



**SVE/SSD SYSTEM  
INSTALATION DOCUMENT  
DELPHI AUTOMOTIVE  
LOCKPORT, NEW YORK**

**PREPARED FOR:**

New York State Department of Environmental Conservation  
Region 9  
Buffalo, New York

**PREPARED BY:**

GZA GeoEnvironmental of New York  
Buffalo, New York

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July 23, 2009  
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Mr. Glenn May  
New York State Department of Environmental Conservation  
Region 9  
270 Michigan Avenue  
Buffalo, NY 14202

Re: Soil Vapor Extraction/Sub-slab Depressurization System  
Installation Document  
Building 10  
Delphi Automotive  
Lockport, New York

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Dear Mr. May:

The enclosed report documents the installation of the Soil Vapor Extraction/Sub-slab Depressurization (SVE/SSD) System which was installed inside Building 10 at the Delphi Automotive facility in Lockport, New York. The SVE/SSD System has been in operation since March 2009. If you require any additional information, please contact the undersigned.

Sincerely,

GZA GEOENVIRONMENTAL OF NEW YORK

A handwritten signature in blue ink that reads 'Chris Boron'.

Christopher Boron  
Senior Project Manager

A handwritten signature in blue ink that reads 'Ernest R. Hanna For'.

Ernest R. Hanna, P.E.  
Principal

Cc: Mr. Richard Eisenman – Delphi Automotive

**SVE/SSD SYSTEM INSTALLATION DOCUMENT  
DELPHI  
LOCKPORT, NEW YORK**

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## **1.0 INTRODUCTION**

This soil vapor extraction (SVE) and sub-slab depressurization (SSD) system installation document has been prepared for the New York State Department of Environmental Conservation (NYSDEC), on behalf of Delphi Automotive LLC (Delphi), to provide an overview of the SVE/SSD system located within Building 10 at Delphi Automotive (Delphi) Facility in Lockport, New York (see Figure 1). This document includes the follow.

- Background on the previous investigations associated with Building 10 and the SVE Pilot Study completed;
- Overview of the SVE/SSD Components (Subsurface & System);
- System Operation & Monitoring;
- System Maintenance;
- Permits;
- Reporting; and
- Waste Management.

## **2.0 BACKGROUND**

In 2006, Delphi conducted a voluntary facility-wide investigation of soil and groundwater conditions at their Lockport facility. The first phase of this work was the development of a Current Conditions Summary (CCS), which was completed by Environmental Resources Management (ERM). The purpose was to obtain information about potential environmental liabilities that may exist at the Site, as this information was needed by Delphi and potential investors to develop strategies for exiting bankruptcy. The CCS work generally followed the requirements for a CCS in the RCRA Corrective Action Program.

After completion of the CCS, a field investigation was initiated to assess soil and groundwater conditions at each area of interest (AOI), identified by the CCS. A total of 144 soil borings were completed throughout the Lockport Complex, and nine sediment and four surface soil samples were collected. Six monitoring wells were installed, but only five were sampled as one of the wells was dry. Over 400 soil and groundwater samples were analyzed for an extensive list of parameters. The field investigation activities and results were described in the Field Investigation Report (FIR), dated January 2007, followed by the CCS submission in May 2007. Both documents were submitted to the NYSDEC.

Two AOIs were identified within the footprint of Building 10 and included in the field investigations. AOI-36 was a former painting operation in the western portion of the building and AOI-37 was an area where soil contamination was encountered during construction of a sump in 1999 (see Figure 2). Boring 10-106 was installed in AOI-36



and borings 10-107-A and 10-107-B were installed in AOI-37. At each AOI, samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and metals. No detections above NYSDEC Part 375 Commercial Soil Clean-up Objectives (CSCO) were found at AOI 36. At AOI-37, tetrachloroethylene was found at 270 milligrams/kilogram (mg/kg) in one sample, exceeding the CSCO of 150 mg/kg.

Based on the findings of the field investigation, a Focused Environmental Assessment<sup>1</sup> (FEA) was conducted by GZA GeoEnvironmental of New York (GZA) in the summer of 2007. The purpose of this FEA at Building 10 was to assess the potential extent of chlorinated VOC impacts in soil and groundwater in the vicinity of column WK45 (AOI-37) and whether vapor intrusion was a concern within the northern portion of Building 10. The FEA was conducted in general accordance with the GZA work plan submitted to NYSDEC dated June 27, 2007.

The Building 10 FEA determined the following.

- Elevated detections of tetrachloroethene (PCE) and trichloroethene (TCE) existed in the sub-slab air sample collected at Bldg 10, SS-1;
- Elevated detections of PCE existed in the soil samples; and
- Detections of VOCs, particularly PCE, existed above NYSDEC groundwater criteria in the groundwater sample from MW-1 which indicate that a release in this area occurred and will require remedial action.

Based on the findings of the Building 10 FEA, GZA recommended the installation of a SVE system designed to remediate soil contamination and reduce the potential for vapor intrusion.

GZA completed a SVE Pilot Test Summary & SVE Design Report<sup>2</sup> which was submitted to NYSDEC in February 2008. As part of this work, additional soil probes were completed to determine the extent of PCE soil contamination greater than 300 ppm. Nine (9) additional soil probe locations were completed in September 2007. Figure 3 shows the limits of PCE soil contamination identified at concentrations greater than 300 ppm.

The SVE Pilot test was completed in October 2007. This involved the installation of two pilot test extraction wells (identified as EW-11 and EW-13 on Figure 2) and eight vacuum monitoring points (4 at each well). Testing was performed at the two pilot test locations and resulted in data that supported the use of SVE as a remedial option and provided sufficient information to support the design of the SVE system.

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<sup>1</sup> "Focused Environmental Assessment, Building 10, Lockport, New York" dated August 28, 2007.

<sup>2</sup> "Soil Vapor Extraction Pilot Test Summary & SVE Design Report, Delphi Automotive, northern Portion of Building 10, Lockport complex, 200 Upper Mountain Road, Lockport, New York" dated November 2007.

The proposed SVE system design considerations are summarized below.



- Unsaturated zone soils at the Site consist of clays and silts with varying percentages of sand and gravel. Therefore, the anticipated pneumatic permeability of these materials is expected to be relatively uniform and low.
- Anthropogenic features, including coarse grained base course installed directly beneath the slab, and unknown utilities and their associated bedding materials, will have a significant affect on SVE flow pathways. These features will likely alter the magnitude and distribution of SVE well flow and vacuum.
- The high vacuum required to induce SVE flow may result in localized upwelling of the groundwater in the area of the SVE wells; therefore, the SVE well points should not extend into or near the anticipated top-of-rock groundwater zone.
- The SVE system will have a sub-slab depressurization (SSD) component designed into the system that will be able to be operated as its own separate system if the SVE system is shut-down.
- SVE pilot test results indicate the average vacuum radius of influence for the SVE wells will be approximately 15 to 20 feet. This suggests that approximately 17 SVE wells are to be installed within the proposed treatment area at a spacing of less than 40 feet on center.
- SVE systems should be designed to extract a minimum of 1 pore volume exchange (PVE) per day. Assuming: (1) the average soil porosity is 0.3, and (2) soil vapor is extracted across the 2 foot to 6 foot depth zone of the SVE well, at an average expected SVE flow rate of 10 SCFM this spacing will result in a PVE rate of approximately 10 PVE/day.
- Based on the results of the SVE pilot test, the average expected SVE flow rate will be approximately 10 SCFM per well at an applied wellhead vacuum of approximately 80 in. w.c.. GZA suggested that the SVE system be capable of extracting approximately 250 SCFM at an applied wellhead vacuum of 120 in. w.c..
- Assuming a 250 SCFM total system flow rate, this translates to an initial VOC mass flux rate of approximately 9 to 85 pounds per day. This VOC mass flux rate would be expected to decrease rapidly during system operation.
- An air/water separator and particulate filter will be installed upstream of the blower to remove entrained water and filterable solids. Water collected in the air/water separator will be periodically removed and disposed off-site.
- Extracted soil vapor will be treated via two vapor phase activated carbon canisters installed in series. Each vessel will contain a minimum of 500 pounds of activated carbon. Sample ports will be installed in the piping upstream and



downstream of the blower to permit the collection of air samples. Once analyses performed on the collected air samples indicate replacement of the activated carbon is warranted, the activated carbon will be removed and replaced and the spent carbon will be shipped off-site for disposal or regeneration. As concentrations in the untreated air stream decline, it may become possible to operate the system without activated carbon.

### **3.0 SYSTEM COMPONENTS**

There are two components to the system operating in Building 10.

1. Soil vapor extraction; and
2. Sub-slab depressurization.

Soil vapor extraction (SVE) is an in-situ unsaturated or vadose zone soil remediation technology in which vacuum is applied to the subsurface soil to induce the flow of air to remove volatile organic compound (VOC) contaminants from the soil. The vacuum is applied through a series of vertical wells which are connected to a carbon treatment system used to remove the contaminants from the air stream prior to discharge to the atmosphere above the building.

Sub-slab depressurization (SSD) is a method of intercepting vapors that volatilized from a contaminated media (i.e., soil, groundwater and/or product), that migrate upwards and may become trapped beneath or infiltrate into a building. The vapors are collected by applying a vacuum to the horizontal piping system located beneath the floor slab. The SSD piping is connected to a carbon treatment system to remove the VOC contaminants from the air stream prior to discharge to the atmosphere above the roof.

Sections 3.1 and 3.2 will discuss the subsurface components of the SVE and SSD, respectively, and Section 3.3 will discuss the SVE/SSD process equipment and instrumentation.

#### **3.1 SUBSURFACE SOIL VAPOR EXTRACTION COMPONENTS**

The subsurface SVE system components consist of 17, 4-inch diameter vertical extraction wells (see Figure 4). The 17 extraction wells were installed with rotary drilling methods using 6¼-inch inner diameter hollow stem augers. The wells are constructed of 4-inch diameter flush coupled polyvinyl chloride (PVC) riser and screen. Depth of the wells ranged from 5.5 to 7 feet below ground surface (bgs). The wells were installed at depths so the bottoms of the wells were above the groundwater table in the vicinity of Building 10 which is about 6 to 6.5 feet bgs. Soil cuttings generated from the drilling activities were drummed and disposed of off-site by Delphi (see Appendix A for disposal documentation).

The screened portion of the wells ranged from was 3.5 to 5-foot in length and consisted of #10 machine slotted PVC pipe. The riser pipes consisted of 4-inch diameter solid



PVC pipe approximately 2 feet in length. The annulus space around the well screen was backfilled with a #00 sand pack. An approximate 2-foot thick layer of bentonite chips were placed above the sand filter and hydrated with water.

Three trenches were excavated to an approximate depth of 2 feet bgs through the concrete slab-on-grade, subbase and soil. Subbase and soil generated during the trench excavations were placed in roll-off boxes and disposed of off-site by Delphi (see Appendix A for disposal documentation). The trenches were used to install 1.5 inch diameter high density polyethylene (HDPE) piping to connect the extraction wells to the manifold located within the SVE shed. The tops of the extraction wells were fitted with 4-inch by 4-inch by 2-inch Schedule 40 PVC Tees (see Figure 5) which were connected to the 1.5-inch diameter HDPE piping.

The tops of the PVC Tees were fitted with removable J-plugs to allow access into the extraction wells, if needed. After the HDPE piping and PVC Tees were connected, a bentonite seal was placed around the Tee/HDPE piping connection at the extraction well heads. Additionally, grout caps (mixture of water, Portland cement and powdered bentonite) were placed over the extraction well heads to seal off the extraction wells from the pea stone used as backfill in the trenches (see Figure 6).

The trenches were backfilled with pea stone to approximately 6 to 8-inches below the concrete slab. The sub-slab depressurization piping, as discussed in Section 1.1.2, was then installed in the upper portion of the pea stone.

### **3.2 SUBSURFACE SUB-SLAB DEPRESSURIZATION COMPONENTS**

The subsurface sub-slab depressurization (SSD) system components consist of 2-inch diameter #10 machine slotted PVC well screen lengths (see Figure 3) connected with PVC couplers. Once assembled, the PVC well screen lengths were covered with a fabric sleeve and placed horizontally in the three north-south orientated trenches (see Figure 2 for locations). The three lengths of piping were placed on top of the pea stone used to backfill the SVE HDPE lines. The three lengths, called sub-slab (SS) legs 1, 2 and 3 are connected to the manifold inside the SVE shed via 1.5-inch diameter HDPE piping.

After the installation of the SS-legs, the trenches were topped with approximately 6-inches of crushed stone (#1 run-of-crusher) and compacted with a vibrating plate tamper. Holes were drilled into the side walls of the existing concrete and rebar dowels were installed to “key” the new concrete to be placed into the existing concrete. Concrete was placed and troweled to grade. Cracks and seams in the existing concrete floor were filled using a self-leveling polyurethane chalk.

