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REPORT - GROUND WATER TREATMENT SYSTEM

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907020

ENGINEERING REPORT
GROUNDWATER TREATMENT SYSTEM

DOWCRAFT Corporation
[redacted] 65. South Dow Street
Falconer, New York

New York State Department of Environmental Conservation
Division of Water
Bureau of Wastewater Facilities Design
Dowcraft Corporation 65 South Dow Str. Falconer NY; SPDES # NY0030210
Groundwater Air Stripper Treatment System for Outfall 002
Approved by: Joseph E. Kellehe P.E., 7/19/94
Recommended by: Robert E. Wirth, P.E.

ENGINEERING REPORT
GROUNDWATER TREATMENT SYSTEM

DOWCRAFT Corporation
[redacted]
Falconer, New York

STATE OF NEW YORK
RICHARD J. SNYDER
No. 66242
LICENSED PROFESSIONAL ENGINEER

6/22/94

JUNE 1994
REF. NO. 5020 (4)
This report is printed on recycled paper.

CONESTOGA-ROVERS & ASSOCIATES

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1.0 PREFACE

The DOWCRAFT Corporation owns and operates an industrial facility, herein known as the DOWCRAFT Plant (Site) located at 65 South Dow Street in Falconer, New York. A Site location plan is included as Figure 1. DOWCRAFT has voluntarily undertaken several environmental investigations of this Site. DOWCRAFT has kept the New York State Department of Environmental Conservation (NYSDEC) informed of the scope and results of the investigations. It is important to note that DOWCRAFT is not under any Order on Consent (Order) with the NYSDEC. For this reason, no detailed information regarding the findings of these investigations will be provided in this Engineering Report, except the general conditions encountered which have led DOWCRAFT to construct and operate a groundwater extraction and treatment system.

2.0 INTRODUCTION

The DOWCRAFT Corporation has performed several environmental investigations at the Site, located in Falconer, New York. During these investigations, a contaminant plume containing trichloroethene (TCE) was discovered. A subsequent investigation revealed a source of the TCE contamination within the Site.

As a result of these Site investigations, DOWCRAFT has installed three groundwater extraction wells. Two of the three wells straddle the TCE plume as it leaves the DOWCRAFT property. The third well is installed within the source area. Figure 2 is a plan of the DOWCRAFT Plant showing the locations of the groundwater extraction wells and the TCE source area. DOWCRAFT plans to use a combination of a minimum of two or possibly all three of these extraction wells to:

i) contain the contaminant plume; and
ii) recover TCE from the source area.

The extracted groundwater is to be treated on-Site with an air stripper. The details of the groundwater treatment system will be presented later in this report. At this time, DOWCRAFT has applied for a modification to their existing State Pollutant Discharge Elimination System (SPDES) Permit Number NY0030310 (permit application filed with NYSDEC in April 1994) to discharge the effluent from the groundwater treatment system to the Chadakoin River via existing Outfall 002.

3.0 DESCRIPTION OF INDUSTRY

The groundwater treatment system is being installed to contain, recover, and treat TCE contaminated groundwater.

There are no plant processing operations or other sources generating wastewater which will be combined with this system. The SPDES Permit modification that DOWCRAFT has filed indicates that all discharges from Outfalls 002, 004, 005 and 007 were eliminated prior to January 1, 1994. Since the facility's non-contact cooling waters are now discharged to the sanitary sewer, no other plant processes or operations will be combined with the effluent discharged by the groundwater treatment system.

4.0 TREATMENT OBJECTIVES

As stated in the SPDES Permit modification application filed by DOWCRAFT, the treatment objective of the groundwater treatment system is to discharge effluent from the air stripper at TCE concentrations of 5 parts per billion (ppb) or less at a maximum combined pumping rate of 50 gallons per minute (gpm).

DOWCRAFT plans to begin groundwater treatment at a reduced rate (i.e. 20-25 gpm) until actual influent concentrations are established. It is assumed that influent concentrations will be the highest at the beginning of the system start-up, largely due to the anticipated loadings from the source well. As the influent loadings decrease, the combined pumping rates will be increased to the maximum combined rate of 50 gpm.

5.0 EXISTING TREATMENT FACILITIES

There are no existing treatment facilities in operation at the DOWCRAFT Plant.

6.0 GROUNDWATER CHARACTERISTICS FOR DESIGN OF THE GROUNDWATER TREATMENT SYSTEM

The wastewater to be characterized at the Site is groundwater contaminated with TCE (and its degradation products).

The characterization of the groundwater being recovered by the plume containment wells (labeled PW-1 and PW-2) was based upon analytical data generated during groundwater pumping tests. This data contains both organic and inorganic parameters and provides information for the design of the groundwater treatment system. This data is summarized on Table 1. A copy of this data is included in Appendix A.

The characterization of the groundwater being recovered by the source control well (labeled PW-3) was based upon analytical data generated from grab samples obtained during the investigation of the TCE source area and following the installation and development of the source control well. This data contains Volatile Organic Compounds (VOCs) only and is incorporated into the treatment system design. A copy of this analytical data is included in Appendix B.

The following information shows the values which are incorporated into the design of the groundwater treatment system:

Influent	*Source Well (PW-3)*	*Containment Well(s) (PW-1 and PW-2)*	*Totals*
Flow (gpm)	15	35	50
TCE (ppm)	500	20	164

Based upon the above referenced influent concentrations, a computer model was used to select an air stripper of appropriate size and efficiency to yield effluent with TCE concentrations at non-detect levels (5.0 ppb for TCE). The computer printout for the air stripper model is included in Appendix C.

It should be noted that DOWCRAFT was presented with two options for groundwater treatment:

i) a 50 gpm unit which would operate at approximately 25 gpm; and
ii) a 90 gpm unit which would operate at approximately 50 gpm.

DOWCRAFT selected the 90 gpm unit which further demonstrates not only their commitment to implement a groundwater remediation program but their willingness to attack this problem aggressively.

7.0 GROUNDWATER TREATMENT SYSTEM

7.1 SYSTEM DESCRIPTION

7.1.1 General

The groundwater treatment system consists of a four-tray air stripper. Groundwater from the containment well(s) (PW-1 and/or PW-2) is pumped directly to the air stripper using submersible pumps. Groundwater from the source well (PW-3) is pumped via submersible pump to a 300-gallon horizontal tank which will allow free product (if present) to settle and be decanted from the bottom of the tank. The flow from the source well is then combined with the containment well for treatment by the air stripper. The effluent from the air stripper will be discharged to the DOWCRAFT Outfall 002 under the terms specified by a SPDES Permit.

Vapors from the air stripper will be treated with vapor phase granular carbon. The air stripper is constructed as a "closed-loop" system. The air which is drawn through the air stripper by the blower is actually treated air coming from the vapor phase carbon treatment beds. A small carbon vent adsorber is attached to the system to allow for pressure equilibration within the system. There will be no appreciable flow from the vent adsorber. The groundwater treatment system will not emit any untreated vapors. Based upon this design, DOWCRAFT does not foresee the need for any air permits for the groundwater treatment system.

The location, and plan of the groundwater treatment system are shown on Figures 3 and 4, respectively. Product literature for the major system components is included in Appendix D. The process flow sheet and process and instrumentation drawings are included as Drawing D-215-5020, Sheets 1 and 2, respectively.

7.1.2 Submersible Pumps

Groundwater will be pumped using Grundfos Redi-Flo 4 Model 25S05-3 submersible pumps. These are 1/2-horse power (HP) 4-inch diameter submersible pumps capable of pumping 25 gpm.

7.1.3 Settling Tank

The settling tank is a 300-gallon horizontal tank manufactured by McMaster Carr. The 38-inch by 60-inch tank is constructed of steel.

7.1.4 Air Stripper

The air stripper is a four tray Model 2641 Shallow Tray® low profile air stripper. Two Spencer VB-055-E Vortex Blowers are used in parallel. Each blower is rated at 370 cubic feet per minute. The blowers are used for dual service. First, untreated air from the air stripper is pushed through the vapor phase carbon units. Then treated air from the carbon units is recycled through the air stripper.

7.1.5 Effluent Pump

The effluent pump used to pump water from the air stripper to the Outfall 002 will be a Goulds sewage ejector system pump Model WE0734H. This is a 2-inch diameter cast iron submersible sewage pump capable of pumping 50 gpm.

7.1.6 Vapor Carbon

The vapors created by the air stripper will be treated using granular carbon. Initially, air emissions will be treated by two carbon beds

installed in series. Each bed will consist of two 1800 pound units. The carbon units are Vapor Pacs which will be supplied and serviced by the Calgon Carbon Corporation. Following start-up the actual amount of carbon usage will be monitored and the carbon treatment system will be adjusted accordingly.

7.1.7 Vent Adsorber

The air stripper is constructed such that treated air from the carbon units is drawn through the air stripper. In effect, this creates a closed-loop system. The process is vented through a small carbon canister to maintain equilibrium pressure in the system. Flow through this canister is insignificant and represents air that has already been carbon treated.

The vent adsorber is a Ventsorb unit manufactured by the Calgon Carbon Corporation. The 55-gallon carbon unit contains 200 pounds of granular carbon.

8.0 FINAL EFFLUENT CHARACTERISTICS

Based upon the system design and anticipated chemical loadings from the extraction wells, the final effluent characteristics will be 5.0 ppb or less, for TCE and its degradation products except vinyl chloride for which the discharge criteria is 2.0 ppb or less.

9.0 PERFORMANCE VERIFICATION

In order to verify that the groundwater treatment system is operating within the limits of the SPDES Permit, an effluent sampling program will be established.

Grab samples for VOC analysis by USEPA Method 8240 will be collected from a sample port located downstream of the air stripper. Samples will be analyzed by a New York State Department of Health (NYSDOH) approved laboratory. The sampling frequency will be as follows:

i) weekly for the first three months of system operation; and
ii) quarterly for the remainder of the operation of the system.

? why not monthly ?

