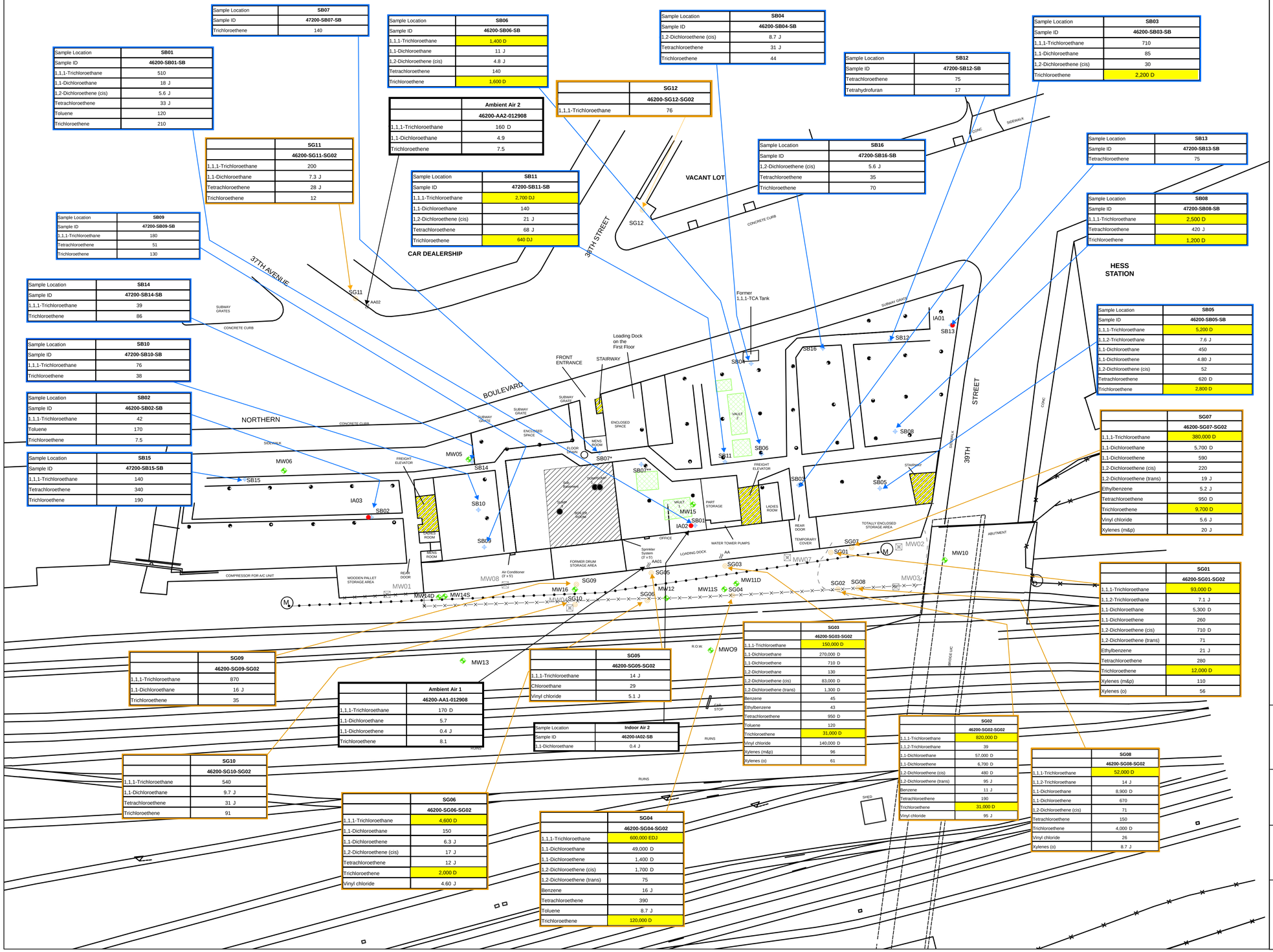
D DILUTED SAMPLE

U NOT DETECTED, VALUE REPORTED IS THE DETECTION LIMIT

J ESTIMATED CONCENTRATION

NOTES:
SB07* - AIR SAMPLE
SB07** - SOIL/GW SAMPLE

DRAFTED BY: BK	**2008 TCE GROUNDWATER ISOCONCENTRATION CONTOUR MAP**
CHECKED BY: JD	**STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK**
REVIEWED BY: MW	CDM
NORTH	50 Feet; DATE 6-18-08; FIGURE 2-11



- INDOOR AIR (IA) SAMPLE LOCATION
- AMBIENT AIR (AA) SAMPLE LOCATION
- DESTROYED MONITORING WELLS (MW)
- MONITORING WELL (MW)
- SUB-SLAB (SB) SAMPLE LOCATION
- SOIL GAS (SG) SAMPLE LOCATION
- (M) SEWER MANHOLE (APPROX 12' DEEP)
- (D) APPROX LOCATION OF DRAIN SPOUT
- R.O.W. RIGHT OF WAY
- SUPPORT COLUMN
- FENCE LINE
- UNDERGROUND STORM SEWER
- APPROX. VICINITY OF PREVIOUSLY EXCAVATED SOIL
- RECESS EQUIPMENT PAD/VAULT
- RECOMMEND MITIGATION

NOTES:
SB07* - AIR SAMPLE
SB07** - SOIL/GW SAMPLE

ALL RESULTS IN µg/m3

DRAFTED BY: BK

2008
SOIL GAS, SUB-SLAB AND INDOOR AIR VOC DETECTIONS

CHECKED BY: CJ

STANDARD MOTOR PRODUCTS, INC. SITE
LONG ISLAND CITY, NEW YORK

REVIEWED BY: MW

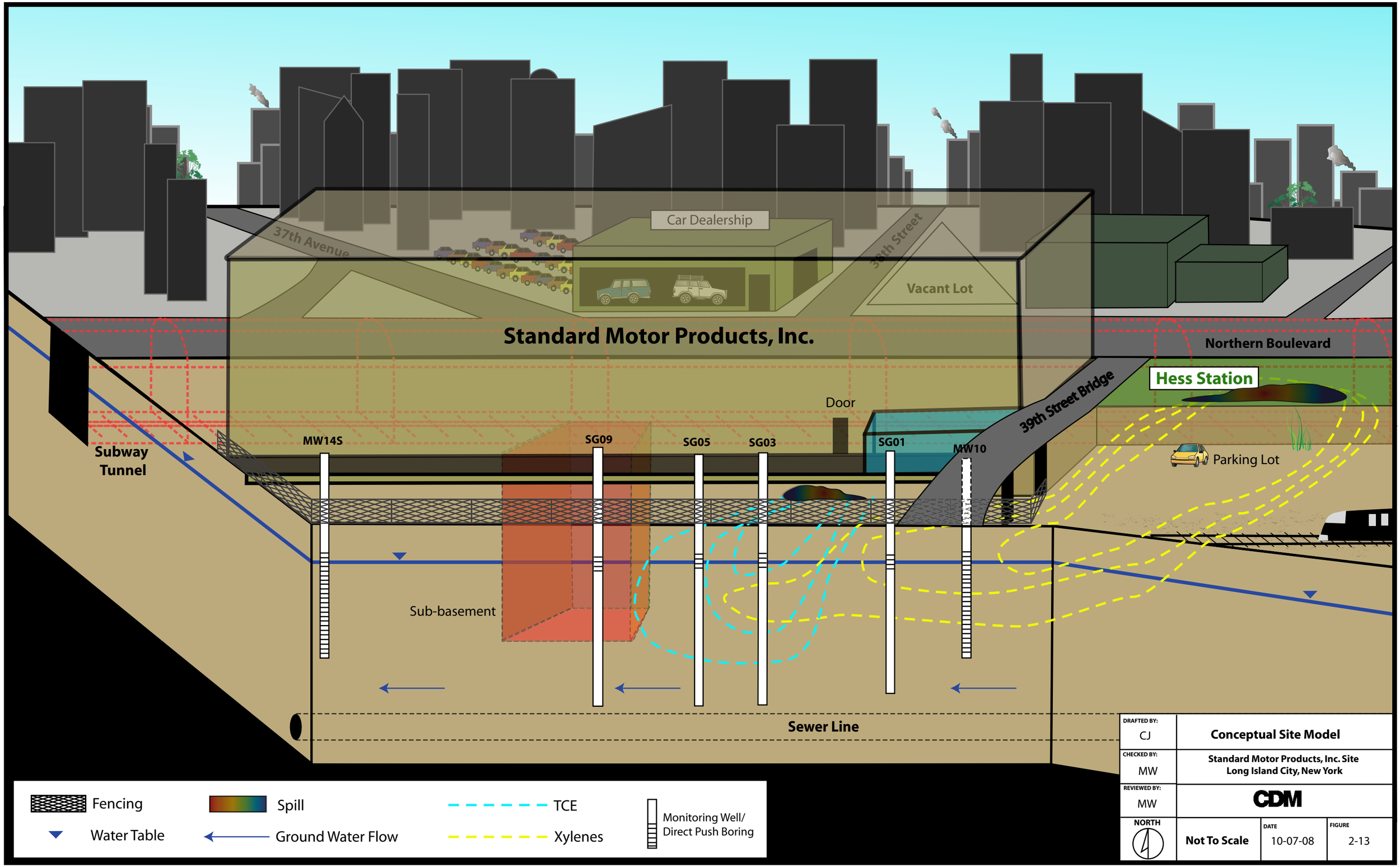
CDM

NORTH

SCALE IN FEET
0 50

DATE: 9-2-08

FIGURE: 2-12


Car Dealership
37th Avenue
38th Street
Vacant Lot
Standard Motor Products, Inc.
Northern Boulevard
Hess Station
39th Street Bridge
Door
Subway Tunnel
MW14S
SG09
SG05
SG03
SG01
MW10
Parking Lot
Sub-basement
Sewer Line
Fencing
Spill
TCE
Water Table
Ground Water Flow
Xylenes
Monitoring Well/ Direct Push Boring
DRAFTED BY: CJ
CHECKED BY: MW
REVIEWED BY: MW
NORTH
Conceptual Site Model
Standard Motor Products, Inc. Site
Long Island City, New York
CDM
Not To Scale
DATE 10-07-08
FIGURE 2-13

Appendix A
Operation and Maintenance Manual

SUB-SLAB DEPRESSURIZATION SYSTEM OPERATION AND MAINTENANCE MANUAL

Site Location:

Standard Motors Products
37-18 Northern Boulevard
Long Island City, NY

Prepared For:

CDM

Prepared By:

INTEX Environmental Group, Inc.
6205 Easton Road
Pipersville, PA 18947
Phone: 215/766-7230 * Fax: 215/766-9730

December 2009

Detailed Operation and Maintenance Program
Standard Motor Products
Sub-Slab Depressurization System

TABLE OF CONTENTS

DETAILED OPERATION AND MAINTENANCE PROGRAM
STANDARD MOTOR PRODUCTS
SUB-SLAB DEPRESSURIZATION SYSTEM

1.0 START-UP AND OPERATION

Start-up of the system as well as shutting the system down for maintenance will be necessary during routine operation of the system. Normally, the system will operate with minimal assistance and routine maintenance operations are described in Appendix A. However, in the event of the system shutting down due to a alarm condition, troubleshooting solutions are also provide in Appendix A. The following sections detail the procedures for start-up and shutdown of the system. Figure 1 depicts the process flow and instrumentation diagram for the system.

1.1 System Start-Up

Start-up of the system consists of three steps. First is setting the valve positions, followed by setting the controls to automatic by use of the HAND-OFF-AUTO Switches or by accessing the PLC. Once the system is running, additional adjustments maybe necessary to achieve the desired flow rates. A normal daily maintenance inspection shall be completed prior to leaving the site with the system running the automatic mode.

1.1.1 Start-Up Valve Positions

Prior to starting the system, the position of the air and bypass butterfly valves should be verified to confirm the settings are correct for startup. The bypass air valve should be in the fully open position fully. Also the inline inlet and outlet butterfly valves for the blower, which is going to be started, must be in the open position. *If not the blower motor amperage draw will approach the locked rotor value, which will cause the electrical breakers to trip.* Once the valves are in position follow the Start-Up Procedure Section 1.1.2.

Bypass Air Valve	Open
Blower (to be started) Inline Inlet and Outlet Butterfly Valves	Open
Blower (in standby) Inline Inlet and Outlet Butterfly Valves	Closed
Air Sample taps	Closed
Vapor Well Balancing Ball Valves	Closed

1.1.2 Start-Up Procedure

1. Clear Faults
2. Reset System
3. Turn on Blower
4. Verify System Operations
5. Open Vapor Well Balancing Ball Valves
6. Close Bypass Butterfly Valve

1.2 Shut Down Procedure

Shutdown of the system or one of the blowers may be necessary to perform maintenance activities. The procedure for shutdown is provided below

.

1. Verify System Operations
2. Turn off Blower
3. Closed Vapor Well Balancing Ball Valves
4. Clear Faults
5. Reset System

1.3 Routine Operations

Operating records are utilized to document system performance and to obtain early indication of equipment requiring maintenance. A copy of the System Operation and Maintenance Checklist can be found in Appendix B. Shown below is a table of routine operating ranges.

These parameters should remain relatively stable over prolonged periods of time. Slight fluctuations may occur due to ambient conditions. Changes should only occur when adjustments are made or problems exist. Changes should be evaluated compare to the troubleshooting guide in Appendix B. Changes in the system parameters and adjustments to the system will be noted in the operator field data sheets and evaluated quarterly.

1.4 Routine Observation/Monitoring Operations

Most blower system troubles can be prevented by systematic observation and monitoring of vibration, noise, and temperature along with scheduled preventive maintenance. During the verification of system operations check and evaluate the blower system following maintenance schedule below. If trouble is detected see the tables to identify and remedy the trouble.

1.5 Safety Precautions

With any mechanical system, it important, that all personnel observe the safety precautions to minimize the chance of injury. The safety plan for the site should read and acknowledge by operational personnel prior to system operation. Among the many considerations, the following should be particularly noted:

- Motor housing, blower casing and associated piping may become hot enough to cause skin burns on contact.
- Internal and external rotating parts and associated drive equipment can produce serious physical injuries. Keep body and clothing away from any openings in the blower equipment while it is operating or while subject to accidental starting. Keep belt guards in place.
- Disconnect power before doing any work with on moving parts and drive assemblies.
- Avoid extended exposure in close proximity to the equipment with high intensity noise levels
- Hearing protect is required for extended period inside the system enclosure.

2.0 SCHEDULED PREVENTIVE MAINTENANCE

Routinely schedule preventive maintenance is essential for a trouble free service life of the mechanical systems. Proper lubrication and belt tension for the rotating parts and drive assemblies is the primary task for the preventive maintenance. These tasks for the blower, motor, and v-belt drive are described as general procedure in the manufacturers inspection and maintenance manuals contained in the site-specific OM manual. These documents should be thoroughly reviewed. The relevant pages from the manuals are contained in Appendix C for quick reference. Detailed procedures are presented in the section and should be closely adhered to. If any deviation in these procedures occurs, it should be noted in the operators daily notes section of the OM checklist form.

2.1 Lubrication

The Tuthill model 7011 blowers employed in the system for the generation of negative pressure utilizes splash lubrication of the rotor timing gears and associated shaft bearings. The timing gears dip into an oil reservoir formed in the gear end plate and cover. The driven ends of the rotor shaft assemblies utilize grease lubrication for the roller bearings.

Tuthill recommends that complete oil be changes be performed every 1000 operating hours under normal operating temperatures. This equates to a maximum service interval of every 41 days within the monthly OM regime.

The Marathon Electric motors employed in the system for driving the Tuthill blowers utilizes grease lubricated ball bearings. Marathon recommends that the maximum service interval for lubrication of 5000 hours based on the service conditions. This interval is also within the monthly O&M regime.

2.1.1 Recommended Lubricants

The Tuthill model 7011 blower oil capacity is approximately 32 ounces of Mobil DTE Heavy Lubricating Oil (ISO 100), which must be change every 1000 operating hours. The Mobil DTE Heavy Lubricating Oil is the Tuthill recommended for an ambient temperature range from 32 to 90 degrees Fahrenheit. It will be necessary to switch to the Mobil DTE Extra Heavy, recommended for 90 to 120 degrees Fahrenheit, during the summer due to the higher ambient conditions.

Marathon Electric and Tuthill both recommend a NGLI # 2 premium grade petroleum based lithium grease for the grease lubricated bearings. Mobilith SHC 100 grease was selected as meeting the specifications.

Both the lubricating oil and grease are readily available through Grainger Inc. The part number for the Mobil DTE heavy is **6Y781**, Mobil DTE extra heavy is **6Y782**, and the Mobilith SHC 100 is **4ZF49**. The local branch distribution center is located at 1143 Longwood Avenue, Bronx, New York, approximately 6 miles from the site. The phone number is (718) 503-9770.

2.1.2 Oil Change Procedure

Prior to starting the oil change the OM checklist should have been completed and oil level and operating temperature should have been recorded. The procedure for the oil service is as follows:

1. Shutdown Blower – place Hand-Off-Auto switch into OFF position
2. Closed Blower Inlet and Outlet Butterfly Valves – if the blower not being serviced is in operation
3. Stage Used Oil Container- place the 5 gallon used oil container in front of the blower skid, remove cap
4. Insert Drain Hose- remove the end of the hose from the spring clip holder and with a 7/16 inch wrench remove the ¼ pipe plug from the end of the drain hose, insert hose into used oil container
5. Open Drain Valve- open the ¼ inch drain valve by hand to allow the used oil to drain through the hose into the storage container.
6. Remove Vent Cap- the vent cap can be remove with a ¾ inch wrench- the vent cap is located in the oil fill threaded port

7. Insert Funnel- the funnel used to fill the blower is thread into the filling port
8. Allow Blower to Drain- it will take a minimum of ten minutes for the used lubricating oil to fully drain out of the blower reservoir
9. Verify Oil Removed- the end of the drain hose should be checked that no further oil is draining
10. Close Drain Valve- close the ¼ inch drain valve by hand
11. Plug Drain Hose- if draining is complete, replace the ¼ inch pipe plug and place end of the hose in the spring clip holder
12. Seal the Used Oil Container- replace the cap and store the container out of the way
13. Slowly Fill Blower- pour the Mobil DTE oil slowly through the funnel in the fill port until the oil appears in the in the oil sight glass. Bring the oil level to the center of the glass. The one-gallon container that the Mobil DTE oil is supplied in is graduated along its side, which allow for measurement of the oil poured. The Tuthill blower holds approximately one quart
14. Verify Correct Oil Level- allow two minutes for the oil level to stabilize. Add additional if necessary to bring the oil level to the correct height in the sight glass. If the oil level is to high it is necessary that the oil be removed down to the correct level by the use of the drain hose and valve. The removed oil is to be placed in the used oil container and not to be reused
15. Remove Filling Funnel- upon achieving the correct level the funnel may be removed
16. Replace Vent Cap- reinstall the vent cap into the oil fill port, tighten with a ¾ inch wrench to a torque of 10 to 15 ft/lbs
17. Clean Up Any Oil Residue
18. Open Inlet Outlet Inline Butterfly Valves
19. Restart Blower- place Hand-Off-Auto switch into the Hand position
20. Verify Oil Level- the oil level will appear lower in the sight glass with the blower running, this is normal, as the oil is being slung. The dynamic oil level should be roughly a 1/8-inch lower compared to the static oil level as filled. This is well within the sight glass observation range
21. Shutdown Blower –place Hand-Off-Auto switch into Off Position.
22. Close Inlet Outlet Butterfly Valves
23. Grease Blower Bearings- follow procedure in section 2.4
24. Note Oil Service- record the oil service work on the OM checklist. Record any discrepancies in the daily notes section
25. Blower Ready for service- follow start-up procedure 1.1.2

2.1.3 Grease Lubricated Bearing Procedure

On the Tuthill model 7011 blower the bearings for the driven end are of the grease-lubricated type. It is necessary that these bearings also be lubricated on a regular schedule. The blower has two grease fittings located on the top rear surface of the blower, adjacent to the belt guard housing, directly above the drive and idler shafts. On the underside of the blower directly opposite of the grease fittings are the grease relief fittings. Using a pressure gun, the Mobilith SHC 100 grease if forced into each bearing until traces of clean grease comes out of the relief fitting. It is imperative that the grease is not pumped to rapidly, to avoid blowing out the drive shaft seal. The procedure for greasing the blower is as follows:

1. Shutdown Blower- the Hand-Off-Auto switch in the Off position
2. Load the Grease Gun- insert the Mobilith SHC 100 grease cartridge in the hand operated grease gun
3. Attach Grease Gun- connect the grease gun outlet to the blower grease fitting with a sharp push
4. Slowly Pump the Grease- slowly force the new grease into the bearing displacing the old grease
5. Observe and Verify- that traces of clean new grease can be seen coming out of the relief fitting
6. Remove the Grease Gun- detached the grease gun from the grease fitting
7. Clean Excess Grease- clean with a paper towel any excess grease around either the grease and relief fittings
8. Grease other bearing fitting- go back to step 3 and follow procedure
9. Note Grease Service- record the grease service work on the O&M checklist. Record any discrepancies in the daily notes section
10. Blower Ready for service- follow start-up procedure 1.1.2

The Marathon Electric motors employed for driving the Tuthill blower also have grease lubricated bearing. A single grease fitting is located on both ends of the top surface of the motor housings. No relief fittings are present. Marathon recommends one cubic inch of the grease gun for each fitting on a interval of every 5000 hours. This equates two three pumps of the grease gun that is used for the maintenance. The procedure is as follows:

1. Shutdown Blower- the Hand-Off-Auto switch in the Off position
2. Load the Grease Gun- insert the Mobilith SHC 100 grease cartridge in the hand-operated grease gun
3. Attach Grease Gun- connect the grease gun outlet to the blower grease fitting with a sharp push

4. Slowly Pump the Grease- slowly force the new grease into bearing a total of three pumps
5. Remove the Grease Gun- detached the grease gun from the grease fitting
6. Clean Excess Grease- clean with a paper towel any excess grease around the grease fitting
7. Grease other bearing fitting- go back to step 3 and follow procedure
8. Note Grease Service- record the grease service work on the O&M checklist. Record any discrepancies in the daily notes section
9. Blower Ready for service- follow start-up procedure 1.1.2

2.2 V-Belt Drive Assemblies

A TB Woods V-Belt drive system is employed on both blower skids to transmit power from the Marathon Electric motor to the Tuthill blowers. Each V-belt drives assemblies consist of two Sure-Grip shaft bushings, two drive sheaves and two flexible v-belts. It is a very common method of power transmission due to the relatively trouble-free service in general, other than occasional belt retensioning.

2.2.1 Inspection and Evaluation

The key to trouble-free service is periodic maintenance and inspection. Most troubles with a belt drive system, are prevented, by maintaining the correct tension on the v-belts. Early indications of trouble include increases in sound, temperature and vibration. An increase, in one of the indicators, is typically noticeable by the system operator, who is familiar with the system normal operating levels. The assessment can be made while the system is running and would follow closely to the maintenance and trouble-shooting guide in Appendix A.

The physical condition of the v-belts is evaluated by visual inspection of both v-belts and the drive sheaves. The proper alignment of the drive sheaves must be verified with a straight edge to prevent premature wear. The tension on the v-belts must be checked and measured regularly with a tension gauge, so that the tension can be maintained within the designed range to prevent premature wear. The physical condition can only evaluated be while the blower is shutdown. *If the blower's v-belt safety-guard is to be opened, the power to the blower must be* ***locked out*** *to prevent any chance of the blower being accidentally started during the inspection.* If a belt appears deteriorated or unevenly worn and must be replaced, both drive belts must by replaced on the blower skid. If not, unequal loading will occur causing vibration and damage to the blower equipment. The visual inspection would follow closely the maintenance and trouble-shooting guide in Appendix A.