### 3.3 SVE/SSD SYSTEM MAJOR PROCESS EQUIPMENT

The following section contains a brief description of the major process equipment associated with the SVE/SSD system. A Vapor Extraction System Shed Layout drawing is included as Figure 7 and a Process and Instrumentation Diagram is included as Figure 8.



Component Name	Manufacturer	Model #	Equipment Description
Rotary Blower	Tuthill	5009-21L2	M-D Pneumatics Competitor Plus Rotary Positive Blower, 25 hp; 460 volts, 3 phase, 60 hertz, 250 SCFM at 13" Hg vacuum.
Blower Motor	US Motor	H25E2D	Horizontal motor with 25 hp; 460 volts, 3 phase, 60 hertz. Variable frequency drive controlled.
Moisture Separator Tank	NES		120 gallon capacity constructed of carbon steel with bronze drain valve. Operates on principal of cyclonic section aided by velocity reduction.
Moisture Separator Pump	Goulds	1ST1E5C4	The pump is total enclosed fan cooled 1 hp, 3 phase, 60 hertz. It can pump 150 gallons per minute at 3,500 RPM.
Heat Exchanger	American Industrial	ACA 6361-92544	Heat exchanger is 3 hp, 3 phase, 460 volts, 60 hertz, 10,500 cfm.
Exhaust Fan	Grainger	4C020	Exhaust Fan is an aluminum ring, vertically mounted fan unit. It contains a 1/4 hp, 1725 RPM, 1 phase, 115 volts, 60 hertz motor.
Inline Filter Unit	Solberg Manufacturing	CT-235P-400C	The inline filter housing is made of carbon steel and has a 4-inch diameter inlet and outlet.
Inline Filter Element	Solberg Manufacturing	235P	The replacement element is polyester and can handle flow up to 570 cfm. It has an inner diameter of 4.75 inches, out diameter of 8.77 inches and height of 9.63 inches.
Discharge Silencer	Stoddard	PD13-4-C	The discharge silencer is located beneath the blower, motor and belt guard which are mounted on top. It is approximately 54 inches long and 14 inches in diameter. A drain plug is located on the west side of the unit.
Vacuum Relief Valve	Knukle	215-HO1QE0015	The vacuum relief valve has a 2-inch diameter inlet and is set for approximately 13 in Hg.
Dilution Valve Filter/Silencer	Solberg Manufacturing	FS-19P-150	The dilution valve filter/silencer filters air and attenuates air inlet noise that is brought into the system from the manual dilution valve. It has an 6 inch diameter inlet housing and a 1 1/2 inch outlet diameter.
Carbon Vessels	Envirotrol, Inc	VPM-2000	Each carbon vessel contain approximately 2,000 pounds of granular activated carbon and have a maximum operating pressure of 15 pound-force per square inch gauge (psig). Two vessels are connected to the SVE/SSD System in series acting as a lead vessel and polishing vessel.

### 3.4 INSTRUMENTATION

The following is a list of the major instruments of the SVE/SSD system and a brief description.



Component Name	Manufacturer	Model #	Instrument Description
Variable Frequency Drive	Square D	ATV	The VFD has been programmed to operate the blower motor in the 45 hz to 60 hz operating ranges only. Adjusting the VFD to operating at below 45 hz or above 60 hz will not occur.
Autodialer	Sensaphone	400	The Sensaphone will call out to programmed telephone numbers when an alarm condition occurs. The three telephone numbers presently programmed can be found in Section 5.7 of this document.
SVE Vacuum Switch	Dwyer	1950-20-2F	The SVE Vacuum Switch has been placed between the blower and moisture separator and set to trigger a low vacuum alarm when the system vacuum falls below 4 water column inches.
Pitot Tubes	Dwyer	DS-300-4	There are two pitot tubes installed in the 4-inch diameter air flow piping inside the shed. One pitot is reading vacuum flow and the second pitot tube is reading pressure flow.
Pitot Tube Magnehelic Gauge	Dwyer	2003	There are two magnehelic gauges indicating readings from the two pitot tubes installed in the system. One gauge is reading vacuum flow and the second is reading pressure flow.
Temperature Switch	United Electric Controls	100 Series	The temperature switch has been installed after the heat exchanger and set to shut the system down if the system discharge temperature exceeds about 110° F. Presently, the system must operate with the heat exchanger on to stay below 110° F.
Moisture Separator Level Switch	Innovative Solutions	L312	The moisture separator level switch can be seen in the sight tube on the moisture separator. The high level will trigger the moisture separator high level alarm and shut the system down. Water from the moisture separator will need to be transferred manually.
Effluent Flowmeter Display	Signet	3-8150	The effluent flow meter display will monitor the volume of water that is transferred from the moisture separator to the external storage containers.
Exhaust Fan Thermostat	Grainger	2E834	The exhaust fan thermostat is located inside the shed and monitors the ambient temperature in the shed. The temperature control is located inside the control panel, behind the swing door and has been set at 75° F.

#### 4.0 SVE/SSD SYSTEM OPERATION & MONITORING

The system was started up on March 3, 2009 and has been generally running continuously since that time with the exception of periodic shut down for routine maintenance.



The goal of the SVE/SSD system is two fold.

- To remediate the subsurface soils via the SVE; and
- To mitigate vapors from migrating upward into the building via the SSD.

The goal of the SVE will be accomplished by establishing “air flow” in the subsurface which will remove the volatile organic compound contamination in the subsurface soil.

The goal of the SSD will be accomplished by establishing a pressure gradient in the sub-slab which will draw air towards the SS-legs, depressurize the sub-slab and limit vapors from migrating upward through the floor slab.

Therefore, operation of the SVE/SSD system requires two approaches.

- Establish a balanced flow in the SVE extraction wells to allow an equal distribution throughout the remedial area; and
- Maintain a vacuum in the SS-legs to depressurize the sub-surface.

#### 4.1 SVE OPERATION

The 17 extraction wells of the SVE do not have similar air flow capacities based on air flow velocity measurements collected (see Table 1). These varying air flows are likely due to the heterogeneities in the subsurface soils and utility locations. The air flow capacities of the 17 extraction wells have been compared to each other and divided into three categories, good (highest 6 air velocities), fair (middle 6 air velocities) and low (lowest 5 air velocities).

The extraction wells fall into the three categories as follows (see Figure 4 for locations).

Good:           EW-1, -4, -5, -6, -7, and -13.

Fair:            EW-2, -3, -12, -15, -16 and -17.

Low:            EW-8, -9, -10, -11 and -14.

Air flow rates in the individual extraction wells will be measured at the manifold system using an air velocity meter. This can be done by removing the vacuum gauge and sample port mounting tee from the manifold and inserting the probe of the air velocity meter into the 1.5 inch diameter PVC manifold piping.



Measurements should be collected from the 17 extraction wells before adjusting the flow rates. The air flow rates of the SVE are dynamic in that adjusting the flow rate at one well location will have an affect on vacuum and flow rate at other locations. Once the air flow rates have been measured at the 17 extraction wells, an average flow rate can be calculated. Note, the air flow rates at the wells identified as low (EW-8, -9, -10, -11 and -14) should not be used in calculating an average. Adjustments to these low wells have minimal affect on the overall air flow or vacuum of the SVE.

Once the average flow rate has been determined, the individual well locations can be adjusted. The adjustments to the flow control valves should be made while measuring air flow rates. Adjustments and measurements to the individual extraction wells may need to be made multiple times to “fine tune” the SVE as adjustments to the individual wells have affects on the entire system.

The SVE system will be operated utilizing a balanced flow rate until it is determined that diminishing returns are occurring. At that time, alternative operating parameters will be evaluated (i.e., alternate extraction wells operating, increase vacuum, etc.)

## **4.2 SSD OPERATION**

The three SS-legs of the SSD require vacuum to create the depressurized condition in the sub-slab. Presently, the SS-legs are operating at about 1 to 2 water column inches of vacuum. This vacuum should be maintained in the three SS-legs.

## **4.3 SVE/SSD SYSTEM MONITORING**

One or both of the following activities are performed during routine monitoring of the SVE/SSD system, which is completed at least monthly.

- Collect tedlar bag air samples from the three air discharge monitoring points (Pre Carbon, Mid Carbon and Post Carbon). Samples will be field screened with an organic vapor meter (OVM).
- Field screen the Mid Carbon monitoring point with detector tubes to measure tetrachloroethylene concentrations for carbon bed break through. If the readings on the detector tubes is greater than 2 parts per million (ppm) break through has begun to occur and a carbon vessel change out should be scheduled. See Section 5.5 for carbon vessel change out procedures.

The Routine Monitoring Form is included in Appendix B. This form provides for the recording of various system parameters (i.e., vacuums, temperatures, etc.) during each routine visit. The forms will provide a historical record of site activities for reference by field personnel during subsequent monitoring visits.

The readings from these various gauges will be input into a calculation to determine the system flow rate. An example copy of the Microsoft Excel spreadsheet with the calculations has been included in Appendix C.



Since the startup of the SVE/SSD System in March 2009, the system has been periodically monitored by the following.

- Field screening tedlar bag air samples with an organic vapor meter for total organic compounds,
- Screened Pre Carbon and Mid Carbon monitoring points with tetrachloroethylene detector tubes,
- Observed air flow rates based on SVE/SSD system instrumentation, and
- Collected two rounds of air samples for laboratory analysis.

Table 4 is a summary of the field screenings results and the system flow rates. Table 5 is a summary of the analytical air samples results and detector tube readings. Air samples were submitted to Contest Laboratory in Long Meadow, Massachusetts on March 13, 2009 and Centek Laboratory, in Syracuse, New York on April 9, 2009. The air samples were analyzed via EPA Method TO-15.

Based on the field screening and system air flow information provided in Table 4, it appears that the total organic compounds concentration has been steadily decreasing and the air flow rate has increased. Both of these results are typical of SVE systems. The air flow increase is likely due to the creation of preferential pathways, decrease in soil moisture content and stabilization of the groundwater table. When the system was first started, the operating vacuums were significantly higher (11 to 12 inches of mercury) and water was accumulating in the moisture separator. Observations in some of the extraction wells during start up indicated that the water table was being drawn up as much as 3 feet. The vacuums have decreased (currently operating at 3 inches of mercury) and water is no longer being generated.

## **5.0 REMEDIAL SYSTEM ROUTINE MAINTENANCE**

The following five maintenance activities are performed on a routine basis as further discussed.

1. Blower Maintenance – Lubrication, Oil Change & Belt Check
2. Motor Maintenance – Lubrication
3. Moisture Separator – Water Transfer & Cleanout
4. In-Line Filter – Change out & Clean
5. Carbon Vessels – Vessel Change out & Carbon Replacement

Routine maintenance for the above listed equipment is further described on Table 2.

Routine maintenance activities for the SVE/SSD system can be recorded by the maintenance personnel on the “Routine Maintenance Form” found in Appendix B. The form will provide a historical record of the maintenance activities completed by maintenance personnel to assist in maintaining the proper maintenance schedule.



## **5.1 BLOWER MAINTENANCE**

The rotary positive displacement blower will require monthly lubrication of its bearings via the grease fittings located on the housing of the blower.

The blower requires the oil to be changed every 1,000 hours of operation (approximately 41 days assuming 24 hour/day operation) if a petroleum based oil is used and every 3,000 hours (approximately 125 days) if a synthetic oil is used.

The blower belt tension and condition should be checked monthly and the belt replaced as needed.

## **5.2 MOTOR MAINTENANCE**

The electric motor will require yearly lubrication via the grease fittings located on the housing of the motor.

## **5.3 MOISTURE SEPARATOR**

The moisture separator should be emptied when it is approximately ½ full as observed through the sight glass on the separator. The water from the moisture separator shall be transferred to another storage container (i.e., 55-gallon drum) located on the exterior of the shed. The volume of water transferred shall be recorded on the Routine Monitoring Form (see Appendix B).

The interior of the moisture separator should be inspected on an annual basis to determine if sediment is accumulating on the bottom of the unit.

The sediments and/or water generated will be containerized for proper disposal (see Section 8.0 for Waste Management).

## **5.4 IN-LINE FILTER**

The in-line filter is located directly above the blower. The filter should be changed when the vacuum below the filter (directly above the blower) is 1 inch of mercury (in Hg) greater than the vacuum above the filter.

The filters can be cleaned and reused. They contain a polyester element which is washable with lukewarm water and a mild detergent. The filter should be allowed to air dry prior to reuse.

A filter should no longer be reused when after cleaning and installation there is a 1 in Hg or greater vacuum difference from the pre-filter vacuum gauge to the post-filter vacuum gauge.



## **5.5 CARBON VESSELS**

The carbon vessels that are being used to treat the air stream from the SVE/SSD system contain about 2,000 pounds of granular activated carbon (GAC) each. Two vessels are connected to the system in series so the air stream moves from the first vessel (Lead Vessel) to the second vessel (Polishing Vessel) prior to discharging to the atmosphere above the building.

