PROPOSED INTERIM REMEDIAL MEASURE

FORMER COMPUTER CIRCUITS SUPERFUND SITE

145 Marcus Boulevard
Hauppauge (Town of Smithtown)
Suffolk County, New York

Site No: 1.52.034

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P.W. GROSSER CONSULTING INC.
PROJECT No. TED0001

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145 MARCUS BOULEVARD
HAUPPAUGE, NEW YORK

MARCH, 2003

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1.0 INTRODUCTION

P.W. Grosser Consulting Inc.(PWGC), was contracted by 145 Marcus Blvd. Corporation to prepare and implement a Remedial Investigation/Feasibility Study(RI/FS) at the former Computer Circuits Site, located at 145 Marcus Boulevard, Hauppauge, New York. The site was placed on the National Priorities List (NPL) effective May 10, 1999 and assigned EPA Index No. CERCLA-02-2000-2036.

The field work portion of the RI was conducted by PWGC from 12/17/01 to 7/24/02, in accordance with the terms and conditions as set forth in the Administrative Order on Consent (AOC), executed on September 29, 2000. A draft RI/FS report, dated January 3, 2003, was submitted to the USEPA on January 6, 2003 and is currently under review by this agency.

Based on the presence of trichloroethene (TCE) in air samples collected from the building, and the Human Health Risk Assessment, which identifies TCE as the only site-related contaminant with a potential for risk/hazards to human receptors, an interim remedial measure (IRM) was recommended in the RI report to reduce TCE concentrations in on-site soils and indoor air. The proposed IRM consists of a dual-purpose soil vapor extraction (SVE) system. The SVE system would include a single vertical extraction well installed within the contaminated zone of the north industrial pool, and a single horizontal extraction well installed beneath the concrete slab of the former silk screening room. Both extraction wells would remediate impacted soils through mass transfer from the sorbed to the vapor phase. The horizontal well installed beneath the building would also serve as an abatement system to prevent vapors from migrating to the building's interior.

1.1 RI Investigation

As noted above, the RI identified TCE in soils just beneath the slab of the former silk screening room, located in the north end of the building, and in soils within the north leaching pool which had received discharge from a sink in this room. TCE was also identified in air samples taken from three locations within the building.

1.1.1 Soil Borings

During the soil boring phase of the RI investigation, 48 shallow and four deep soil borings were performed across the site. Results from the shallow borings revealed concentrations of TCE in the vicinity of the northern industrial leaching pool and beneath the northern portion of the building. TCE was also found to exceed the EPA soil screening level of 60 μg/kg in four borings (SB15 (0'-2'), SB26 (5'-7'), SB31 (0'-2'), and SB32 (0'-2')). TCE in SB15(0'-2') was reported at a concentration of 12,000 μg/kg, which was the highest VOC concentration encountered during this phase of the investigation and the only value above NYSDEC Recommended Cleanup Objectives (RSCO).

Trichloroethene was the only compound detected in excess of its NYSDEC RSCO value or EPA soil screening level from samples collected from the four deep borings. The RSCO value for TCE of 700 μg/kg was exceeded in only one sample SDB3 (20'-22'), with a concentration of 55,000 μg/kg. The EPA soil screening level of 60 μg/kg for TCE was exceeded in two samples; SDB1 (15'-17') and SDB3 (20'-22'). The reported value of 55,000 μg/kg of TCE in SDB3 (20'-22') was obtained from a laboratory dilution. The estimated value for TCE in the sample prior to dilution was 2,100 μg/kg which correlated better with the field GC result of 804 μg/kg. SDB3 (20'-22') was collected from the base level of the north industrial pool. Deeper samples from this pool submitted for analysis did not detect VOCs above RSCOs. The location of the shallow and deep soil borings advanced during the remedial investigation is shown in **Figure 1**. Refer to the Draft RI report for additional information.

1.1.2 Indoor Air Sampling

Air samples were collected on July 24, 2002 from four locations (3 interior, 1 exterior) and compared to EPA and NYSDOH background levels, EPA Region 9 Preliminary Remediation Goals and OSHA Exposure Limits to assess the ambient indoor air quality (see **Figure 2**). VOCs detected above at least one of the guidance values referenced, included 1,1-DCA,1,1,1-TCA, 1,2-DCA, 1,2-DCE, 2-butanone, acetone, chloromethane, methylene chloride, toluene, TCE, vinyl chloride and xylenes. 1,1-DCA,1,1,1-TCA, acetone, methylene chloride, and toluene were also detected in the outdoor control sample.

The only parameter detected above OSHA exposure limits was 1,1,1-TCA at 3,500 $\mu g/m^3$ in sample AS2, located in a former office which served as the on-site laboratory during the investigation. 1,1,1-TCA was not used in the room for any purpose at any point during the investigation and soil or groundwater samples were not present in the room during air sampling. 1,1,1-TCA was also detected at elevated levels (1,800 $\mu g/m^3$) in the outdoor sample, AS4. TCE, which was the only VOC parameter detected in soil (north side of building) above NYSDEC RSCOs, was also detected above ambient air reference values in the three indoor sampling locations. The highest concentration of TCE in air was 220 $\mu g/m^3$ in AS1, located in the former silk screening room. TCE was also reported, however, in AS3, located in the office area of the building at a concentration of 47 $\mu g/m^3$.

2.0 SYSTEM DESIGN

2.1 System Description

PWGC proposes to install an SVE system along the north side of the building. The system would consist of two separate extraction wells connected to a single regenerative blower. The extraction point beneath the building will be a horizontal well, 4 inches in diameter and 10 feet long, installed just beneath the floor slab (see **Figure 3**). The second extraction point will be a vertical SVE well installed adjacent to the former industrial leaching pool with a split screen across the two areas of heaviest contaminant concentrations (see **Figure 3**). The wells will be piped together via a common PVC header system with isolation valves so that each well may be operated independently of one another. Soil gases removed through the wells are drawn back to the SVE system enclosure shed. Once inside the shed the contaminated soil vapors will pass through an air flow meter, a moisture separator, a particulate filter, the blower and then pass through a series of two carbon drums before being discharged to the atmosphere via a 2-inch diameter exhaust stack. A vacuum relief valve will be installed as an integral part of the moisture separator. An air-bleed valve is to be installed upstream of the blower to serve as a flow and vacuum control device as well as a dilution source for the contaminants. A series of vacuum and pressure gages and sample ports are indicated to be installed at various locations throughout the system to assist in monitoring and evaluating the system's operating performance.

2.2 Design Criteria

The design is conceptual in nature and predicated on theoretical equations, typical design parameters for Long Island sand formations and a few key assumptions involving the physical behavior of soil gases and the system performance. Most design parameters have been assumed based on similar type SVE systems on Long Island. This is considered appropriate since there are no unusual geologic conditions present at the site.