2.2.2 Lock Out Power Procedure

It is essential that the electrical power be locked out to the blower motors by physical interruption prior to the v-belt drives being accessed by removal of the safety guard cover(s). This can be accomplished by the using one of the two safety disconnect switches present, placing into the off position and installing a lock to maintain the off position. This will also interrupt all power to the treatment enclosure. The other permissible method, for only the qualified system operator, is the procedure as follows:

1. Shutdown Blowers- place both blowers Hand-Off-Auto selector switches in the Off position
2. Shutoff Power to Control System- turn the safety disconnect located on the face control panel closure to off
3. Verify Power Off- all power to trailer enclosure should be off
4. Open Control Panel Enclosure- turn the quarter turn buttons counter-clockwise, gently open panel
5. Switch Both Blower Breakers Off – the electrical breakers are miniature 3-pole breakers positioned directly above the blower motor starters
6. Verify Off Position- the breakers tap must be in the down position and visible read as off
7. Place Lock Out Device- breaker lock out device is placed on each breaker and locked
8. Closed Control Panel- close panel aligning disconnect shaft as closing, turn quarter turn buttons clockwise to secure
9. Turn Power On to Control System- turn the safety disconnect located on the face control panel closure to on
10. Verify Lockout- place both blowers Hand-Off-Auto selector switches in the On position, they should not start
11. Return Selector Switches to Off- after the lock out verified, return the Hand-Off-Auto switch to Off position
12. Proceed with Maintenance Work- the safety guard for the v-belt drive may be removed

Upon completion of the maintenance and the safety guard for the v-belt drive is replaced, the lockout may be removed. The procedure is as follows:

1. Verify Shutdown of Blowers- verify both blowers Hand-Off-Auto selector switches in the Off position
2. Shutoff Power to Control System- turn the safety disconnect located on the face control panel closure to off
3. Verify Power Off- all power to trailer enclosure should be off

4. Open Control Panel Enclosure- turn the quarter turn buttons counter-clockwise, gently open panel
5. Remove Lock Out Device- breaker lock out device is unlocked and removed from breaker
6. Switch Both Blower Breakers On – the electrical breakers are miniature 3-pole breakers positioned directly above the blower motor starters
7. Verify On Position- the breakers tap must be in the up position and visible read as off
8. Closed Control Panel- close panel aligning disconnect shaft as closing, turn quarter turn buttons clockwise to secure
9. Turn Power On to Control System- turn the safety disconnect located on the face control panel closure to on
10. Verify Operation- place both blowers Hand-Off-Auto selector switches in the Hand position momentarily
11. Return Selector Switches to Off- return the Hand-Off-Auto switch to Off position
12. Blower Ready for service- follow start-up procedure 1.1.2

2.2.3 Belt Tensioning And Inspection

The tension on the v-belts must be checked and measured regularly with a tension gauge, so that the tension can be maintained within the designed range to prevent premature wear. A Dodge V-Belt Tension Tester is used to accurately measure the belt deflection force. The TD Woods recommended values for the installed belt drive assemblies are a deflection of 0.32 inches at a force between the ranges of 11.7 and 16.9 lbs. It is recommended to run the tension at the lower portion of range to reduce the loading on the bearings but sufficient to prevent and slippage of the v-belts. The procedure is as follow:

1. Turn Off Blowers and Lock Out- follow lock out procedure section 2.2.2
2. Remove the Fasteners- using a S2 T-25 torq bit removed the eight button head screws securing the belt guard cover
3. Remove Cover- set on floor
4. Visual Inspect the Belts- inspect the belts for premature wear, belts should run taller than sheave groove, no debris in guard
5. Rotate Belt Assembly- rotate the belt drive by hand, check for any tightness or rough spots
6. Check End Play and Sheaves- check sheaves for play, should be none, and also if excessive end play on the blower and motor is present
7. Measure Belt Tension- using the Tension Tester measure the force (lbs.) to produce the 0.32 inch deflection

8. Insert Tension Tester- using the small port in guard housing, insert the tester, the port is directly above the center of the belt span
9. Place the Tester- place the large end of the tester on one belt, apply force until the mark for the deflection of 0.32 inches is flush with the other belt
10. Read the Tester- read the deflection force from the position of the small O-ring on the plunger scale
11. Compare Force Value- compare to the specified range of force 11.7 to 16.9 lbs.
12. Adjust Drive Centers- if the force is below the specified value, increase the drive center distance to provide greater belt tension
13. Adjust Motor Base- if the drive center adjusted is to be adjusted, loosen the four ½ lock bolts on the motor base plate with a ¾ inch wrench, turn the two ¾ inch tension bolts equally clockwise with a 1 inch wrench to increase the drive center distance until the require belt deflection force can be measured on both belts
14. Check Sheave Alignment- using a three foot long straight edge check to see if the drive sheave are directly inline with each other. Place the thin edge of the straight edge against the two sheaves. All for edges should contact the straight edge. If there is a gap adjust to motor base until it is corrected
15. Confirm Belt Tension- go back to step 7 after the correct alignment has been completed, the belt tension should be check to see if it still is in range, if it is go to next step
16. Install the belt guard
17. Install belt guard fasteners
18. Unlock the power
19. Blower Ready for service- follow start-up procedure 1.1.2

APPENDIX A

INTEX Environmental Group, Inc.
6205 Easton Road, Pipersville PA 18947
Phone: 215/766-7230 FAX: 215/766-9730

Sub-Slab Depressurization System O&M Checklist
Site: Standard Motors Products, 37-18 Northern Boulevard, Long Island City, NY

Date_____ Time:(onsite)_____ Time:(offsite)_____ Technician(s)_____

System Status (circle type)

Maintenance Type:	Scheduled	Alert	Shutdown	Response
System Status: onsite	Manual	Auto	Shutdown	Off
System Status: offsite	Manual	Auto	Shutdown	Off
Blower 1 Status:	Manual	Auto	Shutdown	Off
Blower 2 Satus:	Manual	Auto	Shutdown	Off
Transfer Pump Status:	Manual	Auto		Off
General Alarm System	On/Off	Pressure	Temp	Level
Bypass Valve:	Closed	Open	Angle(record)	

SYSTEM READINGS (Record Values)

Pressure		**Temperature**		**Flow**	
Inlet Vacuum (in H_2O)		Inlet (gas)		Exhaust (cfm)	
Differ. Filter (in H_2O)		Blower 1 (oil)		Total (cft)	
Blower 1 inlet (in H_2O)		Motor 1 (windings)			
Blower 2 inlet (in H_2O)		Blower 2 (oil)			
Outlet Manifold (in H_2O)		Motor 2 (windings)			
Outlet Stack (in H_2O)		Exhaust (gas)			
Meters		**PID Readings**		**Electrical**	
Blower 1 (hrs)		Inlet (ppm)		Supply L1/L2/L3	
Blower 2 (hrs)		Outlet Manifold ppm		System L1/L2/L3	
Condensate (gallons)		Outlet Stack (ppm)		Blower 1 (L1/L2/L3)	

OBSERVATIONS (Record Conditions)

Vibration		**Noise**		**Leaks**	
Blower Skid 1 (ok/type)		Blower Skid (ok/type)		Blower Skid 1	
Blower Skid 2 (ok/type)		Blower Skid (ok/type)		Blower Skid 2	
System (ok/type)		System (ok/type)		System (ok/fluid/gas)	

MAINTENANCE (Record Service)

Oil Change		**V-Belts Tension**		**Motor Grease**	
Blower 1 (hrs/type)		Blower 1 (ok/deflec)		Motor 1 (hrs/type)	
Blower 2 (hrs/type)		Blower 2 (ok/deflec)		Motor 2 (hrs/type)	
Filters		**Piping/Instrument**			
Inlet (hrs/clean/replaced)		Hangers (ok/repair)			
Bypass (hrs/clean/replaced)		Piping (ok/repair)			
Liquid Carbon (gals/replaced)		Wiring (ok/repair)			
Vapor Carbon (cft/replaced)		Sensors (ok/repair)			

Daily Notes:

APPENDIX B

APPENDIX B

(1) Daily, Monthly, Yearly Maintenance

To keep the blower in a good condition, maintenance by users are essential. In daily maintenance, check for something strange. Proper periodic maintenance leads to a trouble-free operation.

Period	Operation	Check Item	How to Check	Criteria	Remark
Daily	ON	Vibration in Blower and Motor	Measure vibration with vibrometer	Within a permissible vibration of "GOOD"	Pay attention to the vibration change
		Sound in Blower	Check with ears or stethoscopic stick	No noise accompanying mechanical vibration No discontinuous noise No abmormal sound	
		Temperature on Blower Bearing	Measure temperature with a thermometer	70° to 80°C	
		Smell emitted by Blower and Motor	Check with nose	No abnormal smell	
		Transmitter	Check with ears and eyes	Amplitude of vibration and sound is not large	
		Loaded current value	check with ampere meter	below with rated loaded current	
		Pressure guage	check with manometer	below with rated loaded current	Vacuum gauge (for vacuum pump)
Monthly	OFF	Loosen bolts for blower	tighten bolts with wrench	No loosen bolts	
		Loosen bolts for pipes	Tighten bolts with wrench	No loosen bolts	
		Clogging suction filter	Check with manometer and with eyes	No clogging	Check the electric current fluctuation
		Belt tension	Check with tension gauge	flexible volume is below the specified value	
		Oil Quantity	check with eyes	Just above the specified value	
Yearly	OFF	Clearance within the casing	Check with thickness gauge	Within the range of specified value	Clean the inside of the casing
		Replacement of bearings	Disassemble and check parts within the casing. Concerning technical information for overhaul, contact with your ITO branch or factory.		
		Replacement of seal			
		Rotor damage			
		Gear damage			
		Shaft damage or bending			
		Transmitter damage			
		Lubrication oil degradation			
		Cooled type casing and pipe dirty			

Most blower troubles can be found by checking vibration, noise, and temperature. Check a blower following maintenance schedule above. If a trouble happens, see the next 3 pages to identify and remedy the trouble.

(2) Vibration

Causes, check procedure, and remedy for abnormal vibration

Vibration level party depends on blower specifications such as pressure and rotating speed. High vibration causes damage of bearings, rotor, and so on. If vibration is high, identify the cause, and take an appropriate remedy. Especially vibration-preventive type common base tend to increase the vibration amplitude of the upper common base, while it lowers vibration transmitted to the ground. Pay attention to blower vibration problem, too.

Trouble	Cause	Check Procedure	Remedy
Foundation	Weak or unstable foundation	Check vibration of the bed and foundation Check other vibration source nearby Check the ground for subsidence and crack	Perform the foundation work again
		Check the bed frame stiffness	Reinforce the base frame
Bed and around legs	Loose anchor bolts	Tighten the anchor bolts	Tighten the anchor bolts Perform the anchor bolt foundation, again
	Loose bolts securing the blower legs to the common bed	Tighten the bolts	Tighten the bolts
	Gap between legs and bed	Check the gap between the legs and bed	Fill the gap with liners
Couplings or pulleys	Pully alignment and damage	Measure the alignment between the pulleys	Repair them so that the value is less than 1 mm per 1000 mm center distance
	Incomplete coupling alignment	Check alignment and clearance between the bearings Check alignment and clearance	Adjust the alignment
Bearings	Damage and abrasion of bearings	Check the vibration near the bearings Check noise with a stethoscope Add grease	Replace the bearings with new ones
Blower	Any loosen bolts	Check the bolts	Tighten bolts
Piping	Loose bolts securing pipe supports	Tighten bolts securing supports	Tighten bolts securing supports
	Resonance in pipes	Check piping for vibration	Attach supports
		Check the stiffness of supports	Reinforce supports
	Loosen bolts securing flanges	Tighten bolts securing flanges	Tighten bolts securing flanges

(3) Sounds

Causes, inspection, and remedy for abnormal sounds

There are 3 types of sounds produced by Tuthill blower; the first is Mechanical Sounds (ex: sliding sounds of gears and bearings), the second in Fluid dynamic sounds (occurred when discharged air flows back to the blower), and the third is Contact sounds.

Trouble	Cause	Check Procedure	Remedy
Bearings	Low lubrication oil level	Check continual metallic sound can be heard (It sometimes occur when temp is low)	If the sound is not always large, it is not a trouble Add grease
	Excessive interior clearance	Check the bearing clearance mark	If it is the recommeded one, it is not a trouble
	Scratch or peeling on bearing races	Check low noise (Vibration becomes higher and temp rises)	Replace bearings with new ones
	Crack on ball and race	Check sounds like tapping (vibration becomes higher and temp rises)	Replace bearings with new ones
	Pleating grooves on race surface	Check sounds with vibration (vibration becomes higher and temp rises)	Replace bearings with new ones
	Dust or iron powder in bearing	Check irregular sounds	Change grease If the trouble has not solved after grease change, replace bearings with new ones
Gears	Lack of lubrication oil (this can be found in summer)	Check sounds like striking (insufficient viscosity can make sounds)	Change lubrication oil Fill lubrication oil
	Teeth abrasion	Check the teeth contact	Replace gears
Rotor	Contact between rotors or rotor and casing	Check tapping sounds	Adjust clearances
Mechanical Seal	Low lubrication oil level	Check high sounds	Add lubrication oil (although the sounds can be heard, no problem occurs, if disappears
Couplings and Pulleys	Abraded coupling elastic body	Check sounds like striking	Replace the elastic body
	Crack on pulley arm	Check sounds like tapping	Replace pulleys
	Poorly fit couplings or pulley boss and shaft	Check key tapping sounds	Replace couplings or pulleys
Piping	Loosened bolts on flange	Check hissing sounds (sounds of gas leakage)	Tighten bolts Replace packing
	Loosen bolts	Check tapping sounds	Tighten bolts
	Sounds from piping, vibration and resonance	Check tapping sounds and humming sounds	Attach a soundproof lagging Attach snubber type
Motor	Overload	Check humming sounds	Reduce the load

(4) Temperature

Causes, inspection, and remedy of abnormal rise in temperature

The maximum allowable temperature in blowers is different according to the specifications, including models, pressures, and gas types to be applied. The maximum allowable temperatures, in general, are as follows:

Maximum Allowable Temperature

	Maximum allowable temperature
Bearing	95° C
Lubrication Oil	90 ° C

Operation at over the maximum allowable temperature causes shorter life and seize-up of blower. Measure temperature by contacting a thermometer to each point. And check that the temperature is almost the same.

Trouble	Cause	Check Procedure	Remedy
Blower	High load	Check the ampere meter and pressure gauge	Operate the blower at under the rated current
	High ambient temperature	Check the blower ambient temperature	Lower the blower ambient temperature below 40°C
	Excessive lubrication oil	Check the oil gauge	Fill oil to proper level
	Contact within casing	Check rotor surfaces	Disassemble and repair it
Bearings	Deterioration of lubricating oil and grease	Check lubricating oil and grease	Change lubricating oil and grease
	Bearing damages	Check if the bearing is burned out or damaged	Replace the bearing
	Poor coupling alignment	Check alignment of 2 couplings	Align the couplings
	Too tensed belts	Check the belt tension	Adjust the belt tension
Motor (standard type)	High load	Check ampere meter	Operate the blower under the rated current value
	High ambient temperature	Check the blower ambient temperature	Make the blower ambient temperature at 40°C
	Much dust in motor	Check dust amount	Disassemble and clean the blower from dust

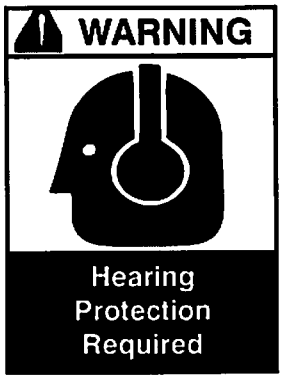
APPENDIX C

SAFETY INSTRUCTIONS

1. Do not operate before reading the enclosed instruction manual.
2. Use adequate protection, warning and safety equipment necessary to protect against hazards involved in installation and operation of this equipment.

NOTICE

1. The safety instruction tags shown below were attached to your unit prior to shipment. Do not remove, paint over or obscure in any manner.
2. Failure to heed these warnings could result in serious bodily injury to the personnel operating and maintaining this equipment.



SAFETY WARNINGS

- Keep hands and clothing away from rotating machinery, inlet and discharge openings.
- Blower and drive mounting bolts must be secured.
- Drive belts and coupling guards must be in place.
- Noise level may require ear protection.
- Blower heat can cause burns if touched.

TUTHILL VACUUM AND BLOWER SYSTEMS — SPRINGFIELD, MO USA

IMPORTANT

In order to assure you of the full benefits of our product warranty, please complete, tear out and return the warranty registration card located on the back cover of this manual, or you can register your product online at:

http://vacuum.tuthill.com/product_registration

SAFETY PRECAUTIONS

- For equipment covered specifically or indirectly in this instruction book, it is important that all personnel observe safety precautions to minimize the chances of injury. Among many considerations, the following should particularly be noted:
- Blower casing and associated piping or accessories may become hot enough to cause major skin burns on contact.
- Internal and external rotating parts of the blower and driving equipment can produce serious physical injuries. Do not reach into any opening in the blower while it is operating, or while subject to accidental starting. Cover external moving parts with adequate guards.
- Disconnect power before doing any work, and avoid bypassing or rendering inoperative any safety or protective devices.
- If blower is operated with piping disconnected, place a strong, coarse screen over the inlet and avoid standing in discharge air stream.
- Avoid extended exposure in close proximity to machinery with high intensity noise levels.
- Use proper care and good procedures in handling, lifting, installing, operating, and maintaining the equipment.
- Other potential hazards to safety may also be associated with operation of this equipment. All personnel working in or passing through the area should be warned by signs and trained to exercise adequate general safety precautions.
- Hearing protection may be required depending on silencing capabilities.

LUBRICATION

Every Tuthill blower is factory tested, oil drained and shipped dry to its installation point. Both independent oil reservoirs must be filled to the proper level before operation.

Shaft bearings at the gear end of the blower are splash lubricated by one or both gears dipping into an oil reservoir formed in the gear end plate and cover.

Shaft bearings at the drive end of the blower are lubricated by a slinger assembly dipping into an oil reservoir. Before starting the blower, fill oil sumps as shown below under "Filling Procedure." Tuthill approved mineral-based, synthetic and food grade lubricants are listed on page 15.

FILLING PROCEDURE

1. Remove fill plugs or breathers from both gear end and drive end plates.
2. SLOWLY pour oil through fill until oil appears in the oil sight glass. Bring oil level to center of sight glass.
3. Verify oil level is at proper level in BOTH gear end and drive end sight glasses.
4. Replace fill plugs or breathers that were removed in step 1.

CAUTION: Do not start the blower until you are sure oil has been put in the gear housing. Operation of the blower without proper lubrication will cause the blower to fail and void its warranty.

WARNING: NEVER ATTEMPT TO CHANGE OIL WHILE THE BLOWER IS IN OPERATION. Failure to heed this warning could result in damage to the equipment and/or serious personal injury. Oil level must be checked while the blower is not running.

APPROXIMATE OIL CAPACITIES

NOTE: Gear end amounts are for all series. Drive end amounts are for SL & GT (22 & 23 series).

MODEL	HORIZONTAL FLOW		VERTICAL AIR FLOW	
	GEAR END	DRIVE END	GEAR END	DRIVE END
2002 – 2004	1.7 ounces *(50 mL)*	N/A	3.4 ounces *(100 mL)*	N/A
3002 – 3006	3.4 ounces *(100 mL)*	2.5 ounces *(75 mL)*	6.0 ounces *(180 mL)*	4.0 ounces *(120 mL)*
4002 – 4007	5.8 ounces *(170 mL)*	4.7 ounces *(140 mL)*	8.5 ounces *(250 mL)*	6.4 ounces *(190 mL)*
5003 – 5009	7.1 ounces *(210 mL)*	5.4 ounces *(160 mL)*	18.3 ounces *(540 mL)*	10.2 ounces *(300 mL)*
6005 – 6015	16.9 ounces *(500 mL)*	9 ounces *(265 mL)*	25.5 ounces *(750 mL)*	18 ounces *(530 mL)*
7006 – 7018	20.3 ounces *(600 mL)*	N/A	28.7 ounces *(850 mL)*	N/A

** Oil capacities are based on filling from dry condition. Less oil may be needed depending on emptiness of oil reservoir(s) after draining. Always fill the gear housing until oil drips out of the oil level hole. Replace plugs in their respective holes. Following this procedure will insure proper oil level.*

LUBRICATION FAQ

What is the functional detriment if the "wrong oil" is used?

The lubricant is selected based on bearing and gear speed, and operating temperature. Too light of a lubricant increases wear by not separating the sliding surfaces and it will not remove the heat adequately. If the lubricant is too thick, the drag in the bearings is increased causing them to run hotter. Since it is thicker, it will not flow as readily into the gears and it will reduce the available backlash. Lubricants at our conditions are incompressible.

What is the functional detriment if the oil is not serviced?

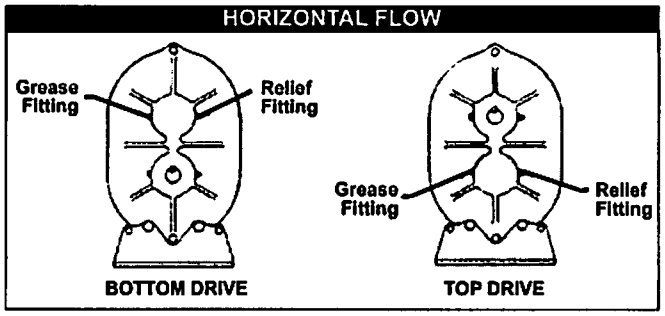
If the lubricant is not serviced at the proper interval the shearing action in the bearing and the gears will begin to take their toll and the lubricant will thicken, making matters worse. The unit will run hotter and the wear on running surfaces will increase. Generally, the lubricant will appear dirtier, this is actually material rubbed off the unit's components. The discoloration comes from overheating the additive package. An indicator of the breakdown of a lubricant is the increase in the TAN (Total Acid Number), and a change in the base viscosity of ten percent

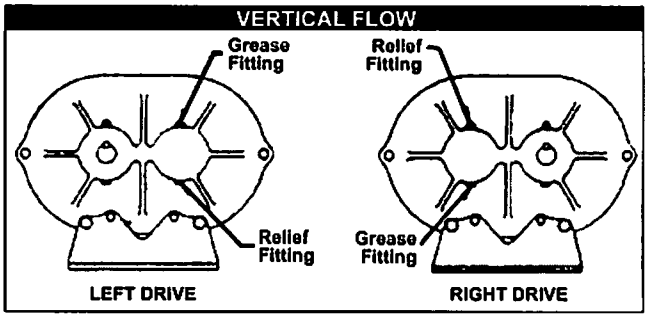
GREASE LUBRICATED BEARINGS *(21 SERIES ONLY)*

Service drive end bearing at regular intervals. (See " Suggested Lubrication Intervals for Grease Lubricated Bearings" below.) Use NLGI #2 premium grade, petroleum base grease with high temperature resistance and good mechanical stability, such as PneuLube grease available from your local Tuthill Vacuum & Blower System Professional. Using a pressure gun, force new grease into each bearing until traces of clean grease comes out of the relief fitting.

CAUTION: To avoid blowing out the drive shaft seal, do not grease too rapidly.

NOTE: Drawings below show location of grease fitting and grease relief for horizontal and vertical flow units (21 series).



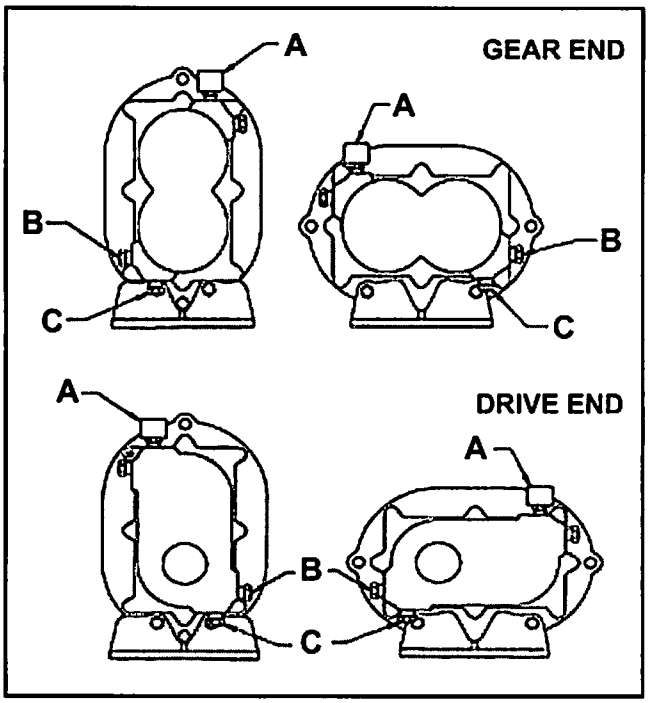


CAUTION:

Most Competitor blowers are shipped from the factory in a left hand drive, vertical flow configuration.