The Lead Vessel is monitored for breakthrough (discussed in Section 4.3) by monitoring the Mid Carbon monitoring point. When it is determined that breakthrough has occurred, the Lead Vessel is removed from the system and replaced with the Polishing Vessel, which becomes the new Lead Vessel. A new carbon vessel is put on-line, becoming the new Polishing Vessel. Delphi Environmental Department personnel will be responsible for the GAC change out.

Carbon change outs are based on the breakthrough of the Lead Vessel and are occurring at approximately two month intervals during the first year of operation. The time frame between vessel change outs will likely increase over time as diminishing contaminant returns are typical of these systems. The used carbon vessels will be stored at the site's 90-day Hazardous Waste Accumulation Area. Section 8.0 provides information about the waste management of the GAC.

## **5.6 NON-ROUTINE MAINTENANCE**

Non-routine maintenance activities will occur when the SVE/SSD system shuts down due to a malfunction or if an alarm condition has occurred. The SVE/SSD system equipment will operate if the swing panel switch is in the "AUTO" position and no alarm is present. Equipment will operate if the swing panel switch is in the "HAND" position with or without an alarm present.

There are six Alarm Condition Display lights which are labeled on the front of the swing panel. They are as follows.

- SVE Low Vacuum
- Moisture Separator High Level
- SVE Blower High Discharge Temperature
- Holding Tank High Level
- Power Monitor Alarm
- VFD Fault

To assist with non-routine site activities, Table 3 has been prepared to provide a general summary of alarm conditions, potential causes and potential solutions. The Sensaphone dials out to the preprogrammed telephone numbers (see Section 5.7) to alert of the alarm condition.

The "Non-Routine Maintenance Form" has been generated for use when non-routine maintenance activities are performed. This form (see Appendix B) should also be

completed by the field and/or maintenance personnel when responding to alarm conditions or other non-routine site visits when a full system inspection may not be required or performed. This form will provide a record of site activities and/or maintenance performed.



## 5.7 REMOTE SYSTEM MONITORING

The SVE/SSD system contains an auto dialer, Sensaphone Model 400 (Sensaphone), a programmable, environmental monitoring system that allows for remote monitoring capabilities. The Sensaphone has been connected with a telephone line to allow the unit to call out if an alarm condition is present or allow for incoming calls to check on the status of the SVE/SSD system.

If an alarm condition occurs, the Sensaphone has been programmed to dial out to three programmed telephone numbers to alert these individuals of the alarm condition that has occurred. When the Sensaphone dials out, a pre-recorded message will play identifying one of four zones “is not OK”, identifying an alarm condition.

The following alarm conditions are associated with one of the four zones.

<u>ZONE</u>	<u>ALARM CONDITION</u>
1 (any of 3 Conditions)	Low Vacuum Moisture Separator High Level SVE High Discharge Temperature
2 (any of 2 Conditions)	Holding Tank High Level Power Monitor Alarm
3 (any of 3 Conditions)	VFD Fault M/S Effluent Pump Overload Heat Exchanger Overload
4	SVE System is not running

See Table 3 for additional information on the Alarm and/or Zone conditions.

## 6.0 PERMITS

The following is a list of applicable permits associated with the operation and maintenance of the SVE/SSD system.



- *City of Lockport, Public Utilities Department, Waste Water Discharge Permit, CL860103.*

This permit is applicable to water generated from the operation of the SVE/SSD system. Water is containerized and sampled for volatile organic compounds. The analytical results are provided to the Department of Public Utilities to obtain permission to discharge the water generated to the City of Lockport sanitary sewer.

- *NYSDEC Title V Facility Permit, 9-2909-00018/00498*

This permit is applicable to the air discharge from the SVE/SSD system. The system is currently operating under a “Trivial Activities” permit exemption.

No additional permits are required for the operation, maintenance and monitoring of the SVE/SSD system.

## **7.0 REPORTING**

A SVE/SSD system operation report will be prepared annually. The system operation report will include performance monitoring data, SVE operational information and indoor air sampling results. The reports will also present conclusions regarding overall system effectiveness and recommendations for modifications to the SVE program, if appropriate.

Operation of the SVE/SSD system began in March 2009. The annual report will be prepared in May of each subsequent calendar year.

## **8.0 WASTE MANAGEMENT**

Various types of waste, both hazardous and non-hazardous, will be generated during the operation, maintenance and monitoring of the SVE/SSD system. These wastes will be handled according to following internal Delphi document.

- *ISO 14001 EMS WI 016 - “Handling Hazardous and Non-Hazardous Waste”.*

This document is an internal Delphi instruction document to provide guidelines for employees and their supervisors that handle hazardous and non-hazardous wastes. It is in compliance with local, state and federal laws pertaining to the storage, transportation and disposal of hazardous and non-hazardous waste. This document is updated as new rules and regulations are put into affect that govern the management of hazardous and non-hazardous waste.

This work instruction is applicable to waste streams generated by the operation and maintenance of the SVE/SSD system and may include the following. The list is not considered to be all inclusive.



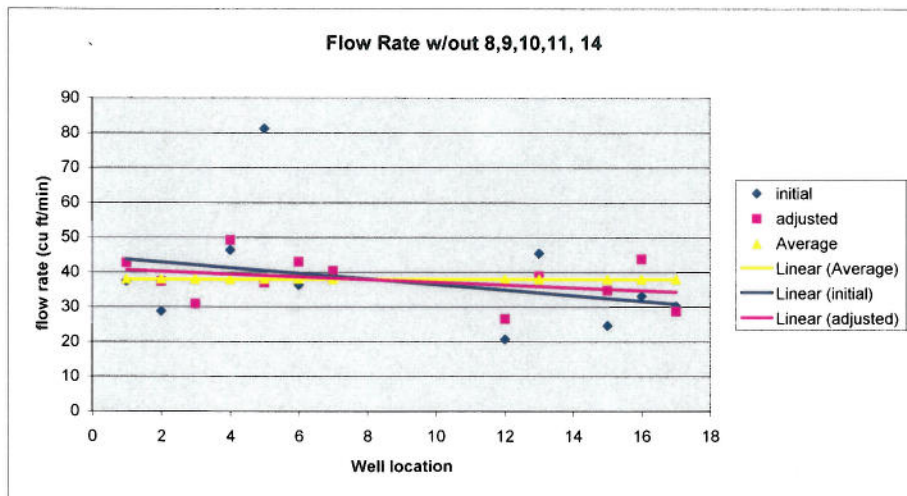
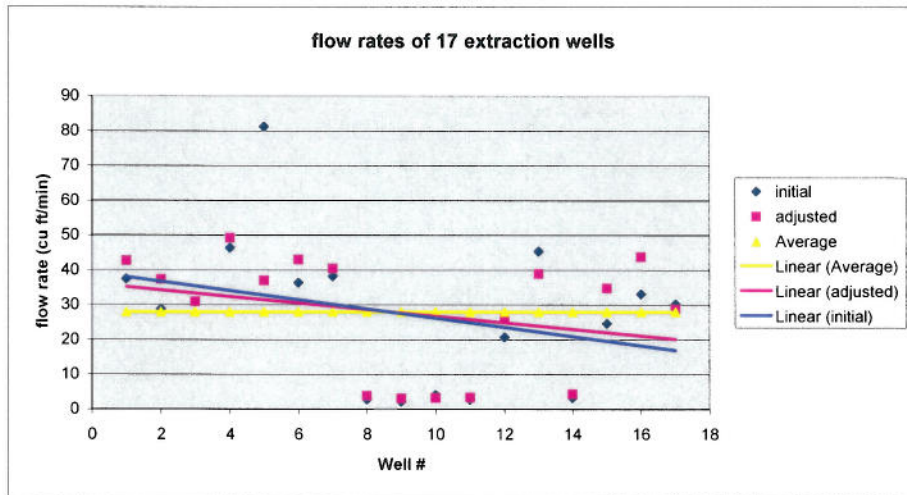
- Operation wastes – water, sediment, soil and particulate
- Maintenance waste – oil, grease, filters and spent GAC
- Monitoring waste – latex gloves, paper towel and detector tubes



## **TABLES**

**TABLE 1**  
**PREVIOUSLY MEASURED FLOW RATES**  
 SVE/SSD INSTALLATION DOCUMENT  
 DELPHI  
 LOCKPORT, NEW YORK

INITIAL FLOW RATES			ADJUSTED FLOW RATES		
SVE Vacuum at start of testing: 3 " Hg at 52 hz			SVE Vacuum after adjustment: 3 " Hg at 60 hz		
Calculated flow based on Pressure Gauge: 315 SCFM			Calculated flow based on Pressure Gauge: 360 SCFM		
Extraction Well	Flow Reading (ft/min)	Flow Rate (ft <sup>3</sup> /min)	Extraction Well	Flow Reading (ft/min)	Flow Rate (ft <sup>3</sup> /min)
1	3040	37	1	3465	43
2	2335	29	2	3030	37
3	2500	31	3	2510	31
4	3770	46	4	4000	49
5	6600	81	5	3000	37
6	2950	36	6	3490	43
7	3100	38	7	3280	40
8	228	3	8	308	4
9	172	2	9	250	3
10	330	4	10	260	3
11	228	3	11	270	3
12	1680	21	12	2160	27
13	3685	45	13	3160	39
14	260	3	14	350	4
15	2000	25	15	2825	35
16	2690	33	16	3560	44
17	2460	30	17	2340	29
SS1	690	8	SS1	500	6
SS2	580	7	SS2	460	6
SS3	2600	32	SS3	420	5
Total Flow	41898	515	Total Flow	39638	488



**TABLE 2**  
**ROUTINE MAINTENANCE ACTIVITIES**  
**SVE/SSD SYSTEM INSTALLATION DOCUMENT**  
**DELPHI**  
**LOCKPORT, NEW YORK**

Frequency	Task	Description
Monthly	Blower Bearing Lubrication	Lithium grease should be applied to the blower grease fittings on a monthly basis until grease is observed exiting the relief fittings. The manufacturer recommends using Tuthill PneuLube NLG#2 premium grade petroleum based lithium grease. See Section 3.6.1 of this document or Section 5 of the NES Operation & Maintenance Manual for additional information.
Monthly	Blower Belt Tension	The blower belt tension should be inspected during the monthly blower bearing lubrication. The belt guard will need to be removed in order to check the tension and it should be adjusted as necessary. There should be 1/64" deflection per inch of span between sheaves when applying 8 to 10 pounds of force at the center point of the top section of the belt. See Table 1 for belt replacement information. See Section 3.6.1 of this document or Section 4 of the NES Operation & Maintenance Manual for additional information.
Quarterly	Blower Oil Change	Synthetic Based Oil should be used to replace the oil in the blower every 3,000 hours of operation. However, the oil should be changed every 1,000 hours if petroleum based oil is being used. The manufacturer recommends using the following synthetic based oils: Tuthill PneuLube; Exxon Mobile SHC 627; or Shell OMALA RL 100. See Section 3.5.1 for this document or Section 5 of the NES Operation & Maintenance Manual for additional information.
Annually	Motor Lubrication	Synthetic grease should be applied to the motor grease fittings on an annual basis. The manufacturer recommends using the following grease: Exxonmobile PolyREX-EM or Chevron SRI No. 2. See Section 3.6.2 of this document or Section 5 of the NES Operation & Maintenance Manual for additional information.
As Needed	Moisture Separator Cleanout	The moisture separator should be cleaned out to remove sediment that may be accumulating in the bottom of the unit. As no water is currently accumulating under its current operating conditions, an annual inspection and as needed cleanout is currently sufficient. Frequency should be altered if water begins to accumulate.
As Needed	In-Line Filter Change Out	The in-line air filter should be changed out on an as needed basis. A change out should be done when there is a 1 in Hg or greater difference between the vacuum gauges before and after the in-line filter. The filters can be washed out, air dried and reused.
As Needed	Carbon Vessel Change Out	The carbon vessel should be changed out when break through is measured in the Mid Carbon monitoring point. Break through has been defined when detector tube readings at the Mid Carbon monitoring point are greater than 2 ppm for tetrachloroethylene. See Section 3.6.5 of this document for additional information.