The contaminated soil has been described as a medium grained (0.25 mm to 0.5 mm - USDA) uniform sand based on soil borings taken at the site. Based on the observed uniformity of the soil (poorly graded, well sorted) it is assumed to be a relatively porous (i.e., a porosity around 0.3) material and thus a good candidate for an SVE remedial system. The major contaminants of concern include: trichloroethylene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane(1,2-DCA), tetrachloroethylene (PCE) and acetone, with the primary contaminant of concern being TCE. The contaminants are volatile organics and are very susceptible to removal from the vadose zone using a vacuum extraction technology. Due to the chemical properties of the contaminants, the porous nature of the soil and the large depth to groundwater (~ 100'), SVE has been selected as the interim remedial measure to remediate the contaminated unsaturated zone of the site at 145 Marcus Blvd. Site characterization has identified two contaminated areas of the unsaturated zone requiring remediation, an area located underneath the building along the north side of the facility and in an area that was formerly used as an industrial leaching pool (see **Figure 3**). The area beneath the building is reported to have shallow contamination on the order of only a couple of feet below the bottom of the floor slab (2' - 3'). Within the area of the former industrial leaching pool, the contamination extends roughly from the bottom of the pool to the water table, with the greatest concentrations of contaminants occurring between 25 and 45 feet and 65 and 85 feet below grade.

A design flow rate of 125 cfm was decided upon based on the extent and type of contamination and the porosity of the soil. Fairly low well head vacuums (on the order of 7 to 8 inches of water column) were determined to be necessary to achieve a radius of influence of around 30 feet (**Table 1**). A 2 hp regenerative blower with an operating point of 125 cfm at 21 inches of water column was selected to meet the design criteria (**Table 2**). The blower motor is to be an explosion proof single phase, 115 volt electric motor.

2.2.1 Emission Rate Estimates

An estimate of the mass removal rate for each of the identified VOCs within the combined remediation areas was made for comparison to the maximum allowable emission rate potential (ERP) as specified in the NYSDEC Air Guide 1.

This was done by first calculating an average core area concentration based on an average of the highest concentration within the two target areas.The average soil concentration through the entire influence area covered by the SVE extraction wells was then estimated by applying an influence area to core area volume dilution ratio of 9 to 1 (**Table 3**). Soil gas concentrations were calculated from the average influence area soil concentration using an equation based on the Johnson-Ettinger model, as presented in ASTM E1739-95 (**Table 4**). Calculated soil gas values were then entered into the Air Guide 1 tables for comparison to annual and short-term concentration guidelines (ACG, SCG). As shown in the ERP tables provided in **Attachment A**, individual VOC emissions from the SVE system will be within both ACG and SCG benchmrks.

2.3 System Details

2.3.1 SVE Blower

The SVE Blower specified is an EG&G Rotron regenerative blower, model number EN505AX58ML. This blower is capable of delivering the required 125cfm at 21" H_2O. The blower is equipped with a 2HP explosion proof motor. A copy of the blower's physical and performance specifications is included in **Attachment B**. The blower will be fitted with an air filter and condensate drum to protect the blower from damage caused by water and/or particulates.

2.3.2 Granulated Activated Carbon Units

The system is currently designed to use Granulated Activated Carbon (GAC) units to remove VOCs from the discharge air. GAC emissions treatment will be provided by two General Carbon 85 gallon Air Pollution barrels connected in series. The units contain 300 pounds of virgin vapor phase carbon each and are capable of handling a maximum air flow rate of 180 cfm. A copy of the GAC unit specifications is included in **Attachment B**. The system will include necessary piping and control valves to bypass carbon treatment of the effluent, if sampling shows that the VOC concentrations in the effluent air stream is within discharge limits.

2.3.3 Piping

The system will be constructed with standard schedule 40 PVC pipe for all influent lines under vacuum. Discharge lines will be constructed with a combination of schedule 40 PVC and flexible hosing. The flexible hoses will be used to connect the GAC units with quick-disconnect couplings.

This configuration will allow for easy replacement of the GAC units should they require replacement. The system piping layout is shown on **Figure 4.**

2.3.4 Electrical

Electrical power for the system will be provided from the existing building. Power will be delivered to the shed via conduit to the final location of the system building. A circuit breaker panel will be installed within the building to distribute power to the system components, lighting, and accessory outlets as needed. A motor starter unit will be installed for the SVE blower which will also provide overload protection of the blower.

2.3.5 System Building

The system will be housed within a pre-constructed 10 ftx10 ftx8 ft high structure. The structure will be weather tight and comply with local requirements for an accessory structure. The building will have a minimum door size of 6'-6" high and 3'-0" wide to allow sufficient room for the system equipment. The building will be installed on a 4-inch thick concrete slab as indicated in **Figure 4**.

3.0 SYSTEM STARTUP

The objectives of the commissioning and start-up phase of a remediation system are to:

- confirm that the system has been constructed as designed;
- check that the equipment operates as specified;
- facilitate modifications to the system based on observations of site conditions that are different than expected during system installation; and
- gather and evaluate initial operational data.

This section presents an overall strategy to follow in preparing a Start-Up Plan to carry out commissioning, shakedown, and start-up activities of the system.

3.1 System Shakedown and Testing

The shakedown and testing process is comprised of three primary activities:

- Pre-commissioning check;
- Functional performance tests of individual components;
- Pre-start-up, functional performance system testing of the combined components.

3.1.1 Pre-commissioning Check-out

This is an inspection to verify that all the components of the system have been properly installed. A checklist for these pre-commissioning activities will be prepared based upon the final system design. Any deficiencies must be corrected and re-tested prior to proceeding to the next phase of testing. The pre-commissioning checklist is a working document that determines if an aspect of the system meets requirements (MR), or requires further action (FA). If further action is needed the required repairs or modifications will be performed.

3.1.2 Equipment Functional Test

The equipment functional performance tests should only commence after all the pre-commissioning checks have been performed successfully. The individual function tests would be performed on components such as the blower, condensate high level float, and the high vacuum valve. The equipment functional performance tests will be carried out in a manner verify that the components operate correctly and within specifications.

3.1.3 Pre-startup Functional Performance System Testing

After the pre-commissioning checks and individual component testing has been successfully completed, the testing of the entire system is performed to verify integrity prior to actual operation. Any deficiencies with the system must be corrected and performance checks successfully completed before the system can go into full operation. The system will be operated with both SVE extraction wells closed. The vacuum bleeder valve will be opened to keep the system vacuum within typical operating values. During this portion of the test, operation of the system as a whole can be assessed. PWGC will inspect the system for piping leaks, loose equipment, and verify that the individual components do not interfere with each other.

3.2 System Start-Up/Full-Scale Demonstration

During the start-up phase, the entire remediation system is operated and remediation actually commences. The strategy for start-up is to conduct these activities sequentially, comparing observations and test data against design and performance criteria. This will allow the system to be brought on line in a systematic and safe manner to meet the operational objectives. The sequence terminates when the design and equipment performance is documented to comply with specifications, and the system is ready for transition into the operations and maintenance phase.