If drive shaft location is changed, the oil level plugs, sight glasses and breathers must be relocated to proper positions, as shown to the right.

Failure to change plug location will result in blower failure and void the product warranty.



A = Breather
B = Oil Level Sight Glass *(Plug on 21 series)*
C = Magnetic Oil Drain Plug

LUBRICATION INSTRUCTIONS FOR OIL LUBRICATED GEARS AND BEARINGS

Add fresh oil as required to maintain proper level. Drain and refill after the first 100 hours of operation and thereafter every 1,000 hours of operation under normal service, more frequently depending on the type of oil and oil operating temperature. Use a good quality oil, such as PneuLube, available through your local Tuthill Pneumatics Sales Professional.

SEE PAGE 15 FOR A LIST OF RECOMMENDED LUBRICANTS.

SPEED IN RPM	OPERATING HOURS PER DAY		
	8	16	24
	GREASING INTERVALS IN WEEKS		
750 - 1000	7	4	2
1000 - 1500	5	2	1
1500 - 2000	4	2	1
2000 - 2500	3	1	1
2500 - 3000	2	1	1
3000 and up	1	1	1

PREVENTATIVE MAINTENANCE

A good maintenance program will add years of service to your blower. A newly installed blower should be checked frequently during the first month of operation, especially lubrication. Check oil level in both the drive end and gear end of the blower and add oil as needed. Complete oil changes are recommended every 1000 operating hours, or more frequently depending on the type of oil and oil operating temperature. *The following is recommended as a minimum maintenance program.*

DAILY	WEEKLY	MONTHLY
1. Check and maintain oil level, and add oil as necessary. 2. Check for unusual noise or vibration (See Troubleshooting on page 8)	1. Clean all air filters. A clogged air filter can seriously affect the efficiency of the blower and cause overheating and oil usage. 2. Check relief valve to assure it is operating properly	1. Inspect the entire system for leaks. 2. Inspect condition of oil and change if necessary (see page 6) 3. Check drive belt tension and tighten if necessary.

START-UP CHECKLIST

We recommend that these startup procedures be followed in sequence and checked off (☑) in the boxes provided in any of the following cases:

- During initial installation
- After any shutdown period
- After maintenance work has been performed
- After blower has been moved to a new location

DATES CHECKED:				
☐☐☐☐	Check the unit for proper lubrication. Proper oil level cannot be over-emphasized. Refer to Lubrication Section.			
☐☐☐☐	Check Alignment.			
☐☐☐☐	*For Direct Drive:* Check coupling and shaft alignment.			
☐☐☐☐	*For Belt Drive:* Check for proper belt alignment and tension.			
☐☐☐☐	Turn the rotors by hand to be certain they do not bind. ***WARNING: Disconnect power. Make certain power is off and locked out before touching any rotating element of the blower, motor or drive components.***			
☐☐☐☐	Bump the unit with the motor a few times to check rotation and to be certain it turns freely and smoothly.			
☐☐☐☐	Start the unit and operate it for 30 minutes at no load. During this time feel the cylinder for hot spots. If minor hot spots occur, refer to the Troubleshooting Section (page 8).			
☐☐☐☐	Apply the load and observe the operation of the unit for one hour. Check the unit frequently during the first day of operation.			
☐☐☐☐	If minor malfunctions occur, discontinue operation and refer to the Troubleshooting Section (page 8).			

RECOMMENDED SHUTDOWN PROCEDURE TO MINIMIZE RISK OF FREEZING OR CORROSION

When high humidity or moisture is present in an air piping system, condensation of water can occur after the blower is shut down and the blower begins to cool. This creates an environment favorable to corrosion of the iron internal surfaces, or in cold weather, the formation of ice. Either of these conditions can close the operating clearances, causing the blower to fail upon future start-up.

The shutdown procedure outlined below minimizes the risk of moisture condensation, corrosion and freezing. Care must be taken to avoid overloading or overheating.

Isolate the blower from the moist system piping, allowing the blower to intake atmospheric air. Operate the blower under a slight load allowing the blower to heat within safe limits. The heat generated by the blower will quickly evaporate residual moisture.

For carpet cleaning applications, after the work is completed, simply allow the blower to run a few (3-5) minutes with the suction hose and wand attached. The suction hose and wand will provide enough load to the blower to evaporate the moisture quickly.

For extended shutdown, inject a small amount of a light lubricating oil such as 3-in-One®* or a spray lubricant such as WD-40®* into the inlet of the blower just prior to shutdown. The lubricant will provide an excellent protective coating on the internal surfaces.

If using a spray lubricant, exercise care to prevent the applicator tube from getting sucked into the blower. The applicator tube will damage the blower, most likely to the point that repair would be required.

** 3-in-One and WD-40 are registered trademarks of WD-40 Company.*

TROUBLESHOOTING

Although Competitor blowers are well designed and manufactured, problems may occur due to normal wear and the need for readjustment. The chart below lists symptoms that may occur along with probable causes and remedies.

SYMPTOM	PROBABLE CAUSE	REMEDIES
Loss of oil	Gear housing not tightened properly.	Tighten gear housing bolts.
	Lip seal failure.	Disassemble and replace lip seal.
	Insufficient sealant.	Remove gear housing and replace sealant. (See Disassembly and Inspection section on page 10)
	Loose drain plug.	Tighten drain plug.
Excessive bearing or gear wear	Improper lubrication.	Correct oil level. Replace dirty oil. (See Lubrication section on page 6)
	Excessive belt tension.	Check belt manufacturer's specifications for tension and adjust accordingly.
	Coupling misalignment.	Check carefully, realign if necessary.
Lack of volume	Slipping belts.	Check belt manufacturer's specifications for tension and adjust accordingly.
	Worn lobe clearances.	Check for proper clearances (See Assembly Clearances on page 14)
	Speed too low.	Increase blower speed within limits.
	Obstruction in piping.	Check system to assure an open flow path.
Knocking	Unit out of time.	Re-time.
	Distortion due to improper mounting or pipe strains.	Check mounting alignment and relieve pipe strains.
	Excessive pressure differential.	Reduce to manufacturer's recommended pressure. Examine relief valve and reset if necessary.
	Worn gears.	Replace timing gears (See Disassembly and Inspection section on page 10)
Excessive blower temperature	Too much or too little oil in gear reservoir.	Check oil level. (See Lubrication section on page 6)
	Too low operating speed.	Increase blower speed within limits.
	Clogged filter or silencer.	Remove cause of obstruction.
	Excessive pressure differential.	Reduce pressure differential across the blower.
	Elevated inlet temperature.	Reduce inlet temperature.
	Worn lobe clearances.	Check for proper clearances (See Assembly Clearances on page 14)
Rotor end or tip drag	Insufficient assembled clearances.	Correct clearances (See Assembly Clearances on page 14)
	Case or frame distortion.	Check mounting and pipe strain.
	Excessive operating pressure.	Reduce pressure differential.
	Excessive operating temperature.	Reduce pressure differential or reduce inlet temperature.
Vibration	Belt or coupling misalignment.	Check carefully, realign if necessary.
	Lobes rubbing.	Check cylinder for hot spots, then check for lobe contact at these points. Correct clearances (See Assembly Clearances on page 14).
	Worn bearings or gears.	Check condition of gears and bearings; replace if necessary.
	Unbalanced or rubbing lobes.	Possible buildup on casing or lobes, or inside lobes. Remove buildup and restore clearances.
	Driver or blower loose.	Check mounting and tighten if necessary.
	Piping resonance.	Check pipe supports, check resonance of nearby equipment, check foundation.

RECOMMENDED LUBRICANTS

OIL CAPACITIES ARE SHOWN ON PAGE 6

RECOMMENDED MINERAL BASED LUBRICANTS				
AMBIENT TEMPERATURE	**SHELL**	**CITGO**	**CHEVRON TEXACO**	**EXXONMOBIL**
0° to 32° F *(-18° to 0° C)*	TELLUS® 68 (ISO 68)	A/W 68 (ISO 68)	RANDO HD 68 (ISO 68)	DTE HEAVY MEDIUM (ISO 68)
32° to 90° F *(0° to 32° C)*	TELLUS® 100 (ISO 100)	A/W 100 (ISO 100)	RANDO HD 100 (ISO 100)	DTE HEAVY (ISO 100)
90° to 120° F *(32° to 50° C)*	TELLUS® 150 (ISO 150)	A/W 150 (ISO 150)	RANDO HD 150 (ISO 150)	DTE EXTRA HEAVY (ISO 150)

RECOMMENDED SYNTHETIC BASED LUBRICANTS*			
AMBIENT TEMPERATURE	**TUTHILL**	**EXXONMOBIL**	**SHELL**
0° to 32° F *(-18° to 0° C)*	PneuLube™ (ISO 100)	SHC 626 (ISO 68)	OMALA® RL 68 (ISO 68)
32° to 90° F *(0° to 32° C)*		SHC 627 (ISO 100)	OMALA® RL 100 (ISO 100)
90° to 120° F *(32° to 50° C)*		SHC 629 (ISO 150)	OMALA® RL 150 (ISO 150)

* Blowers used in oxygen-enriched service should use only Castrol Brayco 1726 Plus non-flammable, PFPE synthetic lubricant. Blowers used in hydrogen service should use only PneuLube synthetic oil. Tuthill Vacuum & Blower Systems cannot accept responsibility for damage to seals, O-rings and gaskets caused by use of synthetic lubricants not recommended by Tuthill Vacuum and Blower Systems.

RECOMMENDED MINERAL BASED, FOOD GRADE LUBRICANTS		
AMBIENT TEMPERATURE	**Lubricant meeting U. S. FDA regulation 21 CFR 178.3570 governing petroleum products which may have incidental contact with food, and USDA H1 requirements**	**Lubricant meeting U.S. FDA regulations 21 CFR 172.878 and 178.3620(a) for direct and indirect food contact**
0° to 32° F *(-18° to 0° C)*	CITGO CLARION® A/W 68 (ISO 68)	CITGO CLARION® 350 FOOD GRADE (ISO 68)
32° to 90° F *(0° to 32° C)*	CITGO CLARION® A/W 100 (ISO 100)	CONSULT FACTORY
90° to 120° F *(32° to 50° C)*	CONSULT FACTORY	CONSULT FACTORY

RECOMMENDED SYNTHETIC BASED, FOOD GRADE LUBRICANTS		
AMBIENT TEMPERATURE	**Lubricant meeting U. S. FDA regulation 21 CFR 178.3570 governing petroleum products which may have incidental contact with food, and USDA H1 requirements**	**Lubricant meeting U.S. FDA regulations 21 CFR 172.878 and 178.3620(a) for direct and indirect food contact**
0° to 32° F *(-18° to 0° C)*	**PneuLube™ FG** (ISO 100)	CONSULT FACTORY
32° to 90° F *(0° to 32° C)*		
90° to 120° F *(32° to 50° C)*		

RECOMMENDED LUBRICANTS FOR M-D VACUUM BOOSTERS (90/91, 92/93, 96, 31/33 AND 35/37 SERIES)	
REQUIREMENTS	**TYPICAL LUBRICANTS**
• Suitable for high vacuum service • 68-100 cSt @ 104° F (40° C) • Vapor pressure of 1 micron or less @ 70° F (21° C) • Straight mineral (no additives) or PAO synthetic oil	**TUTHILL:** PneuLube *(synthetic)* **MOBIL:** DTE 16 *(mineral based)* **SHELL:** Turbo T 68 *(mineral based)* **SUNOCO:** Sunvis 31 *(mineral based)*

RECOMMENDED GREASE FOR COMPETITOR® PLUS BLOWERS:	
TUTHILL	**CITGO**
Tuthill PneuLube™ NLGI #2 premium grade, petroleum base lithium grease.	**For food grade requirements:** Use Citgo Clarion® Food Grade HTEP grease, NLGI No. 2 grade. It meets all requirements of FDA Regulation 21 CFR 178.3570 (the former USDA H-1 approval requirements) for lubricants having incidental contact with food.

SETTING V-BELT TENSION

Proper belt tension is essential to long blower life. The following diagrams and procedures are provided to aid in field adjusting V-belts (when blower is so equipped) for maximum performance. A visual inspection of the V-belt drive should yield the appearance shown in Figure 14 below:

Factors outside the control of the belt tensioning system used on an individual blower package assembly may contribute to decreased belt life, such as environmental factors, and quality of the belts installed. This can cause wear of the belts beyond the ability of the tensioning system to compensate.

As such, it is recommended to check belt tension monthly and make any manual adjustments found necessary.

1. Turn off and lock out power.
2. Remove the fasteners from the belt guard (if equipped)
3. Remove the belt guard.
4. Check and adjust the belt tension as necessary. It should be 1/64" deflection per inch of span (0.157 mm) deflection per centimeter of span) between sheaves, with 8-10 lbs. (3.6-4.5 kg) force applied at center point of the top section of belt.
5. Install the belt guard, making sure that all drive components are free of contact with the guard.
6. Install belt guard fasteners removed in step 2.
7. Unlock the power and start your blower.
8. Resume normal operation.

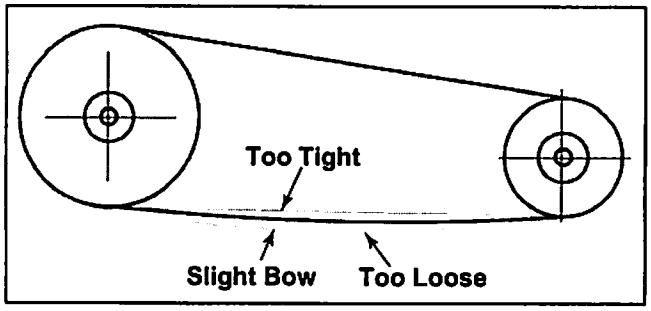


Figure 14. General appearance of V-belt drive

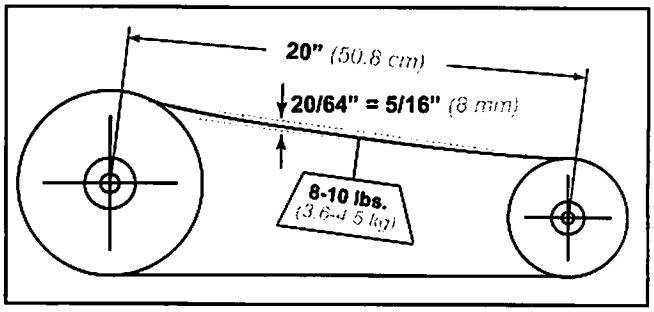


Figure 15. Setting of proper tension for a V-belt drive

NOTES:

OPERATING DATA

It is to the user's advantage to have the requested data filled in below and available in the event a problem should develop in the blower or the system. This information is also helpful when ordering spare parts.

Model No. _____

Serial No. _____

Startup Date _____

Blower RPM _____

Blower Sheave Diameter: _____

Motor Sheave Diameter: _____

Motor RPM _____ HP _____

V-Belt Size: _____ Length: _____

Type of Lubrication: _____

_____

Pressure _____

Vacuum _____

Any other special accessories supplied or in use:

_____

NOTES: _____

_____

_____

_____

_____

_____

_____

IMPORTANT

All MD Pneumatics® blowers manufactured by Tuthill Vacuum & Blower Systems are date coded at time of shipment. In order to assure you of the full benefits of the product warranty, please complete, tear out and return the product registration card below, or you can visit our product registration web page at:

http://vacuum.tuthill.com/product_registration

IMPORTANT

All M-D Pneumatics™ products manufactured by Tuthill Vacuum & Blower Systems are date coded at time of shipment. In order to assure you of the full benefits of the product warranty, please complete, tear out and return this product registration card.

Company _____

Location _____

City **State/Province** **ZIP/Postal Code** **Country**

Telephone : ( )_____

E-mail: _____

Model: _____

Serial Number: _____

Date of Purchase: _____

Date of Startup: _____

PLEASE CHECK ONE

- Pnuematic Conveying ☐
- Food ☐
- Vacuum ☐
- Paper ☐
- Wastewater ☐
- Gas/Petrochemical ☐
- Other _____

TB Wood's

V-Drive Inspection and Maintenance Procedures

Well designed and properly installed V-belt drives are without question the most reliable, trouble-free means of power transmission available. In general, except for an occasional retensioning, they will run year in and year out without maintenance.

However, some do require periodic inspection and maintenance, both while the drive is running and while it is stationary.

Inspection while running

A noisy V-belt drive is like a person with a fever. Both need attention.

V-drive noise can be caused by the slapping of belts against the drive guard or other obstruction. Check for an improperly installed guard, loose belts or excessive vibration. Squealing of belts as a drive is started or while it is running is usually caused by a poorly tensioned drive and/or by a build-up of foreign material in the sheave grooves. But it can also be caused by oil or grease between the belt and the sheave groove.

If necessary, remove the belt guard and watch the drive while it is running under load. **(Caution: Observe only; stand clear of the running drive!)** Much can be learned by watching the action of the slack side of the drive. Each variation in the driven load causes a corresponding change in the tension of the slack side of the belt. During across-the-line starts or suddenly applied loads while running, the sag on the slack side of the drive will increase. If the sag under these conditions is excessive, tension should be increased.

Any vibration in a system will cause the slack side of the belts to dance up and down. Excessive vibration will also induce a vibration in the tight side of the drive. The cause of the vibration should be determined and corrected.

If a set of belts is perfectly matched, all belts will have the same amount of sag. However, perfection is a rare thing and there will usually exist some difference in sag from belt to belt. It is more important to look at the tight side of a drive to be sure that all of the belts are running tight. If one or more belts are running loose, the drive needs to be retensioned, or the belts replaced with a matched set.

The above conditions could also be caused by uneven wear of the grooves in the sheave. These should be checked with sheave groove gages.

Inspect sheaves often

Keep all sheave grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil and other foreign matter can lead to pitting and rust and should be avoided as much as possible. If sheave sidewalls are permitted to "dish out," as shown in the picture on page 2, the bottom "shoulder" ruins belts quickly by chewing off their bottom corners. Also, the belt's wedging action is reduced and it loses its gripping power.

A shiny groove bottom indicates that either the sheave, the belt or both are badly worn and the belt is bottoming in the groove.

Badly worn grooves cause one or more belts to ride lower than the rest of the belts, and the effect is the same as with mismatched belts. This is called "differential driving." The belts riding high in the grooves travel faster than the belts riding low. In a drive under proper tension, a sure sign of differential driving is when one or several belts on the tight side are slack.

Check alignment of drive. Sheaves that are not aligned properly cause excessive belt and sheave wear. When the shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. These overloaded belts wear out faster, reducing the service life of the entire set. If the misalignment is between the sheaves themselves, belts will enter and leave the

bottom in the groove. This will cause the belt to lose its wedging action, to slip and/or burn. Sheaves worn to the point where they allow a belt to bottom should be replaced immediately.

Keep belts clean

Dirt and grease reduce belt life. Belts should be wiped with a dry cloth occasionally to remove any build-up of foreign material. If the belts have been splattered with grease and/or oil, clean them with methyl chloroform or soap and water. Inflammable cleaners such as gasoline are to be avoided as a matter of safety.

Although all Wood's V-belts are of oil resistant construction, an occasional cleaning will help to prolong their life.

Under no circumstances is the use of belt dressing recommended on a V-belt. The remedial effect is only temporary. It is much better to keep the belts and grooves of the drive clean.

Use belt guards

Belt guards protect personnel and the drive itself. They should be definitely used in abrasive atmospheres to protect the drive from sand, metal chips and other foreign matter. But they should be ventilated to avoid excessive heat.

Check them periodically for damage and for loose or missing mounting bolts. These could cause the belts to come in contact with the guard and cause failure.

Guards alone will generally protect belts from abrasion. But where abrasive materials are common — in rock processing machinery, grinders, foundries, etc. — drives should be inspected frequently for excessive belt and groove wear.

Check for hot bearings

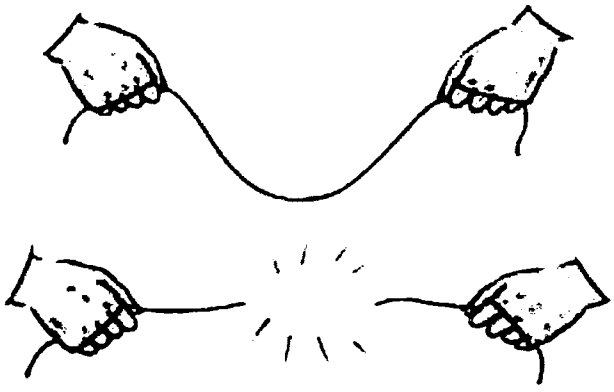
When the drive has been stopped for inspection, check the bearings to make sure they are not running hot. If they are, it could be due to improper lubrication or improper drive tension. Hot bearings can be caused by belts that are either too tight or too loose. Check the tension carefully using the instructions furnished.

If the belts are slipping on your drive, retension the drive. Never use belt dressing to correct slipping belts.

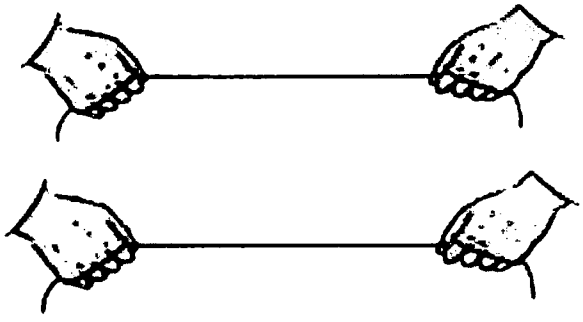
Maintain proper belt tension

Maintaining correct tension is the most important rule of V-belt care. It will give the belts 50% to 100% longer life.

Belts that are too loose will slip, causing excessive belt and sheave wear. V-belts that sag too much are snapped tight suddenly when the motor starts or when peak loads occur. That snapping action can actually break the belts, because the added stress is more than the belt was designed to take. This can be clearly demonstrated with a piece of string, as illustrated.



Loosely-held string snaps easily,
Taut string can stand strong pull.



TB Wood's

Drive Installation

Sure-Grip® Sheave and Bushing Installation Instructions

Wood's Sure-Grip bushings are the most widely used, tapered, QD-type and have exceptional holding power that eliminates wobble. Standard and reverse mounting features provide greater adaptability. Sure-Grip bushings can be used interchangeably in many of Wood's products as well as those of other maufacturers.

To Install:

IMPORTANT:
DO NOT USE LUBRICANTS IN THIS INSTALLATION

Before beginning, make sure the correct size and quantity of parts are available for the installation. The bushing has been manufactured to accept a setscrew over the key and its use is optional. It is packaged with the hardware on sizes SH to M and loosely installed in the bushing on sizes N to S.

1. Inspect the tapered bore of the sheave and the tapered surface of the bushing. Any paint, dirt, oil, or grease MUST be removed.