**TABLE 3**  
**ALARM CONDITIONS**  
SVE/SSD SYSTEM INSTALLATION DOCUMENT  
DELPHI  
LOCKPORT, NEW YORK

Alarm Condition	Alarm Rationale	System Response	Sensaphone Zone Condition
SVE Low Vacuum	Indicates that there is low vacuum in the SVE/SSD system. Blower may or may not be in operation. If none of the other 5 potential alarm condition exists then the SVE Blower swing panel switch is in the "OFF" position or the blower belt is broken and/or loose	Alarm light is illuminated. Remaining system equipment continues to operate.	ZONE 1
Moisture Separator High Level	Indicates that the moisture separator is full. This alarm condition should be coupled with the SVE Low Vacuum Alarm. If the Moisture Separator High Level alarm is not coupled with the SVE Low Vacuum, then the system is still in operation and generating water.	Alarm light is illuminated. Blower and heat exchanger are shut down. The moisture separator effluent pump, if set in the "AUTO" position, will continue to run until water level in the moisture separator is drawn below the low level switch.	ZONE 1
SVE Blower High Discharge Temperature	Indicates that there is high vacuum and low flow within the system which causes a temperature increase. This could mean that the vacuum relief valve has failed, there is water in the extraction wells or the transfer lines impeding flow. High temperature condition may also be caused if the heat exchanger is off or has failed. The high temperature sensor will trigger at approximately 110°F.	Alarm light is illuminated. Blower and heat exchanger are shut down.	ZONE 1
Holding Tank High Level	Indicates the external storage container is full.	Alarm light is illuminated. Blower, heat exchanger and moisture separator effluent pump are shut down.	ZONE 2
Power Monitor Alarm	Indicates that there is low voltage, an electrical phase reversal, a phase loss or an imbalance in the electrical load.	Alarm light is illuminated. Blower, heat exchanger and moisture separator effluent pump are shut down.	ZONE 2
VFD Fault	Indicates there is either a problem with the variable frequency drive or the blower motor.	Alarm light is illuminated. Blower and heat exchanger are shut down.	ZONE 3
No Formal Alarm	SVE/SSD system is not running.		ZONE 4

Note: Refer to the NES Operation & Maintenance Manual, 08-197 dated October 2008 for additional information.

**TABLE 4**  
**SUMMARY OF FIELD SCREEN RESULTS AND FLOW RATES**  
**SVE/SSD INSTALLATION DOCUMENT**  
**DELPHI**  
**LOCKPORT, NEW YORK**

Date	SVE/SSD System Run Hours (hours)	Blower Vacuum (in Hg)	Approximate Flow Rate from Pressure Readings (SCFM)	Field Screen Readings			Detector Tube Readings Collected	Analytical Samples Collected	Carbon Change Out Completed
				Pre Carbon (ppm)	Mid Carbon (ppm)	Post Carbon (ppm)			
3/2/2009 <sup>1</sup>	50 <sup>2</sup>	12.5	124	250	20	NM			
3/3/2009	70	11	149	1,500	0.7	0.7			
3/6/2009	98	4.5	287	450	1	0.9			
3/9/2009	168	4	319	100	0.5	0.5			
3/13/2009	264	4	323	85	1.5	0.8	X	X	
3/20/2009	433	3.5	327	68	1.9	1			
3/21/2009 <sup>6</sup>									X
3/23/2009	435	4	255	700	0.6	0.4			
3/27/2009	529	8.5	270	200	2	0.5			
4/1/2009	576	2.5	325	NM	NM	NM			
4/3/2009	629	2	326	NM	NM	NM			
4/9/2009	766	2.75	318	50	1	2	X	X	
4/17/2009	958	3	316	82	1.2	0.9			
4/27/2009	1,203	4.5	331	40	0.9	0.8			
5/8/2009	1,440	5	314	46	1.1	0.4			
5/14/2009 <sup>7</sup>							X		
5/28/2009 <sup>7</sup>							X		
5/29/2009	1,945	3	347	52	13	0.7			
5/30/2009 <sup>6</sup>									X
6/12/2009	2,280	3	348	38	0.6	0.4			
6/15/2009 <sup>7</sup>							X		
6/25/2009	2,594	3	340	41	1.6	0.9			
7/10/2009	2,953	3.25	340	58	3	0.5			

Notes: 1) SVE/SSDS System was start up was March 3, 2009.

2) SVE/SSDS System was delivered to Delphi with approximately 50 Run Hours on the system from NES.

3) NM - not measured

4) NR - not recorded.

5) X - indicated that detector tube readings, air analytical samples or carbon change out were collected.

Detector Tube and air analytical results can be found on Table 5.

6) On March 21, 2009 and May 30, 2009 the system was shut down for carbon change outs.

7) On May 14, 2009, May 28, 2009 and June 15, 2009, Delphi staff collected Detector Tube readings only.

TABLE 5  
SUMMARY OF AIR SAMPLE DETECTOR TUBE RESULTS  
SVE/SSDS INSTALLATION DOCUMENT  
DELPHI  
LOCKPORT, NEW YORK

March 13, 2009 TO-15 Data from Contest Laboratory & Detector Tube Readings

Compounds	PRE CARBON	MID CARBON	POST CARBON
Volatile Organic Compounds via USEPA Method T0-15 (ppbv)			
Acetone	140	740	910
Benzene	1.8	1.4	1.5
2-Butanone (MEK)	1.7	1.4	1.2
Chloroform	1.7		
Cyclohexane	6.7	2.6	2.6
1,1-Dichloroethylene	13	1.3	
cis-1,2-Dichloroethylene	290	2.9	
Ethanol	340	200	220
Ethylbenzene		7	8
4-Ethyl Toluene		2.8	3.2
n-Heptane	11	3.9	4.3
Hexane	110	190	230
Isopropanol	8.4	6.9	7.5
Methylene Chloride	3.5	1.7	
Tetrachloroethylene	1,600	2.7	2.9
Tetrahydrofuran	1.3		
Toluene	38	120	140
1,1,2-Trichloroethane	1.1		
Trichloroethylene	330	7.6	
1,2,4-Trimethylbenzene		4.4	4.8
1,3,5-Trimethylbenzene		2	2.3
m/p-Xylene		22	26
o-Xylene		6.3	7.1
Total VOC (ppbv)	2,917	1,327	1,571
OVM field screening results (ppb)	85,000	1,500	800
Detector Tubes (ppm)	15	0	NM

April 9, 2009 TO-15 Data from Centek Laboratory & Detector Tube Readings

Compounds	PRE CARBON	MID CARBON	POST CARBON
Volatile Organic Compounds via USEPA Method T0-15 (ppbv)			
Acetone	210	68	59
Benzene	0.86	0.25	0.2
2-Butanone (MEK)		13	
Chloroform	1.3	0.11	
Cyclohexane	7.3	1.5	
1,1-Dichloroethylene	3.8	21	
cis-1,2-Dichloroethylene	100	1.1	0.12
trans-1,2-dichloroethylene	8.4	0.38	
Ethylbenzene	0.27	0.15	0.13
4-Ethyl Toluene	0.11		
n-Heptane	5.8	2	1.3
Hexane	92	17	20
Methylene Chloride	5	6.1	15
Tetrachloroethylene	3,200	3.7	0.88
Toluene	68	33	23
1,1,2-Trichloroethane	0.54		
Trichloroethylene	97	0.25	0.15
1,2,4-Trimethylbenzene	0.25	0.14	
1,3,5-Trimethylbenzene	0.1		
m/p-Xylene	1.6	0.41	0.29
o-Xylene	0.41	0.12	
Vinyl Chloride	0.21	0.21	0.21
Styrene	0.14		
Methyl isobutyl ketone		0.25	
Isopropyl alcohol	21	14	11
Freon 11	0.26	0.56	0.13
Freon 12	0.46	0.44	0.5
Ethyl Acetate	2.5	1.7	0.97
Chloromethane	0.4	0.33	0.43
Carbon Disulfide	0.34	0.64	0.15
1,4-Dichlorobenzene	0.39	0.3	0.28
Total VOC (ppbv)	3,803	168	120
OVM field screening results (ppb)	50,000	1,000	2,000
Detector Tubes (ppm)	19	0	NM

May 14, 2009 Detector Tube Readings

Detector Tubes (ppm)	25	0.6	NM
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May 28, 2009 Detector Tube Readings

Detector Tubes (ppm)	NM	5.5	NM
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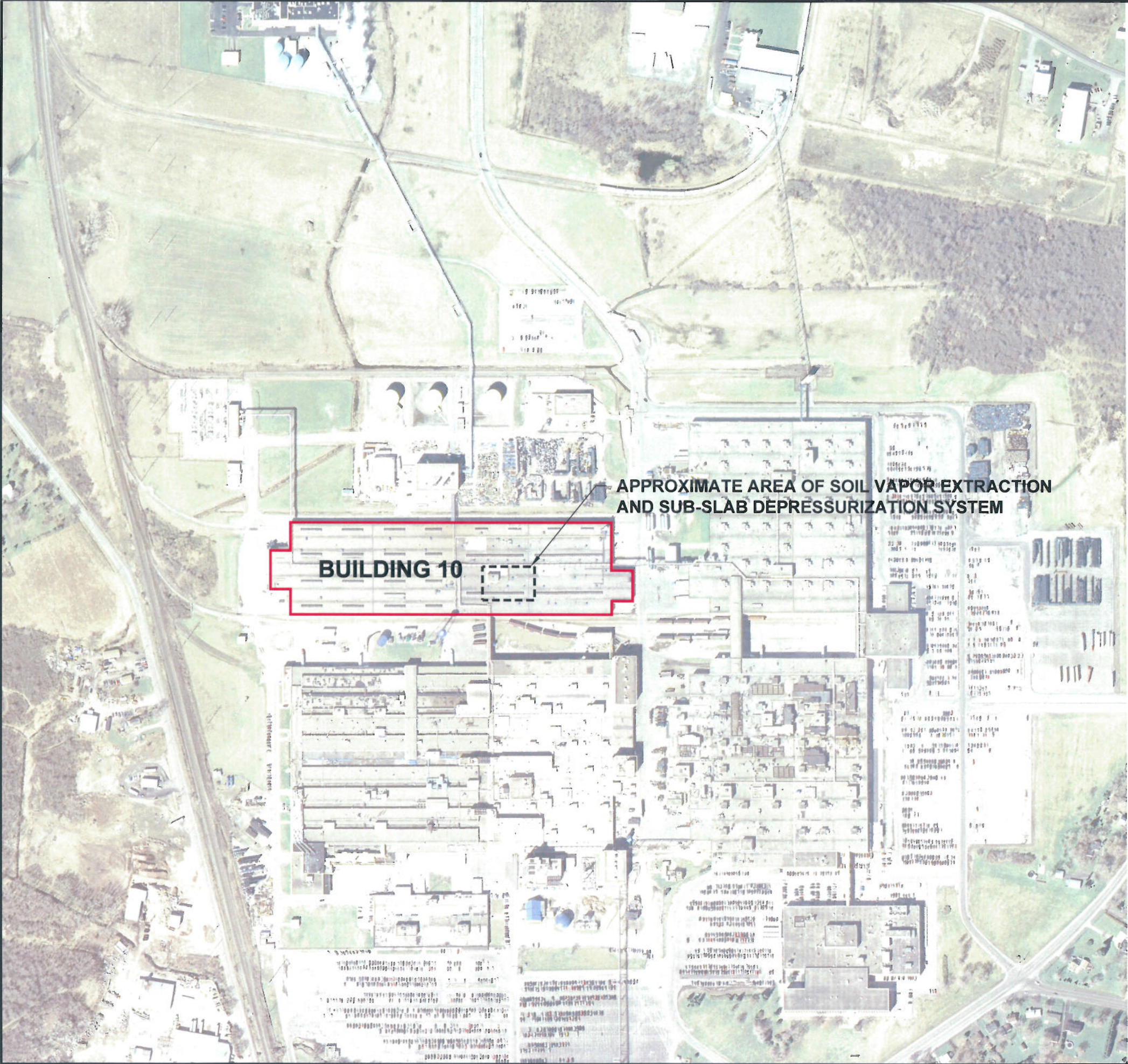
June 15, 2009 Detector Tube Readings

Detector Tubes (ppm)	25	NM	NM
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- Notes: 1) Detector Tube readings are for tetrachloroethylene concentrations.  
2) NM - not measured.  
3) Blank indicates compound was detected below method detection limits.  
4) ppbv - parts per billion by volume.  
5) ppb - parts per billion.  
6) ppm - parts per million.