FIGURES

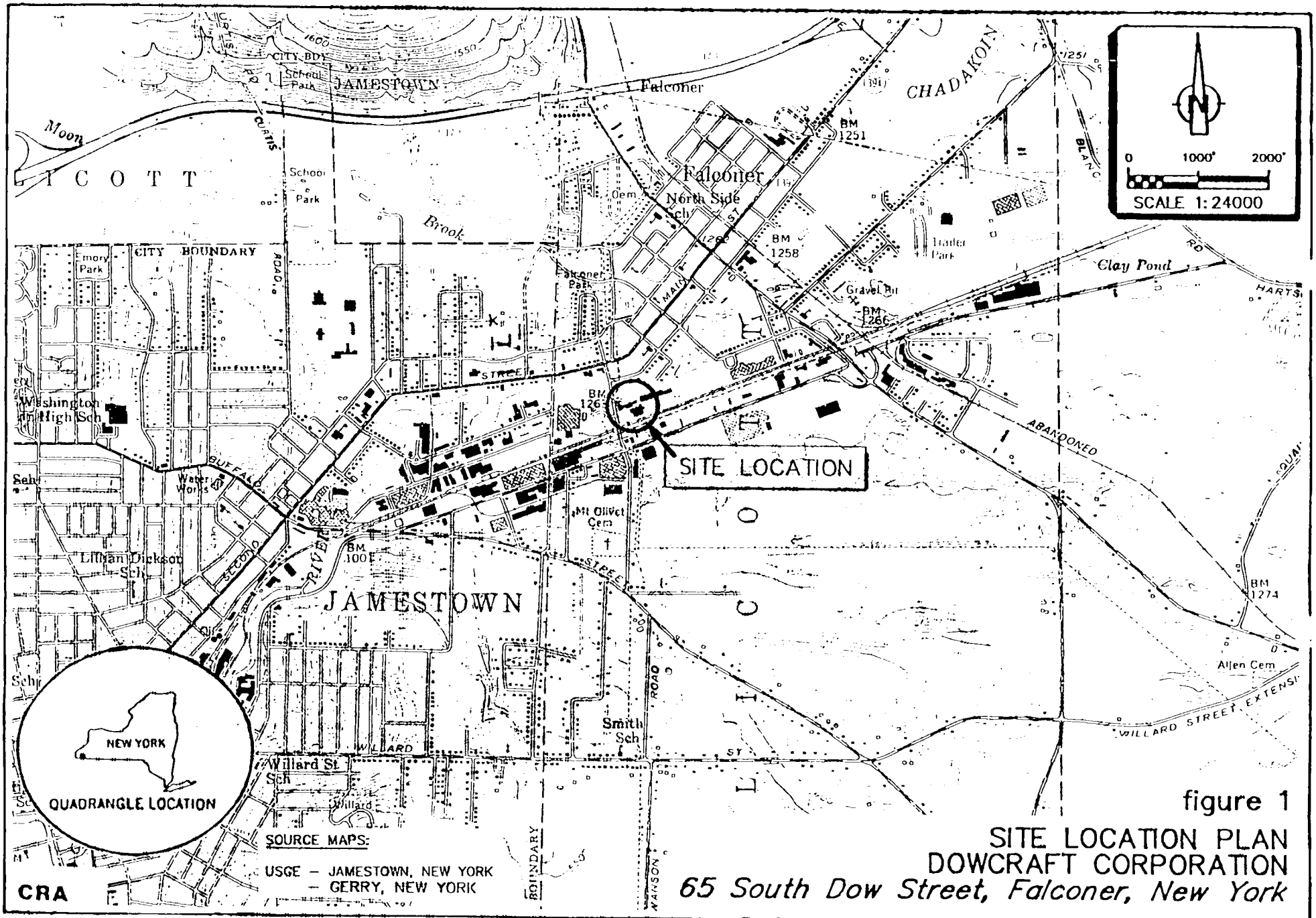
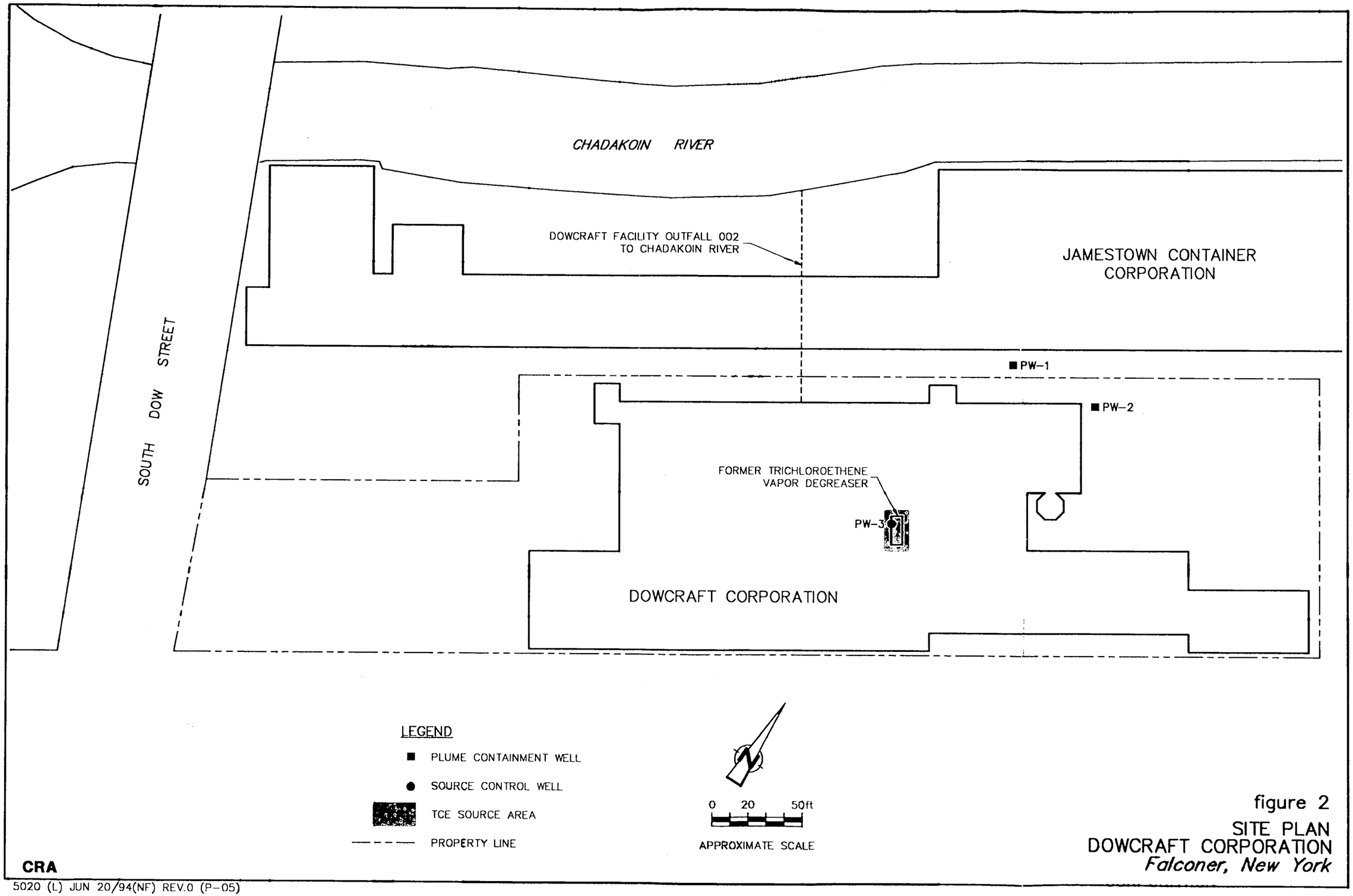


figure 1

SITE LOCATION PLAN
DOWCRAFT CORPORATION
65 South Dow Street, Falconer, New York

5020 (L) APR.15/94 (W) REV.0



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5020 (L) JUN 20/94(NF) REV.0 (P-05)