2. Select the type of mounting (See Fig. 1 or 2) that best suits your application.

3. **STANDARD MOUNTING:** Install shaft key. (Note: If key was furnished with bushing, you must use that key.) Install bushing on clean shaft, flange end first. If bushing will not freely slide on the shaft, insert a screwdriver or similar object into the flange sawcut to act as a wedge to open the bushing's bore. **Caution: Excessive wedging will split the bushing.** If using the setscrew, tighten it just enough to prevent the bushing from sliding on the shaft. **Caution: Do not over tighten setscrew!** Slide sheave into position on bushing aligning the drilled holes in the sheave with the tapped holes in the bushing flange. (Note: Install M thru S bushings so that the two tapped holes in the sheave are located as far away as possible from the bushing's sawcut.) Loosely thread the capscrews with lockwashers into the assembly. **DO NOT USE LUBRICANT ON THE CAPSCREWS!**

4. **REVERSE MOUNTING:** With large end of the taper out, slide sheave onto shaft as far as possible. Install shaft key. (See shaft key note in #3 above.) Install bushing onto shaft so tapered end will mate with sheave. (See wedging note in #3 above.)If using the setscrew, tighten it enough to prevent the bushing from sliding on the shaft. **Caution: Do not over tighten setscrew!** Pull the sheave up on the bushing, aligning the drilled holes in the bushing flange with the tapped holes in the sheave. Loosely thread the capscrews with lockwashers into the assembly. **DO NOT USE LUBRICANT ON THE CAPSCREWS!**

5. Using a torque wrench, tighten all capscrews evenly and progressively in rotation to the torque value in Table. There must be a gap between the bushing flange and sheave hub when installation is complete. **DO NOT OVER TORQUE! DO NOT ATTEMPT TO CLOSE GAP BETWEEN BUSHING FLANGE AND SHEAVE HUB!**

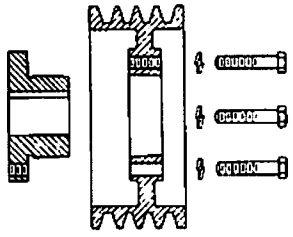


FIG. 1 Standard Mounting

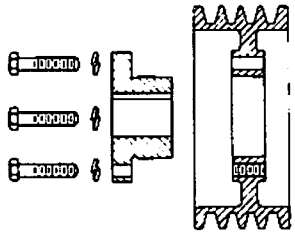


FIG. 2 Reverse Mounting

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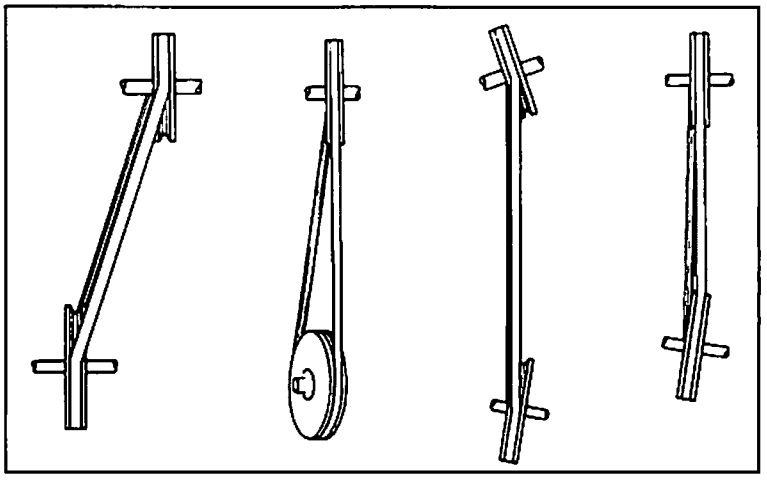
Check alignment

Although alignment is not as critical in V-belt drives as in others, proper alignment is essential to long belt and sheave life.

First, make sure that drive shafts are parallel. The most common causes of misalignment are non-parallel shafts and improperly located sheaves.

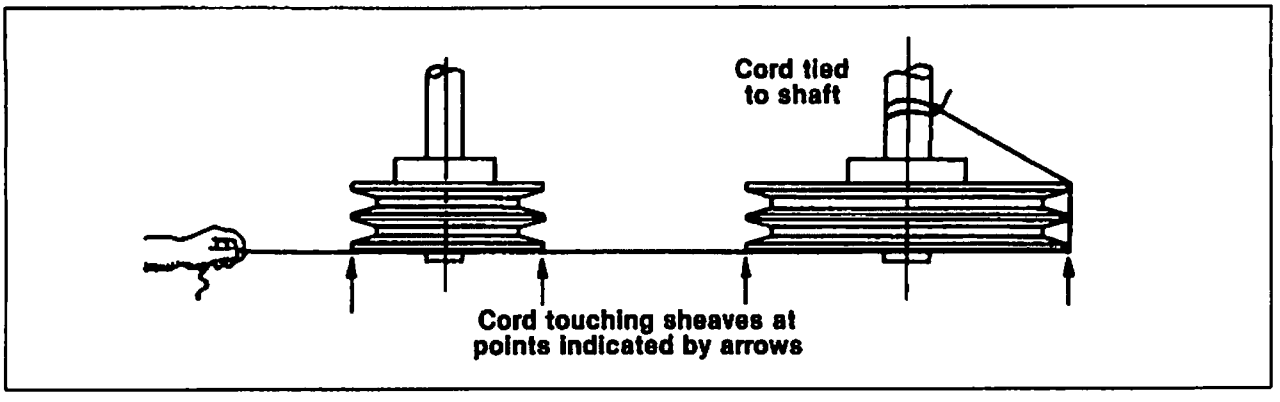
Where shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. As a result, these belts wear out faster, requiring the entire set to be replaced before it has given maximum service. If misalignment is in the sheave, belts will enter and leave the grooves at an angle, causing excessive belt cover and sheave wear.



Shaft alignment can be checked by measuring the distance between the shafts at three or more locations. If the distances are equal, then the shafts will be parallel.

To check the location of the sheaves on the shafts, a straightedge or a piece of string can be used. If the sheaves are properly lined up, the string will touch them at the points indicated by the arrows in the accompanying sketch. Rotating each sheave a half revolution will determine whether the sheave is wobbly or the drive shaft is bent. Correct any misalignment.

With sheaves aligned, tighten cap screws evenly and progressively. Apply the recommended torque to cap screws as listed in table on page 9. NOTE: There should be ⅛" to ¼" gap between the mating part hub and the bushing flange. If gap is closed, the shaft is seriously undersize.



TB Wood's

Tensioning V-Belt Drives

Without exception, the most important factor in the successful operation of a V-belt drive is proper belt-tensioning. To achieve the long, trouble-free service associated with V-belt drives, belt tension must be sufficient to overcome slipping under maximum peak load. This could be either at start or during the work cycle. The amount of peak load will vary depending upon the character of the driven machine or drive system. To increase total tension, merely increase the center distance. Before attempting to tension any drive it is imperative that the sheaves be properly installed and aligned. If a V-belt slips it is too loose. Add to the tension by increasing the center distance. Never apply belt dressing as this will damage the belt and cause early failure.

General method

The general method for tensioning V-belts should satisfy most drive requirements.

Step 1: Reduce the center distance so that the belts may be placed over the sheaves and in the grooves without forcing them over the sides of the grooves. Arrange the belts so that both the top and bottom spans have about the same sag. Apply tension to the belts by increasing the center distance until the belts are snug. See figure 1.

Step 2: Operate the drive a few minutes to seat the belts in the sheave grooves. Observe the operation of the drive under its highest load condition (usually starting). A slight bowing of the slack side of the drive indicates proper tension. If the slack side remains taut during the peak load, the drive is too tight. Excessive bowing or slippage indicates insufficient tension. If the belts squeal as the motor comes on or at some subsequent peak load, they are not tight enough to deliver the torque demanded by the drive machine. The drive should be stopped and the belts tightened.

Step 3: Check the tension on a new drive frequently during the first day by observing the slack side span. After a few days' operation the belts will seat themselves in the sheave grooves and it may become necessary to readjust so that the drive again shows a slight bow in the slack side.

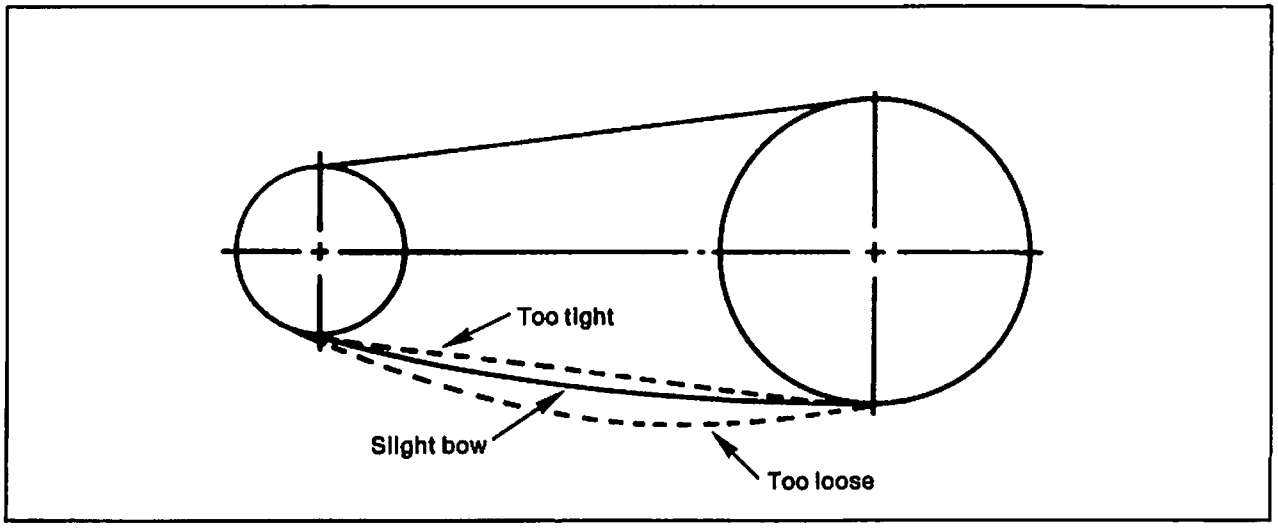


Figure 1

Force deflection method

This method should be used only for tensioning drives on which the grade of belt, rated belt capacity, service factor, design horsepower, etc. are known.

Step 1: Install belts per Step 1 of General Method. Measure span length (t) in inches as shown in figure 2, or calculate using formula.

Step 2: From figure 2 the deflection height (h) is always 1/64" per inch of span length (t). For example, a 32" span length would require a deflection of 32/64" or 1/2".

Step 3: Determine the minimum, maximum, and initial recommended pounds force using table 1 or calculate based on the required Static Strand Tension (T_S). Note: The initial recommended force is used only for installing new belts which have not seated themselves into the sheave grooves and where initial belt stretch has not taken place.

Step 4: Using a spring scale, apply a perpendicular force to any ONE of the belts at the mid point of the span as shown in figure 2. Compare this deflection force with the values found in Step 3.

a. If the deflection force is below the minimum, the belts are too loose and the tension should be increased by increasing the center distance.

b. If the deflection force is higher than the maximum, the belts are too tight and the tension should be decreased.

When new V-belts are installed on a drive the INITIAL tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. Subsequent retensioning should fall between the minimum and maximum force.

To determine the deflection distance from normal position, use a straightedge or stretch a cord from sheave to sheave to use as a reference line. On multiple-belt drives an adjacent undeflected belt can be used as a reference.

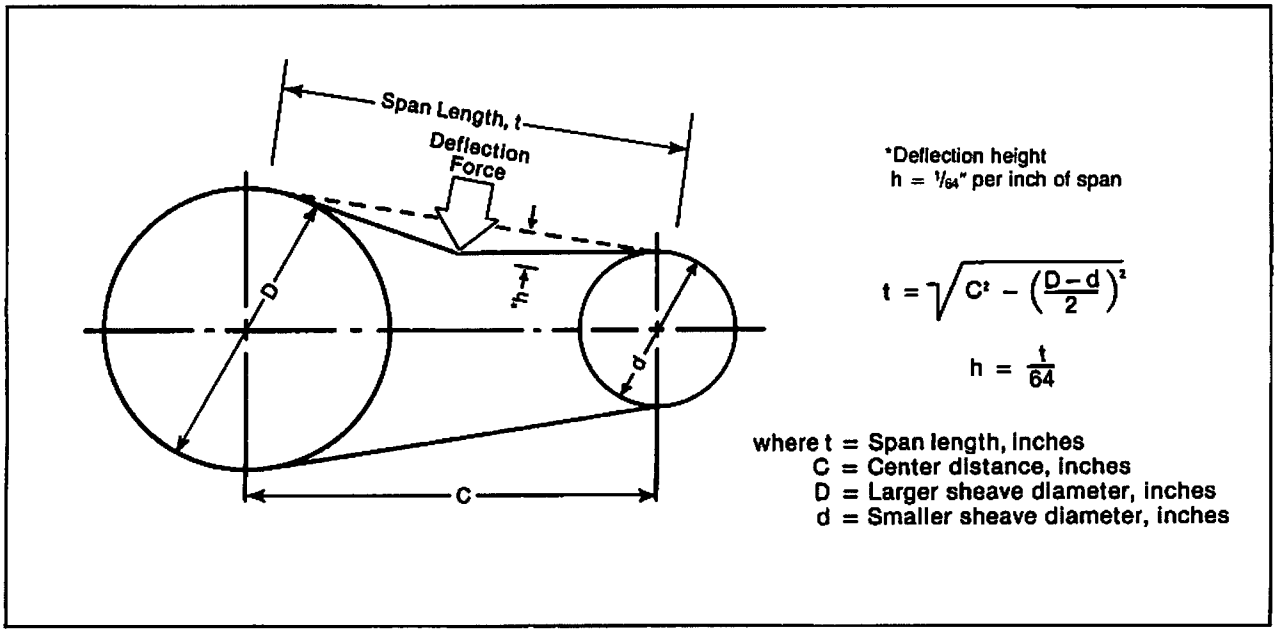


Figure 2

TB Wood's

Table 1
Recommended Minimum Force Per Belt

Belt Section	Small Sheave Speed Range	Small Sheave Dia.	Drive Ratio 1.0	1.5	2.0	4.0 & over
3V	1200-3600	2.65	2.0	2.4	2.8	3.0
	1200-3600	3.65	2.8	3.6	3.8	4.2
	1200-3600	4.75	3.8	4.2	4.4	4.8
	1200-3600	5.60	4.2	4.6	4.8	5.4
	1200-3600	6.90	4.6	5.0	5.2	5.6
5V	900-1800	7.1	8.5	9.5	10	11
	900-1800	9.0	10	11	12	13
	900-1800	14.0	12	13	14	15
	700-1200	21.2	14	15	16	17
8V	900-1800	12.5	18	21	23	25
	900-1800	14.0	21	23	24	28
	700-1500	17.0	24	26	28	30
	700-1200	21.2	26	30	32	34
	400-1000	24.8	31	32	34	36
3VX	1200-3600	2.20	2.2	2.5	2.7	3.0
	1200-3600	2.50	2.6	2.9	3.1	3.6
	1200-3600	3.00	3.1	3.5	3.7	4.2
	1200-3600	4.12	3.9	4.3	4.5	5.1
	1200-3600	5.30	4.6	4.9	5.1	5.7
	1200-3600	6.9	5.0	5.4	5.6	6.2
5VX	1200-3600	4.4	6.5	7.6	8.0	9.0
	1200-3600	5.2	8.0	9.0	9.5	10
	1200-3600	6.3	9.5	10	11	12
	1200-3600	7.1	10	11	12	13
	900-1800	9.0	12	13	14	15
	900-1800	14.0	14	15	16	17
AP	1800-3600	3.0	2.0	2.3	2.4	2.6
	1800-3600	4.0	2.6	2.8	3.0	3.3
	1800-3600	5.0	3.0	3.3	3.4	3.7
	1800-3600	7.0	3.5	3.7	3.8	4.3
BP	1200-1800	4.6	3.7	4.3	4.5	5.0
	1200-1800	5.0	4.1	4.6	4.8	5.6
	1200-1800	6.0	4.8	5.3	5.5	6.3
	1200-1800	8.0	5.7	6.2	6.4	7.2
CP	900-1800	7.0	6.5	7.0	8.0	9.0
	900-1800	9.0	8.0	9.0	10	11
	900-1800	12.0	10	11	12	13
	700-1500	16.0	12	13	13	14
DP	900-1500	12.0	13	15	16	17
	900-1500	15.0	16	18	19	21
	700-1200	18.0	19	21	22	24
	700-1200	22.0	22	23	24	26
AX	1800-3600	3.0	2.5	2.8	3.0	3.3
	1800-3600	4.0	3.3	3.6	3.8	4.2
	1800-3600	5.0	3.7	4.1	4.3	4.6
	1800-3600	7.0	4.3	4.6	4.8	5.3
BX	1200-1800	4.6	5.2	5.8	6.0	6.9
	1200-1800	5.0	5.4	6.0	6.3	7.1
	1200-1800	6.0	6.0	6.4	6.7	7.7
	1200-1800	8.0	6.6	7.1	7.5	8.2
CX	900-1800	7.0	10	11	12	13
	900-1800	9.0	11	12	13	14
	900-1800	12.0	12	13	13	14
	700-1500	16.0	13	14	14	15
DX	900-1500	12.0	16	18	19	20
	900-1500	15.0	19	21	22	24
	700-1200	18.0	22	24	25	27
	700-1200	22.0	25	27	28	30

MAXIMUM Deflection Force = Minimum times 1.5

INITIAL Deflection Force = Minimum times 2.0

Minimum deflection force values shown in table 1 are based on assumed average static tensions for drives having multiple belts or more than one V-band, thus eliminating calculations. (For drives using only one belt or one V-band, deflection force must be determined by use of engineering formulas.)

Find the minimum recommended deflection force for the belt section and type based upon the small sheave diameter, speed and drive ratio. For intermediate sheave diameters and/or drive ratio combinations the minimum deflection force may be interpolated.

For Narrow Band, Classical Band and Classical Cog Band belts multiply the minimum deflection force from table 1 by the number of belts in the band. Where larger values make use of the Force Deflection Method impractical, use the Elongation Method to tension V-bands.

Table 2
K Factors and Arc of Contact

$\frac{D-d}{C}$	Arc Contact Degree	Factor Ac	K	$\frac{D-d}{C}$	Arc Contact Degree	Factor Ac	K
0.000	180	1.000	24.750	0.750	138	0.879	30.411
0.025	179	0.997	24.883	0.775	134	0.874	30.688
0.050	177	0.994	25.019	0.800	133	0.869	30.975
0.075	178	0.990	25.158	0.825	131	0.864	31.270
0.100	174	0.987	25.300	0.850	130	0.858	31.576
0.125	173	0.983	25.444	0.875	128	0.852	31.892
0.150	171	0.980	25.591	0.900	127	0.847	32.219
0.175	170	0.977	25.742	0.925	125	0.841	32.558
0.200	169	0.973	25.896	0.950	123	0.835	32.909
0.225	167	0.969	26.053	0.975	122	0.829	33.273
0.250	166	0.966	26.213	1.000	120	0.823	33.652
0.275	164	0.962	26.377	1.025	118	0.816	34.045
0.300	163	0.958	26.545	1.050	117	0.810	34.454
0.325	161	0.954	26.717	1.075	115	0.803	34.879
0.350	160	0.951	26.892	1.100	113	0.796	35.323
0.375	158	0.947	27.072	1.125	112	0.789	35.786
0.400	157	0.943	27.257	1.150	110	0.782	36.270
0.425	155	0.939	27.445	1.175	108	0.774	36.777
0.450	154	0.935	27.639	1.200	106	0.767	37.307
0.475	153	0.930	27.837	1.225	104	0.759	37.864
0.500	151	0.926	28.040	1.250	103	0.751	38.448
0.525	150	0.922	28.249	1.275	101	0.742	39.064
0.550	148	0.917	28.463	1.300	99	0.734	39.713
0.575	147	0.913	28.684	1.325	97	0.725	40.398
0.600	145	0.908	28.910	1.350	95	0.716	41.123
0.625	144	0.904	29.142	1.375	93	0.706	41.892
0.650	142	0.899	29.381	1.400	91	0.697	42.709
0.675	141	0.894	29.627	1.425	89	0.687	43.580
0.700	139	0.889	29.881				
0.725	137	0.884	30.142				

TB Wood's

Trouble Shooting V-Belts

How to spot V-belt trouble

Trouble	Cause	To correct
Belt slip (sidewalls glazed)	Not enough tension.	Replace belts; apply proper tension.
Drive squeals	Shock load.	Apply proper tension.
	Not enough arc of contact.	Increase center distance.
	Heavy starting load.	Increase tension.
Belt turned over.	Broken cord caused by prying on sheave.	Replace set of belts correctly.
	Overloaded drive.	Redesign drive.
	Impulse loads.	Apply proper tension.
	Misalignment of sheave and shaft.	Realign drive.
	Worn sheave grooves.	Replace sheaves.
	Flat idler sheave.	Align idler. Re-position on slack side of drive close to drive sheave.
	Excessive belt vibration.	Check drive design. Check equipment for solid mounting. Consider use of banded belts.
Mismatched belts.	New belts installed with old belts.	Replace belts in matched set only.
	Sheave grooves worn unevenly; improper groove angle. Give appearance of mismatched belts.	Replace sheaves.
	Sheave shafts not parallel. Give appearance of mismatched belts.	Align drive.
Belt breaks.	Shock loads.	Apply proper tension; Recheck drive.
	Heavy starting loads.	Apply proper tension; Recheck drive. Use compensator starting.
	Belt pried over sheaves.	Replace set of belts correctly.
	Foreign objects in drive.	Provide drive shroud.
Belt wears rapidly.	Sheave grooves worn.	Replace sheaves.
	Sheave diameter too small.	Redesign drive.
	Mismatched belts.	Replace with matched belts.
	Drive overloaded.	Redesign drive.
	Belt slips.	Increase tension.
	Sheaves misaligned.	Align sheaves.
	Oil or heat condition.	Eliminate oil. Ventilate drive.

⚠ WARNING: LOOSE & ROTATING PARTS HAZARD
Before proceeding read Section 1-2 on Mechanical Safety. Failure to follow the instructions in Section 1-2 could result in serious personal injury, death and/or property damage

⚠ WARNING: EXCESSIVE SURFACE TEMPERATURE HAZARD
Motors with the temperature code stated on the nameplate are designed to operate within this limit. Improper application or operation can cause the maximum surface temperature to be exceeded. A motor operated in a Hazardous Location that exceeds this surface temperature limit increases the potential of igniting hazardous materials. *Therefore, motor selection, installation, operation, and maintenance must be carefully considered to ensure against the following conditions:* (1) Motor load exceeds service factor value, (2) Ambient temperature above nameplate value, (3) Voltages outside of limits (3.4.1.3), (4) Loss of proper ventilation, (5) VFD operation exceeding motor nameplate rating, (6) Altitude above 3300 feet / 1000 meters, (7) Severe duty cycles, (8) Repeated starts, (9) Motor stall, (10) Motor reversing, and (10) Single phase operation. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ CAUTION: HOT SURFACE
Normal motor surface temperatures may exceed 90 ° C (194° F). Touching the motor frame may cause discomfort or injury. Surface temperatures should only be measured with suitable instruments and not estimated by hand touch.

3.4.5.1 Start Up - No Load Procedure

1. **Check Instructions:** Before startup carefully read and fully understand these instructions including all warnings, cautions, and safety notice statements.
2. **Motor out of storage after more than three months:** Check winding insulation integrity with a Megger. If winding resistance to ground is less than 1.5 Meg-ohms consult the local authorized service shop before energizing the motor.
3. **Check Installation: Mechanical** - Check tightness of all bolts and nuts. Manually rotate the motor shaft to ensure motor shaft rotates freely. Note: Shaft & bearing seals will add drag.
   Electrical - Inspect all electrical connections for proper terminations, clearance, mechanical tightness and electrical continuity. Be sure to verify connections are made per the nameplate connection diagram or separate connection plate. Replace all panels and covers that were removed during installation before energizing the motor.
4. **Energize Motor: Check Rotation**
   If practical check motor rotation before coupling to the load. Unlock the electrical system. Momentarily provide power to motor to verify direction of rotation. If opposite rotation is required, lock out power before reconnecting motor. If motor has a rotational arrow only operate the motor in the rotation identified. Reapply power to ensure proper operation.
5. **Record No Load Amps, Watts & Voltage:**
   Recommend - To establish a baseline value check and record the no load amps, watts, and voltage.

3.4.5.2 Start Up – Load Connected Procedure

1. **Check Instructions:** Before startup carefully read and fully understand these instructions including all warnings, cautions, & safety notice statements.
2. **Coupling Installation:** Check that the connected equipment is properly aligned and not binding. Check that all guards and protective devices are properly installed.
3. **Energize Motor:** When all personnel are clear of the machine, apply power and verify that the load is not transmitting excessive vibration back to the motor though the shaft or the foundation. Verify that motor amps are within nameplate rating. For repeated starts see 3.4.5.3. The equipment can now be fully loaded and operated within specified limits as stated on the nameplate.

3.4.5.3 Jogging and/or Repeated Starts

Do not start more than twice in succession under full load. Repeated starts and/or jogs of induction motors can cause overheating and immediate failure. Contact the motor manufacturer if it is necessary to repeatedly start or jog the motor.

4.0 MAINTENANCE:

⚠ WARNING: Hazardous Locations Motor Repair HAZARD:
Division 1 Hazardous Locations motors can only be modified or repaired by the manufacturer or a facility that is Listed under UL's category "Motors and Generators, Rebuilt for use in Hazardous Locations". Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ WARNING: ELECTRICAL SHOCK HAZARD
Electrical connections are to be made by qualified electrical personnel in accordance with all applicable codes, ordinances and sound practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage. Only qualified personnel who are familiar with the applicable national codes, local codes and sound practices should install or repair electric motors and their accessories.