The start-up procedure of the SVE system will proceed slowly with a well-planned sequence of events. Before the system is started, make a final check on the position of all valve set points. Start the SVE system without extracting soil vapor by closing the manifold valves to the SVE wells and by opening the inlet bleed valve to the ambient air. Then increase the vacuum applied to the extraction wells incrementally to start extracting small flows of soil vapor so that periodic inspection of the entire system can be made to verify proper operation. The exhaust from the vapor treatment system will be monitored to confirm that it is operating properly.

Once the system is running at or close to the expected operating conditions, the entire system should be checked. Check the flows, pressures, vacuums and temperatures at all monitoring points in the system (as described in the following section). The systems may take time to stabilize, some may reach equilibrium in a few minutes while others may take a day or two. The aboveground systems will reach equilibrium much more rapidly than the subsurface systems. But as subsurface systems stabilize, aboveground systems may change too. Soon after an SVE system is started, the system will be checked for condensate accumulation.

3.2.1 System Startup Monitoring and Sampling

PWGC will conduct routine operation monitoring and maintenance (OM&M) visits to assess the operation of the SVE system. During the initial start up phase, PWGC will initially conduct OM&M visits 3 times during the first week. Following the first week, OM&M visits will be on an alternate week basis till the end of the first month of operation and then on a monthly schedule for the remainder of the system's operation. OM&M visits will consist of assessing the system's current condition, documenting gauge readings, taking vapor stream PID readings and, when scheduled, collecting vapor samples for laboratory analysis. System parameters such as flow rates and gauge readings will be documented on the system monitoring form (**Attachment C**). PID readings will be taken from each of the three sampling ports to assess system performance and determine the effectiveness of the GAC vapor treatment. Air samples, when scheduled, will be collected from each of the three sampling ports using the carbon sorbent tube method. A known volume of air (approximately 10-20 liters) is drawn through the carbon tubes using a battery powered sampling pump. The carbon tubes will then be taken under chain of custody to a New York State Department of Health certified laboratory for analysis. The samples will be analyzed by EPA method 8260 for VOCs.

4.0 SAMPLING AND MONITORING PLAN

As stated in section 3.2.1, PWGC will perform OM&M visits on a monthly basis following the initial startup phase. OM&M visits will consist of assessing the systems current condition, documenting gauge readings, taking vapor stream PID readings. System parameters such as flow rates and gauge readings will be documented on the system monitoring form (**Attachment C**). Air samples for laboratory analysis will be collected from the system on a quarterly basis. System air samples will be collected from each of the three sampling ports to assess system performance and determine the effectiveness of the GAC vapor treatment. Samples will be collected and analyzed as specified in Section 3.2.1. If sampling results show that the GAC units are no longer required, only one sample, the system influent, will be collected during each OM&M visit.

5.0 SYSTEM SHUTDOWN

PWGC will periodically review the monthly data to assess the effectiveness of the system. Based upon the sampling results, PWGC may make adjustments to the system to enhance effectiveness or performance. This may include adjustments to the applied vacuum to increase or reduce air flow to a specific extraction point to alter air exchange rates or areas of influence. When continued operation of the system is no longer necessary for vapor mitigation, and contaminant recovery has reached asymptotic levels, a review will be performed to determine if the system should be shut down. This will include a review of system performance, effluent levels and mass recovery rates. Confirmatory soil sampling may also be performed.

5.1 System De-activation and Removal

Once the determination has been made that the system may be deactivated, operation will be terminated and the system will be dismantled. The main power to the system building will be disconnected and the remedial equipment will be removed from the building. The SVE extraction well will be abandoned following NYSDEC well abandonment procedures. The remaining system piping will be cut flush with grade and capped. The system building will either be left on site or removed at the discretion of the property owner.

TABLES

Soil Vapor Extraction: USEPA Equation E - 5

$Q/H = \pi (k/\mu) P_w \{[1 - (P_{atm}/P_w)^2] / \ln(R_w/R_i)\}$

Q = vapor flow rate in cm^3/s	58,993.43	125 cfm
H = length of screen in cm	1219.2	40 ft
k = intrinsic permeability in cm^2	4.17E-07	0.008661 " (d_{10})
μ = viscosity of air @ 55°F= 1.7822 E-4 g/(cm*s)	1.78E-04	
P_w = absolute pressure at extraction well in g/(cm*s^2)	991,767	7.37 "H_2O
P_{atm} = absolute ambient air pressure = 1.01 E+6 g/(cm*s^2)	1.01E+06	
R_w = radius of vapor extraction well in cm	5.08	4 in (diam)
R_i = radius of influence of vapor extraction well in cm		

K
0.034063 cm/s
(Hazen Formula)
$K = A*C*T*(d_e)^2$
A = coefficient = 0.00116
C = 400 + 40*(p - 26)
p = porosity %
T = 0.7 + 0.03*t
t = water temp. in °C
d_e = effective grain dia. = d_{10} in mm

$k = (K*\mu)/(\rho*g)$
K = hydraulic conductivity
μ = dynamic viscosity of H_2O @ 55°F = 0.0012 N*s/m^2
ρ = denisty of H_2O @ 55°F = 999.28 kg/m^3
g = gravitational acceleration constant = 9.81 m/s^2

Rearranging and solving for R_i:

$R_i = R_w / e^{\wedge}\{\pi (k/\mu) P_w \{[1 - (P_{atm}/P_w)^2] / (Q/H)\}\}$

Radius of Influence

R_i = 1360.588 cm = 44.6387 ft

Blower Selection:
Make: **EG&G Rotron**
Model: **EN 505**
Operating Point: **125 cfm, 21" H_2O**

<u>assumptions:</u>
d_{10} = 0.22 mm (fine sand - conservative)
soil assumed to be isotropic and homogeneous
Minimum ROI of 30 ft assumed based on site characterization and extent of contamination
adjusted well pressure and flow rate to achieve desired ROI
selected blower based on flow rate and well pressure plus assumed losses based on schematic/conceptual layout
substantiated blower selection with calculations in head loss spreadsheet
H (screen length) based on site characterization data and depth/intervals of contamination
groundwater and soil air temperatures assumed to be 55°F
soil porosity assumed to be 0.30 ~ typical Long Island sand formation

Design based on 40 feet of 4" diameter split screen - 20' at 25'-45' and 20' at 65'-85' BLS.
Likely additional head losses will be experienced at lower screen and thus lower screened zone to have smaller ROI.
Design based entirely on conceptual and theoretical data. No pilot test or study data/information available.