figure 2

SITE PLAN
DOWCRAFT CORPORATION
Falconer, New York

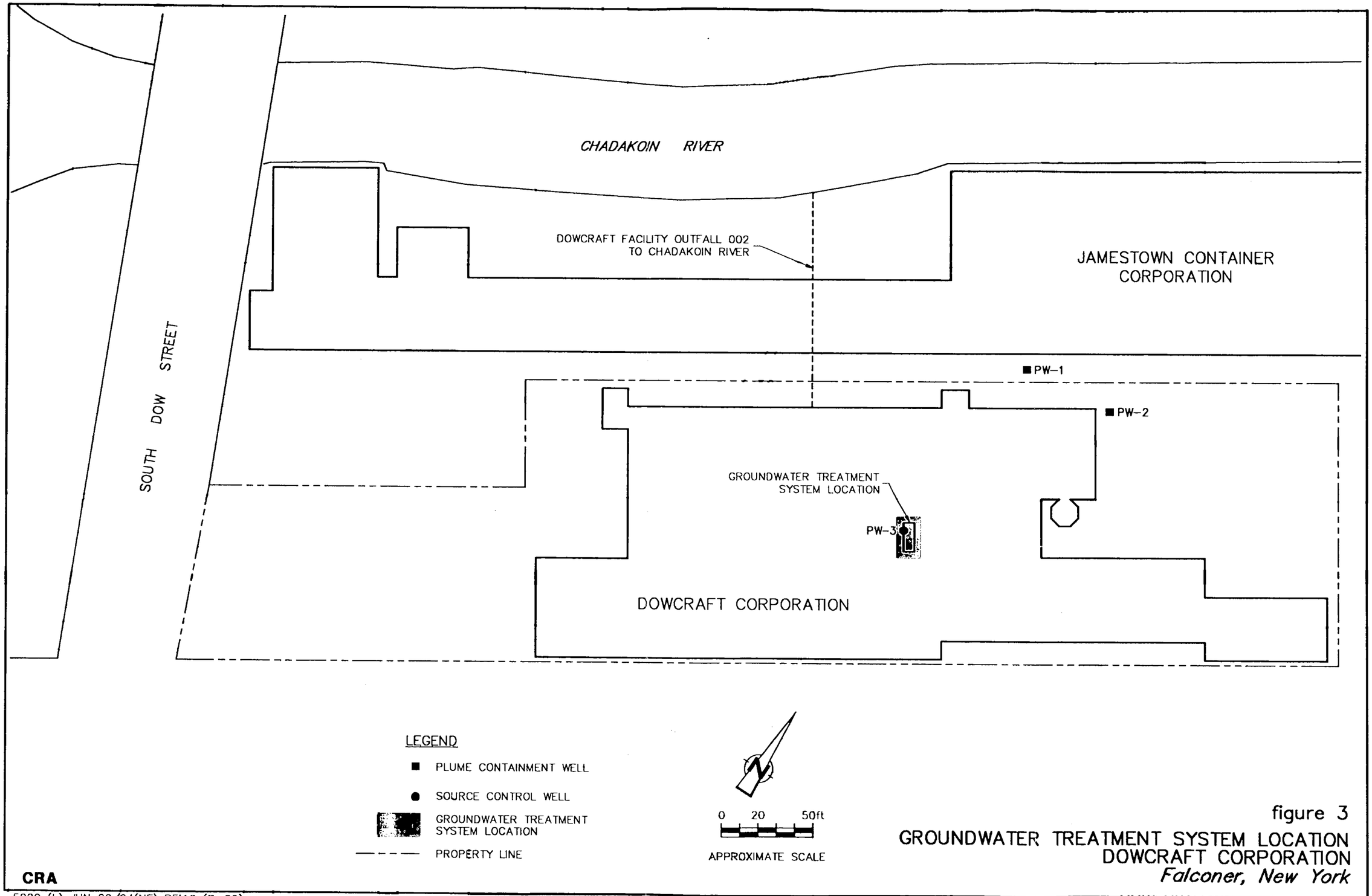
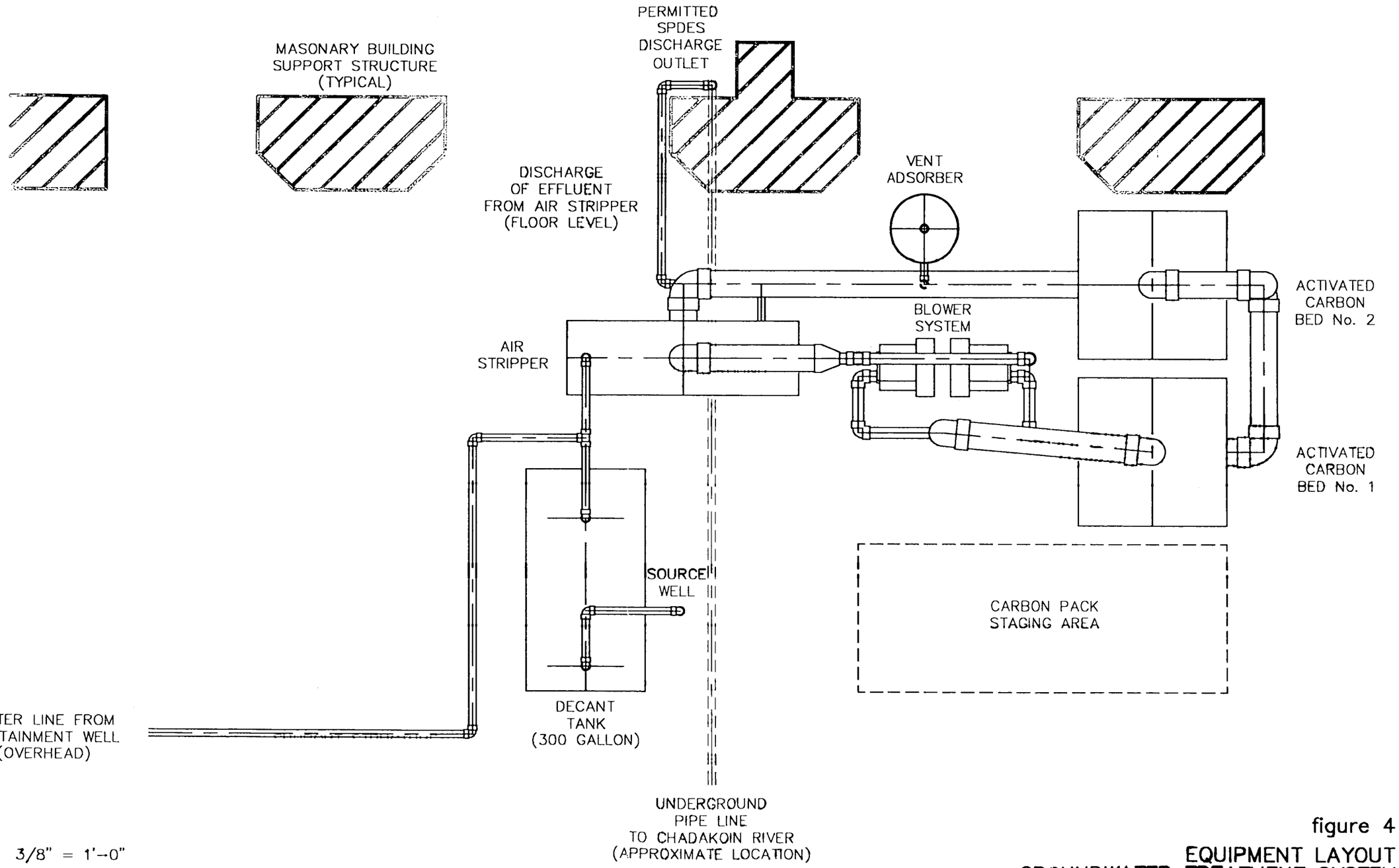


figure 3
GROUNDWATER TREATMENT SYSTEM LOCATION
DOWCRAFT CORPORATION
Falconer, New York

CRA

5020 (L) JUN 20/94(NF) REV.0 (P-06)



SCALE: 3/8" = 1'-0"

TreaTek - CRA™ COMPANY

215-5020 Jun 22/94 (A-001)

figure 4

EQUIPMENT LAYOUT
GROUNDWATER TREATMENT SYSTEM
Dowcraft – Falconer, New York

TABLES

TABLE 1

SUMMARY OF ANALYTICAL DATA
DOWCRAFT CORPORATION
FALCONER, NEW YORK

Parameter (µg/L)	*PW-1 (5 Minutes)*	*PW-1 (129 Minutes)*	*PW-2 (5 Minutes)*	*PW-2 (1184 Minutes)*	*PW-2 (1658 Minutes)*
Trichloroethene	5,900	8,100	22,000	20,000	19,000
1,2-Dichloroethene	180	160	410	190	190
Tetrachloroethene	ND	ND	76	58	54
1,1,1-Trichloroethane	ND	ND	18	16	15
Vinyl Chloride	ND	ND	11	ND	ND
Total VOC's	6,080	8,260	22,515	20,264	19,259
Total Aluminum	61,500	10,100	7,520	847	1,170
Filtered Aluminum	35	53	46	33	<30
Total Iron	133,000	22,400	16,100	1,610	2,760
Filtered Iron	67	98	80	47	79
Total Manganese	5,100	1,690	2,850	940	900
Dissolved Manganese	1,480	1,140	2,240	831	893

ND - Not Detected.

Note: Analytical data obtained during pumping tests.

A

APPENDIX A

GROUNDWATER DATA FROM PUMPING TEST
WELLS PW-1 AND PW-2

SUMMARY OF ANALYTICAL TESTING COMPLETED ON GROUND WATER SAMPLES COLLECTED DURING AQUIFER PUMP TESTING					
Parameter (ug/L)	Sample Designation and Time Elapsed from Beginning of Pumping				
	PW-1 (5 Minutes)	PW-1 (129 Minutes)	PW-2 (5 Minutes)	PW-2 (1184 Minutes)	PW-2 (1658 Minutes)
Total Aluminum	61,500	10,100	7,520	847	1,170
Filtered Aluminum	35	53	46	33	<30
Total Iron	133,000	22,400	16,100	1,610	2,760
Filtered Iron	67	98	80	47	79
Total Manganese	5,100	1,690	2,850	940	900
Dissolved Manganese	1,480	1,140	2,240	831	893
Trichloroethene	5,900	8,100	22,000	20,000	19,000
1,2-Dichloroethene	180	160	410	190	190
Tetrachloroethene	ND	ND	76	58	54
1,1,1-Trichloroethane	ND	ND	18	16	15
Vinyl Chloride	ND	ND	11	ND	ND
Total VOC's	6,080	8,260	22,515	20,264	19,259

ND - Not Detected.

B

APPENDIX B

GROUNDWATER DATA FROM SOURCE AREA INVESTIGATION AND PW-3

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: TH-A
COLLECTION METHOD:
COLLECTION DATE(S): 07/17/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 336Q-1
PROJECT ID: 336Q

Analytical Parameters	Analytical Results	Units	Practical Quantifiable Limit	Method
Chloromethane	BQL	mg/l	10 *	SW 846 8240
Bromomethane	BQL	mg/l	10	SW 846 8240
Vinyl chloride	BQL	mg/l	10	SW 846 8240
Chloroethane	BQL	mg/l	10	SW 846 8240
Methylene chloride	BQL	mg/l	10	SW 846 8240
Acetone	BQL	mg/l	10	SW 846 8240
Carbon disulfide	BQL	mg/l	10	SW 846 8240
1,1-Dichloroethene	BQL	mg/l	10	SW 846 8240
1,1-Dichloroethane	BQL	mg/l	10	SW 846 8240
trans-1,2-Dichloroethene	BQL	mg/l	10	SW 846 8240
Chloroform	BQL	mg/l	10	SW 846 8240
1,2-Dichloroethane	BQL	mg/l	10	SW 846 8240
2-Butanone	BQL	mg/l	10	SW 846 8240
1,1,1-Trichloroethane	BQL	mg/l	10	SW 846 8240
Carbon tetrachloride	BQL	mg/l	10	SW 846 8240
Vinyl acetate	BQL	mg/l	10	SW 846 8240
Bromodichloromethane	BQL	mg/l	10	SW 846 8240
1,2-Dichloropropane	BQL	mg/l	10	SW 846 8240
cis-1,3-Dichloropropene	BQL	mg/l	10	SW 846 8240
Trichloroethene	1600	mg/l	10	SW 846 8240
Benzene	BQL	mg/l	10	SW 846 8240
trans-1,3-Dichloropropene	BQL	mg/l	10	SW 846 8240
Chlorodibromomethane	BQL	mg/l	10	SW 846 8240
1,1,2-Trichloroethane	BQL	mg/l	10	SW 846 8240
Bromoform	BQL	mg/l	10	SW 846 8240
4-Methyl-2-pentanone	BQL	mg/l	10	SW 846 8240
2-Hexanone	BQL	mg/l	10	SW 846 8240
Tetrachloroethene	BQL	mg/l	10	SW 846 8240

* High limit due to sample matrix; dilution was required.