⚠ WARNING: ELECTRICAL LIVE CIRCUIT HAZARD
Do not touch electrically live parts. Disconnect, lockout and tag input power supply before installing or servicing motor (includes accessory devices).

4.1 GENERAL INSPECTION

Inspect the motor approximately every 500 hours of operation or every three months, whichever occurs first. Keep the motor clean and the ventilation and fin openings clear. The following steps should be performed at each inspection:

4.1.1 VENTILATION: Check that the ventilation openings and/or exterior of the motor is free of dirt, oil, grease, water, etc, which can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.

4.1.2 INSULATION: Use a "Megger" periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. If winding resistance to ground is less than 1.5 Meg-ohms consult the local authorized service shop before re-energizing the motor.

4.1.3 ELECTRICAL CONNECTIONS: Check all electrical connectors to be sure that they are tight.

4.2 LUBRICATION & BEARINGS:

The lubricating ability of grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Longer bearing life can be obtained if the listed recommendations are followed:

NOTE: If lubrication instructions are provided on the motor nameplate, the nameplate instructions will supersede these instructions. Motors marked "Permanently Lubricated" do not require additional service.

⚠ CAUTION: BEARING / MOTOR DAMAGE WARNING
Lubricant should be added at a steady moderate pressure. If added under heavy pressure bearing shield(s) may collapse. Over greasing bearings greatly increases bearing friction and can cause premature bearing and/or motor failure.

4.2.1 GREASE TYPE (unless nameplate states otherwise):
Nameplate Ambient Temperature between -30°C (-22°F) to 65°C (150°F) inclusive: Recommended grease for standard service conditions is Mobil Polyrex ® EM. Equivalent and compatible greases include: Texaco Polystar RB, Rykon Premium #2, Pennzoil Pen 2 Lube, Chevron SRI & Mobil SHC 100.

Nameplate Ambient Temperature below -30°C (-22°F): Special low temperature grease is recommended, such as Aeroshell 7 or Beacon 325 for ball bearings and Mobil SHC 100 for roller bearings.

Nameplate Ambient Temperature above 65°C (150°F): Dow Corning DC44 or equivalent, a special high temperature grease is required. Note that Dow Corning DC44 grease does not mix with other grease types.

For RTD settings see Table 3-7.

4.2.2 BEARING OPERATING TEMPERATURE:

⚠ CAUTION: HOT SURFACE

The external surface temperature of the end shield (bracket) bearing hub may reach 100° C (212° F) during normal operation. Touching this surface may cause discomfort or injury. Surface temperatures should only be measured with suitable instruments and not estimated by hand touch.

4.2.3 LUBRICATION INTERVALS: (For motors with regreasing provisions)

Eq. 4.2 Lubrication Interval = [(Table 4-1) hrs] x [Interval Multiplier (Table 4-2)] x [Construction Multiplier (Table 4-3)]

Table 4-1 Lubrication Intervals (Hours) These values are based on average use.

NEMA / [IEC] Frame Size	Operating Speed – RPM (See Table 3.4 for Maximum Operating Speed)					
	<7200	<5400	<4500	<3600	<1800	<1200
56-180 [80-110]	2500 Hrs.	4000 Hrs	5000 Hrs	6000 Hrs.	17000 Hrs.	20000 Hrs.
210-250 [130-160]		2500 Hrs	4000 Hrs	5000 Hrs.	12000 Hrs.	16000 Hrs.
280 [180]		2000 Hrs	3000 Hrs	4000 Hrs.	10000 Hrs.	14000 Hrs.
320 [200]			2000 Hrs	3000 Hrs.	9000 Hrs.	12000 Hrs.
360 [225]			1500 Hrs	2000 Hrs.	8000 Hrs.	10000 Hrs.
400-440 [250 – 280]				1500 Hrs.	4000 Hrs.	7000 Hrs.
>440 [>280]				1000 Hrs.	3000 Hrs.	5000 Hrs.

Seasonal Service: If motor remains idle for more than six months, Lubricate at the beginning of the season, then follow lubrication interval.

Do not exceed maximum safe operating speed Table 3-4 without manufacturer's approval

Table 4-2 Service Conditions

Use highest level Multiplier: Maximum Ambient Temperature and Contamination are independent factors

Severity of Service	Maximum Ambient Temperature	Atmospheric Contamination	Multiplier
Standard	Less than 40° C (104° F)	Clean, Slight Corrosion, indoors, less than 16 hrs per day	1.0
Severe	Above 40° C (104° F) to 50° C	Moderate dirt or Corrosion or outdoors or more than 16 hrs per day	0.5
Extreme	Greater than 50° C or Class H Insulation	Severe dirt or Abrasive dust or Corrosion	0.2

Table 4-3 Construction Multiplier

Construction	Multiplier
Angular Contact or Roller Bearing	0.5
Vertical Motor	0.5
All others	1.0

Table 4-4 Relubrication Amounts

Frame Size		Volume		
NEMA	IEC	Cu. In.	Fluid oz	ml
48-56	80	0.25	0.14	4.0
143-145	90	0.25	0.14	4.0
182-184	110	0.50	0.28	8.0
213-215	130	0.75	0.42	12.5
254-256	160	1.00	0.55	16.0
284-286	180	1.50	0.83	25.0
324-326	200	2.00	1.11	33.0
364-365	225	3.00	1.66	50.0
404-405	250	3.80	2.11	62.0
444-449	280	4.10	2.27	67.0
>449	>280	4.50	2.50	74.0

For regreasing while operating multiply volume by 125%.

4.2.4 LUBRICATION PROCEDURE:
(For Motors with Regreasing Provisions)

CAUTION: BEARING DAMAGE WARNING
Added grease must be compatible with the original equipment's grease. If a grease other than those stated in 4.2.1 is to be utilized contact the motor manufacturer. Nameplate information supersedes section 4.2.1 (GREASE TYPE). New grease must be free of dirt. Failure to follow these instructions and procedure below may result in bearing and/or motor damage.

For an extremely dirty environment, contact the motor manufacturer for additional information.

LUBRICATION PROCEDURE:

1. Clean the grease inlet plug or zerk fittings prior to regreasing.
2. (If present) Remove grease drain plug and clear outlet hole blockage.

CAUTION: GREASE DRAIN PLUGGED:
Old grease may completely block the drain opening and must be mechanically removed prior to regreasing. Forcing a blocked drain open by increased greasing pressure may collapse bearing shields and / or force excess grease through the bearings and into the motor.

3. Add grease per Table 4-4
4. Re-install grease inlet and drain plugs (if removed).

⚠ WARNING: EXPLOSION HAZARD
Do NOT energize a Hazardous Locations motor without all grease fittings properly installed.

4.2.5 EXAMPLE: LUBRICATION
Assume - NEMA 286T (IEC 180), 1750 RPM Vertical motor driving an exhaust fan in an ambient temperature of 43° C and the atmosphere is moderately corrosive.

1. Table 4-1 list 10,000 hours for standard conditions.
2. Table 4-2 classifies severity of service as "Severe" with a multiplier of 0.5.
3. Table 4-3 lists a multiplier value of 0.5 for "Vertical"
4. (Eq. 4.2) Interval = 10,000 hrs x 0.5 x 0.5 = 2500 hrs

Table 4-4 shows that 1.5 in^3 of grease is to be added.

Relubricate every 2,500 hrs of service with 1.5 in^3 of recommended grease.

4.3 TROUBLE-SHOOTING

⚠ WARNING: READ INSTRUCTIONS:
Before trouble-shooting a motor, carefully read and fully understand the warnings, cautions, & safety notice statements in this manual.

⚠ WARNING: Hazardous Locations Motor Repair:
Motors nameplated for use in Division 1 Hazardous Locations can only be disassembled, modified or repaired by the plant of manufacturer or a facility that is Listed under UL's category "Motors and Generators, Rebuilt for use in Hazardous Locations". Failure to follow these instructions could result in serious personal injury, death and/or property damage

CAUTION: DISASSEMBLY APPROVAL REQUIRED:
Motor disassembly must be performed by a party approved by the motor manufacturer. To disassemble the motor without approval voids the warranty.

4.3.1 GENERAL TROUBLE-SHOOTING WARNINGS

1. **DISCONNECT POWER TO THE MOTOR BEFORE PERFORMING SERVICE OR MAINTENANCE.**
2. **Discharge all capacitors before servicing motor.**
3. **Always keep hands and clothing away from moving parts.**
4. **Be sure required safety guards are in place before starting equipment.**
5. **If the problem persists contact the manufacturer.**

4.3.2 Motor Trouble-shooting Cause / Corrective Action - Table 4-5

Issue:		Likely Cause:	Corrective Action:
Motor fails to start upon initial installation:			
	A.)	Supply voltage is too low or is severely unbalanced (one phase is low or missing).	(1) Check power supply fuses (2) Match motor lead wiring to nameplate connection diagram and supply voltage (3) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3). Correct as needed (4) Obtain correct motor to match actual supply voltage.
	B.)	Motor leads are miswired at conduit box.	
	C.)	Driven load exceeds motor capacity	(1) Verify that motor & load turn freely (2) Disconnect motor from load & ensure motor turns freely. Note: Roller bearings make noise when motor is uncoupled and shaft is rotated (3) Verify that motor starts when disconnected from load (4) Remove excessive / binding load if present.
	D.)	Load is jammed.	
	E.)	Fan guard is bent and making contact with fan	Replace fan guard & fan (if blades are damaged)
	F.)	VFD with power factor capacitors installed	Remove power factor correction capacitors if equipped
	G.)	VFD with motor neutral lead grounded	Ensure that motor neutral lead is ungrounded
	H.)	VFD programmed incorrectly	(1) Repeat checks listed above (2) Verify that VFD current limit and starting boost are set correctly (5) Double-check motor and feedback parameter settings and VFD permissives (6) Repeat autotune (for vector drives) procedure (7) Consult VFD supplier.
Motor has been running, then slow down, stalls, or fails to restart:			
	A.)	Supply voltage has drooped or has become severely unbalanced	(1) Replace fuse or reset circuit breaker. Allow motor to cool down before resetting manual protector on motor. **Warnings** - See section 1.1 for automatic and manual reset protector warnings (2) Verify that rated and balanced supply voltage has been restored before restarting motor. Measure voltage during restart. Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3).
	B.)	Motor is overloaded	(1) Verify that motor & load turn freely. Repair binding components as needed (2) Reduce driven load to match motor capacity or increase motor size to match load requirements.
	C.)	Motor bearings are seized	
	D.)	Load is jammed.	
	E.)	VFD will not restart motor after tripping	(1) Check fault codes on VFD and follow VFD troubleshooting procedures (2) Verify that VFD input voltage is balanced and within limits (3) Remove excessive mechanical load if present.
	F.)	Capacitor failure on single phase motor (if equipped)	**Warning: Potential Shock Hazard**: Contact service shop to check capacitor.
Motor takes too long to accelerate:			
	A.)	Motor leads are not connected correctly	Match motor lead wiring to nameplate diagram.
	B.)	Supply voltage has drooped or become severely unbalanced.	(1) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3). Correct as needed (2) Obtain correct motor to match actual supply voltage.
	C.)	Load exceeds motor capability	Determine correct motor size and contact motor representative to obtain replacement motor.
	D.)	Faulty start capacitor (Single Phase)	Motor may be too small for load. Record acceleration time. Start capacitors may fail if acceleration time exceeds 3 seconds.
	E.)	Mechanical Failure	(1) Check to make sure motor & load turn freely (2) Disconnect motor from load & ensure motor turns freely
Motor rotates in the wrong direction:			
	A.)	Incorrect wiring connection at motor	[Single Phase] Reconnect motor according to wiring schematic provided. Note: Some motors are non-reversible
			[Three Phase] Interchange any two power supply (phase) leads.
Motor overheats or overload protector repeatedly trips			
	A.)	Driven Load is excessive	(1) If motor current exceeds nameplate value, ensure that driven load has not increased. Correct as needed. (2) If new motor is a replacement, verify that the rating is the same as the old motor. If previous motor was a special design, a general purpose motor may not have the correct performance.
	B.)	Ambient temperature too high	Most motors are designed to operate in an ambient up to 40 °C. (See section 4.2.2 Hot Surface Caution)
	C.)	Motor cooling fins and/or vent openings blocked	Remove foreign materials – clear vent openings, fan guard air inlets and frame fins (TEFC motors)
	D.)	Insufficient Air Flow	TEAO (Totally Enclosed Air Over) motors: Measure airflow next to motor surface and obtain minimum requirements from motor manufacturer.

	E.)	Motor is started too frequently	See section 3.4.5.3
	F.)	Supply voltage too low, too high, or unbalanced	(1) Ensure that steady state supply voltage at motor terminals is within limits (see section 3.4.1.3) Correct as needed (2) Reconnect motor per input voltage (3) Obtain correct motor to match power supply.

Motor Vibrates

	A.)	Motor misaligned to load.	Realign load
	B.)	Load out of balance (Direct drive application)	(1) Ensure that load is dynamically balanced: (2) Remove motor from load and inspect motor by itself. Verify that motor shaft is not bent. Rule of thumb is 0.002" runout for shafts extension lengths up to 3.00". Add 0.0005" per every additional inch of shaft length beyond 3.00".
	C.)	Uneven tension on multiple belts	Mixing new with used belts. Replace multiple belt applications with a complete set of matched belts.
	D.)	Driven load operating at resonant point / natural frequency.	(1) De-energize motor and record vibration as load coasts from 100% speed to 0 RPM. If vibration drops immediately, vibration source is electrical. If levels do not drop immediately, source is mechanical (2) Redesign system to operate below the resonant point (3) On VFD-driven loads, program skip frequencies to bypass resonant points (4) Increase carrier frequency to obtain <3% THD current (5) On variable torque loads reduce volts/hertz below base speed.
	E.)	VFD torque pulsations	(1) Adjust VFD to obtain <3% THD current @ rated motor current (2) Adjust VFD stability for smooth operation. Vector drives may be unstable at light load.
	F.)	Motor miswired at terminal box	Match motor lead wiring to nameplate connection diagram.
	G.)	Uneven, weak or loose mounting support.	Shim, strengthen or tighten where required.
	H.)	Motor bearings defective	Test motor by itself. If bearings are bad, you will hear noise or feel roughness. Roller bearings are normally noisy when operated without load. If sleeve bearing, add oil per nameplate instructions. For motors with regreasing provisions, add grease per relubricating instructions (see section 4.2.3). If noise persists contact warranty service.
	I.)	Motor out of balance	Disconnect from load. Set motor on rubber pads on solid floor. Secure a ½ height key in shaft keyway and energize from balanced power supply @ rated voltage. Record vibration levels and compare with appropriate standards. If excessive vibration persists contact motor manufacturer.

Bearings repeatedly fail.

	A.)	Load to motor may be excessive or unbalanced	(1) If belt drive check system per section 3.3.4. (2) Other than belting, check loading on motor shaft. An unbalanced load will also cause the bearings to fail. (3) Check runouts of mating components, such as a C-face and pump flange.
	B.)	Bearings contaminated.	Motor enclosure not suitable for environment. Replace with correct enclosure construction
	C.)	Incorrect grease or bearings for ambient extremes.	See section 4.2.1
	D.)	VFD bearing damage	Ground brush, common mode filter, or insulated bearings must be added. Contact motor manufacturer.

Motor, at start up, makes a loud rubbing, grinding, or squealing noise.

	A.)	Contact between rotating and stationary components	Belt squeal during across the line starting is normal: (1) Verify that supply voltage is within limits (see section 3.4.1.3). (2) Ensure that motor lead wiring matches nameplate connection diagram: (3) Isolate motor from load. (4) To locate point of contact turn motor shaft by hand. (5) If point of contact is not located contact motor service shop.

Start capacitors repeatedly fail.

	A.)	The motor acceleration time is too long	Motor may be too small for load. Record acceleration time. Start capacitors may fail if acceleration time exceeds 3 seconds.
	B.)	Motor is being started too frequently	Excessive starting will damage motor capacitors. Contact motor manufacturer if motor is started more than 20 times/hour or if acceleration time exceeds 3 seconds.
	C.)	Motor voltage low	Verify that voltage at the motor terminals is within limits (see section 3.4.1.3).
	D.)	Defective start switch inside motor	Motor internal switch failure overheats start capacitor. Contact service shop or motor manufacturer.

Run capacitor fails.

	A.)	High ambient temperature	Verify that the ambient does not exceed motor's nameplate value

	B.)	Input voltage exceeds limit	Verify that voltage to the motor terminals is within limits (see section 3.4.1.3).
	C.)	Power surge to motor (caused by lightning strike or other high transient voltage).	If a common problem, install surge protector.

EXAMPLE O&M CHECKLIST

Sub-Slab Depressurization System OM checklist

Site: Standard Motors Products, 37-18 Northern Blvd., Long Island City, NY

Date: - - Time: onsite : offsite : Technician(s):

System Status (circle type)

Maintenance Type:	Scheduled	Alert	Shutdown	Response
System Status:onsite	Manual	Auto	Shutdown	Off
System Status:offsite	Manual	Auto	Shutdown	Off
Blower 1 Status:	Manual	Auto	Shutdown	Off
Blower 2 Status:	Manual	Auto	Shutdown	Off
Transfer Pump Status:	Manual	Auto		Off
Genaral Alarm Status:	Off/On	Pressure	Temp.	Level
Bypass Valve	Closed	Open	Angle	

System Readings (record values)

Pressure

Inlet Vacuum (in H2O) 4.2
Differ.Filter (in H20) 1.5
Blower 1 Inlet (in H2O) 7.6
Blower 2 Inlet (in H2O) 0
Outlet Manifold (in H2O) 0.6 1.87
Outlet Stack (in H2O) ~~0.6~~ 0.42

Temperture

Inlet (gas)
Blower 1(oil) 78.2
Motor 1 (windings) 83.4
Blower 2 (oil) 77.5
Motor 2 (windings) 78.8
Exhaust (gas) 55.05
Trailer (ambient) 65.00

Flow

Exhaust (cfm) 1856 903
Total (cft) 5642,050

Meters

Blower 1 (hrs.) 58.2
Blower 2 ((hrs.) 54.2
Condensate (gals.) 135

PID Readings

Inlet (ppm)
Outlet Manifold(ppm)
Outlet Stack (ppm)

Electrical

Supply L1/L2/L3 (volts) 275 / 291 / 291
System L1/L2/L3(amps)
Blower 1 L1/L2/L3(amps) 13.2, 12.87, 12.91
Blower 2 L1/L2/L3(amps) 13.7 12.85 12.93

Oberservations (record condition)

Vibration

Blower Skid 1 (ok/ type)
Blower Skid 2 (ok/type)
System (ok/type)

Noise

Blower Skid 1 (ok/type)
Blower Skid 2 (ok/type)
System (ok/type)

Leaks

Blower Skid 1 (ok/fluid/gas)
Blower Skid 2 (ok/fluid/gas)
System (ok/fluid/gas)

Maintenance (record service)

Oil Change

Blower 1 (hrs./type)
Blower 2 (hrs./type)

V-Belts Tension

Blower 1 (ok/deflec.)
Blower 2 (ok/deflec.)

Motor Grease

Motor 1(hrs./type)
Motor 2(hrs./type)

Filters

Inlet (hrs./clean/replaced)
Bypass(hrs/clean/replaced)
Liquid Carbon (gals/replaced)
Vapor Carbon (cft/replaced)

Piping/Instrumentation

Hangers (ok/repair)
Piping (ok/repair)
Wiring (ok/repair)
Sensors (ok/repair)

Daily Notes:

Appendix B
Site Monitoring Plan

Appendix B
SMP Site Monitoring Plan

Section 1
Introduction

1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the Interim Remedial Measure (IRM) in minimizing migration of vapor contamination from underneath the building slab into the building at the Standard Motor Products (SMP) Site. Operation and Maintenance of the Sub-slab Depressurization System (SSDS) is provided in Appendix A of the SSDS Remedial Action (RA) Report. This Monitoring Plan may only be revised with the approval of New York State Department of Environmental Conservation (NYSDEC). The work under the SMP Monitoring Plan will be performed in accordance with the 2002 Quality Assurance Project Plan (QAPP) (GES 2002a) prepared by Groundwater and Environmental Services, Inc. (GES) for this Site, the 2007 Project Plan Addendum C (CDM 2007) prepared by CDM, and the 2009 Health and Safety Plan (HASP) (CDM 2009) prepared by CDM for the operation and maintenance of the SSDS.

1. 2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of SSDS process influent and effluent water and vapor
- Assessing compliance with applicable NYSDEC standards, criteria and guidance;
- Assessing achievement of the IRM performance criteria.
- Evaluating SSDS monitoring points periodically to confirm that the remedy continues to be effective in protecting public health; and
- Preparing the necessary reports for the various monitoring activities.

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

- Sampling locations, protocol, and frequency;
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;

Semi-annual monitoring of the SSDS sub-slab monitoring points, field screening at the extraction sumps, and sampling at the treatment system for laboratory analysis will be performed to ensure proper functioning of the IRM. These sampling and monitoring events will be conducted for one year. Annual sampling will be performed after year one. The vacuum readings at the sub-slab monitoring points will be evaluated to determine if the remedy continues to be effective in providing negative pressure across the building slab. A photoionization detector (PID) will be used to field screen the extraction sump air for volatile

organic compounds (VOCs). The aqueous and air samples will be used to ensure that the granulated activated (GAC) and liquid phase granulated activated carbon (LPGAC) unit are functioning properly. The monitoring program is summarized in Table 1-1 and outlined in detail in Section 3 below.

Table 1-1: Monitoring/Inspection Schedule

Location	Frequency	Matrix	Analysis
Before and After GAC unit	Semi-annually for year 1, annual thereafter	Air	EPA TO-15
Before and After LPGAC unit	Semi-annually, annual thereafter	Aqueous	EPA 8260
Sub-Slab Monitoring Points	Semi-annually, annual thereafter	Air	Field vacuum readings
Extraction Sumps	Semi-annually, annual thereafter	Air	Field PID Readings

Section 2
Soil Cover System Monitoring

There is no soil cover system that is being implemented under the IRM. Therefore, this section is not applicable to this Monitoring Plan.

Section 3
Media Monitoring Program

3.1 Process Water

Water extracted from the nine extraction sumps is collected in an air/water separator prior to the in-line blowers. The water will be collected from sampling ports within the process line.

3.1.1 Sampling Protocol

Aqueous process samples will be collected from the SSDS treatment system. Aqueous process samples will be collected semi-annually at two locations; before and after the LPGAC from sampling ports.

All samples will be analyzed by a New York State Department of Health (NYSDOH) approved Environmental Laboratory Approval Program (ELAP) certified laboratory. Aqueous samples will be analyzed for VOCs by EPA method 8260. A NYSDEC ASP Category B data deliverable will be provided for these analyses.

3.2 Offgas

Blowers operating in suction mode induce air through an air/water separator and through a GAC unit before discharge to air. The offgas will be collected semi-annually at two locations; before and after the GAC from sampling ports.

3.2.1 Sampling Protocol

Grab air samples will be collected in 6-liter air canisters from two locations; sampling ports before and after the GAC units in the process line. The sampling procedure is provided in the CDM Generic Quality Assurance Project Plan (QAPP).

All samples will be analyzed by a NYSDOH approved ELAP certified laboratory. Offgas samples will be analyzed for VOCs by EPA method TO-15. A NYSDEC ASP Category B data deliverable will be provided for these analyses.

All samples collected will be validated in accordance with NYSDEC DUSR guidance by a party that is independent of the laboratory which performed the analyses and CDM. A usability analysis will be conducted by a qualified data validator and a DUSR will be submitted to NYSDEC.

Field readings will be performed of the offgas at the nine extraction sumps during the semi-annual sampling events. A Tedlar bag will be filled from the extraction sump sampling port. The contents of Tedlar bag will be screened using a PID to determine estimated VOC concentrations at each extraction sump.

3.3 Sub-slab Monitoring Points

Sub-slab monitoring points are located within the building slab to monitor the pressure differential across the slab. There are a total of 17 sub-slab monitoring points where vacuum measurements will be collected and measured. These semi-annual field measurements will be performed using a vacuum pump.

3.4 Field Notebook Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician. In addition to the notebook, any and all original sampling and monitoring forms used during the field activities will be submitted to NSYDEC as part of the report submitted under Section 6. Field and sampling procedures will be photo-documented.

3.5 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Sample identification procedures are described in the CDM Generic QAPP.