Table 2
Soil Vapor Extraction System Design - Head Losses

Q_1 =	125 cfm	2.08 cfs	
Q_2 =	125 cfm	2.08 cfs	
υ =	1.55E-04 ft^2/s		air @ 55°F

	L_e	N_{re}	E/D	f	1.) h_f ft of air	h_f in H_2O	K	2.) h_f ft of air	h_f in H_2O	3.) h_f in H_2O	h in H_2O
blower											**21**
2" PVC	8.5	1.03E+05	0.00003	0.018	130.09	2.01					
union	0.45	1.03E+05	0.00003	0.018	6.89	0.11					
2" 90 bend	8.5	1.03E+05	0.00003	0.018	130.09	2.01					
air filter										1	
2" tee line	1.8	1.03E+05	0.00003	0.018	27.55	0.43					
a/w sep										1	
flow meter										1	
4x2 reducer							0.375	3.32	0.05		
4" 90 bend	13	5.13E+04	0.000015	0.021	7.25	0.11					
4" PVC	28.7	5.13E+04	0.000015	0.021	16.01	0.25					
4" 90 bend	13	5.13E+04	0.000015	0.021	7.25	0.11					
4" tee line	17	5.13E+04	0.000015	0.021	9.49	0.15					
4" 90 bend	13	5.13E+04	0.000015	0.021	7.25	0.11					
4x2 reducer							0.5625	4.98	0.08		
2" BV	21	1.03E+05	0.00003	0.018	321.40	4.98					
4x2 reducer							0.375	3.32	0.05		
4" tee branch	21	5.13E+04	0.000015	0.021	11.72	0.18					
						10.45			0.18	3	**13.63**
well head											**7.37**

$N_{Re} = D v^2 / \upsilon$ (Reynolds number - unitless)
E/D = relative roughness
E = specific roughness, PVC ~ 0.000005
f obtained from Moody diagram
1.) $h_f = (f L_e v^2) / (2 D g)$
g = gravitational acceleration constant = 32.174 ft/s^2
2.) $h_f = (K v^2) / (2 g)$
3.) h_f from manufacturer's data

Assumptions: air behaves as incompressible fluid for head loss calculations
negligible temperature rise of air
ambient soil air temperature = 55°F (similar to groundwater)
suction temperature rise from blower ~ +7.5°F
pressure air temperature rise from blower ~ +9°F
total temperature rise at exhaust stack ~ +16.5°F
screen entrance losses assumed to make up the difference or remainder (i.e. vacuum at well head)

TABLE 3

Former Computer Circuits
IRM System Design

Dilution Calculation	Acetone	1,2-DCE	PCE	TCE	1,1,1-TCA	
Average Concentration in soil - core region	27.5	30	37.5	33500	11.5	*ug/kg*
Average Concentration in soil - influence region	3.1	3.3	4.2	3722.2	1.3	*ug/kg*
Volume ratio - influence : core	9	9	9	9	9	
Average Soil Concentration for Transfer to Vapor Phase	5.5	6.0	7.5	6700.0	2.3	*ug/kg*

Dilution Ratio		
core radius	10	ft
core area	314	sq ft
core height	20	ft
core volume	6,283	cu ft
influence radius	30	ft
influence area	2,827	sq ft
influence height	20	ft
influence volume	56,549	cu ft
volume ratio - influence : core	9	

TABLE 4

Former Computer Circuits

Soil Gas Concentrations Derived from Average Soil Concentrations

Input variables	Description	Acetone	1,2-DCE	PCE	TCE	1,1,1-TCA
C_t	Soil concentration (ug/kg)	5.5	6.0	7.5	6,700	2.3
p_s	Soil bulk density (kg/L)	1.85	1.85	1.85	1.85	1.85
H'	Henry's Law Constant (dimensionless)	9.00E-04	2.74E-01	9.56E-01	3.71E-01	1.16E-01
f_{oc}	fraction of organic carbon	0.0001	0.0001	0.0001	0.0001	0.0001
k_{oc}	organic carbon partition coeff.	2	59	660	130	150
k_d	soil water partion coeff. (L/kg)	2.00E-04	5.90E-03	6.60E-02	1.30E-02	1.50E-02
φ	Total Soil Porosity ($1-p_s/2.65$)	0.30	0.30	0.30	0.30	0.30
φ_w	water content	0.12	0.12	0.12	0.12	0.12
φ_a	air fill soil porosity ($\varphi-\varphi_w$)	0.18	0.18	0.18	0.18	0.18

Q	Flow rate of SVE blower (ft^3/min)	110	110	110	110	110

Output	Description	Acetone	1,2-DCE	PCE	TCE	1,1,1-TCA
C_a	Soil vapor concentration (ug/L)	7.60E-02	1.69E+01	3.20E+01	2.18E+04	2.93E+00
C_a	Soil vapor concentration (ug/m^3)	7.60E+01	1.69E+04	3.20E+04	2.18E+07	2.93E+03
C_a	Soil vapor concentration (lb/ft^3)	4.74E-09	1.05E-06	2.00E-06	1.36E-03	1.83E-07
E_r	Emission rate (lb/hr)	3.13E-05	6.95E-03	1.32E-02	8.99E+00	1.21E-03
E_r	Emission rate (lb/yr)	0.27	60.91	115.61	78736.28	10.57
E_r	Emission rate (tons/yr)	1.37E-04	3.05E-02	5.78E-02	3.94E+01	5.28E-03