## **FIGURES**



**LEGEND:**





INDICATES BUILDING 10 FOOTPRINT

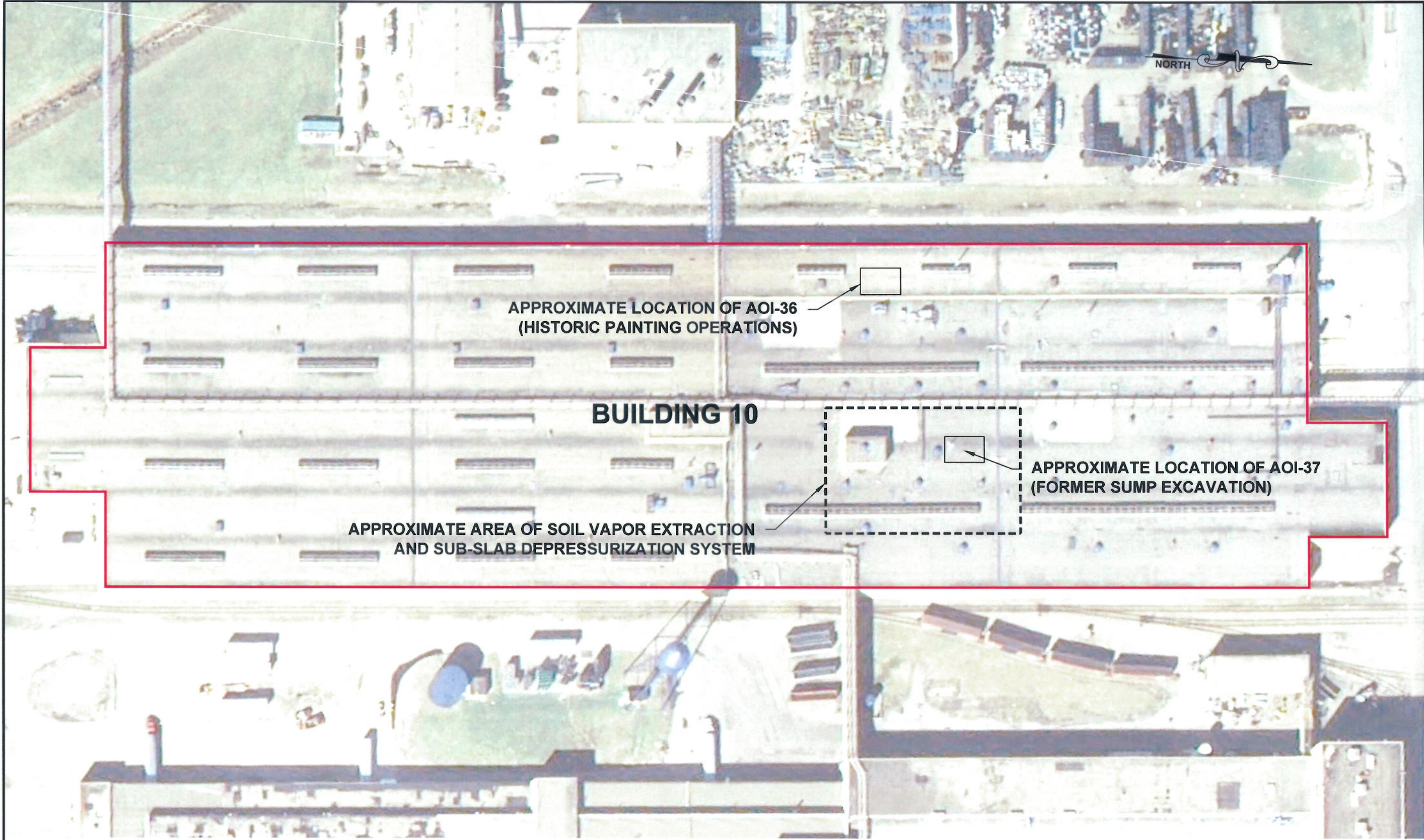


APPROXIMATE LOCATION OF  
SVE/SSD SYSTEM



**NOTES:**

- 1. BASE MAP ADAPTED FROM A 2005 AERIAL PHOTOGRAPH DOWNLOADED FROM [http://www.nysgis.state.ny.us/gateway/mg/interactive\\_main.html](http://www.nysgis.state.ny.us/gateway/mg/interactive_main.html) AND SITE OBSERVATIONS.
- 2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

DRAWN BY: DEW		DATE: JULY 2009		 GZA GeoEnvironmental of New York
APPROXIMATE SCALE IN FEET				
DELPHI AUTOMOTIVE, LLC		PROJECT No. <b>21.0056445.00</b>		
DELPHI LOCKPORT FACILITY				
200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK		FIGURE No. <b>1</b>		
DELPHI BUILDING 10				
SVE / SSD SYSTEM INSTALLATION DOCUMENT		SITE PLAN		




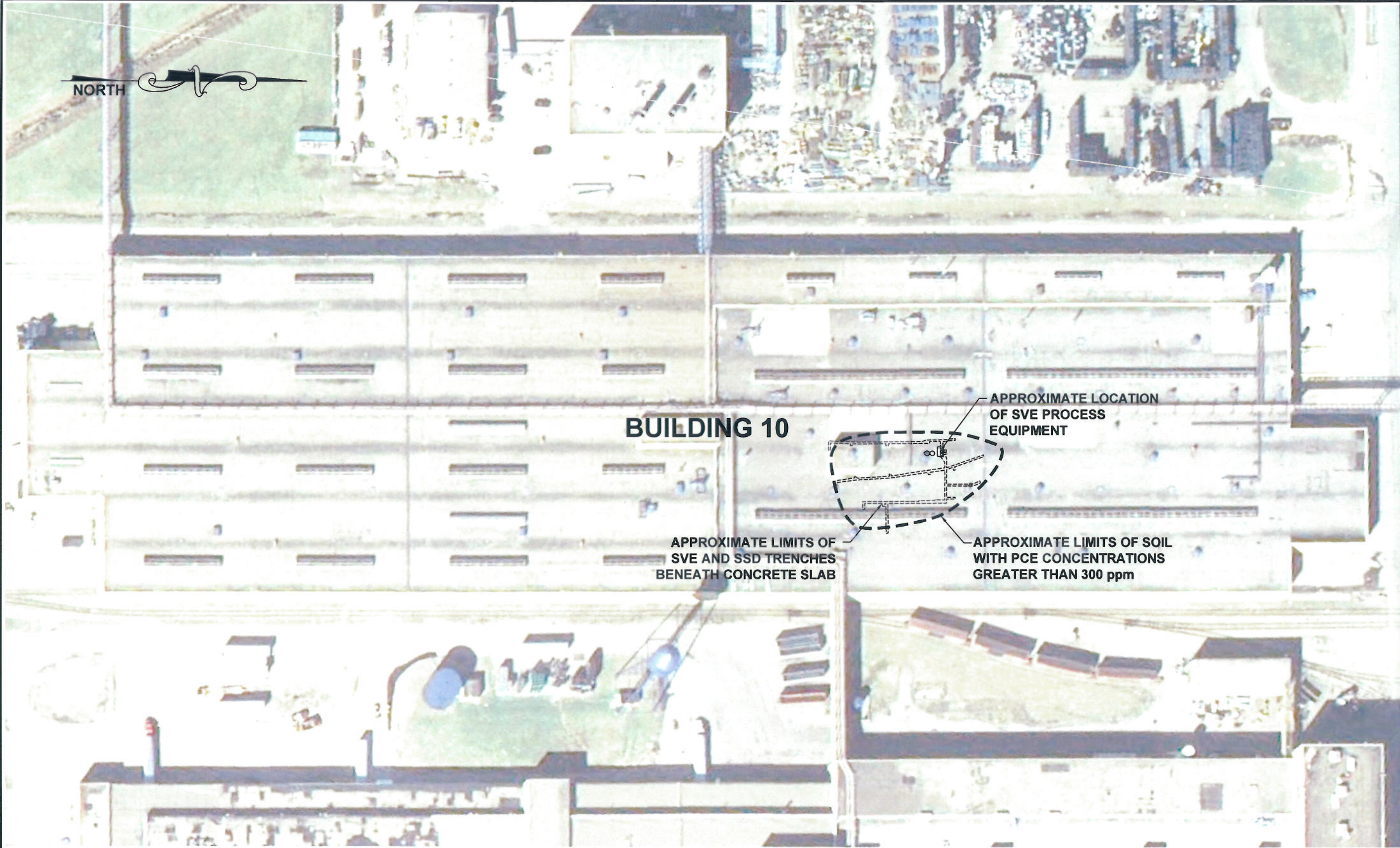
**LEGEND:**

-  INDICATES BUILDING 10 FOOTPRINT
-  APPROXIMATE LOCATION OF SVE/SSD SYSTEM

**NOTES:**

1. BASE MAP ADAPTED FROM A 2005 AERIAL PHOTOGRAPH DOWNLOADED FROM [http://www.nysgis.state.ny.us/gateway/mg/interactive\\_main.html](http://www.nysgis.state.ny.us/gateway/mg/interactive_main.html) AND SITE OBSERVATIONS.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

<div>DRAWN BY: DEW</div> <div>DATE: JULY 2009</div>		<div></div> <div>GZA GeoEnvironmental of New York</div>	
<div>APPROXIMATE SCALE IN FEET</div> <div><div>050100200</div><div><div></div><div></div><div></div><div></div><div></div></div></div>			
<div>DELPHI AUTOMOTIVE, LLC</div> <div>DELPHI LOCKPORT FACILITY</div> <div>200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK</div> <div>DELPHI BUILDING 10</div>			
<div>SVE / SSD SYSTEM INSTALLATION DOCUMENT</div> <div>BUILDING 10 AOI's</div>			
<div>PROJECT No.</div> <div>21.0056445.00</div>			
<div>FIGURE No.</div> <div>2</div>			



**NOTES:**

1. BASE MAP ADAPTED FROM A SITE PLAN PROVIDED BY THE CLIENT.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

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200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK  
DELPHI BUILDING 10

SVE / SSD SYSTEM INSTALLATION DOCUMENT  
AREA OF PCE CONCENTRATIONS ABOVE 300 ppm

PROJECT No.

**21.0056445.00**

FIGURE No.

**3**

APPROXIMATE SCALE IN FEET

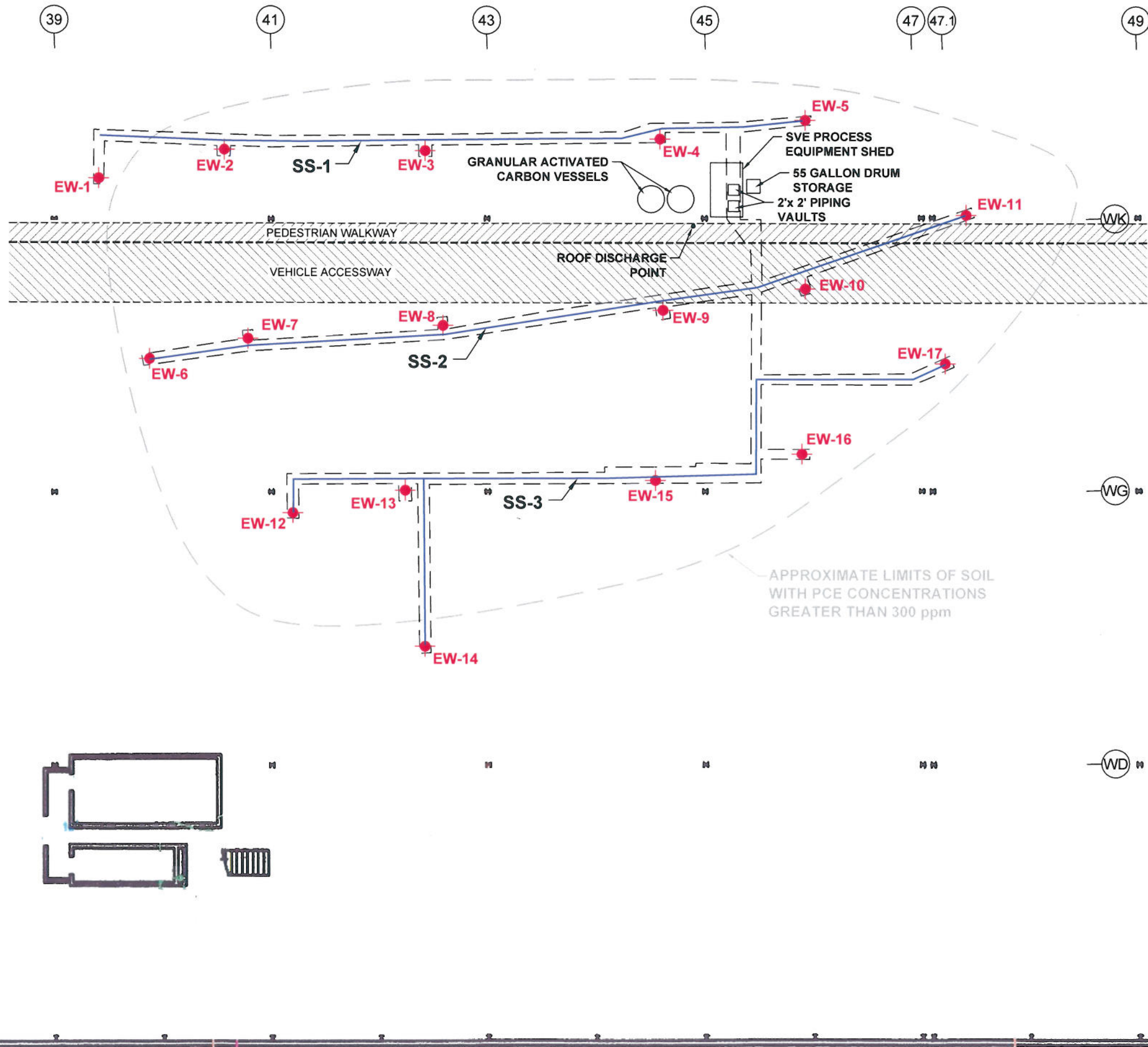


DRAWN BY: DEW

DATE: JULY 2009



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New York



**LEGEND:**

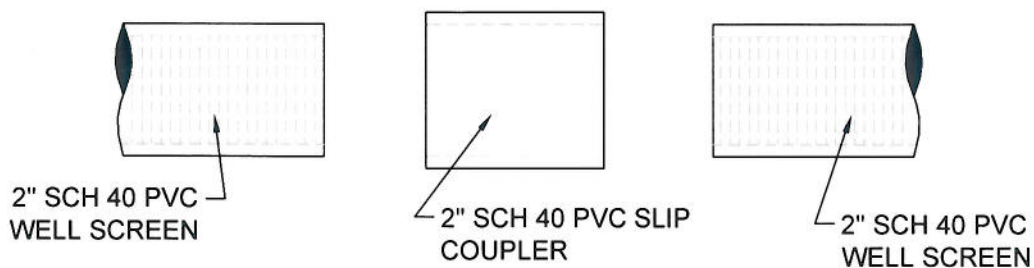
- APPROXIMATE LOCATION OF TRENCHES INSTALLED BENEATH CONCRETE SLAB FOR SVE AND SSD PIPING
- SS-1 SUB-SLAB LEG 1
- EW-1 APPROXIMATE LOCATION AND DESIGNATION OF 4-INCH DIAMETER SOIL VAPOR EXTRACTION WELL