Section 4
Site-Wide Inspection

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. The inspections will be covered under the full scale remedial action whereby institutional controls will be implemented and the air sparge/soil vapor extraction (AS/SVE) system will be installed. Inspection, operation and maintenance of the SSDS will be performed on a monthly basis during the first year of operation. The operation and maintenance manual is provided in Appendix A of the SSDS RA Report.

Section 5
Monitoring Quality Assurance/Quality Control

Quality Control samples will be collected as part of the monitoring plan. A total of four aqueous samples will be collected. A trip blank will accompany samples shipped for laboratory analyses as a rate of one per shipment. Additionally, field duplicates and matrix spike/matrix spike duplicates (MS/MSDs) will be collected at a rate one duplicate per 20 samples. Based on the number of samples to be collected, one duplicate and one MS/MSD will be collected. A total of four air samples will be collected. Additionally, field duplicates will be collected at a rate of one duplicate per 20 samples. Based on the number of samples to be collected, one duplicate air sample will be collected.

Aqueous samples will be collected in three 40-milliliter vials with hydrochloric acid and a septum top, and air samples will be collected in 6-liter canisters. Sample holding times will be in accordance with the NYSDEC ASP requirements.

QA/QC requirements for aqueous and air samples are described in the GES 2002 QAPP (GES 2002) and CDM's 2007 Project Plan Addendum C (CDM 2007).

Section 6
Monitoring Reporting Requirements

All forms and field documentation generated during regular monitoring events and inspections will be kept on file. This includes all field monitoring sheets completed during the monthly inspection at the sub-slab monitoring points, field PID readings, and laboratory analysis of aqueous and air samples. All other field documentation will also be kept on file.

An annual report will be prepared and submitted to NYSDEC to summarize the operation, maintenance and monitoring (OMM) of the SSDS. The report will include, at a minimum:

- Date of events;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., air, aqueous, etc);
- Copies of all field forms completed (e.g., SSDS field monitoring sheets, chain-of-custody documentation, etc.);

- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all samples (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether the SSDS has functioned as designed.

Data will be reported in hard copy or digital format as determined by NYSDEC.

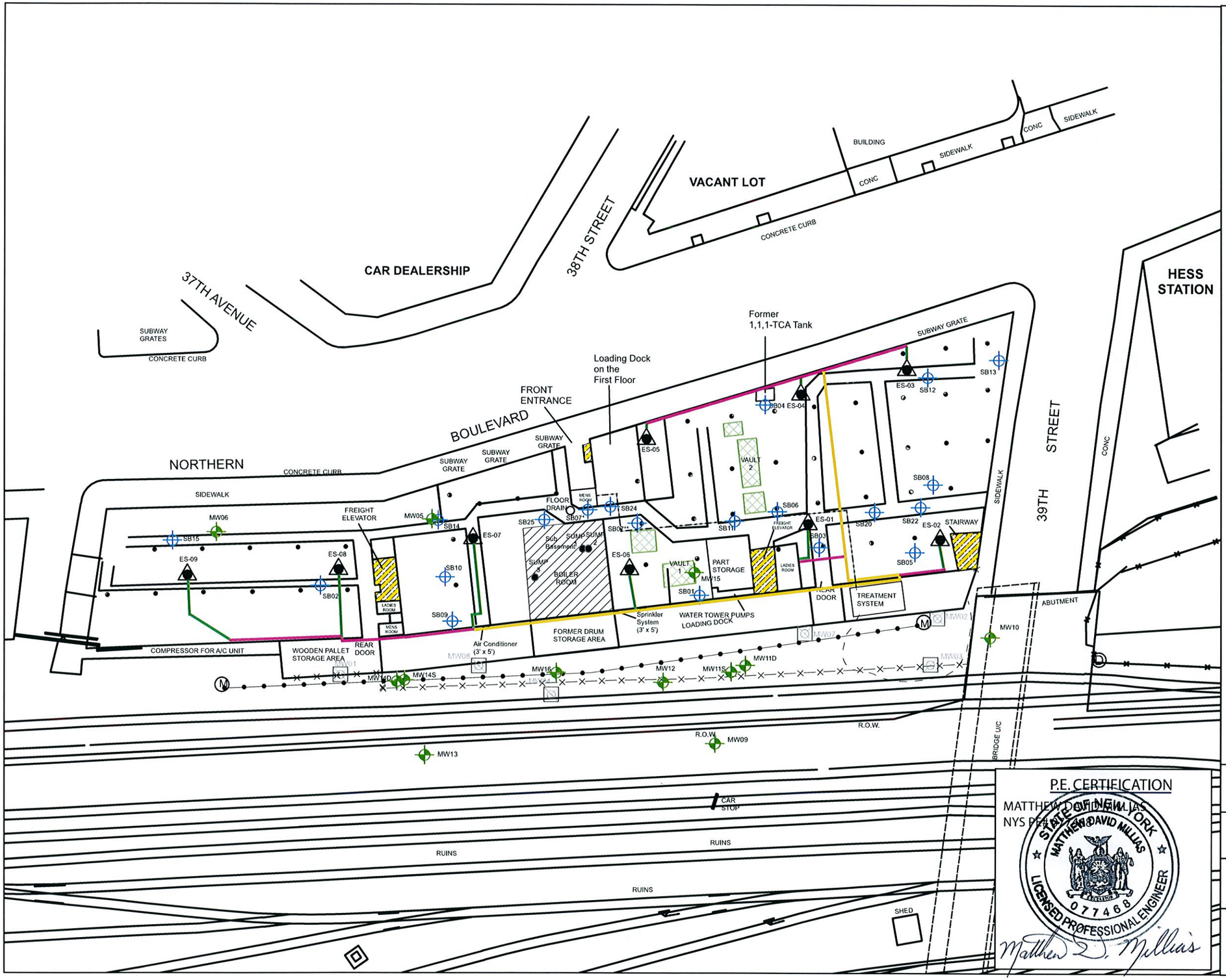
Section 7
References

Camp Dresser & McKee (CDM), 2009. *Health and Safety Plan for Standard Motor Products, Inc. Site*. December.

CDM, 2007. *Project Plan Addendum C for Remedial Investigation/Feasibility Study Standard Motor Products, Inc. Site.* April.

Groundwater and Environmental Services, Inc. (GES). 2002a. *Quality Assurance Project Plan for Remedial Investigation/Feasibility Study Standard Motor Products, Inc. Site*. September.

Appendix C
As-Built Drawings



- DESTROYED MONITORING WELLS (MW)
- MONITORING WELL (MW)
- SUB-SLAB (SB) SAMPLE LOCATION
- (M) SEWER MANHOLE (APPROX 12' DEEP)
- (D) APPROX LOCATION OF DRAIN SPOUT
- R.O.W. RIGHT OF WAY
- SUPPORT COLUMN
- FENCE LINE
- UNDERGROUND STORM SEWER
- APPROX. VICINITY OF PREVIOUSLY EXCAVATED SOILS
- RECESS EQUIPMENT PAD/VAULT
- ELECTRICAL CONDIUT
- 8 INCH OVERHEAD PIPING
- 6 INCH OVERHEAD PIPING
- 4 INCH UNDERGROUND PIPING
- EXTRACTION POINT

NOTES:

SB07* - AIR SAMPLE

SB07** - SOIL/GW SAMPLE

EXTRACTION POINTS, SB20, SB22, SB24, AND SB25 LOCATIONS ARE NOT SURVEYED

P.E. CERTIFICATION

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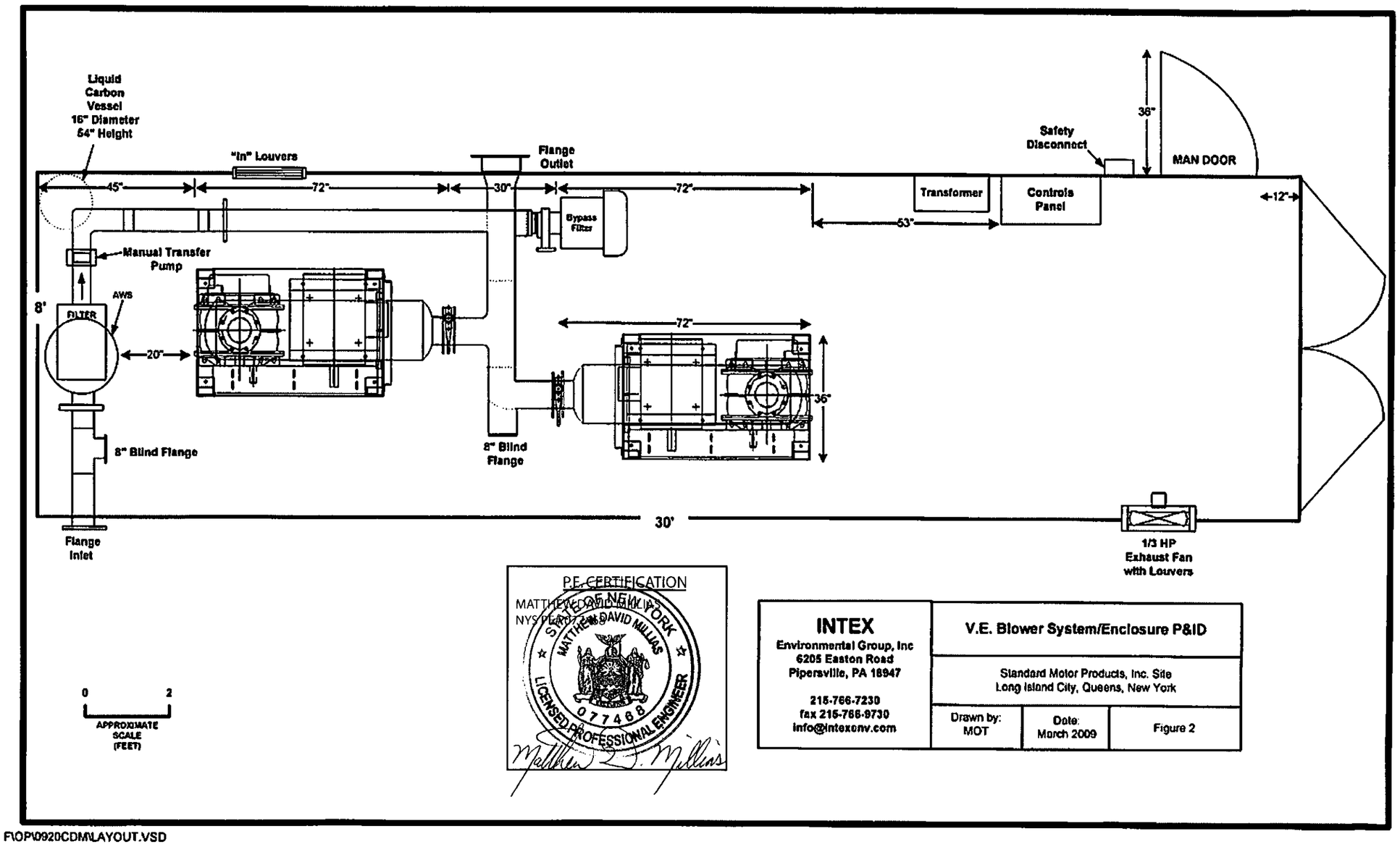
STATE OF NEW YORK
MATTHEW DAVID MILLIAS
077468
LICENSED PROFESSIONAL ENGINEER

Matthew D. Millias

DRAFTED BY: JL	**SSDS PIPING LAYOUT (AS-BUILT)**
CHECKED BY: JVB	**STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK**
REVIEWED BY: MW	CDM

NORTH	SCALE IN FEET	DATE	FIGURE
	0 50	2-17-10	1



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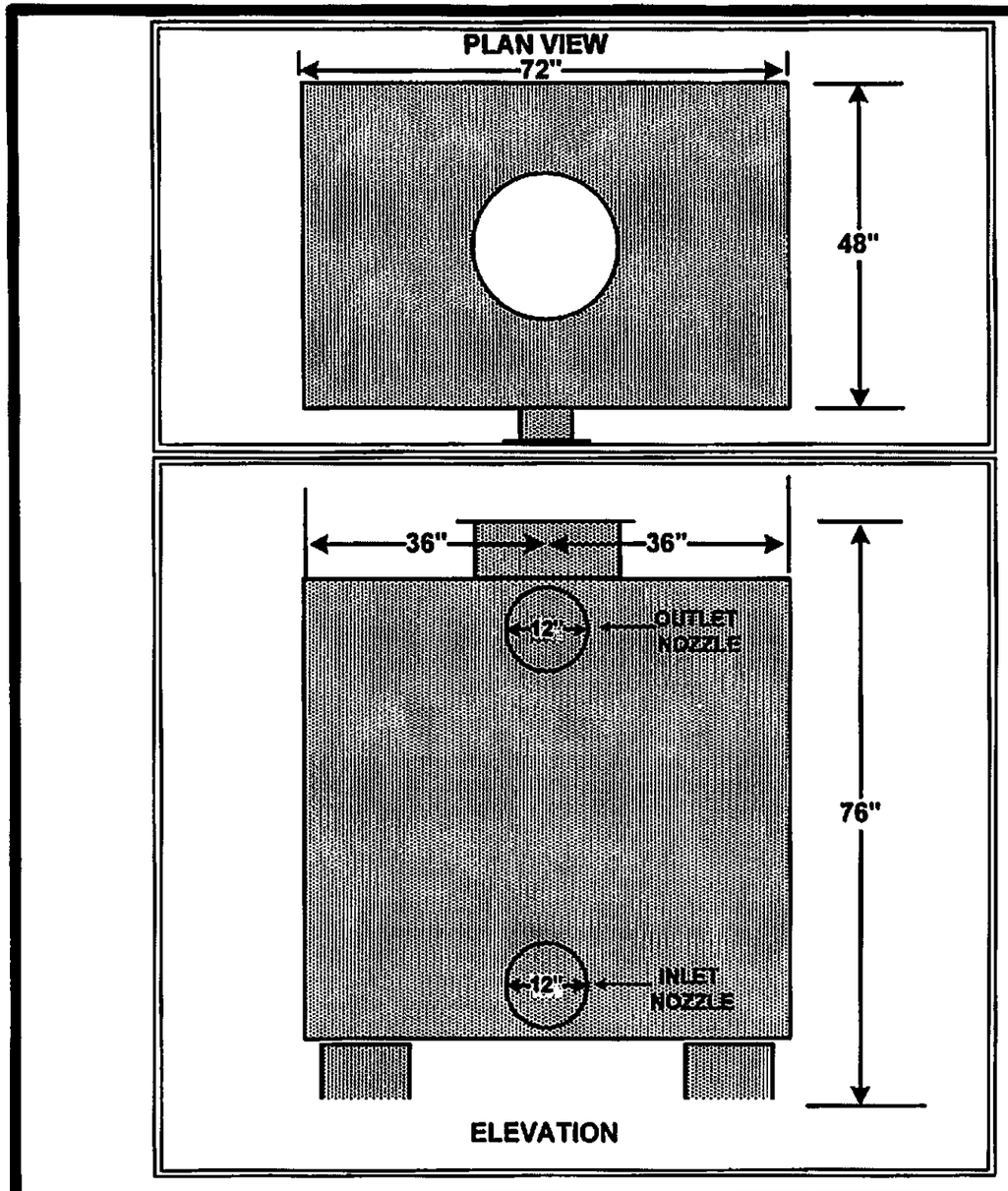
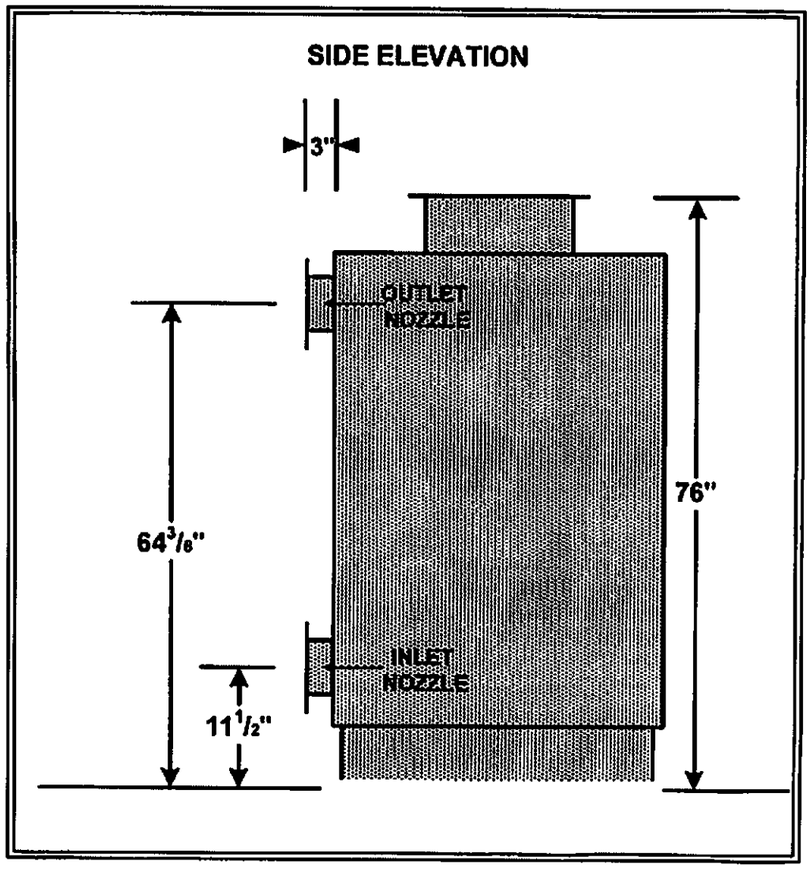
INTEX Environmental Group, Inc 6205 Easton Road Pipersville, PA 18947 215-766-7230 fax 215-766-9730 info@intexenv.com	**V.E. Blower System/Enclosure P&ID**		
	Standard Motor Products, Inc. Site Long Island City, Queens, New York		
	Drawn by: MOT	Date: March 2009	Figure 2

F\OP\0920CDM\LAYOUT.VSD





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6205 Easton Road
Pipersville, PA 18947

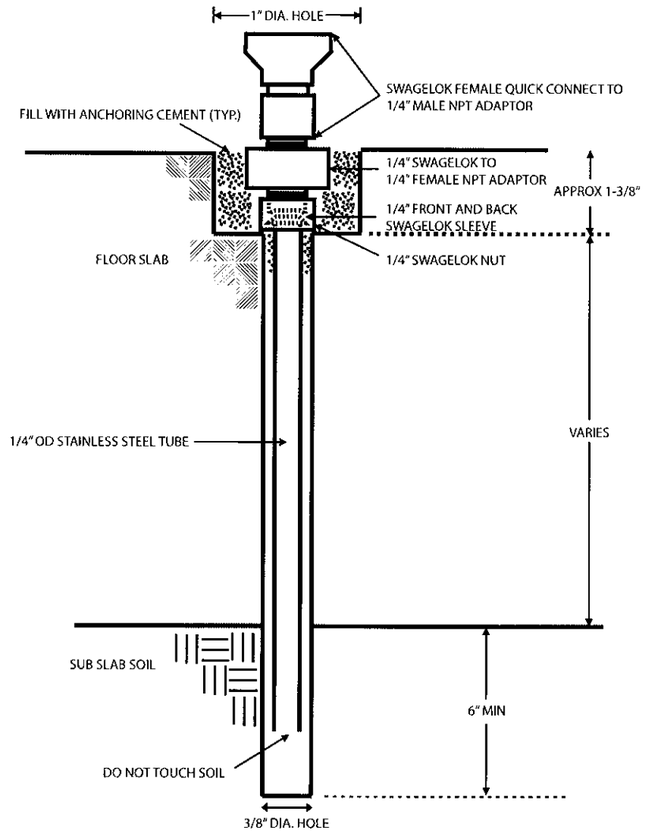
215-766-7230
fax 215-766-9730
info@intexenv.com

VAPOR PHASE ACTIVATED CARBON UNIT

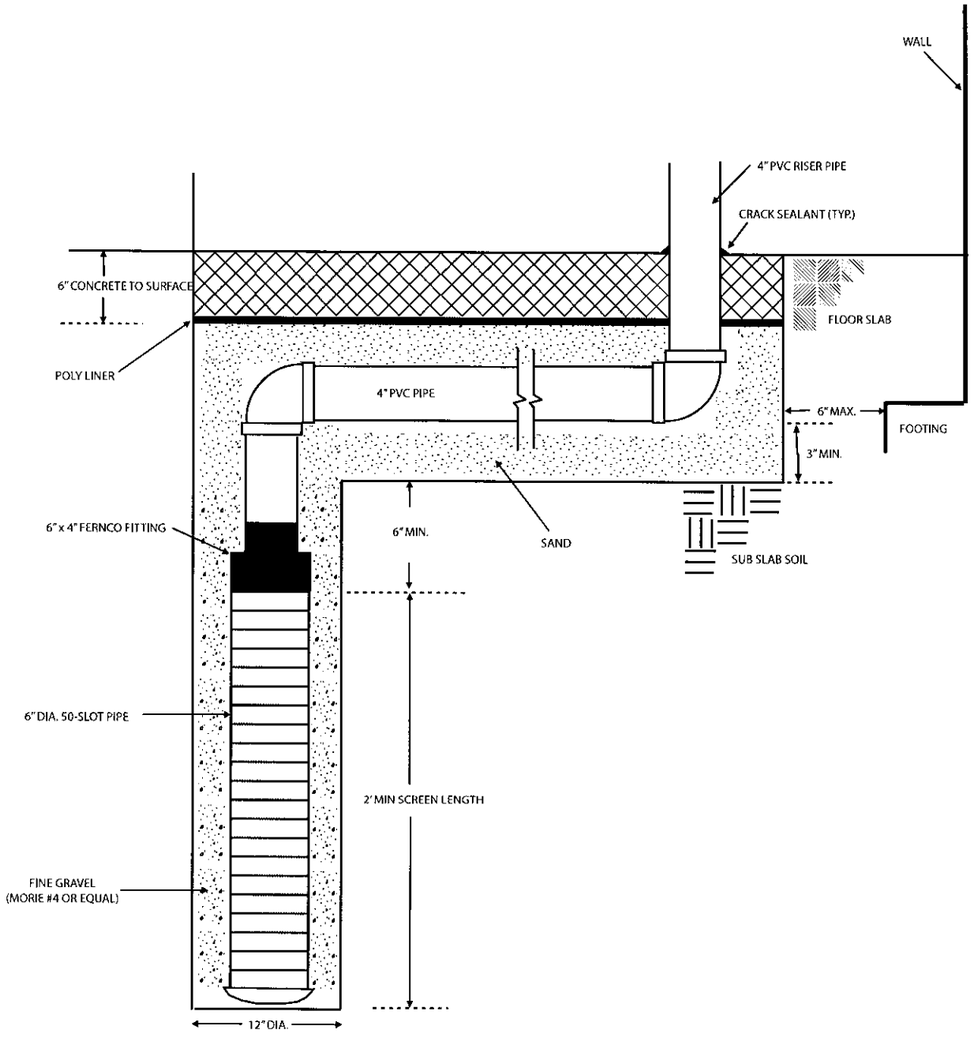
Standard Motor Products Site

Drawn by:	Date:	
MOT	March 2009	Figure 5

f:OP\0920\HFVS2000.VSD



MONITORING POINT DETAIL (TYP.)



EXTRACTION SUMP DETAIL (TYP.)