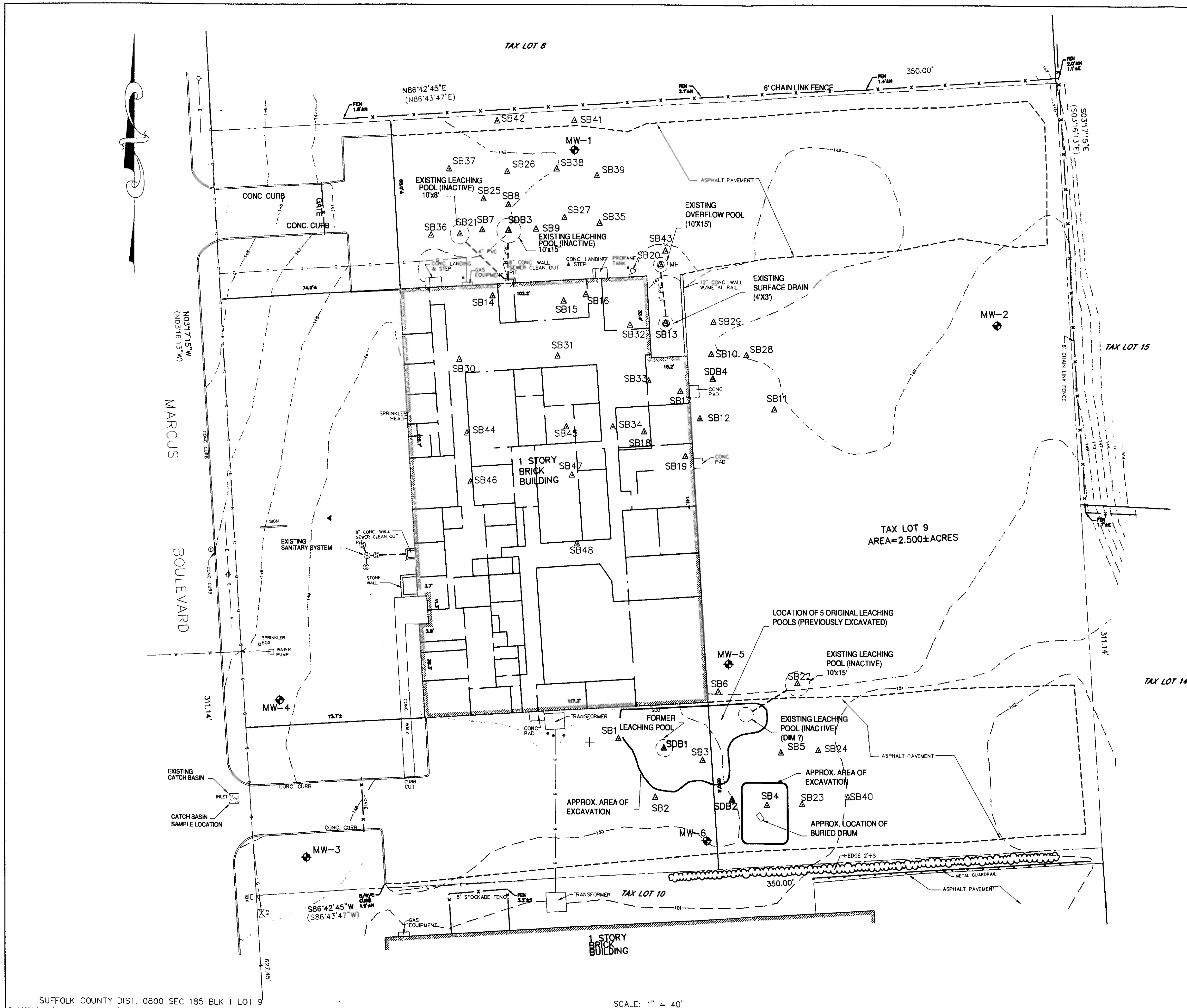
Equations

$$*C_a\ (ug/L) = \frac{C_t \times H' \times p_s}{(k_d \times p_s) + \varphi_w + (\varphi_a \times H')}$$

$$E_r\ (lb/hr) = C_a\ (ug/L) \times \frac{(1000\ L)}{(m3)} \times \frac{(1 \times 10^{-6}\ g)}{(ug)} \times \frac{(1\ lb)}{(453.59\ g)} \times \frac{(m^3)}{(35.31\ ft3)} \times \text{flowrate}\ (ft^3/min) \times \frac{(60\ min)}{(hour)}$$

* From ASTM E1739-95

FIGURES



LEGEND

SDB4 △	STEP-OUT BORING LOCATION
SB11 △	INITIAL SOIL BORING LOCATION
⊕	MONITORING WELL LOCATION
SB	SOIL BORING
SDB △	DEEP SOIL BORING
TC	TOP OF CURB
BC	BOTTOM OF CURB
TWL	TOP OF WALL
BWL	BOTTOM OF WALL
☼	LIGHT POLE
◀	GROUND LIGHT
MH ○	MANHOLE
Ⓢ	SEWER MANHOLE
Ⓣ	TELEPHONE MANHOLE
IS ⊘	INLET STRUCTURE
•	BOLLARD
⋈	GAS VALVE
—G—	APPROX. LOC. OF GAS LINE
—W—	APPROX. LOC. OF WATER LINE
—E—	APPROX. LOC. OF ELECTRIC LINE
SCO	SANITARY CLEAN OUT
TBX	TELEPHONE BOX
TR.	TOP OF RIM ELEV.
TW.	TOP OF WELL

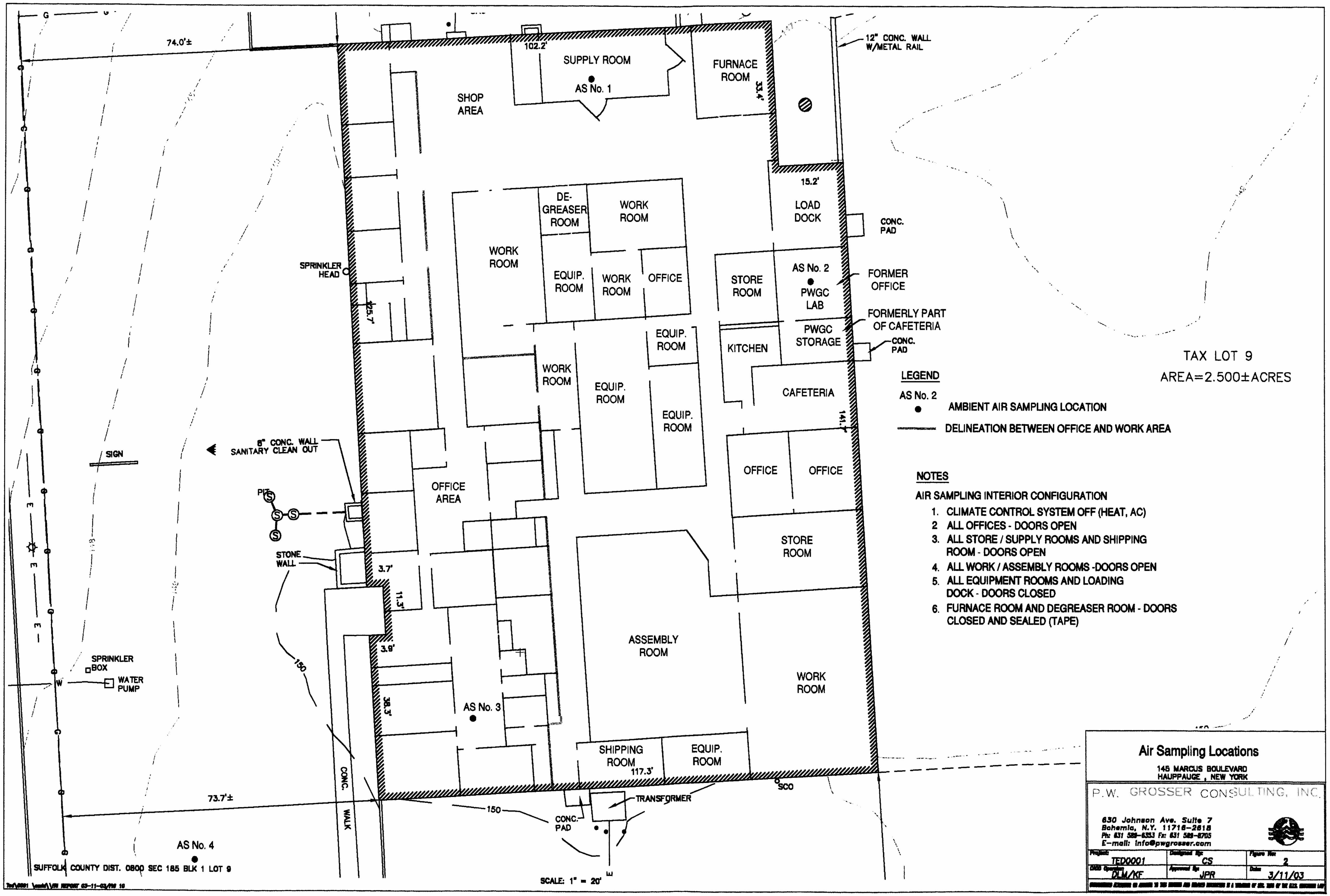
Soil Boring Location Map

145 MARCUS BOULEVARD
HAUPPAUGE , NEW YORK

P.W. GROSSER CONSULTING, INC.