**NOTES:**

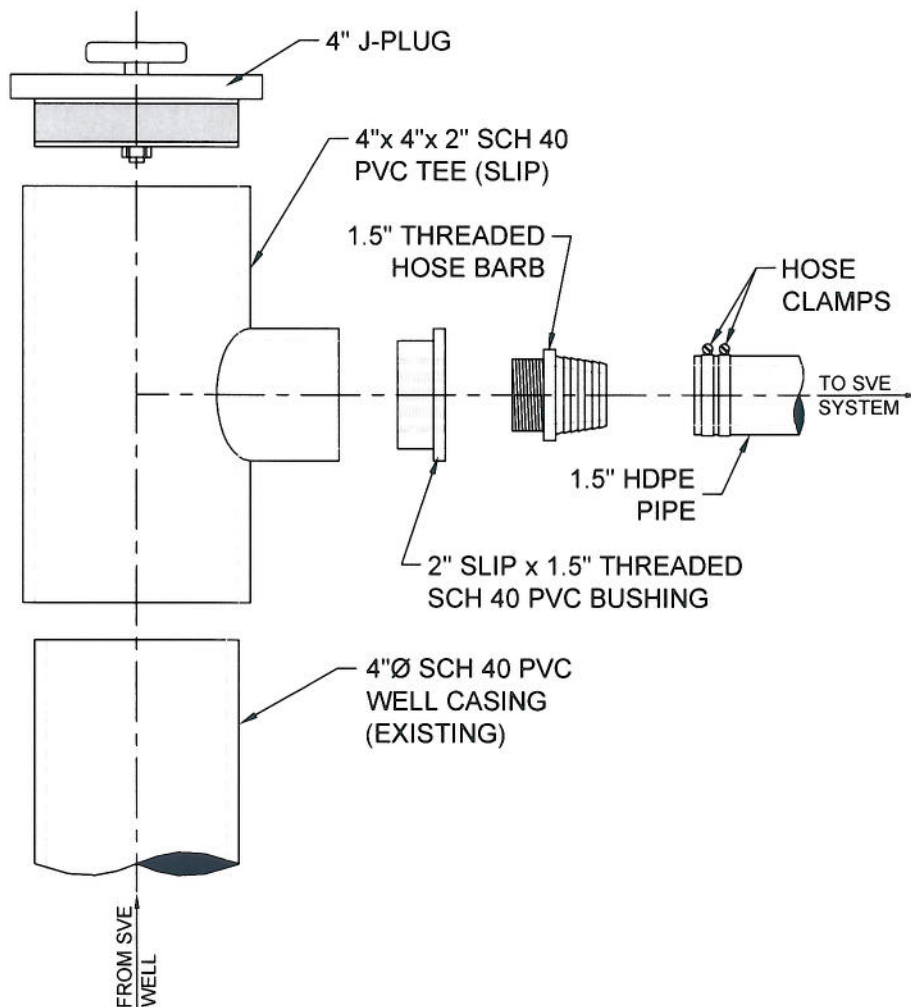
1. BASE MAP ADAPTED FROM A SITE PLAN PROVIDED BY THE CLIENT.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

DRAWN BY: DEW DATE: JULY 2009		GZA GeoEnvironmental of New York	
APPROXIMATE SCALE IN FEET 0 10 20 40		DELPHI AUTOMOTIVE, LLC DELPHI LOCKPORT FACILITY 200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK DELPHI BUILDING 10 SVE / SSD SYSTEM INSTALLATION DOCUMENT SVE / SSD SYSTEM LAYOUT	
PROJECT No. 21.0056445.00		FIGURE No. 4	

## SUB-SLAB DEPRESSURIZATION SYSTEM PIPING



## SOIL VAPOR EXTRACTION SYSTEM PIPING



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DATE: JULY 2009



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New York

NOT TO SCALE

DELPHI AUTOMOTIVE, LLC  
DELPHI LOCKPORT FACILITY  
200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK  
DELPHI BUILDING 10

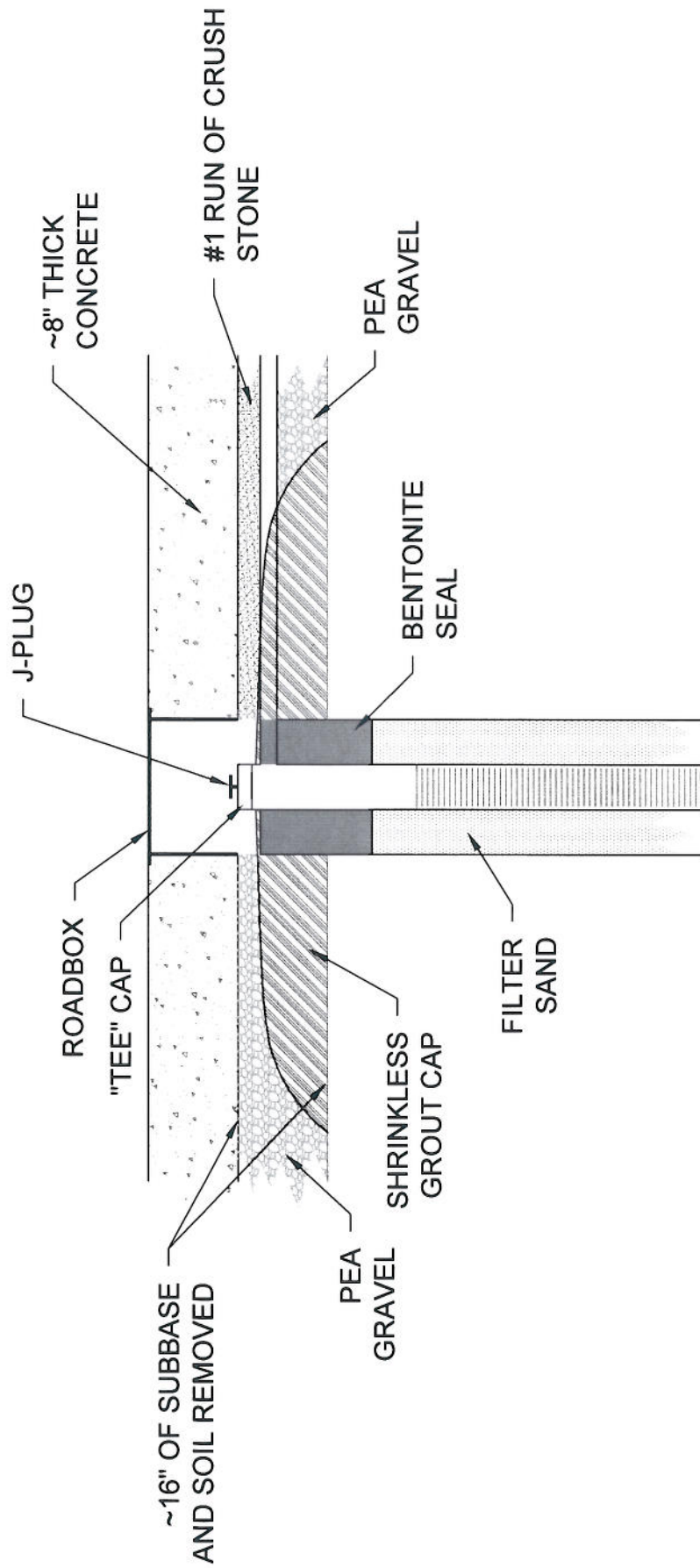
SVE / SSD SYSTEM INSTALLATION DOCUMENT  
PIPE FITTING SCHEMATIC FOR SVE WELL HEAD  
AND SSD PIPING

PROJECT No.

21.0056445.00

FIGURE No.

5



PROJECT No.

**21.0056445.00**

FIGURE No.