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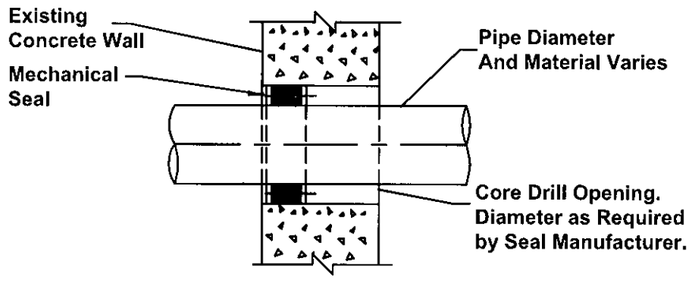
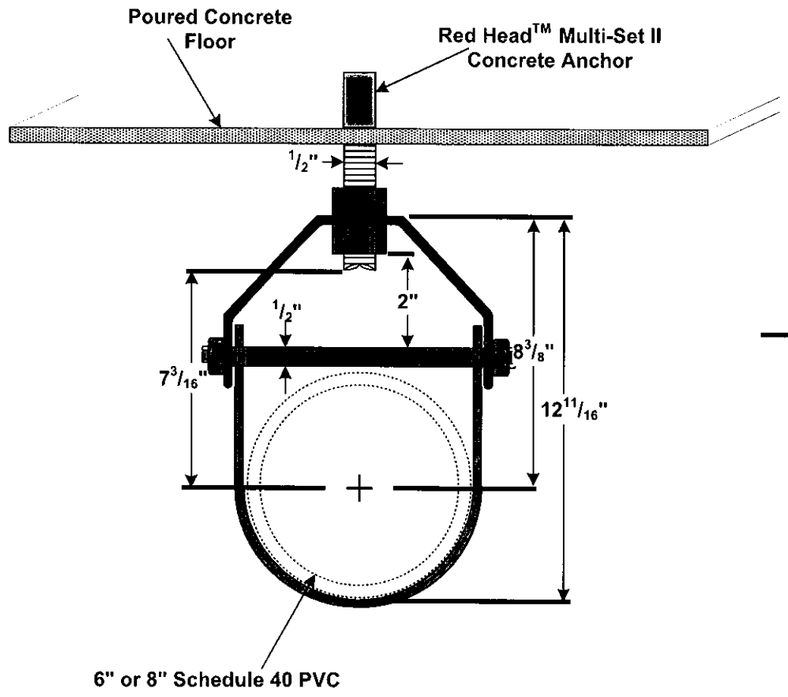
DRAFTED BY: CJ	MECHANICAL DETAILS 1		
CHECKED BY: JVB	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK		
REVIEWED BY: MW	CDM		
PAGE 2 of 3	SCALE NTS	DATE 7-14-09	DRAWING NO M-002.00

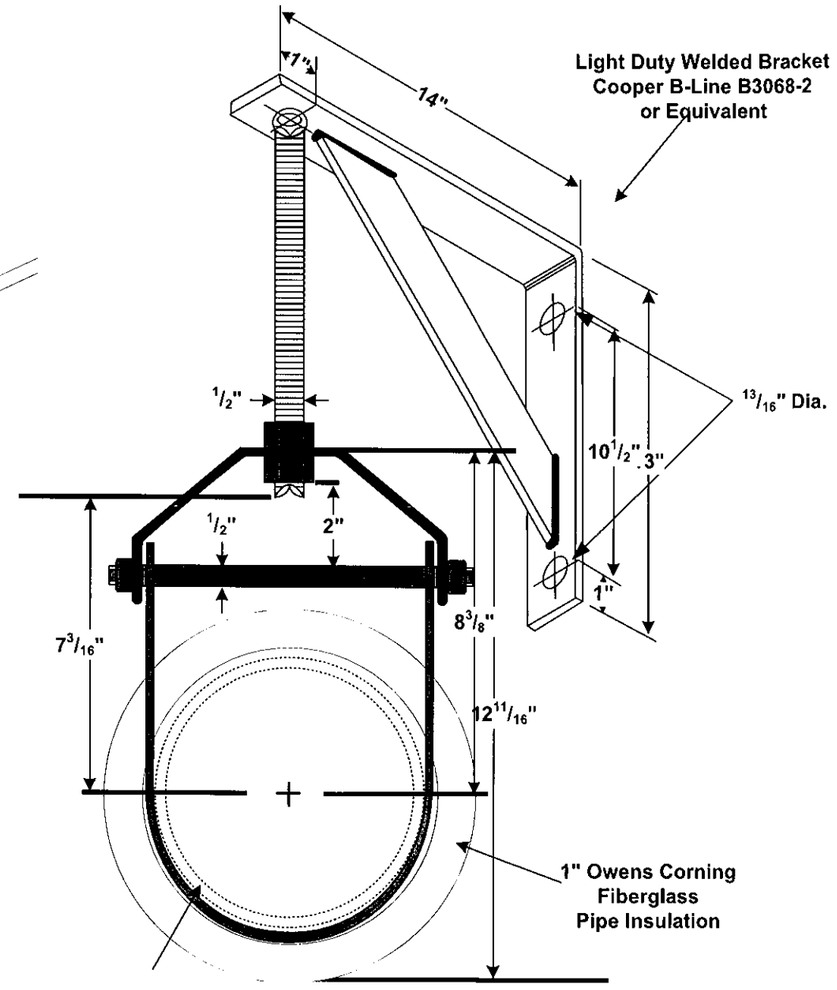


Note:
Insulated Piping:
Interrupt insulation at both sides of wall.
Install insulation flush with wall after water tight installation of mechanical seal.

CORE DRILLED OPENING AND MECHANICAL SEAL PENETRATION THROUGH EXISTING CONCRETE DETAIL (TYP)



INDOOR OVERHEAD PIPING DETAIL (TYP.)



OUTDOOR OVERHEAD PIPING DETAIL (TYP.)

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DRAFTED BY: CJ	**MECHANICAL DETAILS 2**	
REVIEWED BY: JVB	STANDARD MOTOR PRODUCTS, INC. SITE LONG ISLAND CITY, NEW YORK	
DRAFTED BY: MW	**CDM**	
PAGE 3 of 3	SCALE NTS	DATE 7-14-09	DRAWING NO M-003.00

Appendix D
Photographs

Photo 1: Crew coring for installation of extraction sump

Photo 2: Extraction sump material at ES-01

Photo 3: Exterior pipe with insulation and aluminum cover

Photo 4: Extraction system skid being transported to underneath cover

Photo 5: Delivery of vapor phase granulated activated carbon unit

Photo 6: Concrete cuttings placed into equipment vault prior to pouring of new concrete

Photo 7: Steel beam encountered at ES-05 prior to changing location

Photo 8: Trenching direction was altered near far wall due to site conditions

Photo 9: Pipe from pump to surface water discharge

Photo 10: Pipe from pump to surface water discharge

Appendix E
Start up Testing Data

Field Monitoring Sheet
Standard Motor Products
SSDS Startup Testing

Scenario Description:		1 Blower, dilution valve fully open	1 Blower, dilution valve fully open	1 Blower, dilution valve partially open	1 Blower, dilution valve partially open	1 blower, dilution valve closed	1 blower, dilution valve closed	2 Blowers, dilution valve partially open	2 Blowers, dilution valve partially open	2 Blowers, dilution valve partially open	2 Blowers, dilution valve partially open	2 Blowers, dilution valve closed
Date		9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009	9/11/2009
Time		10:15	16:00	11:30	15:55	12:15	15:50	13:50	15:45	14:30	15:34	15:30
Influent Header Vac (in. WC)		1.98		5.59		9.55		14.45		19.81		26
Blower Influent Vac (in. WC)		8		13		18.5		30/27		41/39		47
Blower Eff. Pressure (in. WC)		NR	2.15	NR	2.07	NR	1.69	5.52		5.08		4.7
Blower Effluent Temp. (˚F)		73		78		81		88		93		90/88
Total Flowrate (cfm)		NR		NR		NR		NR		NR		NR
Sub-Slab Monitoring Point Vacuum (inches WC)	SB01	0.33		0.92		1.47		2.08		2.72		3.01
	SB02	0.171		0.42		0.67		0.94		1.25		1.35
	SB03	0.077		0.244		0.43		0.69		0.96		1.1
	SB04	0.149		0.56		0.94		1.37		1.88		2.1
	SB05	0.046		0.208		0.36		0.59		0.86		0.96
	SB06	0.229		0.7		1.26		1.91		2.62		2.92
	SB07	-0.037	-0.008	-0.02	-0.013	-0.006	0.004	-0.018	0.01	-0.007	0.019	0.024
	SB08	0.04		0.201		0.35		0.57		0.89		1.04
	SB09	0.005		0.015		0.03		0.051		0.005		0.06
	SB10	0.031		0.117		0.198		0.27		0.42		0.44
	SB11	0.128		0.43		0.73		1.12		1.54		1.73
	SB12	0.29		0.91		1.45		2.04		2.72		3.04
	SB13	0.067		0.3		0.51		0.66		0.99		1.11
	SB14	0.037		0.117		0.199		0.27		0.39		0.43
	SB15	0.043		0.118		0.175		0.3		0.38		0.42
	SB20	0.084		0.24		0.39		0.59		0.88		0.96
	SB22	0.057		0.216		0.41		0.65		0.92		1.05
	ES01	1.84	1.80	5.09	5.01	8.17	7.97	12.06	11.96	16.07	16.11	17.77
	ES02	1.81		5.08		8.25		12.07		16.01		17.75
	ES03	1.79		4.75		7.55		10.84		14.39		15.73
	ES04	1.78		4.73		7.5		10.75		14.11		15.55
	ES05	1.78		4.8		7.67		11.05		14.5		15.88
	ES06	1.84		4.84		7.74		11.3		15		16.65
	ES07	1.89		4.98		7.99		11.68		15.38		16.98
	ES08	1.82		4.84		7.67		11		14.43		16
	ES09	1.86		4.94		7.91		11.5		15.21		16.8

Notes:

1. SB-07 is located near a large door in the basement. The readings became steady after the large basement door was closed to reduce the breeze through the hall.

2. A second round of testing was performed after cracks in the concrete flooring in the vicinity of SB-07 were filled with caulk. The second round was performed to re-measure SB-07 readings by emulating the conditions at ES-01.

Field Monitoring Sheet
Standard Motor Products
SSDS Startup Testing

Scenario Description:		Blower #2, dilution valve closed	Both blowers on, dilution valve closed	Blower #2 on, dilution valve partially opened	Blower #2 on, dilution valve fully opened
Date		9/16/2009	9/16/2009	9/16/2009	9/16/2009
Time		10:00	10:20	10:45	11:10
Influent Header Vac (in. WC)		10.1	20	5.28	1.95
Blower Influent Vac (in. WC)		20	43/48	14	8
Blower Eff. Pressure (in. WC)		1.9	5.2	2	2.13
Blower Effluent Temp. (˚F)		80	84/87	82	77
Total Flowrate (cfm)		32	60*	33*	33*
Sub-Slab Monitoring Point Vacuum (inches WC)	SB01*	1.52	2.97	0.93	0.35
	SB02				
	SB03				
	SB04				
	SB05				
	SB06				
	SB07*	0.009	0.023	-0.006	-0.013
	SB08				
	SB09				
	SB10*	0.19	0.47	0.124	0.04
	SB11*	0.79	1.76	0.44	0.13
	SB12				
	SB24	0.25	0.67	0.143	0.03
	SB25	0.008	0.022	0.002	-0.008
	SB15				
	SB20				
	SB22				
	ES01	8.67	18.1	5.22	1.94
	ES02				
	ES03				
	ES04				
	ES05				
	ES06	8.21	16.95	5	1.87
	ES07	8.4	17.28	5.08	1.95
	ES08				
	ES09				

Notes:

* Denotes that the reading is not accurate

Appendix F
Daily and Weekly Reports

Daily Reports

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	8-4-09

Project Name	Standard Motor Products	Project Number	71712
Owner		Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	1	Work Day #	1
CCI Superintendent	Willie Puts	Day of Week	Tues.	Weather	P.S 89.
Signature	Willie Puts	Temp @ 8:00am	69	Temp @ 2:00pm	81
		High Temp.	89	Low Temp.	

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Joel Millard	8	mobilization to site - unload all material and
Joseph Knight	8	equipment for start of job,
Trey Daniels	8	start coring holes into floor slab for sump's
Intex		E504, E508, E567
		Propane cutting saw for trenching did not work, will
		call Sunbelt rental for serviced call.

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Joel Shilland		8	mobolize to Job site (10am arrival For subs)
Joe Kmiecik		8	unload material to lower Floor
Todd Daniels		8	START coring Holes into Floor For Future sumps, concrete is 4" thick
			propane Road saw did not work,

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Concrete saw	1/2	7.5	propane
Propane.			Road saw - walk behind, used For
			cutting concrete
Drum VAC	6	2	VAC up water USED For cutting concrete
Coring machine	6	2	Core Holes through concrete Floor or
			walls AT 8" width
			Finish Holes, E509, E508, E507

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Date	8.5.09

Project Name	SMP	Project Number	71712
Owner		Project Manager	Pete Connolly

CDM Representative	Scott SASEK	Daily Job Report #	2	Work Day #	2
CCI Superintendent	William Potts	Day of Week	wed.	Weather	P.S
Signature	William Potts	Temp @ 8:00am	71	Temp @ 2:00pm	86
		High Temp.	89	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Joe Knight	10.5	START cutting slab For pipe EXCAVATION
Joel millard	10.5	CONTINUE coring Holes For SUMPS
Todd Daniels	10.5	
- INTEX -		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Joel milliard		10.5	START cutting concrete floor for excavation
Joe Kimbell		10.5	saw broke down (BATTERY) - continue, cut
Todd Daniels		10.5	Trench for ES08, ES09,
			continue coring Holes, ES06, ES05, ES04
		Lunch	

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Road saw	4		cutting concrete floor
Drum VAC	8		Vac up water, water used to cut down dust.
coring machine	5		

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Date	8-6-09

Project Name	Sub slab Depressurization	Project Number	71712
Owner	SMP	Project Manager	Peter Connolly

CDM Representative	Scott Sasek	Daily Job Report #	3	Work Day #	3
CCI Superintendent	Willie Pitts	Day of Week	thurs.	Weather	P.C
Signature	Willie Pitts	Temp @ 8:00am	70	Temp @ 2:00pm	80
		High Temp.	85	Low Temp.	68

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes		
No. of Workers	Hours	Extent of Work (complete description of days activity)
Intex 3		~~START~~
		Continue Sawcut of Concrete - 7:30am Run out of
Joseph Knaak		propane, 8:30 am - Resume cutting AT 9:30 ESO6
Joe Milliard		And 07
Todd Daniels		
		Continue coring Holes - ESO 2 complete

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels F	3	10.5	CONTINUE CUTTING FLOOR WITH ROAD SAW - 7:30
JBC MILLER		0.5	RAN OUT OF PROPANE 8:30 - RESUME CUTTING AT
JOSEPH KNIGHT		10.5	9:30 - CUT 06 - 07
			CORE HOLES FOR SUMPS ESD 2

Equipment on Project	Hours	Idle	Description of Operation of Equipment
ROAD SAW	6		CUT SLAB FOR TRENCHING OF UNDER SLAB PIPE
CORING MACHINE	3		CORE HOLES IN SLAB FOR SUMPS.
DRUM VAC	9		VAC UP WATER OFF THE FLOOR, USED TO KEEP
			DUST DOWN

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Date	6-7-09

Sub Slab

Project Name	DEPRESSURIZATION SYSTEM	Project Number	71712
Owner	SMP	Project Manager	Pete Connolly

CDM Representative	Scott SASEK	Daily Job Report #	4	Work Day #	4
CCI Superintendent	William Potts	Day of Week	Sat.	Weather	PS.
Signature	William Potts	Temp @ 8:00am	72	Temp @ 2:00pm	81
		High Temp.	85	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Joe Knight		Finish sawcutting ES07, also now complete 09,08,06
Joel Minami		
Toby Daniels		core Holes for Sumps all complete.

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Tod Daniels		5	Finish 2307, Finish coring all Holes
Joe Kmiecik		5	for sumps
Joseph Millum		5	

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Road Saw	3		Finish Saw cut at ES07, also 09, 08, 06
			ARC CUT
DRUM VAC	5		VAC up water off floor, used for DUST control
Coring machine	2		Finish core at ES03, all 9 cores ARE
			Complete

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Date: 8-10-09

Project Name	sub-slab Depressurization	Project Number	7
Owner	SMP	Project Manager	pete connolly

CDM Representative	Scott Sasek	Daily Job Report #	5	Work Day #	5
CCI Superintendent	Willie Potts	Day of Week	mon	Weather	Sunny
Signature	Willie Pot	Temp @ 8:00am	72	Temp @ 2:00pm	88
		High Temp.	90	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 4	Hours	Extent of Work (complete description of days activity)
Rob Daniels		Remove concrete from trench
Joe Kmiech		
Keith Jr		continue to saw cut other trenches
Keith Jr		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
	4		
Todd Daniels		9	Cutting & Saw cut Concrete Slab
Keith A.		9	Work with Todd. Water control - Drum VAC.
Keith F		9	With Jack Hammer Break out And remove
Joe Kmiec		9	Concrete From Saw cut Slab area's

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Concrete Saw	8		Finish Saw cut of E502
Drum VAC	0		work with saw
coring machine	0		no longer needed
Scissor Lift	0		Brought on site w/material (Hangers, rod etc)
Compressor + Hammer	8		Removal of concrete E50, 9.8.7

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Date	8-11-09

Project Name	DEPRESSURIZATION SYSTEM	Project Number	71712
Owner	BMP	Project Manager	Pete Donnelly

CDM Representative	Scott Sarsek	Daily Job Report #	6	Work Day #	6
CCI Superintendent	Collin Potts	Day of Week		Weather	P.C
Signature	Willi Pott	Temp @ 8:00am	68	Temp @ 2:00pm	80
		High Temp.	84	Low Temp.	67

Visitors (include time)	Name/Company	Time In	Time out
weekly meeting	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
intek		continue saw cut of concrete ESO
		continue removal of concrete from saw cut trenches
		start digging for extraction sumps

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

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Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Intex			
Todd Daniels			Continue sawcut of concrete slab - E501
Joseph Kmiecik			Continue concrete removal from all
Keith Fitzgerald			sawcut slab.
Kevin			
			START EXCAVATING TRENCHES & SUMPS BY HAND
			START INSTALLATION of SUMPS & UNDERGROUND PIPING 09, 08,

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Coring machine	0		
Drum vac	0		
Road saw			saw cut E501
Scissor Lift			
Compressor/Hammer			Remove concrete from
			E501C, 5, 4, 3, 2, 1

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Date: 8-12-09

Project Name	Depressurization System	Project Number	71712
Owner	Smp	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	7	Work Day #	7
CCI Superintendent	Willie Pitt	Day of Week	Wed.	Weather	Sun
Signature	Willie Pitt	Temp @ 8:00am	72	Temp @ 2:00pm	87
		High Temp.	88	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 4	Hours	Extent of Work (complete description of days activity)
Todd Danek		Complete sumps, 2 3 4 5 with all piping
Kent Fitch		associated with sumps
Keith Pr		Cover pipe with sand cover sand with plastic
Joseph Kmiech		and cover trench with plywood For safety
Juan Torres		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Dell Daniels	4	10.5	Finish piping and sump installation
Keith Fitzgerald		10.5	of 2, 3, 4, 5 Backfill, cover with plastic
Keith Jr		10.5	and cover trench with plywood for safety.
Joseph Kmiec		10.5	
Jim Torres		10.5	All Concrete Debris From Trenches is stockpiled
	—	15	on pallets next to designated pit.
	Lunch		As of end of today all trenches are complete
		(10)	including sump, piping, sand covered, plastic

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Band Saw	4		Re-cut ES05- In area of sump we Have Hit
Jack Hammer	4		steel, we are moving sump, further away From
Compressor	4		wall, From 4.6' to 9'
Drum VAC	3		
Coring machine	0		

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Date	8-13-09

Project Name	Depressurized system	Project Number	71712
Owner	Spm	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	8	Work Day #	8
CCI Superintendent	William Potts	Day of Week	thurs.	Weather	pc.
Signature	William Potts	Temp @ 8:00am	72	Temp @ 2:00pm	84
		High Temp.	92	Low Temp.	69

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes		
No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels		Pour concrete into trenchs ES09,8,7,6,5,4,3,2,1
Keith [illegible]		
Keith Fitzpatrick		START Installing pipe supports
Joseph Kmiech		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received
		4 yds of concrete

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels		11	Pour concrete into sump trenches 4 yds
Keith Fitzgerald		11	
Kevin A		11	START Hanging pipe supports EXTERIOR
Joseph Kmiecik		11	24 Brackets installed TODAY

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Band saw			
Compressor w/ Hammer			
coring machine			
drum VAC			
Drills	5		For Hanging pipe supports, Drop ins
Concrete Buggy	5		GET concrete to each DESTINATION
Scissor Lifts (2)	5		for Hanging pipe supports

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Date	8-14-09

Project Name	Depressurization System	Project Number	7171.2
Owner	SMP	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	9	Work Day #	9
CCI Superintendent	William Putis	Day of Week	Fri	Weather	D.S
Signature	William Putis	Temp @ 8:00am	70	Temp @ 2:00pm	82
		High Temp.	87	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 4	Hours	Extent of Work (complete description of days activity)
Kevin Uthmen		START interior ... SET up for Future Int. piping
Kevin Fitzgerald		(Running String Lines, cutting threaded rod, etc).
Joseph Kinsella		
Todd Daniels		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
F-Todd Daniels	5		START INT Layout for pipe run
Kevin Pittsent	5		Cut Threaded Rod
Kevin Umbach	5		
Joseph Kmiecik	5		All 4" Risers coming out of slab are duct taped to prevent vapors from filling Basement.

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lift	5		Doing Wall and ceiling Layout for Pipe.
Concrete Buggy	0	0	
Compressa, Hammer	0	0	
Concrete saw	0		

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Date	8-17-09

Project Name	Depressurization System	Project Number	07172
Owner	Smp	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	10	Work Day #	16
CCI Superintendent	William Puttis	Day of Week	Mon.	Weather	PS
Signature	Willi Put	Temp @ 8:00am	78	Temp @ 2:00pm	90
		High Temp.	94	Low Temp.	72

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
4		
Kevin Ulm		Continue Hanging 12T-ELT pipe supports
Kevin Fitzgerald		for P.V.C. piping
Joseph Kinsch		
Joel Millard		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)
	ON-SITE		

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Keith Jones	9		Continue int ext installation of
Kenth Fitzgerald	9		Pipe supports.
Josh Millard	9		
Joseph Komrik	9		As of today interior pipe supports installed 17-8" and 10-6" for interior
			24-8" exterior pipe supports

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lift(2)	8		For wall and ceiling pipe support Hangers
Hammer Drill	6		For pipe supports
Propane Road saw		OFF SITE	

NOTE all supports include ceiling Drop Ins. And or wall mounted Brackets with threaded Rod And cleavage Hangers.

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Date	8-18-09

Project Name	DEPRESSURIZED SYSTEM	Project Number	7172
Owner	SMP	Project Manager	PETE connolly

CDM Representative	SCOTT SASEK	Daily Job Report #	11	Work Day #	11
CCI Superintendent	Willm Potts	Day of Week	TUES.	Weather	
Signature	Willi Pot	Temp @ 8:00am		Temp @ 2:00pm	
		High Temp.		Low Temp.	

Visitors (include time)	Name/Company	Time In	Time out
	/ peter connolly	11:00 a	1:00 p
	/ Chris Wendt	9:00 a	10:00 a
	/ Randy Kullman	11:00	1:00 p
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels		Continue Hanging pipe supports
Keith Uhler		
Keith Fitzgerald		Unload Delivery of 8"-6" pipe
Joseph Konecki		
Joel milliard		START Hanging pipe

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received
		Delivery of 8" and 6" pipe

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
TJ's Daniels	8		Continue hanging pipe supports using
Keith Fitzgerald	12		scissor lifts, @ interior
Keith Ulm	12		
Joe Knisely	12		Unload Delivery of 2"-6" pipe
Jud milliard	12		
			START INSTALLATION of Pipe @
			05 04, 03, 02, 01 piping installed, Hung
			Glued. 4" 6" 8"

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts (3)	8		Put Pipe (pvc) into place.