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: TH-A
COLLECTION METHOD:
COLLECTION DATE(S): 07/17/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 3360-1

PROJECT ID: 3360

Analytical Parameters	Analytical Results	Units	Practical Quantifiable Limit	Method
1,1,2,2-Tetrachloroethane	BQL	mg/l	10	SW 846 8240
Toluene	BQL	mg/l	10	SW 846 8240
Chlorobenzene	BQL	mg/l	10	SW 846 8240
Ethylbenzene	BQL	mg/l	10	SW 846 8240
Styrene	BQL	mg/l	10	SW 846 8240
m-Xylene	BQL	mg/l	10	SW 846 8240
o/p-Xylene	BQL	mg/l	10	SW 846 8240

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: TH-SUMP
COLLECTION METHOD:
COLLECTION DATE(S): 07/17/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 3360-2

PROJECT ID: 3360

Analytical Parameters	Analytical Results	Units	Practical Quantifiable Limit	Method
Chloromethane	BQL	mg/l	10 *	SW 846 8240
Bromomethane	BQL	mg/l	10	SW 846 8240
Vinyl chloride	BQL	mg/l	10	SW 846 8240
Chloroethane	BQL	mg/l	10	SW 846 8240
Methylene chloride	BQL	mg/l	10	SW 846 8240
Acetone	BQL	mg/l	10	SW 846 8240
Carbon disulfide	BQL	mg/l	10	SW 846 8240
1,1-Dichloroethene	BQL	mg/l	10	SW 846 8240
1,1-Dichloroethane	BQL	mg/l	10	SW 846 8240
trans-1,2-Dichloroethene	BQL	mg/l	10	SW 846 8240
Chloroform	BQL	mg/l	10	SW 846 8240
1,2-Dichloroethane	BQL	mg/l	10	SW 846 8240
2-Butanone	15	mg/l	10	SW 846 8240
1,1,1-Trichloroethane	BQL	mg/l	10	SW 846 8240
Carbon tetrachloride	BQL	mg/l	10	SW 846 8240
Vinyl acetate	BQL	mg/l	10	SW 846 8240
Bromodichloromethane	BQL	mg/l	10	SW 846 8240
1,2-Dichloropropane	BQL	mg/l	10	SW 846 8240
cis-1,3-Dichloropropene	BQL	mg/l	10	SW 846 8240
Trichloroethene	1500	mg/l	10	SW 846 8240
Benzene	BQL	mg/l	10	SW 846 8240
trans-1,3-Dichloropropene	BQL	mg/l	10	SW 846 8240
Chlorodibromomethane	BQL	mg/l	10	SW 846 8240
1,1,2-Trichloroethane	BQL	mg/l	10	SW 846 8240
Bromoform	BQL	mg/l	10	SW 846 8240
4-Methyl-2-pentanone	BQL	mg/l	10	SW 846 8240
2-Hexanone	BQL	mg/l	10	SW 846 8240
Tetrachloroethene	BQL	mg/l	10	SW 846 8240

* High limit due to sample matrix; dilution was required.

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: TH-SUMP
COLLECTION METHOD:
COLLECTION DATE(S): 07/17/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 336Q-2
PROJECT ID: 336Q

Analytical Parameters	Analytical Results	Units	Practical Quantifiable Limit	Method
1,1,2,2-Tetrachloroethane	BQL	mg/l	10	SW 846 8240
Toluene	BQL	mg/l	10	SW 846 8240
Chlorobenzene	BQL	mg/l	10	SW 846 8240
Ethylbenzene	BQL	mg/l	10	SW 846 8240
Styrene	BQL	mg/l	10	SW 846 8240
m-Xylene	BQL	mg/l	10	SW 846 8240
o/p-Xylene	BQL	mg/l	10	SW 846 8240

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: PW3-1-11593
COLLECTION METHOD: GRAB
COLLECTION DATE(S): 11/05/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 348J-1

PROJECT ID: 348J

Analytical Parameters	Analytical Results	Units	Method Detection Limits	Practical Quantifiable Limit	Method
TCL Volatiles					
Chloromethane	ND	µg/L	6000	20000	SW 846 8240
Bromomethane	ND	µg/L	4000	20000	SW 846 8240
Vinyl chloride	ND	µg/L	6000	20000	SW 846 8240
Chloroethane	ND	µg/L	6000	20000	SW 846 8240
Methylene chloride	ND	µg/L	3000	20000	SW 846 8240
Acetone	ND	µg/L	10000	20000	SW 846 8240
Carbon disulfide	ND	µg/L	5000	20000	SW 846 8240
1,1-Dichloroethene	ND	µg/L	6000	20000	SW 846 8240
1,1-Dichloroethane	ND	µg/L	4000	20000	SW 846 8240
trans-1,2-Dichloroethene	ND	µg/L	5000	20000	SW 846 8240
Chloroform	ND	µg/L	8000	20000	SW 846 8240
1,2-Dichloroethane	ND	µg/L	2000	20000	SW 846 8240
2-Butanone	ND	µg/L	10000	20000	SW 846 8240
1,1,1-Trichloroethane	ND	µg/L	5000	20000	SW 846 8240
Carbon tetrachloride	ND	µg/L	6000	20000	SW 846 8240
Vinyl acetate	ND	µg/L	2000	20000	SW 846 8240
Bromodichloromethane	ND	µg/L	2000	20000	SW 846 8240
1,2-Dichloropropane	ND	µg/L	4000	20000	SW 846 8240
cis-1,3-Dichloropropene	ND	µg/L	2000	20000	SW 846 8240
Trichloroethene	320000	µg/L	5000	20000	SW 846 8240
Benzene	ND	µg/L	4000	20000	SW 846 8240
trans-1,3-Dichloropropene	ND	µg/L	2000	20000	SW 846 8240
Chlorodibromomethane	ND	µg/L	2000	20000	SW 846 8240
1,1,2-Trichloroethane	ND	µg/L	2000	20000	SW 846 8240
Bromoform	ND	µg/L	2000	20000	SW 846 8240
4-Methyl-2-pentanone	ND	µg/L	10000	20000	SW 846 8240
2-Hexanone	ND	µg/L	10000	20000	SW 846 8240
Tetrachloroethene	ND	µg/L	5000	20000	SW 846 8240

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: PW3-1-11593
COLLECTION METHOD: GRAB
COLLECTION DATE(S): 11/05/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 348J-1

PROJECT ID: 348J

Analytical Parameters	Analytical Results	Units	Method Detection Limits	Practical Quantifiable Limit	Method
1,1,2,2-Tetrachloroethane	ND	µg/L	2000	20000	SW 846 8240
Toluene	ND	µg/L	4000	20000	SW 846 8240
Chlorobenzene	ND	µg/L	3000	20000	SW 846 8240
Ethylbenzene	ND	µg/L	6000	20000	SW 846 8240
Styrene	ND	µg/L	3000	20000	SW 846 8240
m-Xylene	ND	µg/L	4000	20000	SW 846 8240
o/p-Xylene	ND	µg/L	7000	20000	SW 846 8240

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: PW3-2-11593
COLLECTION METHOD: GRAB
COLLECTION DATE(S): 11/05/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 348J-2

PROJECT ID: 348J

Analytical Parameters	Analytical Results	Units	Method Detection Limits	Practical Quantifiable Limit	Method
TCL Volatiles					
Chloromethane	ND	µg/L	6000	20000	SW 846 8240
Bromomethane	ND	µg/L	4000	20000	SW 846 8240
Vinyl chloride	ND	µg/L	6000	20000	SW 846 8240
Chloroethane	ND	µg/L	6000	20000	SW 846 8240
Methylene chloride	ND	µg/L	3000	20000	SW 846 8240
Acetone	ND	µg/L	10000	20000	SW 846 8240
Carbon disulfide	ND	µg/L	5000	20000	SW 846 8240
1,1-Dichloroethene	ND	µg/L	6000	20000	SW 846 8240
1,1-Dichloroethane	ND	µg/L	4000	20000	SW 846 8240
trans-1,2-Dichloroethene	ND	µg/L	5000	20000	SW 846 8240
Chloroform	ND	µg/L	8000	20000	SW 846 8240
1,2-Dichloroethane	ND	µg/L	2000	20000	SW 846 8240
2-Butanone	ND	µg/L	10000	20000	SW 846 8240
1,1,1-Trichloroethane	ND	µg/L	5000	20000	SW 846 8240
Carbon tetrachloride	ND	µg/L	6000	20000	SW 846 8240
Vinyl acetate	ND	µg/L	2000	20000	SW 846 8240
Bromodichloromethane	ND	µg/L	2000	20000	SW 846 8240
1,2-Dichloropropane	ND	µg/L	4000	20000	SW 846 8240
cis-1,3-Dichloropropene	ND	µg/L	2000	20000	SW 846 8240
Trichloroethene	500000	µg/L	5000	20000	SW 846 8240
Benzene	ND	µg/L	4000	20000	SW 846 8240
trans-1,3-Dichloropropene	ND	µg/L	2000	20000	SW 846 8240
Chlorodibromomethane	ND	µg/L	2000	20000	SW 846 8240
1,1,2-Trichloroethane	ND	µg/L	2000	20000	SW 846 8240
Bromoform	ND	µg/L	2000	20000	SW 846 8240
4-Methyl-2-pentanone	ND	µg/L	10000	20000	SW 846 8240
2-Hexanone	ND	µg/L	10000	20000	SW 846 8240
Tetrachloroethene	ND	µg/L	5000	20000	SW 846 8240

CLIENT: Conestoga-Rovers & Associates, Inc.
SAMPLE ID: PW3-2-11593
COLLECTION METHOD: GRAB
COLLECTION DATE(S): 11/05/93
SAMPLE TYPE: WATER