630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
Ph: 631 589-6353 Fx: 631 589-8705
E-mail: info@pwgrosser.com

Project:	Designed By:	Figure No:
TED0001	CS\KF	1
CADD Operator: DLM/KF	Approved By: JPR	Date: 03/11/03



74.0'±
102.2'
SUPPLY ROOM
AS No. 1
FURNACE ROOM
33.4'
12" CONC. WALL W/METAL RAIL
SHOP AREA
15.2'
LOAD DOCK
CONC. PAD
DE-GREASER ROOM
WORK ROOM
WORK ROOM
EQUIP. ROOM
WORK ROOM
OFFICE
STORE ROOM
AS No. 2
PWGC LAB
FORMER OFFICE
FORMERLY PART OF CAFETERIA
SPRINKLER HEAD
125.7'
EQUIP. ROOM
KITCHEN
PWGC STORAGE
CONC. PAD
WORK ROOM
EQUIP. ROOM
EQUIP. ROOM
CAFETERIA
141.1'
TAX LOT 9
AREA=2.500±ACRES
LEGEND
AS No. 2
AMBIENT AIR SAMPLING LOCATION
DELINEATION BETWEEN OFFICE AND WORK AREA
SIGN
8" CONC. WALL SANITARY CLEAN OUT
OFFICE AREA
OFFICE
OFFICE
PIT
STONE WALL
3.7'
11.3'
STORE ROOM
NOTES
AIR SAMPLING INTERIOR CONFIGURATION
1. CLIMATE CONTROL SYSTEM OFF (HEAT, AC)
2 ALL OFFICES - DOORS OPEN
3. ALL STORE / SUPPLY ROOMS AND SHIPPING ROOM - DOORS OPEN
4. ALL WORK / ASSEMBLY ROOMS -DOORS OPEN
5. ALL EQUIPMENT ROOMS AND LOADING DOCK - DOORS CLOSED
6. FURNACE ROOM AND DEGREASER ROOM - DOORS CLOSED AND SEALED (TAPE)
3.9'
ASSEMBLY ROOM
SPRINKLER BOX
WATER PUMP
150
38.3'
AS No. 3
WORK ROOM
SHIPPING ROOM
117.3'
EQUIP. ROOM
Air Sampling Locations
145 MARCUS BOULEVARD HAUPPAUGE , NEW YORK
P.W. GROSSER CONSULTING, INC.
630 Johnson Ave. Suite 7
Bohemia, N.Y. 11716-2618
E-mail: info@pwgrosser.com
TED0001
CS
2
DLM/KF
JPR
3/11/03
CONC. WALK
73.7'±
150
TRANSFORMER
SCO
CONC. PAD
AS No. 4
SUFFOLK COUNTY DIST. 0800 SEC 185 BLK 1 LOT 9
SCALE: 1" = 20'

ATTACHMENT - A
Emission Rate Potential Tables

Computer Circuits

ERP CALCULATIONS

Maximum allowable emission rate potential within updated 2000 DAR -1 AGC-SGC Tables

Assume 100% mass transfer from soil to gas.

Air Rates: 110 cfm = 3.115 m^3/min = 186.91 m^3/hr

Initial Ratings: 1,1-Dichloroethylene; Carbon tetrachloride — Refer to DAR -1 Appendix A IV.B.1.a for emission rate < 0.1 lb/hr, can consider no control if ambient impact < AGC and SGC.

Appendix B Ambient Air Quality Impact Screening Analyses (1991 Edition):

I. Assume dimensions as follows:

building height, h_b = 18 ft above grade

discharge port, h_s = 20 ft above grade

II. Cavity impacts:

shortest distance to property line, D_{pl} = 62 ft

$D_{pl} > 3h_b$, cavity impacts are confined to on-site receptors, and do not need to be calculated.

ERP CALCULATIONS

III. Point and Area Source Air Quality Impacts

A.1.c - Discharge Buoyancy

84.03 = V, exit velocity [ft/sec]
0.08 = R, stack outlet radius [ft]
0.02 = S, stack outlet area [ft^2]
525 = T, stack exit temp. [Rankine] = F + 460
0.0046 = F, buoyancy flux parameter [m^4/sec^3] = $0.276\ V\ R^2\ (T-510) / T$

A.1.d - Effective Stack Height

20 = h_e [ft] = h_s, if $h_s/h_b < 1.5$

A.2. - Maximum Actual Annual Impact

Assume uniform influent for initial screening step

= Ca [ug/m^3] = $6\ Qa / h_e^{2.25}$

A.3. - Maximum Potential Annual Impact

= Cp [ug/m^3] = $52500\ Q / h_e^{2.25}$

A.4. - Stack Height Reduction of Impacts

1 = f = reduction factor, no reduction for $h_s/h_b < 1.5$

A.5. - Maximum Short-Term Impact

= Cst [ug/m^3] = Cp * f * 65

Computer Circuits

ERP CALCULATIONS

				DAR - 1 Appendix B Screening Analyses								
				A.2.	A.3.	A.4.		AGC	OK?	A.5.	SGC	OK?
Contaminant	Initial Soil Gas Concentration (ug/l)	Initial Annual Emission Rate Q (lb/hr)	Qa (lb/yr)	Maximum Actual Annual Impact, Ca (ug/m^3)	Maximum Potential Annual Impact, Cp (ug/m^3)	Reduced Ca (ug/m^3)	Reduced Cp (ug/m^3)	Annual Guideline Concentration (ug/m^3)		Maximum Short-Term Impact, Cst (ug/m^3)	Short-term Guideline Concentration (ug/m^3)	
Acetone	7.60E-02	**3.14E-05**	2.75E-01	1.95E-03	1.95E-03	1.95E-03	1.95E-03	28000.0	YES	0.13	180000.0	YES
1,2-Dichloroethylene (1,2-DCE)	1.69E+01	**6.97E-03**	6.11E+01	4.33E-01	4.33E-01	4.33E-01	4.33E-01	1900.0	YES	28.12	- - -	
Tetrachloroethylene (PCE)	3.20E+01	1.32E-02	1.16E+02	8.22E-01	8.21E-01	8.22E-01	8.21E-01	1.0	YES	53.38	1000.0	YES
1,1,1-Trichloroethane (1,1,1-TCA)	2.18E+04	**9.01E+00**	7.89E+04	5.60E+02	5.59E+02	5.60E+02	5.59E+02	1000.0	YES	36351.75	68000.0	YES
Trichloroethylene (TCE)	1.09E+05	4.50E+01	3.94E+05	2.80E+03	2.79E+03	2.80E+03	2.79E+03	4.50E-01	NO	181661.85	54000.0	NO
Total VOC	1.31E+05	5.41E+01	4.74E+05	3.36E+03								

ATTACHMENT - B
Equipment Specifications

GENERAL CARBON CORP.