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Date	8-19-09

Project Name	Depressurization System	Project Number	7172
Owner	Sump	Project Manager	Peter Connolly

CDM Representative	SCOTT SASEK	Daily Job Report #	12	Work Day #	12
CCI Superintendent	William Potts	Day of Week	wed	Weather	P.C.
Signature	William Pott	Temp @ 8:00am	72	Temp @ 2:00pm	84
		High Temp.	88	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 4	Hours	Extent of Work (complete description of days activity)
Keith Vinn		As of yesterday ES5, 4, 3, 2, 1 were completed (installed and Glued) All piping From 4", 6", 8"
Keith Fitzgerald		
Joe Kmiech		
Joel Milliard		Today START Piping ES09, 8, 7, 6
		START EXT. Wall Penetration ES06,

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Kevin Ulmer	10		Finish Int. piping E501, now E501, 3, 2, 1, Are installed and Glued.
Kenth Fitzgerald	10		START INT. piping of E509, 8, 7, 6. including Pipe Supports
Joel Miller	10		START EXT. Wall penetration E506,
Joe Kinnard	10		EXT-wall penetration And Piping For E506 Complete
			EXT-wall penetration For E507 and 8 Complete
			all piping associated w/E509, 8, 7, 6 complete

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts	9		SET pipe into supports. As well as Hang Supports

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Date 8.20-09

Project Name	DEPRESSURIZATION System	Project Number	7172
Owner	SNP	Project Manager	Peter Connelly

CDM Representative	SCOTT SAGER	Daily Job Report #	13	Work Day #	13
CCI Superintendent	William PUTIS	Day of Week	Thurs.	Weather	P.S
Signature	Willi Puts	Temp @ 8:00am	72	Temp @ 2:00pm	85
		High Temp.	89	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 4	Hours	Extent of Work (complete description of days activity)
Keith Hunt		Continue 6" and 8" Ext. PVC piping
Kenn Fitzpatrick		For Depressurization system.
Joe Kinsella		
Joel Millard		
Todd Daniels		work at shop putting system togeth on Trailer

Verbal Directives

Changes from Specification

Back charges and/or Extra Work

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Keith Olmo	11		Continue ext. piping 6" & 8" P.V.C. w/hy'll Tying into all manifolds
Keith Fitzgerald	11		
Joe Knight	11		
Joel Milliard			

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts (2)	9		For installation of 6" and 8" P.V.C pipe, Max Height 10', and pipe supports

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Date	8-21-09

Project Name	Depressurized System	Project Number	7172
Owner	Smp	Project Manager	Pete Connel

CDM Representative		Daily Job Report #	14	Work Day #	14
CCI Superintendent	Willie Pettis	Day of Week	~~Fri~~	Weather	P.C
Signature	Willie Pett	Temp @ 8:00am	75	Temp @ 2:00pm	PC
		High Temp.	92	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Kevin Wilson		Finish up 8" EXT. piping
Keith Fitzjerrell		
Joe Kmiech		Patch in all Holes (wall penetrations)
Joseph Millan		
Todd Daniels		AT shop working on Trailer Fill System

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Keith Ulm	4		START loading out equipment and material to bring back to shop.
Keith Fitzpatrick			
Joe Kmiecik			
Dave Hand			Finish 2" EXT piping - all piping INT. EXT. complete except for piping into system - patch wall penetrations.

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts			

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Date	8-24-09

Project Name	Depressurization System	Project Number	71712
Owner	GMP	Project Manager	Pete Connolly

CDM Representative	Scott SASEK	Daily Job Report #	15	Work Day #	15
CCI Superintendent	William Potts	Day of Week	~~MONDAY~~	Weather	P.S.
Signature	William Potts	Temp @ 8:00am	75	Temp @ 2:00pm	82
		High Temp.	88	Low Temp.	70

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 2	Hours	Extent of Work (complete description of days activity)
Doug Wright		Do Air Test on all newly installed piping 4" - 6" - 8"
Kevin Fitzgerald		measure all piping to see if it corresponds with CDM footage.

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors 2	No. of Workers	Hours	Extent of Work (complete description of days activity)
Doug Urglan		8	start Air Test All all newly installed Pipe 4-6-8" check all fittings
Keith Fitzgerald		8	measure all pipe And Compare Footage with CDM's
			Install extraction sample values on Every sump ball value

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Rented Air Comp.			
Scissor Lifts (2)			

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Date	8-25-09

Project Name	Depressurization System	Project Number	0171.2
Owner	SMP	Project Manager	Pete Donnelly

CDM Representative	Scott Sasek	Daily Job Report #	16	Work Day #	15
CCI Superintendent	William Potts	Day of Week	Tues	Weather	PC
Signature	William Pott	Temp @ 8:00am	92	Temp @ 2:00pm	88
		High Temp.	96	Low Temp.	78

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Doug Wright		Finish Pipe Testing with Air Compressor.
Kevin Fitzgerald		Remove cover From vault one included Removal of plywood and 2x8. Drilled Hole (1" of water) And start filling Vault with Concrete Rubble.

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received
		Arrival of Exterior Pipe Insulation

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
			Finish Air test on P.V.C. Soap all Joints for any Leaks (2 pin Holes)
Kevin Fitzgerald	10.5		
Doug Wright	10.5		START plywood and wood framing Removal From Vault one. Remove any excess water 1" then START to fill Vault with concrete Debris-Blockade Hole w/ Fence.

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lift	8		START EXT insulation of 8"-6" pre insulation pant first - then - Aluminum Cover -

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	8-26-09

Project Name	DEPressurization System	Project Number	71712
Owner	SMJ	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #	17	Work Day #	17
CCI Superintendent	William Potts	Day of Week	Wed.	Weather	PC
Signature	Williput	Temp @ 8:00am	69	Temp @ 2:00pm	77
		High Temp.	80	Low Temp.	67

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 7	Hours	Extent of Work (complete description of days activity)
Intek		Continue insulation of Ext. pipe 4-6"-8" pvc.
Doug Wright		insulation part first
Kevin Fitzgerald		

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Intex			
Day Wright	11		continue insulation of exterior pipe 4-6-8" PVC.
Keith Fitzgerald	11		
			insulation part first then Aluminum cover second

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lift (1)	8		in order to reach pipe for insulating
Scissor Lift (2)		✓	

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9-27-08

Project Name	DEPressurization System	Project Number	71712
Owner	SMP	Project Manager	Pete Connolly

CDM Representative	Scott Sajek	Daily Job Report #	18	Work Day #	18
CCI Superintendent	Willie Potts	Day of Week	Thur	Weather	P.S.
Signature	Willie Potts	Temp @ 8:00am	78	Temp @ 2:00pm	82
		High Temp.	87	Low Temp.	72

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Kevin Ulm		Clean out inside of Basement - moving
Joe Knight		all Equipment to Exterior of Building
		Continue insulation of Ext. pipe including
		outer shield
		Patch holes w/caulking (overhead)

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)
Intex			

Position (trade) of Subcontractors Z	No. of Workers	Hours	Extent of Work (complete description of days activity)
Keith Ulm			move all tools and equipment outside including, pallets, wood, cardboard.
Joe Knuth			electrician on site to run power to unit
			continue jacket insulation.

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts (2)			Electricians for installing conduits

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date: 9-1-09

Project Name	DEpressurization system	Project Number	71712
Owner	Smp	Project Manager	Pete connolly

CDM Representative		Daily Job Report #		Work Day #	
CCI Superintendent	Willie Pitts	Day of Week	TUES	Weather	PS
Signature	Willi Pitt	Temp @ 8:00am	66	Temp @ 2:00pm	>1
		High Temp.	78	Low Temp.	63

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 2	Hours	Extent of Work (complete description of days activity)
Kevin Fitzgerald		CONTINUE Aullominum clad cover over P.V.C
Joseph millard		pipe insulation.
		Finish insulation cover. Clean out overhang
		where unit will sit

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Kevin Fitzgerald	8		continue Aluminum clad cover
Joseph millard	8		over insulation for 6" 8" Exterior
			pvc pipi (Finish)
			clean out overhang where unit
			will be placed

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lift(2)	7		For use with pipe insulation

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date: 9-2-09

Project Name	Depressurization System	Project Number	7172
Owner	SMP	Project Manager	

CDM Representative	Scott Sasek	Daily Job Report #		Work Day #	
CCI Superintendent	William Potts	Day of Week	Wed	Weather	Sunny
Signature	Will Pott	Temp @ 8:00am	67	Temp @ 2:00pm	77
		High Temp.	80	Low Temp.	62

Visitors (include time)	Name/Company	Time In	Time out
Progress meeting	/ SMP - Chris Wendt		
	/ DEP - Shawn Sollen		
	/ INTEX -		
	/ ODM - Pete Connolly Scott Sasek		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
all sub-olients		Have progress meeting. Probably Last one as Job wind end week of Labor Day
USEC X		
Todd Daniells		Arrival of Depressurization unit. SET THE unit
Joseph Millard		into place and start piping into it including
Keith Fitz		electrical power to unit

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels	10		Receive unit for Depressurization system
Keith Fitz	10		SET unit into place, START piping
Joseph Millward	10		into unit including power (Electric)
			SET Carbon Unit

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Sorsson Lifters	8		
Backhoe	8		unload unit and SET into place

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9-3-09

sub-slab

Project Name	Depressurization System	Project Number	21712
Owner	Shop	Project Manager	Pete Connolly

CDM Representative	SCOTT SASEK	Daily Job Report #		Work Day #	
CCI Superintendent	William Potts	Day of Week	Thurs.	Weather	P.C.
Signature	William Potts	Temp @ 8:00am	63	Temp @ 2:00pm	75
		High Temp.	79	Low Temp.	60

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers 3	Hours	Extent of Work (complete description of days activity)
Todd Daneker		Continue pipe work for carbon unit and
Kevin Fitzpatrick		Depressurization system
~~Kevin~~ Ulmer		

Verbal Directives

Changes from Specification

Back charges and/or Extra Work

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels			Continue pipe work associated with
Kevin Fitzpatrick			Carbon unit and Depressurization system
Kevin Uhlich			

Equipment on Project	Hours	Idle	Description of Operation of Equipment
Scissor Lifts (2)			off site Friday 9-3
Backhoe			off site 9-2

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9-8-09

Project Name	Depressurization System	Project Number	71712
Owner	SMP	Project Manager	Pete Connolly

CDM Representative	SCOTT SAVEK	Daily Job Report #		Work Day #	
CCI Superintendent	William Potts	Day of Week	TUES.	Weather	RS
Signature		Temp @ 8:00am	61	Temp @ 2:00pm	70
		High Temp.	74	Low Temp.	59

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
1		
Todd Danish	9	Continue work related to Trailor system and Carbon unit. Secure 12" p.v.c. carbon vent
		Install new Rain guard Cap. Secure 12"
		vent to Trailor

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
R&B Daniels			Complete carbon unit vent Piping, penetration sealing penetration, and piping inside the trailer. Secure carbon vent stack (12" PVC) install new Rain Cap.

Equipment on Project	Hours	Idle	Description of Operation of Equipment

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9.9-09

Project Name	Sub-slab Depressurization	Project Number	11712
Owner	Sump System	Project Manager	Pete Donnelly

CDM Representative	Scott Sasek	Daily Job Report #		Work Day #	
CCI Superintendent	William Putis	Day of Week	Wed.	Weather	Cloudy
Signature	William Putis	Temp @ 8:00am	58	Temp @ 2:00pm	CT
		High Temp.	68	Low Temp.	52

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes		
No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Davids		Wire in pumps inside system Tracer
		Secure all openings in Shell with plywood
		Patch 4" opening (P.V.C. - Penetration)

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)
			Delivery from FLS ex - Testing Kit For Josh

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels	11		continue wiring pumps inside system Trailer for STARTup.
			CUT and install plywood over screened openings in shell for safety + weather.
			Patch Remaining PVC wall openings

Equipment on Project	Hours	Idle	Description of Operation of Equipment

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9-10-07

Project Name	Depressurization system	Project Number	7172
Owner	Smp	Project Manager	Pete connolly

CDM Representative	Scott Sasek	Daily Job Report #		Work Day #	
CCI Superintendent	William Potts	Day of Week		Weather	
Signature	Willi Pott	Temp @ 8:00am		Temp @ 2:00pm	
		High Temp.		Low Temp.	

Visitors (include time)	Name/Company	Time In	Time out
	/ Smp		
	/ CDM		
	/ Intex		
	/ Shaun Boilers DEP		
	/		

Notes

No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels		misc. work related to system Trailer
		Final walkthru with all parties
		Do startup and test system with Josh
		Van Gosen

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

9-10-07

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
Todd Daniels			misc. work related to system trailer final walkthru with all to startup and test system with Josh Van Buskirk.

Equipment on Project	Hours	Idle	Description of Operation of Equipment

CDM

CDM Constructors Inc.
Business Operations Manual

SUBJECT: Daily Construction Report Form BZ-0023	Rev: 0
Section: 4.14 Field Practices	Effective: 03/20/2009

Date	9-11-09

Project Name	Depressurization System	Project Number	71717
Owner	SMP	Project Manager	Pete Connolly

CDM Representative	Scott Sasek	Daily Job Report #		Work Day #	
CCI Superintendent	William Potts	Day of Week	Fri	Weather	Showers
Signature	William Potts	Temp @ 8:00am	57	Temp @ 2:00pm	62
		High Temp.	65	Low Temp.	52

Visitors (include time)	Name/Company	Time In	Time out
	/		
	/		
	/		
	/		
	/		

Notes		
No. of Workers	Hours	Extent of Work (complete description of days activity)
Intex		
Todd Daniels		Continue work on punch list items
Bill Potts		
Jonathan Bugar		Do test on sumps

Verbal Directives	
Changes from Specification	
Back charges and/or Extra Work	

Slip #	Supplier	Material Received

Supplier	Date In	Date Out	CDM Constructors Inc. Equipment Rental (Supplier Name)

Position (trade) of Subcontractors	No. of Workers	Hours	Extent of Work (complete description of days activity)
INTEX			
Todd Daniels			Continue work related to startup including punch list items.
Josh VAN Bogart			Sump Testing - Help with punch list
Ben Potts			

Equipment on Project	Hours	Idle	Description of Operation of Equipment

Work completed with punch list items

Weekly Progress Reports

WEEKLY PROGRESS REPORT
STANDARD MOTOR PRODUCTS
INTERIM REMEDIAL MEASURE (IRM) CONSTRUCTION
SITE CODE 2-41-016

SITE NAME/ACTIVITY: Standard Motor Products IRM Construction
NYSDEC PROJECT MANAGER: Shaun Bollers
SMP CONTACT: Robert Martin/Chris Wendt
CDM PROJECT MANAGER: Maria Watt
CDM CONSTRUCTION MANAGER: Peter Connolly
PERIOD: 8/4/09 through 8/7/09

PROJECT DESCRIPTION: This is an Interim Remedial Measure (IRM) construction project. The project involves installation of a sub-slab depressurization system (SSDS) at the site, which is located in Long Island City, Queens, New York. The SSDS is being constructed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009.

1. PROGRESS MADE THIS REPORTING PERIOD
    - Completed mobilization of equipment and materials to the site.
    - Set up field office and contractor staging area.
    - Continued system enclosure/equipment construction (offsite).
    - Completed concrete coring for all sumps.
    - Completed concrete saw cutting at trenches for sumps 6-9.

2. PROBLEMS/RESOLUTIONS
    - Saw cutting taking longer than anticipated due to unexpected conditions (thicker than expected slab, sub-slab overpour of equipment pit concrete fills). Effort made to keep construction on schedule by extending work hours.

3. VARIANCES, ANTICIPATED PROBLEMS, AND RECOMMENDED SOLUTIONS
    - Minor adjustments made in trenching layout due to site conditions.
    - ES-07 location moved approximately two feet east due to site conditions.

4. UPCOMING EVENTS / PLANNED ACTIVITIES (week of 8/10/09)
    - Continue system enclosure/equipment construction (offsite)
    - Complete concrete saw cutting for remaining trenches.
    - Complete concrete removal, sump installation, and sub-slab piping.
    - Complete slab restoration (concrete pouring) for all trenches.
    - Begin installation of above-slab interior piping.

WEEKLY PROGRESS REPORT
STANDARD MOTOR PRODUCTS
INTERIM REMEDIAL MEASURE (IRM) CONSTRUCTION
SITE CODE 2-41-016

SITE NAME/ACTIVITY: Standard Motor Products IRM Construction
NYSDEC PROJECT MANAGER: Shaun Bollers
SMP CONTACT: Robert Martin/Chris Wendt
CDM PROJECT MANAGER: Maria Watt
CDM CONSTRUCTION MANAGER: Peter Connolly
PERIOD: 8/10/09 through 8/14/09

PROJECT DESCRIPTION: This is an Interim Remedial Measure (IRM) construction project. The project involves installation of a sub-slab depressurization system (SSDS) at the site, which is located in Long Island City, Queens, New York. The SSDS is being constructed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009.

1. PROGRESS MADE THIS REPORTING PERIOD
    - Continued system enclosure/equipment construction (offsite).
    - Completed concrete saw cutting for remaining trenches.
    - Completed concrete removal, sump installation, and sub-slab piping.
    - Complete slab restoration (concrete pouring) for all trenches.
    - Initiated fabrication of interior pipe hangers and installation of exterior pipe hangers.

2. PROBLEMS/RESOLUTIONS
    - Saw cutting taking longer than anticipated due to unexpected conditions (thicker than expected slab, sub-slab overpour of equipment pit concrete fills). Effort made to keep construction on schedule by extending work hours.

3. VARIANCES, ANTICIPATED PROBLEMS, AND RECOMMENDED SOLUTIONS
    - ES-05 location moved approximately two feet south due to site conditions.

4. UPCOMING EVENTS / PLANNED ACTIVITIES (week of 8/17/09)
    - Continue system enclosure/equipment construction (offsite)
    - Initiate installation of interior and exterior pipe hangers and piping.

WEEKLY PROGRESS REPORT
STANDARD MOTOR PRODUCTS
INTERIM REMEDIAL MEASURE (IRM) CONSTRUCTION
SITE CODE 2-41-016

SITE NAME/ACTIVITY: Standard Motor Products IRM Construction
NYSDEC PROJECT MANAGER: Shaun Bollers
SMP CONTACT: Robert Martin/Chris Wendt
CDM PROJECT MANAGER: Maria Watt
CDM CONSTRUCTION MANAGER: Peter Connolly
PERIOD: 8/17/09 through 8/21/09

PROJECT DESCRIPTION: This is an Interim Remedial Measure (IRM) construction project. The project involves installation of a sub-slab depressurization system (SSDS) at the site, which is located in Long Island City, Queens, New York. The SSDS is being constructed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009.

1. PROGRESS MADE THIS REPORTING PERIOD
    - Continued system enclosure/equipment construction (offsite).
    - Completed installation of all interior and exterior piping.

2. PROBLEMS/RESOLUTIONS
    - None.

3. VARIANCES, ANTICIPATED PROBLEMS, AND RECOMMENDED SOLUTIONS
    - Specified pitch for above-slab interior piping was not feasible due to overhead space constraints. Under the engineer's direction, the pitch was reduced to allow installation.

4. UPCOMING EVENTS / PLANNED ACTIVITIES (week of 8/24/09)
    - Continue system enclosure/equipment construction (offsite).
    - Install sample ports for individual extraction sump riser pipes.
    - Perform pressure testing on piping.
    - Install insulation on exterior piping.
    - Install electrical connection for extraction/treatment system.

WEEKLY PROGRESS REPORT
STANDARD MOTOR PRODUCTS
INTERIM REMEDIAL MEASURE (IRM) CONSTRUCTION
SITE CODE 2-41-016

SITE NAME/ACTIVITY: Standard Motor Products IRM Construction
NYSDEC PROJECT MANAGER: Shaun Bollers
SMP CONTACT: Robert Martin/Chris Wendt
CDM PROJECT MANAGER: Maria Watt
CDM CONSTRUCTION MANAGER: Peter Connolly
PERIOD: 8/24/09 through 8/28/09

PROJECT DESCRIPTION: This is an Interim Remedial Measure (IRM) construction project. The project involves installation of a sub-slab depressurization system (SSDS) at the site, which is located in Long Island City, Queens, New York. The SSDS is being constructed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009.

1. PROGRESS MADE THIS REPORTING PERIOD
    - Continued system enclosure/equipment construction (offsite).
    - Installed sample ports on sump riser pipes.
    - Initiated installation of insulation and jacketing on exterior piping.
    - Conducted pressure testing on piping.
    - Installed electrical connection.
    - Demobilized project tools and equipment from the basement.

2. PROBLEMS/RESOLUTIONS
    - Identified and repaired two pinhole leaks during pressure testing.

3. VARIANCES, ANTICIPATED PROBLEMS, AND RECOMMENDED SOLUTIONS
    - None.

4. UPCOMING EVENTS / PLANNED ACTIVITIES (week of 8/31/09)
    - Complete system enclosure/equipment construction (offsite).
    - Deliver system enclosure to site.
    - Complete electrical connection to system.
    - Complete mechanical connection to system.
    - Complete installation of insulation and jacketing on exterior piping.
    - Patch wall and ceiling/overhang penetrations.

WEEKLY PROGRESS REPORT
STANDARD MOTOR PRODUCTS
INTERIM REMEDIAL MEASURE (IRM) CONSTRUCTION
SITE CODE 2-41-016

SITE NAME/ACTIVITY: Standard Motor Products IRM Construction
NYSDEC PROJECT MANAGER: Shaun Bollers
SMP CONTACT: Robert Martin/Chris Wendt
CDM PROJECT MANAGER: Maria Watt
CDM CONSTRUCTION MANAGER: Peter Connolly
PERIOD: 8/31/09 through 9/4/09

PROJECT DESCRIPTION: This is an Interim Remedial Measure (IRM) construction project. The project involves installation of a sub-slab depressurization system (SSDS) at the site, which is located in Long Island City, Queens, New York. The SSDS is being constructed in accordance with the approved Final Interim Remedial Measure Work Plan dated February 6, 2009.

1. PROGRESS MADE THIS REPORTING PERIOD
    - Completed system enclosure/equipment construction (offsite).
    - Delivered system enclosure to site.
    - Completed mechanical and electrical connections to system.
    - Completed insulation/jacketing on exterior piping.
    - Patched wall penetrations.
    - Delivered vapor-phase granular activated carbon (VPGAC) unit to site.
    - Filled VPGAC unit with fresh carbon.
    - Completed mechanical connections to VPGAC unit.
    - Installed treated vapor discharge stack.

2. PROBLEMS/RESOLUTIONS
    - None.

3. VARIANCES, ANTICIPATED PROBLEMS, AND RECOMMENDED SOLUTIONS
    - None.

4. UPCOMING EVENTS / PLANNED ACTIVITIES (week of 9/7/09)
    - Patch overhang penetration.
    - Secure discharge stack.
    - Complete mechanical piping and instrumentation inside system enclosure.
    - Complete shakedown testing of system using atmospheric air and potable water.
    - Initiate startup testing/optimization.

Appendix G
Permitting Documents

BASEMENT

NYC™ Buildings

Work Permit Department of Buildings

Permit Number: 420057510-01-EW-OT

Issued: 08/03/2009 **Expires:** 01/01/2010

Address: QUEENS 37-18 NORTHERN BOULEVARD

Issued to: AMANDA MACLSSAC

Business: CDM CONSTRUCTORS INC

License No:

Description of Work:

ALTERATION TYPE 2 - MITIGATION SYST
INSTALLATION OF MITIGATION SYSTEM AS REQUIRED AND APPROVED BY DEP (SEE DEP LETTER ATTACHED WITH THIS APPLICATION).

Review is requested under Building Code: 1968

SITE FILL: NOT APPLICABLE

To see a Zoning Diagram (ZD1) or to challenge a zoning approval filed as part of a New Building application or Alteration Application filed after 7/13/2009, please use "My Community" on the Buildings Department web site at www.nyc.gov/buildings.

Emergency Telephone Day or Night: 311

Borough Commissioner:

Commissioner of Buildings:

Tampering with or knowingly making a false entry in or falsely altering this permit is a crime that is punishable by a fine, imprisonment or both.

OP-35A (2/05)

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21ST Street, Long Island City, NY 11101-5407
Phone: (718) 482-4995 • **Fax:** (718) 482-6538
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

July 7, 2009

Maria Watt, P.E.
Senior Project Manager
Camp Dresser and McKee
110 Field Crest Avenue
Edison, NJ 08818

Re: Standard Motor Products
Site no. 241016
Waiver for NYSDEC-Issued Permits

Dear Ms. Watt:

This letter is in response to your inquiry and discussions with Shaun Bollers, the New York State Department of Environmental Conservation's (the Department's) project manager for the referenced site. Pursuant to 6 NYCRR Part 375-1.12(b), the Department exempts Standard Motor Products, Inc. and/or their representatives from the requirement to obtain any Department-issued permits for the Sub-Slab Depressurization System to be installed as an Interim Remedial Measure (IRM) for the referenced site. However, all substantive technical requirements pursuant to an applicable permit must be complied with including, but not limited to, submittals and notifications. As per Part 375-1.12(c), Standard Motor Products, Inc. must still obtain any Federal, State and local permits for the project that are not issued by the Department.

If you have any questions, please contact Shaun Bollers at (718) 482-4096.

Sincerely,

Jane H. O'Connell
Acting Chief, Region 2 Remedial Section A

ec: Shaun Bollers, Lou Oliva - NYSDEC