AES CLIENT ID: CRANF
AES SAMPLE ID: 348J-2

PROJECT ID: 348J

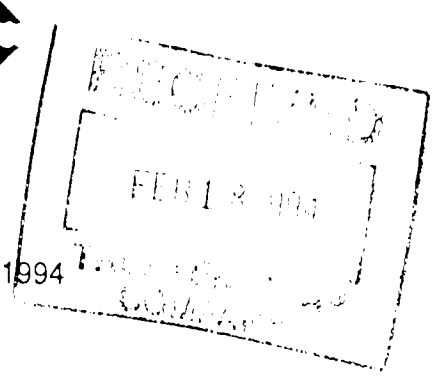
Analytical Parameters	Analytical Results	Units	Method Detection Limits	Practical Quantifiable Limit	Method
1,1,2,2-Tetrachloroethane	ND	µg/L	2000	20000	SW 846 8240
Toluene	ND	µg/L	4000	20000	SW 846 8240
Chlorobenzene	ND	µg/L	3000	20000	SW 846 8240
Ethylbenzene	ND	µg/L	6000	20000	SW 846 8240
Styrene	ND	µg/L	3000	20000	SW 846 8240
m-Xylene	ND	µg/L	4000	20000	SW 846 8240
o/p-Xylene	ND	µg/L	7000	20000	SW 846 8240

C

APPENDIX C

COMPUTER PRINTOUT AIR STRIPPER MODEL

ShallowTray



February 15, 1994

Don McLeod
TreaTek-CRA
7703 Niagara Falls Blvd.
Niagara Falls, NY 14304

RE: Proposal #294513-1
Site I.D. 5020

Dear Don,

I have revised the pricing for our **four-tray Model 2641** ShallowTray® low profile air stripper with a blower sized at 600 cfm @ 36"wc. The blower will draw air through the air stripper instead of pushing through the system.

I understand that the maximum treatment flow rate is **50 gpm** and the water temperature is assumed as 50°F. ShallowTray systems are more tolerant of inorganics than other types of aeration equipment, however, high concentrations can cause operational difficulties if proper precautions are not taken.

Expected performance for the **Model 2641** ShallowTray air stripper operating at **50 gpm** (normal operating range is 1-90 gpm) and 50°F follows:

Contaminant	Untreated ppb	After 1st Tray ppb	After 2nd Tray ppb	After 3rd Tray ppb	After 4th Tray ppb
Trichloroethylene	160,000	11,779	868	64	5

The power requirements as specified are *480V, 3Ø, 3 wire and ground*. If site requirements differ, please contact our office.

The blower is ~~not~~ oversized for off-gas treatment. Most off-gas treatments require additional pressure in the air discharge stream, if additional pressure is needed please contact our office

The price for the ShallowTray Model 2641, and optional components, is listed below:

Basic System Model 2641
Sump tank & 1 tray, 304L stainless steel
3 Additional tray(s), 304L stainless steel
Blower, 4 tray, 10 hp, 600 cfm @ 36wc, 3 phase, 480V, TEFC
Inlet screen and damper, 304L stainless steel demister, air pressure gauge, spray nozzle, sight tube, gaskets, stainless steel latches, Schedule 80 PVC piping, tray cleanout ports, steel frame.

D

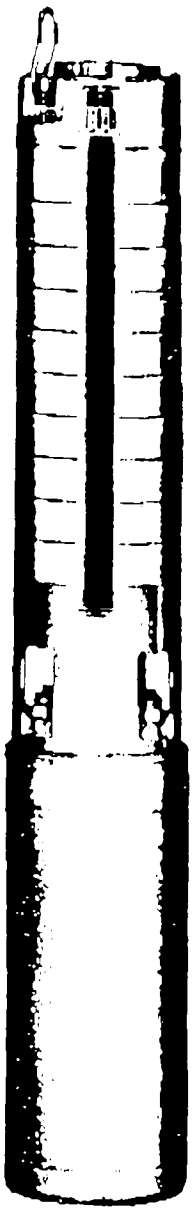
APPENDIX D

PRODUCT LITERATURE FOR THE MAJOR GROUNDWATER TREATMENT SYSTEM COMPONENTS

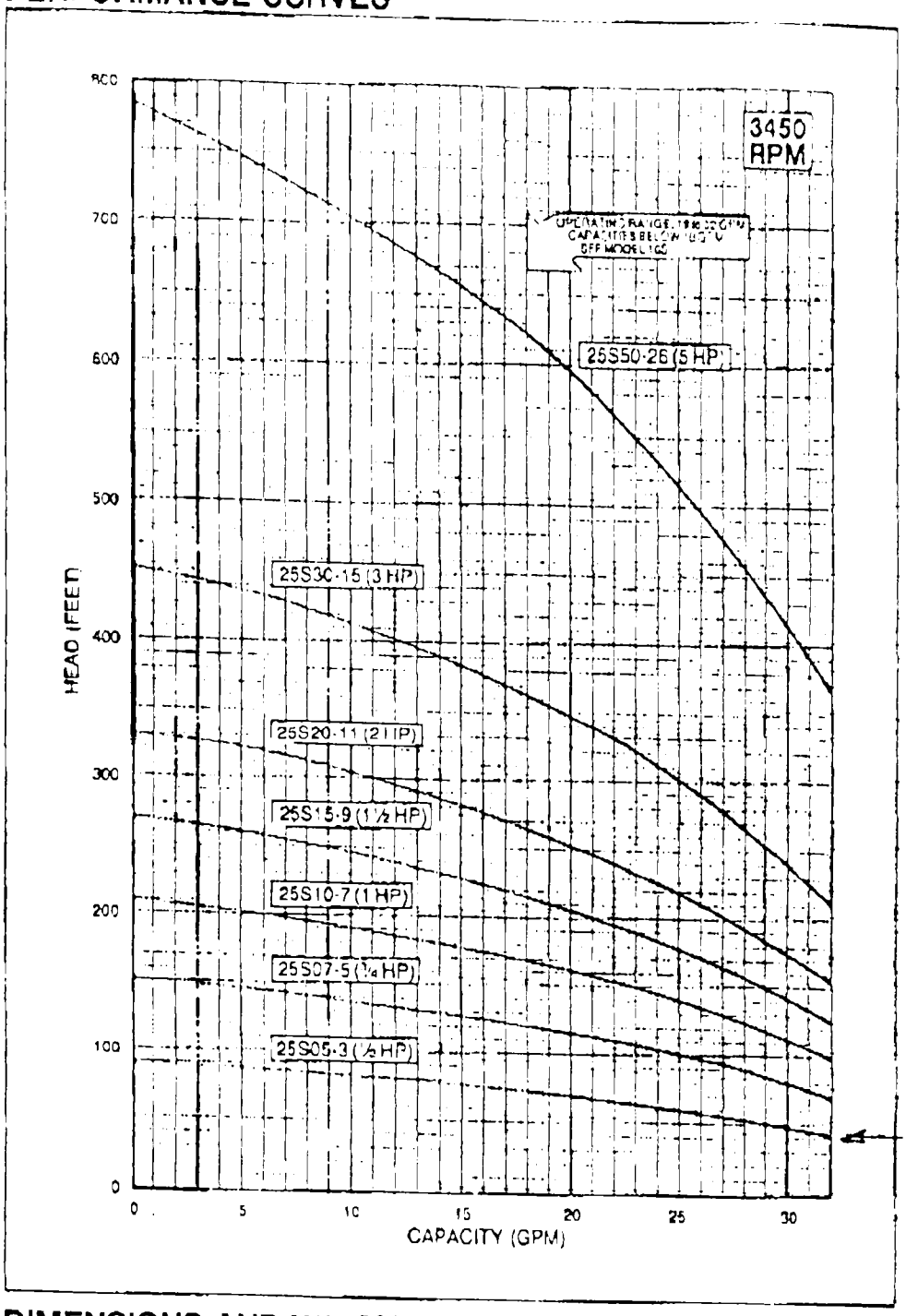
MODEL 25S — 25 GPM — GRUNDFOS

FLOW RANGE
18 to 32 GPM

PUMP OUTLET
1½" NPT



PERFORMANCE CURVES



DIMENSIONS AND WEIGHTS

MODEL NO.	HP	LENGTH (INCHES)	WIDTH (INCHES)	APPROX. UNIT SHIPPING WT. (LBS.)
25S05-3	½	20 ¼	3 15/16	26
25S07-5	¾	22 ⅜	3 15/16	28
25S10-7	1	24 ⅞	3 15/16	29
25S15-9	1½	28	3 15/16	34
25S20-11	2	28 ⅞	3 15/16	37
25S30-15	3	39 ⅛	3 15/16	59
25S50-26	5	51 ⅛	3 15/16	76