**6**

**DELPHI AUTOMOTIVE, LLC**

**DELPHI LOCKPORT FACILITY**

200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK

**DELPHI BUILDING 10**

**SVE / SSD SYSTEM INSTALLATION DOCUMENT**

**SVE WELL HEAD GROUT CAP DETAIL**

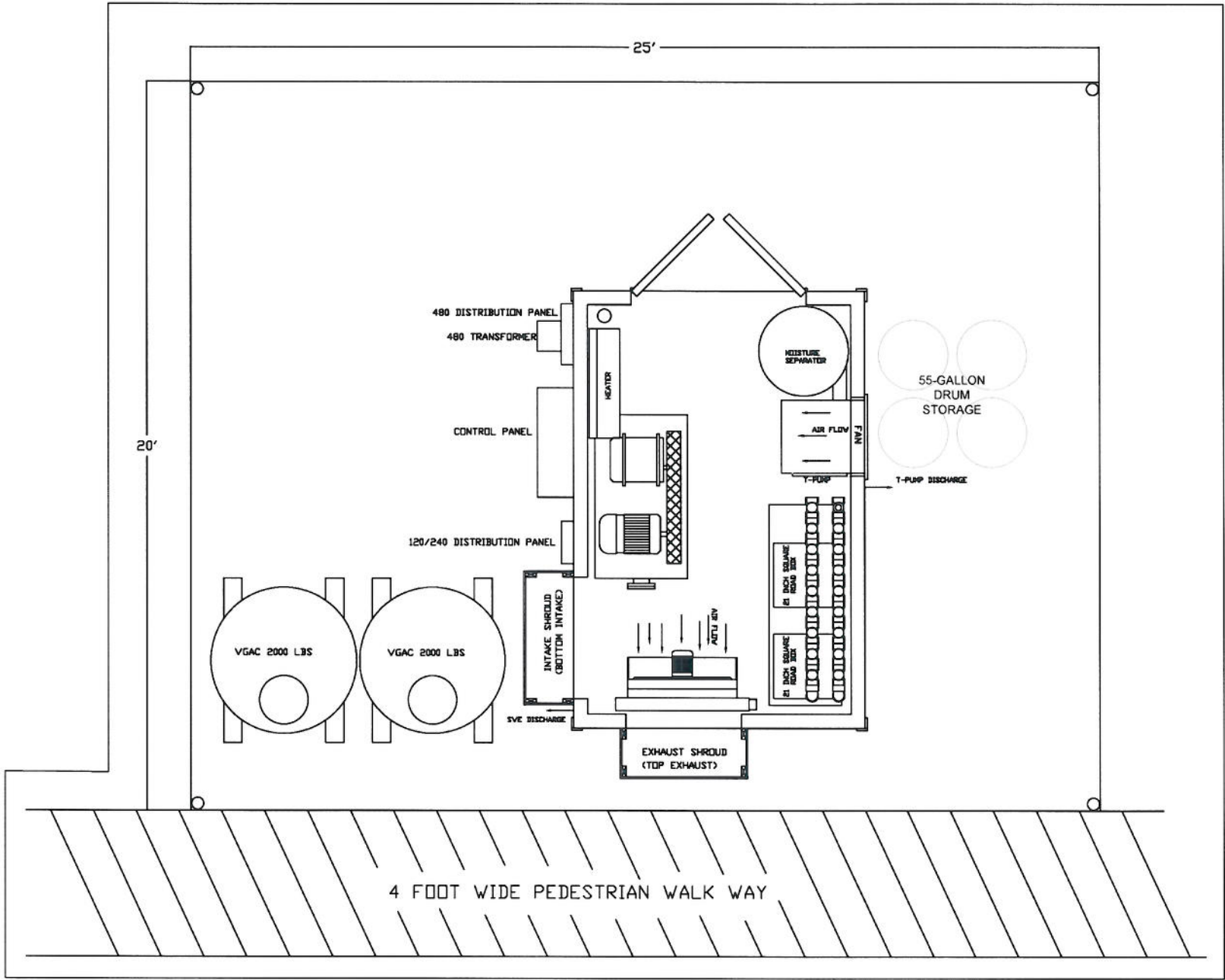
NOT TO SCALE



**GZA GeoEnvironmental of  
New York**

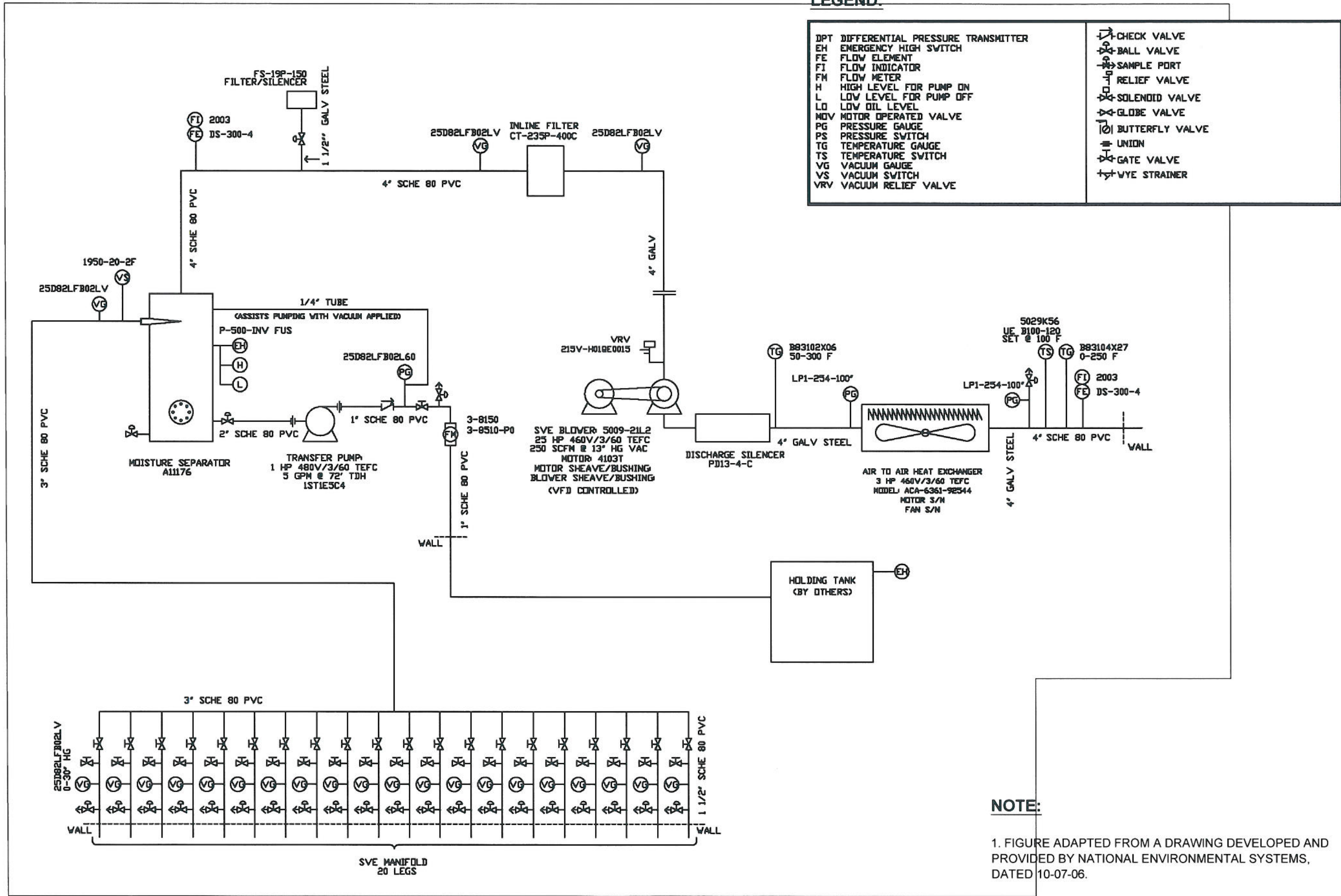
DRAWN BY: DEW

DATE: JULY 2009



**NOTE:**  
1. FIGURE ADAPTED FROM A DRAWING DEVELOPED AND PROVIDED BY NATIONAL ENVIRONMENTAL SYSTEMS, DATED 10-07-06.

DRAWN BY: DEW DATE: JULY 2009		GZA GeoEnvironmental of New York	
DELPHI AUTOMOTIVE, LLC DELPHI LOCKPORT FACILITY 200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK DELPHI BUILDING 10		APPROXIMATE SCALE IN FEET 0 2 4 8	
PROJECT No. 21.0056445.00		SVE / SSD SYSTEM INSTALLATION DOCUMENT SVE / SSD SYSTEM SHED LAYOUT	
FIGURE No. 7			



DRAWN BY: DEW

DATE: JULY 2009



GZA GeoEnvironmental of  
New York

NOT TO SCALE

DELPHI AUTOMOTIVE, LLC  
DELPHI LOCKPORT FACILITY  
200 UPPER MOUNTAIN ROAD, LOCKPORT, NEW YORK  
DELPHI BUILDING 10

SVE / SSD SYSTEM INSTALLATION DOCUMENT  
SVE / SSD SYSTEM PROCESS AND  
INSTRUMENTATION DIAGRAM

PROJECT No.

21.0056445.00

FIGURE No.

8



**APPENDIX A**  
**DISPOSAL DOCUMENTATION**

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator ID Number NYD002126982	2. Page 1 of 1	3. Emergency Response Phone 800-525-5043	4. Manifest Tracking Number 000513588 GBF	
5. Generator's Name and Mailing Address 200 Upper Mountain Road Lockport, New York 14094 Generator's Phone: 716-439-3302				6. Generator's Site Address (if different than mailing address) Delphi Thermal Systems Same Attn: C. Tudor-Schulte Bldg. 7A		
8. Transporter 1 Company Name Tonawanda Tank Transport				U.S. EPA ID Number NYD097644801		
7. Transporter 2 Company Name				U.S. EPA ID Number		
9. Designated Facility Name and Site Address Michigan Disposal Waste Treatment Plant 49350 North I-94 Service Drive Belleville, MI 48111 Facility's Phone: 800-592-5480				U.S. EPA ID Number MID0009724621		
GENERATOR	9a. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No. Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes	
	X HQ, Hazardous Waste Solid, N.O.S., 9, NA3077, III (U210) (ERG 171)	01 CM	26,000 R		U210	L
<div style="border: 2px solid black; padding: 10px; text-align: center;"> <b>RECEIVED</b>  <b>FEB 19 2008</b>  <b>DELPHI THERMAL SYSTEMS</b>  <b>ENVIRONMENTAL</b> </div>						
14. Special Handling Instructions and Additional Information One Time LDR'S On File. * ALL WEIGHTS ARE NET * CONTAIN AND ABSORB SPILLED MATERIAL.						
15. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, labeled and placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste management statement identified in 40 CFR 263.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.						
Generator's/Owner's Printed/Typed Name Cynthia M. Tudor-Schulte				Signature Cynthia M. Tudor-Schulte		Month Day Year 01/31/08
TRANSPORTER (INTL)	16. International Shipments <input type="checkbox"/> Import to U.S. <input type="checkbox"/> Export from U.S.		Port of entry/exit: Date leaving U.S.:			
	17. Transporter Acknowledgment of Receipt of Materials					
	Transporter 1 Printed/Typed Name Jeff Goodale		Signature Jeff Goodale		Month Day Year 01/31/08	
	Transporter 2 Printed/Typed Name PI		Signature PI		Month Day Year	
DESIGNATED FACILITY	18. Discrepancy 18a. Discrepancy Indication Space <input type="checkbox"/> Quantity <input type="checkbox"/> Type <input type="checkbox"/> Residue <input type="checkbox"/> Partial Rejection <input type="checkbox"/> Full Rejection					
	Manifest Reference Number:					
	18b. Alternate Facility (or Generator) U.S. EPA ID Number					
	Facility's Phone:					
18c. Signature of Alternate Facility (or Generator) Month Day Year						
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)						
20. Designated Facility Owner or Operator Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a						
Printed/Typed Name Ryan Rushman				Signature Ryan Rushman		Month Day Year 2/1/08



**Modern Disposal Services, Inc.**  
4746 Model City Rd  
Model City, NY 14107-0209  
1-800-662-0012 (716) 754-8226 Fax (716) 754-8964

TRANSACTION #: TK-3772255-000

DATE: 01/10/08

SERVICE SITE: DELPHI THERMAL AND INTERIOR  
19298.034

COMMODITY: 0100-0230

CONTAINER SIZE: 20.00

TRANSACTION TYPE/STYLE: EMPTY AND NO RETURN

SERVICE CODE: ROLLOFF

TRANSPORTATION (M01-1581) COL WK#45 \*\*ORDER# 356922\*\*

nmhwy waste  
ID tracking no 002-08

SERVICE CODE: ROLLOFF

TRANSPORTATION (M01-1581) COL WK#45 \*\*ORDER# 356922\*\*

**NOTES:**

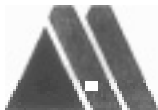
Bldg 10 Concrete / gravel  
nmhwy waste ID tracking no 002-08

DRIVER SIGNATURE

CUSTOMER SIGNATURE

**\*\*\*PLEASE NOTE INDEMNIFICATION AGREEMENT\*\*\***

The Customer agrees to indemnify, defend and hold harmless the Contractor against all claims, damages, suits, judgments, penalties, fines and other liability or injury or death to persons or loss or damage to property arising out of the Customer's use, operation or possession of the equipment or arising out of the Customer's breach of any warranty created hereunder by the Customer. The Customer shall not overload the equipment nor use it for incineration purposes or make alterations without the contractor's written approval.



**Modern Disposal Services, Inc.**  
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Model City, NY 14107-0209  
1-800-662-0012 (716) 754-8226 Fax (716) 754-8964

TRANSACTION #: TK-3772255-000

DATE: 01/10/08

SERVICE SITE: DELPHI THERMAL AND INTERIOR  
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COMMODITY: 0100-0230

CONTAINER SIZE: 20.00

TRANSACTION TYPE/STYLE: EMPTY AND NO RETURN

SERVICE CODE: ROLLOFF

TRANSPORTATION (M01-1581) COL WK#45 \*\*ORDER# 356922\*\*

nmhwy waste  
ID tracking no 002-08

# TONAWANDA TANK TRANSPORT SERVICE, INC.

1140 MILITARY ROAD  
P.O. BOX H  
BUFFALO, NY 14217  
(716) 873-9703

3990 U.S. ROUTE 42  
MASON, OH 45040  
(513) 398-6997

DATE

1/28/08

PICK UP		DELIVERY	
SHIPPER	NAME <u>Delphi Thermal</u>	CONSIGNEE	NAME <u>Modern Landfill</u>
	STREET <u>Upper mtn rd</u>		STREET <u>Model City rd</u>
	CITY <u>Lockport</u> STATE <u>ny</u> ZIP CODE _____		CITY <u>Model City</u> STATE _____ ZIP CODE _____
	CONTACT NAME _____		CONTACT NAME _____
	SCHEDULED TIME <u>8am</u>		SCHEDULED TIME <u>12:00</u>
ADDITIONAL INFORMATION <u>Pickup only at Bldg 10</u>		ADDITIONAL INFORMATION 	
PURCHASE ORDER NO. _____	WORK ORDER NUMBER _____	MANIFEST NUMBER _____	PRODUCT CODE _____
LOAD NUMBER <u>10801146</u>	TRACTOR NUMBER <u>213</u>	TRAILER NUMBER <u>2138-195</u>	DRIVER'S NAME <u>Hennis</u>
TYPE (CIRCLE ONE) TANK (S/S) (R/L) VAC DUMP VAN ROLL-OFF FLATBED	MATERIAL DESCRIPTION <u>Non Haz waste 10 tracking no. 005-08</u> <u>Bldg 10 Col w K45 Soil (Vapor Extraction System)</u> <u>Customer No. 19298.034</u> <u>M011581</u>		QUANTITY <u>20 cu yds</u>
PICK UP		DELIVERY	
ARRIVAL TIME _____ AM PM RELEASE TIME <u>4:00</u> <u>AM</u>		DRIVER _____ DATE _____	
TRAILER EMPTY UPON ARRIVAL (If not, explain below) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		ARRIVAL TIME _____ AM PM RELEASE TIME _____ AM PM	
DIP MEASUREMENT (Tankers Only) _____ INCHES		TRAILER EMPTY UPON DEPARTURE <input type="checkbox"/> YES <input type="checkbox"/> NO (If not, explain below)	
COMMENTS: (EXPLAIN ALL DELAYS) <u>time delay to get train well available</u>		COMMENTS: (EXPLAIN ALL DELAYS) 	
I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.  X <u>[Signature]</u> SHIPPER'S SIGNATURE		I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.  X _____ CONSIGNEE'S SIGNATURE	