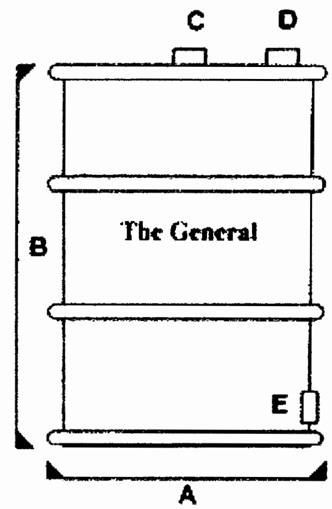
CLEANING the WORLD with ACTIVATED CARBON

VAPOR FILTRATION | LIQUID FILTRATION | REACTIVATION SERVICES | CONTACT INFO | HOME PAGE

33 Paterson Street
Paterson, NJ 07501
Tel: 973 523-2223
Fax: 973 523-1494
sales@generalcarbon.com

VAPOR FILTRATION

The General
Air Pollution Control Barrels



The General Air Pollution Control Barrels are ready to use, low cost, self contained air purification units that can treat air flows of up to 250 CFM. **The General** is available in three different sizes to better serve your treatment needs.

Specifications	**55 Gallon**	**85 Gallon**	**110 Gallon**
A-Diameter, Outside:	24"	28"	32"
B-Height, Outside Wall:	35"	39"	43"
Inlet Fitting:	E-2"MPT	C-4"FPT	C-4"FPT
Outlet Fitting:	C-2"MPT	D-4"FPT	D-4"FPT
Drain Fitting:	E-2"MPT	E-I"FPT	E-I"FPT
Carbon Weight, Lbs.:	150	300	400
Max. Recommended Flow Rate, CFM:	100	180	250
Maximum Pressure, psig:	10	7	7
Max. design Temp., Deg F:	140	140	140
Flow Direction:	Upflow	Upflow	Upflow

Activated Carbon - The General vapor adsorbers are filled with virgin, high activity GC C-40 pelletized carbon. Other virgin coal, coconut shell, reactivated or impregnated carbons are available.

Removable Lid - 16 gauge lid with ring & bolt closure and poly-clad cellulose gasket.

Connections - Metal connectors with standard pipe threads insure easy, durable and leakproof hookup to your system. Unions or quick connect fittings are advised to make drum exchange easy. Drains let you remove any accumulated condensate.

Flow Distributors - The 55 gallon barrel uses an air chamber to insure even distribution of the air flow through the carbon. Low pressure drop, slotted Schedule 40 PVC collectors are used in the 85 gallon and 110 gallon drums for proper flow distribution. Stainless Steel internals and drums are available for special applications.

Coatings - The General pollution control barrels are coated on the inside with heat cured phenolic epoxy. The outside coating is industrial enamel. A polyethylene liner is available for extra corrosion resistance for the 55 gallon and 85 gallon units.

Installation & Start Up - The General air pollution control barrel requires no special procedure for start up. Just connect the inlet and outlet to the treatment system and start it up. Multiple units are usually connected in series with testing advised between the units to determine when the first unit needs to be changed out.

Maintenance - Once connected, **The General** requires no maintenance other than the monitoring of the influent and effluent air streams and the operating pressure of the system. Monitoring the air stream into the last Air Pollution Control Barrel in series mode is a recommended safeguard against breakthrough in the final discharge. When the concentration of contaminants in the outflow equals the concentration in the inflow, **The General** has reached its removal capacity and should be removed from the service. The working life of each adsorber is dependent upon the type of contaminant in the air as well as its concentration and the air flow rate. A pressure relief device is advised to prevent damage to the canister in the event of excessive pressure buildup.

Recharging The General - Once the carbon has reached its pollutant removal capacity, the unit should be removed and replaced with a fresh one. To purchase replacement carbon or to arrange for a carbon change out, please contact our office.

Disposal - Dispose of the spent carbon in accordance with Federal, State and Local regulations.

WARNING!

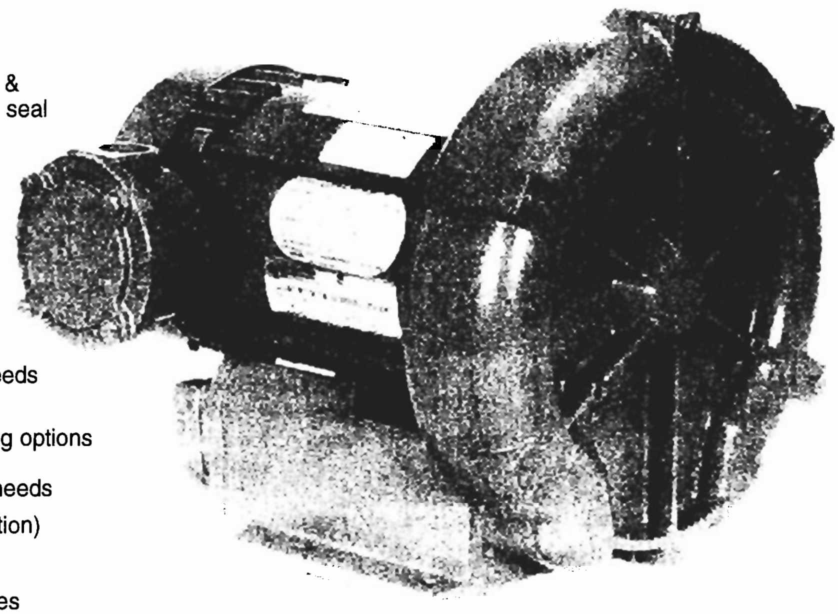
Wet activated carbon removes oxygen from air causing a severe hazard to workers inside carbon vessels. Confined space/low oxygen procedures should be put in place before any entry is made. Such procedures should comply with all applicable local, state and federal guidelines.

---

33 Paterson Street • Paterson, NJ 07501 • Tel: 973 523-2223 Fax: 973 523-1494

EN 505 & CP 505 Explosion-Proof Regenerative Blower

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 160 SCFM
- Maximum pressure: 62 IWG
- Maximum vacuum: 60 IWG
- Standard motor: 2.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