Specifications are subject to change without notice

GRUNDFOS 25 GPM MODEL 25S

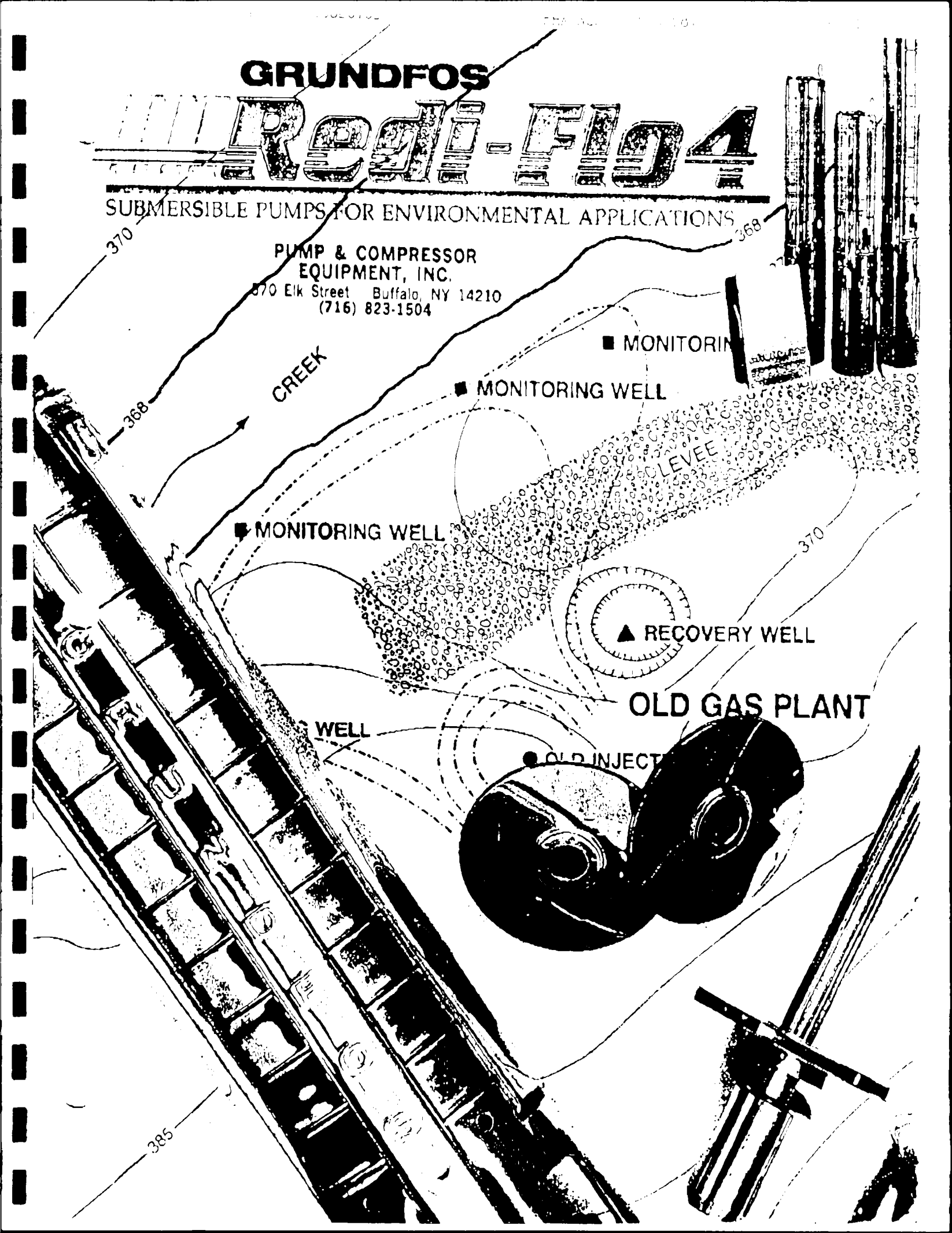
SELECTION CHARTS

(Ratings are in GALLONS PER HOUR - GPH)

FLOW RANGE 18 to 32 GPM

PUMP OUTLET 1½" NPT

PUMP MODEL	HP	PSI	DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
25S05-3	½	0		1960	1350	740																					
		20	1115	380	195																						
		30	630																								
		40																									
		50																									
		60																									
Shut-off PSI:			31	22	13	5																					
25S07-5	¾	0			2030	1785	1435	1035																			
		20	1975	1715	1310	925	450																				
		30	1625	1350	735	120																					
		40	1170	700	350																						
		50	605																								
		60	245																								
Shut-off PSI:			57	48	39	31	22	13																			
25S10-7	1	0					1880	1710	1460	1210	780	305															
		20		1890	1620	1655	1375	1100	625	150	80																
		30	1980	1785	1550	1385	780	575	290																		
		40	1765	1595	1280	970	490																				
		50	1520	1290	855	420	210																				
		60	1180	835	420																						
Shut-off PSI:			83	74	65	57	48	39	31	22	13	5															
25S15-9	1½	0						1930	1800	1675	1485	1295	975	650													
		20				1390	1780	1630	1420	1215	870	530	285														
		30			1975	1745	1585	1420	1135	850	470	90															
		40		1860	1715	1580	1365	1125	770	410	205																
		50	1835	1705	1530	1350	1045	735	370																		
		60	1670	1530	1280	1090	650	290	145																		
Shut-off PSI:			109	100	91	83	74	65	57	48	39	31	22	13													
25S20-11	2	0						1965	1865	1760	1655	1505	1350	1110	870	560											
		20					1960	1835	1725	1620	1455	1290	1035	780	485	150											
		30				1920	1820	1720	1585	1450	1235	1015	720	420	210												
		40			1910	1835	1690	1580	1400	1225	955	845	575														
		50		1800	1785	1685	1540	1395	1165	935	625	320	160														
		60	1880	1775	1655	1535	1345	1155	870	590	295																
Shut-off PSI:			135	126	118	109	100	92	83	74	88	57	48	40	31	23											
25S30-15	3	0										1835	1660	1785	1705	1825	1510	1240									
		20								1910	1835	1750	1680	1595	1475	1360	1190	810									
		30						1560	1900	1825	1750	1670	1570	1470	1325	1180	985	560									
		40					1870	1690	1815	1740	1660	1560	1440	1315	1140	965	745	295									
		50				1920	1880	1800	1720	1645	1540	1430	1280	1125	920	720	490	130									
		60			1945	1865	1790	1715	1620	1550	1460	1270	1085	900	680	455	230										
Shut-off PSI:					170	161	152	144	135	126	118	109	100	92	83	74	66	48									
25S50-26	5	0																1950	1815	1680	1515	1195	610				
		20															1935	1645	1715	1555	1350	950	300				
		30														1825	1580	1795	1660	1480	1250	810	150				
		40													1920	1875	1830	1745	1800	1400	1135	660					
		50												1960	1810	1870	1825	1780	1690	1530	1305	1010	510				
		60											1850	1905	1860	1815	1775	1730	1635	1455	1200	875	350				
Shut-off PSI.													350	245	236	227	219	210	193	167	141	115	50	37			


GRUNDFOS
Redi-Flo4
SUBMERSIBLE PUMPS FOR ENVIRONMENTAL APPLICATIONS
PUMP & COMPRESSOR
EQUIPMENT, INC.
870 Elk Street Buffalo, NY 14210
(716) 823-1504
370
368
CREEK
368
MONITORING WELL
MONITORING WELL
LEVEE
370
RECOVERY WELL
OLD GAS PLANT
WELL
385

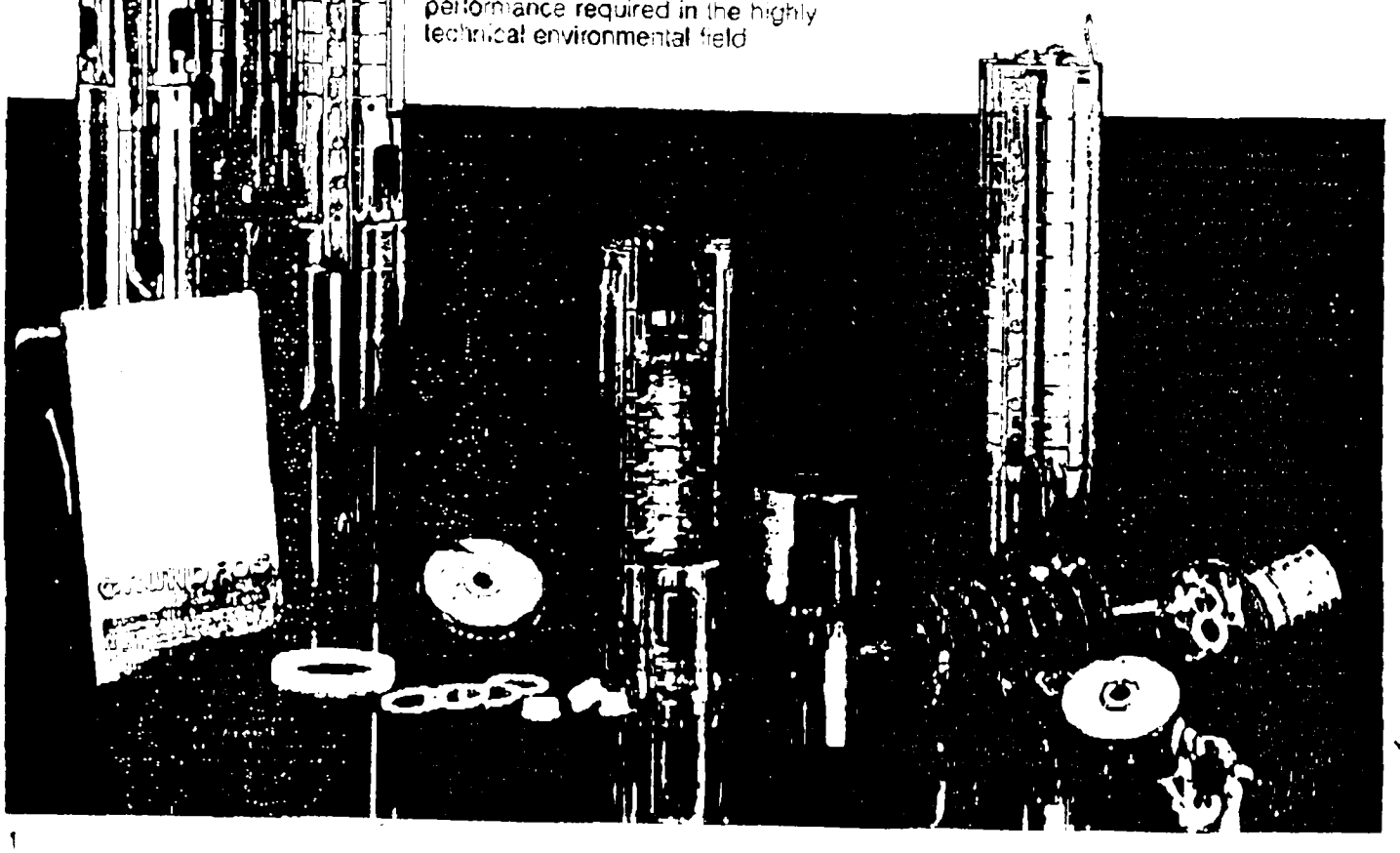
GRUNDFOS

Redi-Flo4

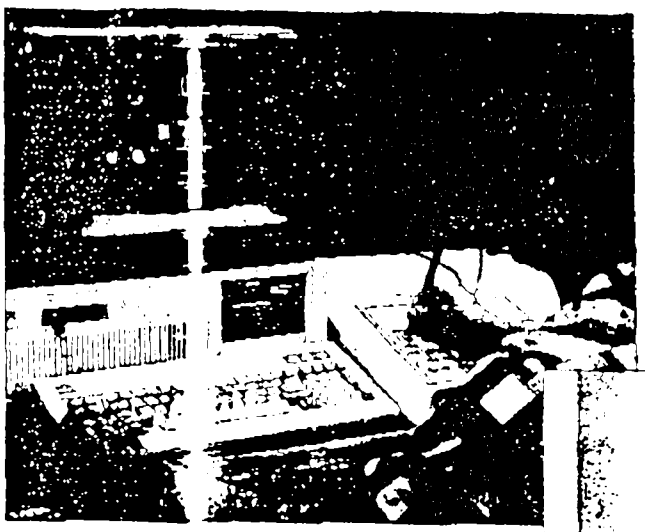
Grundfos Sets the Industry Standar
...*Redi-Flo4 Stainless Steel and Teflo*

In an industrialized world such as ours, large volumes of fuels, oils and other hydrocarbons, as well as industrial wastes and toxic contaminants are routinely moved and stored. Spills, seepage, leaks and the accumulation of agricultural products contribute daily to the contamination of our underground water supplies.