## OFFICE USE ONLY

DRIVE

TRIP \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_  
LAYOVER \_\_\_\_\_

ACCOST

DRIVER'S # \_\_\_\_\_  
FREIGHT \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_

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P.O. BOX H  
BUFFALO, NY 14217  
(716) 873-9703

3990 U.S. ROUTE 42  
MASON, OH 45040  
(513) 398-6997

DATE

1/28/08

PICK UP		DELIVERY	
SHIPPER	NAME <i>Delphi Thermal</i>	CONSIGNEE	NAME <i>Modern Landfill</i>
	STREET		STREET
	CITY <i>Lockport</i> STATE <i>ny</i> ZIP CODE		CITY <i>Model City</i> STATE <i>ny</i> ZIP CODE
	CONTACT NAME		CONTACT NAME
	SCHEDULED TIME		SCHEDULED TIME
ADDITIONAL INFORMATION <i>Pickup Only</i>		ADDITIONAL INFORMATION	

PURCHASE ORDER NO

WORK ORDER NUMBER

MANIFEST NUMBER

PRODUCT CODE

LOAD NUMBER	TRACTOR NUMBER	TRAILER NUMBER	DRIVER'S NAME
<i>10801147</i>		<i>213B</i>	<i>Hennis</i>
TYPE (CIRCLE ONE)	MATERIAL DESCRIPTION		QUANTITY
TANK (S/S) (R/L) VAC DUMP VAN ROLL-OFF FLATBED	<i>Non Haz Waste 10 tracking no 006-08</i> <i>Bldg 10 WK 45 Soil (Vapor Extraction System)</i> <i>Customer No. 19298.034</i> <i>M011581</i>		<i>20 cu yd</i>

PICK UP	DELIVERY
ARRIVAL TIME _____ AM PM RELEASE TIME _____ AM PM	DRIVER _____ DATE _____ ARRIVAL TIME _____ AM PM RELEASE TIME _____ AM PM
TRAILER EMPTY UPON ARRIVAL <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (If not, explain below)	TRAILER EMPTY UPON DEPARTURE <input type="checkbox"/> YES <input type="checkbox"/> NO (If not, explain below)
WIP MEASUREMENT (Tankers Only) _____ INCHES	COMMENTS: (EXPLAIN ALL DELAYS)
COMMENTS: (EXPLAIN ALL DELAYS) <i>no delays</i>	COMMENTS: (EXPLAIN ALL DELAYS)
I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.	I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.
X <i>Computer - [Signature]</i> SHIPPER'S SIGNATURE	X _____ CONSIGNEE'S SIGNATURE

## OFFICE USE ONLY

TRIP \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_  
LAYOVER \_\_\_\_\_  
VAC \_\_\_\_\_

DRIVER'S # \_\_\_\_\_  
FREIGHT \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_  
MISC \_\_\_\_\_

# TONAWANDA TANK TRANSPORT SERVICE, INC.

1140 MILITARY ROAD  
P.O. BOX H  
BUFFALO, NY 14217  
(716) 873-9703

3990 U.S. ROUTE 42  
MASON, OH 45040  
(513) 398-6997

DATE

01 / 29 / 08

PICK UP		DELIVERY	
SHIP	NAME DELPHI THERMAL	CONSIGNEE	NAME MODERN LANDFILL
	STREET UPPER MOUNTAIN RD		STREET MODEL CITY RD
	CITY LOCKPORT NY.		CITY MODEL CITY NY.
	STATE NY.		STATE NY.
	ZIP CODE		ZIP CODE
	CONTACT NAME		CONTACT NAME
	SCHEDULED TIME 09:00 AM		SCHEDULED TIME
ADDITIONAL INFORMATION PICK UP ONLY		ADDITIONAL INFORMATION	

PURCHASE ORDER NO.

WORK ORDER NUMBER

MANIFEST NUMBER

PRODUCT CODE

LOAD NUMBER

10801156

TRACTOR NUMBER

90

TRAILER NUMBER

201 / 522

DRIVER'S NAME

LEBARRON

TYPE (CIRCLE ONE)

MATERIAL DESCRIPTION

QUANTITY

TANK (S/S) (R/L)

VAC

DUMP

VAN

ROLL-OFF

FLATBED

Non-Haz waste tracking no. 007-08  
Modern Approval No. MDI-1501  
Customer No. 19298-034  
Building 10 WK 45 Soil - Vapor Ext. Pro.

PICK UP

DELIVERY

ARRIVAL TIME 7:15

AM

PM RELEASE TIME 8:00

AM

PM

TRAILER EMPTY UPON ARRIVAL

(If not, explain below)

☐ YES

☐ NO

DIP MEASUREMENT (Tankers Only)

INCHES

COMMENTS: (EXPLAIN ALL DELAYS)

B-140 Picked up

I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.

SHIPPERS SIGNATURE

DRIVER

DATE

ARRIVAL TIME

AM

PM RELEASE TIME

AM

PM

TRAILER EMPTY UPON DEPARTURE

(If not, explain below)

☐ YES

☐ NO

COMMENTS: (EXPLAIN ALL DELAYS)

I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.

CONSIGNEE'S SIGNATURE

## OFFICE USE ONLY

TRIP

TOLLS

DEMURRAGE

LAYOVER

DRIVER'S #

FREIGHT

TOLLS

DEMURRAGE

DR

ACCOUNT

# TONAWANDA TANK TRANSPORT SERVICE, INC.

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P.O. BOX H  
BUFFALO, NY 14217  
(716) 873-9703

3990 U.S. ROUTE 42  
MASON, OH 45040  
(513) 398-6997

DATE

01 / 29 / 08

PICK UP				DELIVERY			
SHIPPER	NAME DELPHI THERMAL			NAME MODERN LANDFILL			
	STREET UPPER MOUNTAIN RD			STREET MODEL CITY RD			
	CITY LOCKPORT NY.	STATE	ZIP CODE	CITY MODEL CITY NY.	STATE	ZIP CODE	
	CONTACT NAME			CONTACT NAME			
	SCHEDULED TIME 08:00 AM			SCHEDULED TIME			
ADDITIONAL INFORMATION PICK UP ONLY				ADDITIONAL INFORMATION			
PURCHASE ORDER NO.		WORK ORDER NUMBER		MANIFEST NUMBER		PRODUCT CODE	
LOAD NUMBER 10801155		TRACTOR NUMBER 86		TRAILER NUMBER 2021 PM		DRIVER'S NAME Goodale	
TYPE (CIRCLE ONE) TANK (S/S) (R/L) VAC DUMP VAN <u>ROLL-OFF</u> FLATBED		MATERIAL DESCRIPTION Non-Haz waste tracking no. 008-08 Customer No. 19298-034 Building 10 WK 45 Soil-Vap Ext. Pro. MO11581				QUANTITY	
PICK UP				DELIVERY			
ARRIVAL TIME 850 AM				DRIVER _____ DATE _____			
TRAILER EMPTY UPON ARRIVAL <input type="checkbox"/> YES <input type="checkbox"/> NO				ARRIVAL TIME _____ AM PM RELEASE TIME _____ AM PM			
DIP MEASUREMENT (Tankers Only) _____ INCHES				TRAILER EMPTY UPON DEPARTURE <input type="checkbox"/> YES <input type="checkbox"/> NO			
COMMENTS: (EXPLAIN ALL DELAYS) Pickup Only-B214				COMMENTS: (EXPLAIN ALL DELAYS)			
I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.				I, THE UNDERSIGNED, CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE.			
X <u>Cynthia M. Jones</u> SHIPPER'S SIGNATURE				X _____ CONSIGNEE'S SIGNATURE			

## OFFICE USE ONLY

TRIP \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_  
LAYOVER \_\_\_\_\_  
VAC \_\_\_\_\_

DRIVER'S # \_\_\_\_\_  
FREIGHT \_\_\_\_\_  
TOLLS \_\_\_\_\_  
DEMURRAGE \_\_\_\_\_  
MISC. \_\_\_\_\_



## **APPENDIX B**

### **FORMS**

**ROUTINE MONITORING FORM**  
**SVE/SSD SYSTEM INSTALLATION DOCUMENT**  
**DELPHI**  
**LOCKPORT, NEW YORK**

Name: _____		Time On-Site: _____		Time Off-Site: _____			
Date: _____		SVE Blower Run Time: _____		hours	VDF: _____ hertz		
<b>SYSTEM STATUS</b>							
SVE System Operating:	YES	NO	If no: _____				
Alarm lights off:	YES	NO	If no: _____				
Autodialer Alarm On:	YES	NO	If Yes: _____				
<b>Position of Swing Panel HOA Switches:</b>							
Control Power Switch	ON	OFF	SVE Blower Switch	HAND	OFF AUTO		
M/S Effluent Pump Switch	HAND	OFF AUTO	Heat Exchanger Switch	HAND	OFF AUTO		
Heat Exchanger Operating	YES	NO	If no: _____				
SVE System appear to be operating properly?	YES	NO	If no: _____				
Moisture Separator Tank Level:	Empty	1/4 Full	1/2 Full	3/4 Full	Full Volume Tranfered: _____ gals		
<b>SYSTEM MONITORING READINGS</b>							
Vacuum Gauge Pre-Inline Filter:	in Hg		<b>System Monitoring Notes:</b>          				
Vacuum Gauge Post-Inline Filter:	in Hg						
Temperature on Discharge Silencer:	° F						
Temperature after Heat Exchanger:	° F						
Pressure After Heat Exchanger	in H <sub>2</sub> O						
Pressure Before Heat Exchanger	in H <sub>2</sub> O						
Pressure Magnehelic Gauge:	in H <sub>2</sub> O						
Vacuum Magnehelic Gauge:	in H <sub>2</sub> O						
Vacuum Gauge After Manifold:	in Hg						
<b>EXTRACTION WELL VACUUM GAUGE READINGS</b>							
EW -1:	in Hg		EW-11:	in Hg		<b>Vaccum Gauge Reading Notes:</b>          	
EW-2:	in Hg		EW-12:	in Hg			
EW-3:	in Hg		EW-13:	in Hg			
EW-4:	in Hg		EW-14:	in Hg			
EW-5:	in Hg		EW-15:	in Hg			
EW-6:	in Hg		EW-16:	in Hg			
EW-7:	in Hg		EW-17:	in Hg			
EW-8:	in Hg		SS-1:	in H <sub>2</sub> O			
EW-9:	in Hg		SS-2:	in H <sub>2</sub> O			
EW-10:	in Hg		SS-3:	in H <sub>2</sub> O			
<b>AIR FLOW FIELD SCREENING</b>							
Background Outside SVE Shed:	ppm		<b>Detector Tube Readings</b>				
Background Inside SVE Shed:	ppm		Pre Carbon	YES	NO		_____ ppm
Pre Carbon Discharge:	ppm		Mid Carbon	YES	NO		_____ ppm
Mid Carbon Discharge:	ppm		Post Carbon	YES	NO		_____ ppm
Post Carbon Discharge:	ppm						
<b>Additional Notes:</b>          							

[illegible][illegible]

[illegible]



## **APPENDIX C**

### **EXAMPLE EXCEL SPREADSHEET FOR FLOW CALCULATIONS**

Dwyer DS-300 Averaging Pitot Tube - Vacuum Gauge

DIFFERENTIAL PRESSURE	2	INCHES H2O	FLOW	277	SCFM
FLOW COEFFICIENT	0.67		FLOW	326	ACFM
PIPE I.D.	3.826	INCHES			
STATIC PRESSURE	12.490	PSIA			
TEMPERATURE	60	DEG F			
SPECIFIC GRAVITY	1	AT 60 DEG F			

Variable inputs			VACUUM	IN Hg
				4.5
			PSIA	12.490

Dwyer DS-300 Averaging Pitot Tube - Pressure Gauge

DIFFERENTIAL PRESSURE	2.9	INCHES H2O	FLOW	360	SCFM
FLOW COEFFICIENT	0.67		FLOW	342	ACFM
PIPE I.D.	3.826	INCHES			
STATIC PRESSURE	15.458	PSIA			
TEMPERATURE	92	DEG F			
SPECIFIC GRAVITY	1	AT 60 DEG F			

Variable inputs	Static Pressure	in water
		21
	PSIA	15.458