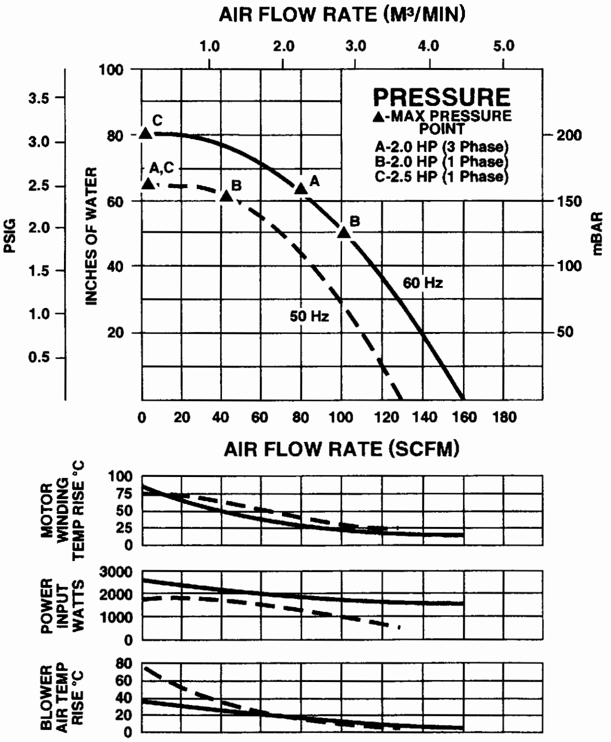


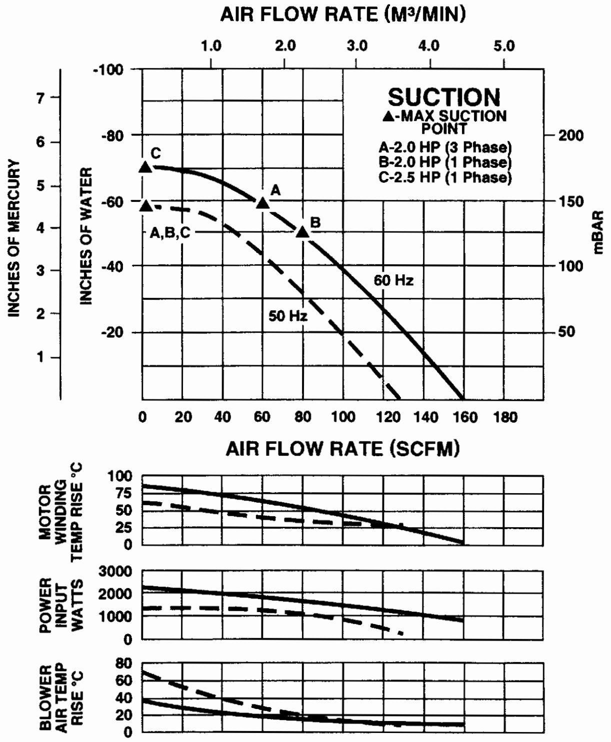
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

BLOWER PERFORMANCE AT STANDARD CONDITIONS

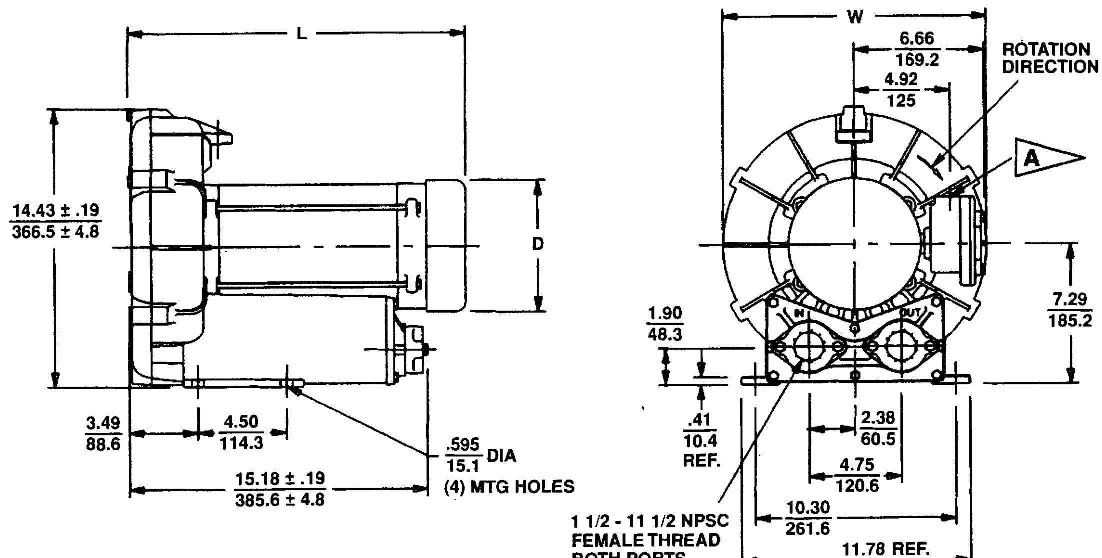




AMETEK ROTRON TMD, SAUGERTIES, NY 12477 • e mail: info@ametek.com • internet: www.rotrontmd.com

EN 505 & CP 505
Explosion-Proof Regenerative Blower

Scale CAD drawing available upon request.



A ▷ 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

DIMENSIONS: IN / MM
TOLERANCES: .XX ± .08 / 2.0
.XXX ± .030 / .800
(UNLESS OTHERWISE NOTED)

MODEL	L (IN) ± .30	L (MM) ± 8	D (IN)	D(MM)	W(IN)	W(MM) ± 5 MM
EN/CP505AX72ML	16.0	405	6.84	173	13.53	344
EN/CP505AX58ML	17.21	437	6.84	173	13.53	344
EN/CP505CJ5ML	18.57	472	7.32	186	13.53	344

SPECIFICATIONS

MODEL	EN505AX58ML		EN505AX72ML		EN505CJ5ML	CP505FS58MLR	CP505FS72MLR
Part No.	038177		038178		038445	–	038962
Motor Enclosure – Shaft Material	Explosion-proof – **CS**		Explosion-proof – **CS**		Explosion-proof – **CS**	Chem XP – **SS**	Chem XP – **SS**
Horsepower	2.0		2.0		2.5	Same as EN505AX58ML – 038177 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN505AX72ML – 038178 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz		Three - 60 Hz		Single - 60 Hz		
Voltage [1]	115	230	230	460	230		
Motor Nameplate Amps	17.2	8.6	5.8	2.9	15.5		
Max. Blower Amps [3]	22.0	11.0	6.2	3.1	14.0		
Inrush Amps	112	56	56	28	86		
Starter Size	1	0	0	0	1		
Service Factor	1.0		1.0		1.0		
Thermal Protection [2]	Class B - Pilot Duty		Class B - Pilot Duty		Class B - Pilot Duty		
XP Motor Class – Group	I-D		I-D		I-D, II-F&G		
Shipping Weight	95 lb (43 kg)		87 lb (40 kg)		103 lb (228 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.

ATTACHMENT - C
SVE System Monitoring Form

Former Computer Circuits Site
SVE System Monitoring Form

Date / Time: ____________________
Technician: ____________________

System Operating (Yes / No)

System Parameters

Influent Flow Meter	________	SCFM
Influent Vacuum	________	"H2O
Condensate Drum Vac.	________	"H2O
Blower Vacuum	________	"H2O
Pre- GAC Pressure	________	PSI
Mid GAC Pressure	________	PSI
Post GAC Pressure	________	PSI
Condensate Level	________	inches
Condensate Drained	________	gal.
Bleed valve position	________	

Sample Ports

	PID (ppm)	Sampled	Analysis / Comments
Pre-GAC			
Mid-GAC			
Post-GAC			

Repairs / Modifications / Comments