Environmental monitoring and clean-up operations require the best equipment available. For years hydrogeologists and environmental engineers have recognized the unique qualities of Grundfos stainless steel submersibles and have used them extensively in environmental applications. With their automated design and manufacturing techniques, Grundfos engineers have combined their time-proven stainless steel submersible with the environmental requirement of Teflon® bearings and seals. The resulting 4-inch *Redi-Flo4* submersible features the combination of stainless steel and Teflon® as its *standard materials of construction*. With off-the-shelf availability in sizes to 32 gpm, *Redi-Flo4* provides the quality product and reliable performance required in the highly technical environmental field.

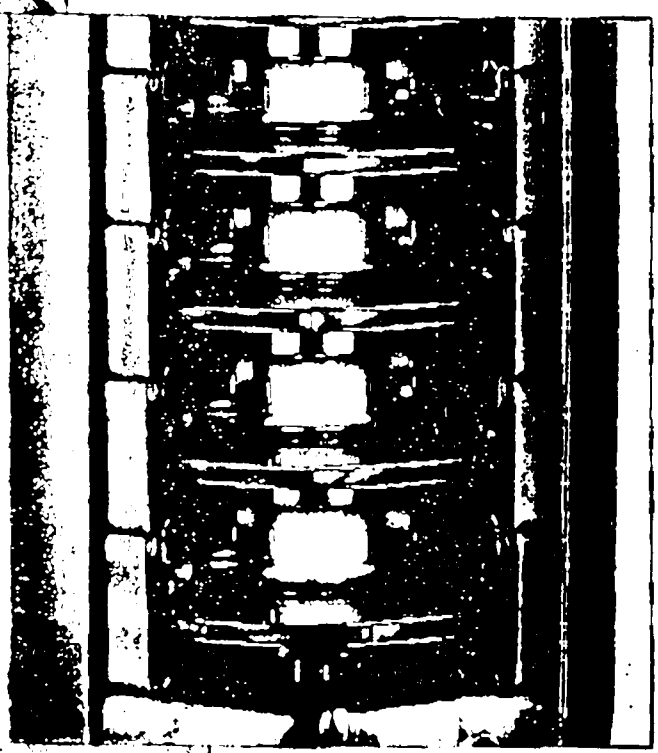


...ith Quality and Performance Submersible Pumps



"Computer assisted design allows specified performance without compromising materials of construction..."

Through the application of modern CAD/CAM design technology, Grundfos engineers have been able to overcome the difficulties of fabricating stainless steel while maintaining the benefits of durable construction and top performance.



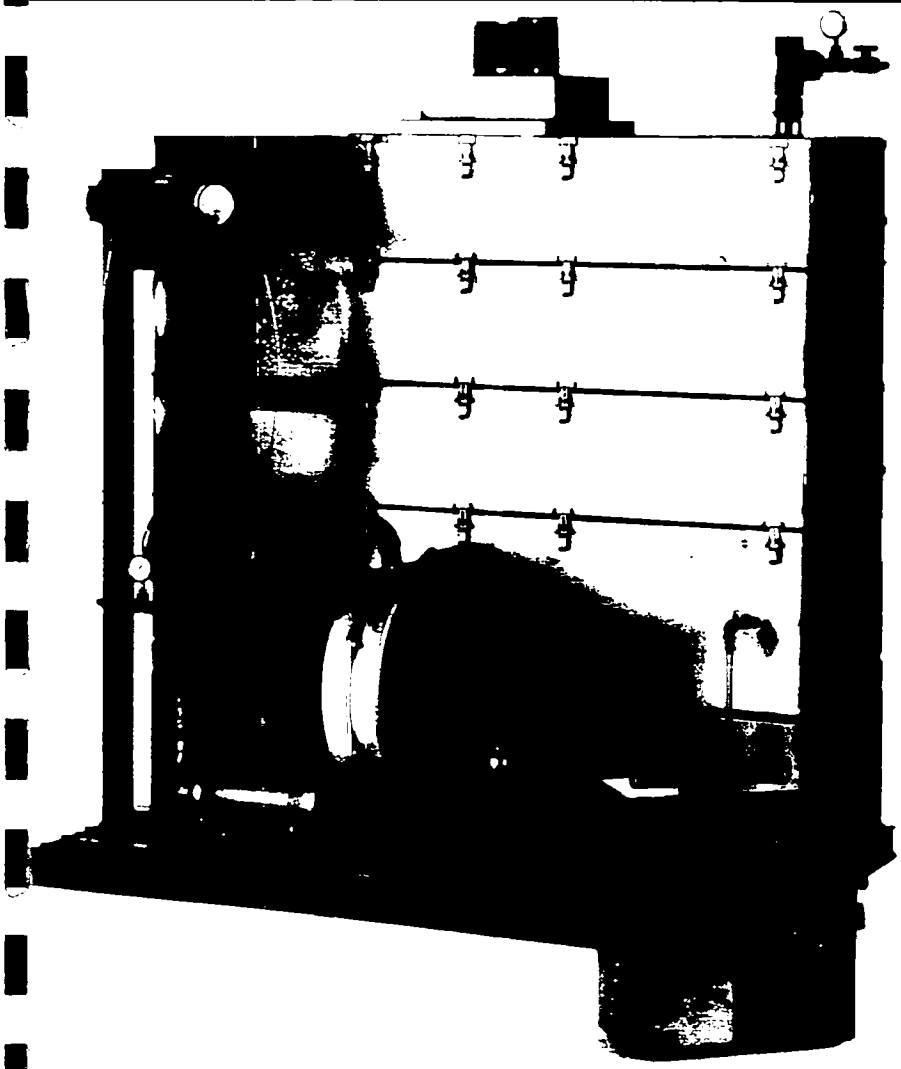
"Redi-Flo4 submersibles meet government guidelines for sample integrity..."

Stainless steel and Teflon® are the only materials used in Grundfos *Redi-Flo4* submersible pump end. Bowls, impellers, guide vanes, pump shaft, check valve, even the nuts, bolts and washers are stainless steel. With Teflon® bearings, seals and motor cable, the *Redi-Flo4* is the industry's choice in 4-inch submersible pumps.

"Automated manufacturing techniques turn stainless steel into state-of-the-art environmental pumps..."

Computerized manufacturing processes turn single stock stainless steel into fully tested [illegible] Teflon® submersible pumps. Rigorous quality assurance [illegible] with the most [illegible] *Redi-Flo4* submersibles [illegible] applications [illegible]

2600 Series

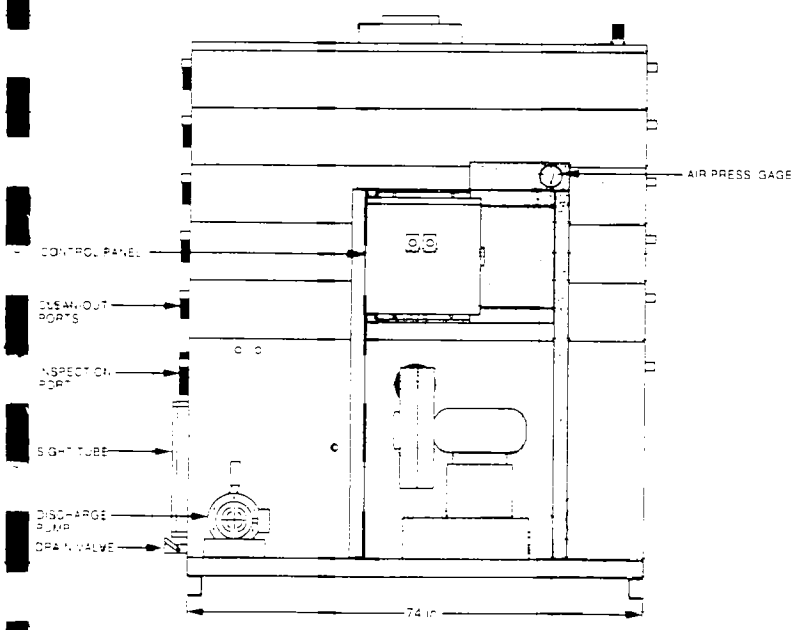


Model Pictured: 2631

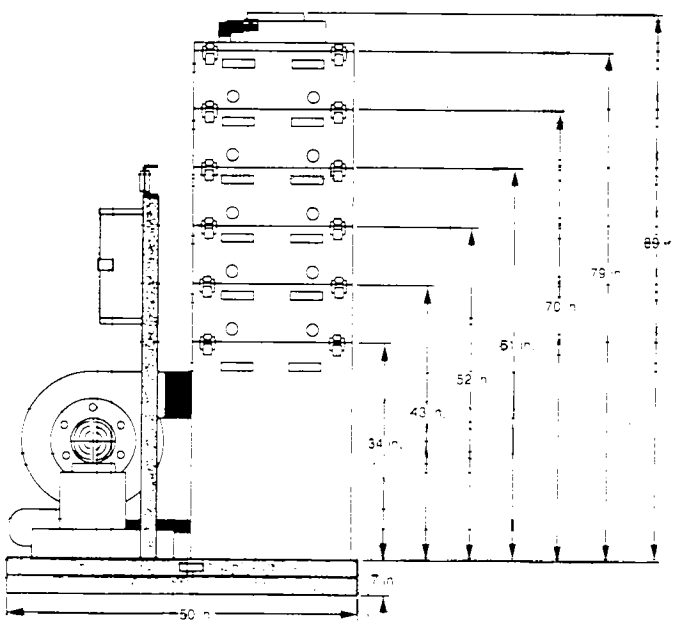
Options chosen for system pictured:

- ☑ Discharge pump
- ☑ EXP pump and blower motors
- ☑ NEMA 3R control panel with level controls for pump, alarm interlocks, motor starters, relays, 100 db alarm horn (remote mount)
- ☑ Control panel intrinsically safe components for remote mounted NEMA 3R panel
- ☑ Low pressure alarm switch
- ☑ High level alarm switch
- ☑ Discharge pump level switch
- ☑ Water pressure gauges
- ☑ Line sampling ports

Typical 2651 Configuration*



FRONT VIEW



RIGHT SIDE VIEW

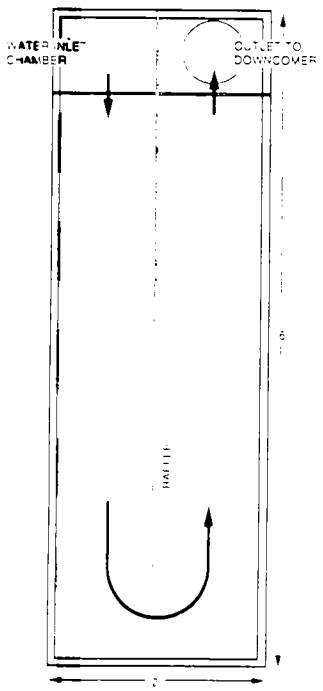
*Use these drawings as a guideline only. Systems are built to your project's specifications.

The graphs represent approximate removal efficiencies at 50°F. Use the ShallowTray® Modeler™ software to calculate expected performance.

Models	flow rate	# trays	width	length	height	min. cfm	approx. lbs.
2611	2-90gpm	1	4'0"	6'2"	5'0"	600	935
2621	2-90gpm	2	4'0"	6'2"	5'9"	600	1050
2631	2-90gpm	3	4'0"	6'2"	6'6"	600	1165
2641	2-90gpm	4	4'0"	6'2"	7'3"	600	1280
2651	2-90gpm	5	4'0"	6'2"	8'0"	600	1395

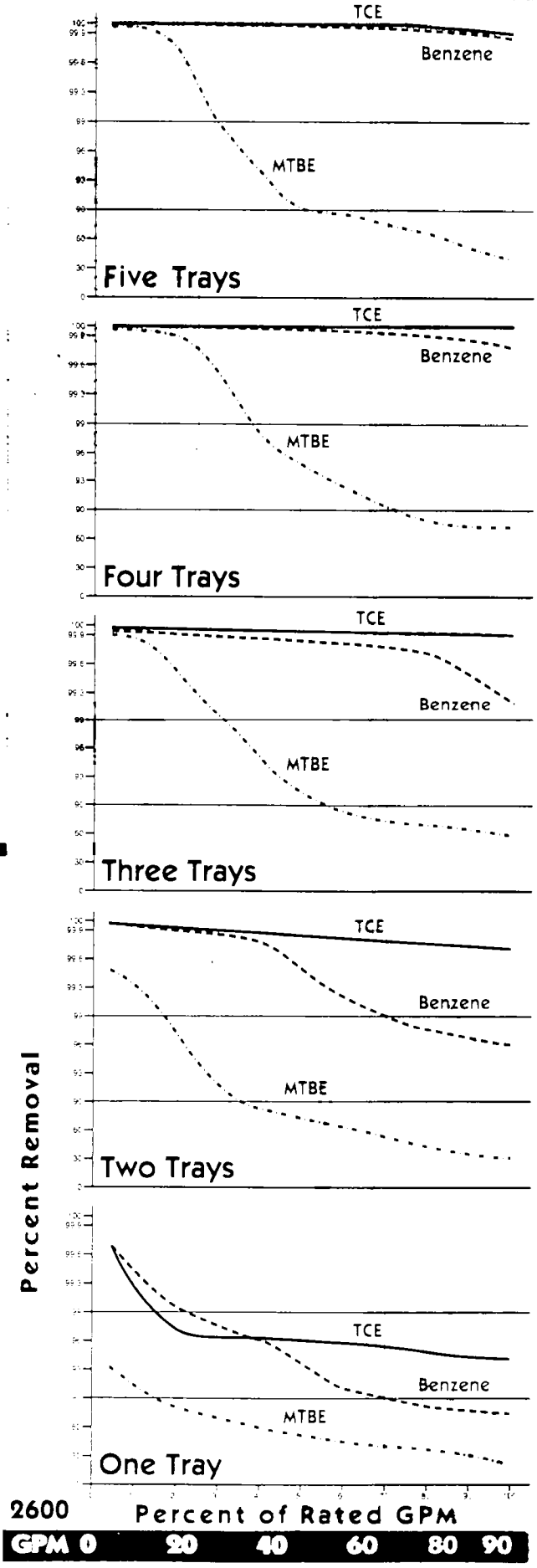
ShallowTray®
low profile air strippers

2600 AERATION TRAY



TOP VIEW

Percent Removal vs. Flow Rate



ShallowTray™
aeration systems

TECHNICAL INFORMATION

North East
Environmental Products, Inc.

17 Technology Drive
West Lebanon, NH 03784
(603) 298-7061

July 1990

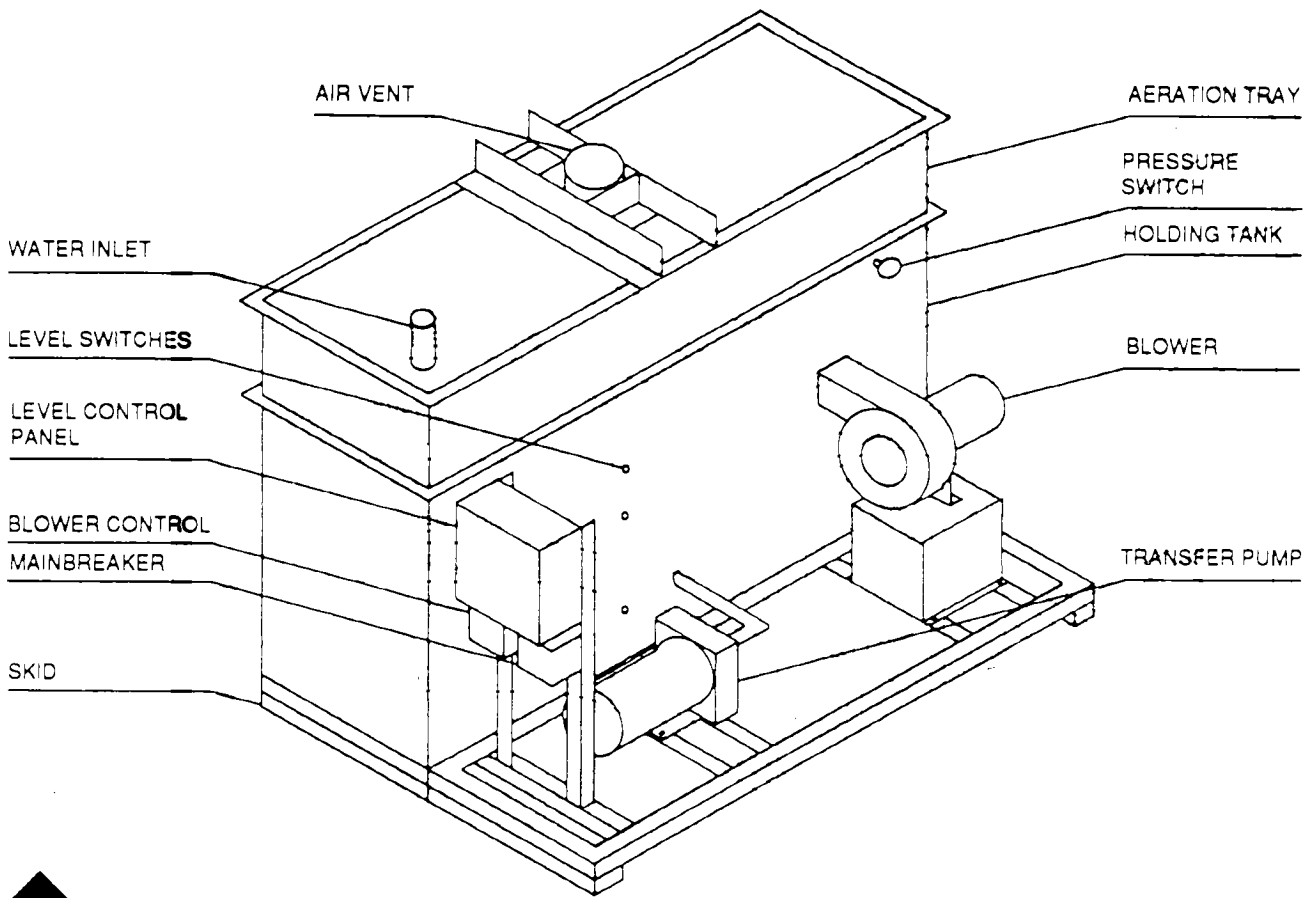
ShallowTray
aeration systems

GENERAL DESCRIPTION

The ShallowTray™ aeration system is shown in Figure 1 below. Figure 2 is a detail of the aeration tray portion of the equipment. Figure 3 shows the removal efficiency of the ShallowTray technology. Referring to Figure 2, water is sprayed into the inlet chamber through a coarse mist spray nozzle. It then flows over a flow distribution weir and along the aeration tray. Air is blown up through hundreds of 3/16" diameter holes in the aeration tray. The air forms a froth of bubbles approximately 6 inches deep on the aeration tray which generates a very large amount of mass transfer surface area. The air is then vented out the top of the unit. The treated water flows over an effluent weir and down a downcomer to the holding tank below.

The turbulent action of the froth scours the surfaces of the tray and prevents build-up of an iron film. The water turbulence makes the unit virtually fouling free as compared to air stripping towers with dumped packing. In the event that under extreme conditions the tray does accumulate an iron film, the trays can be easily cleaned with a brush and a mild acid solution (such as citric acid). There is no packing to replace.

FIGURE 1 - ShallowTray Aeration System



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17 Technology Drive, West Lebanon, NH 03784
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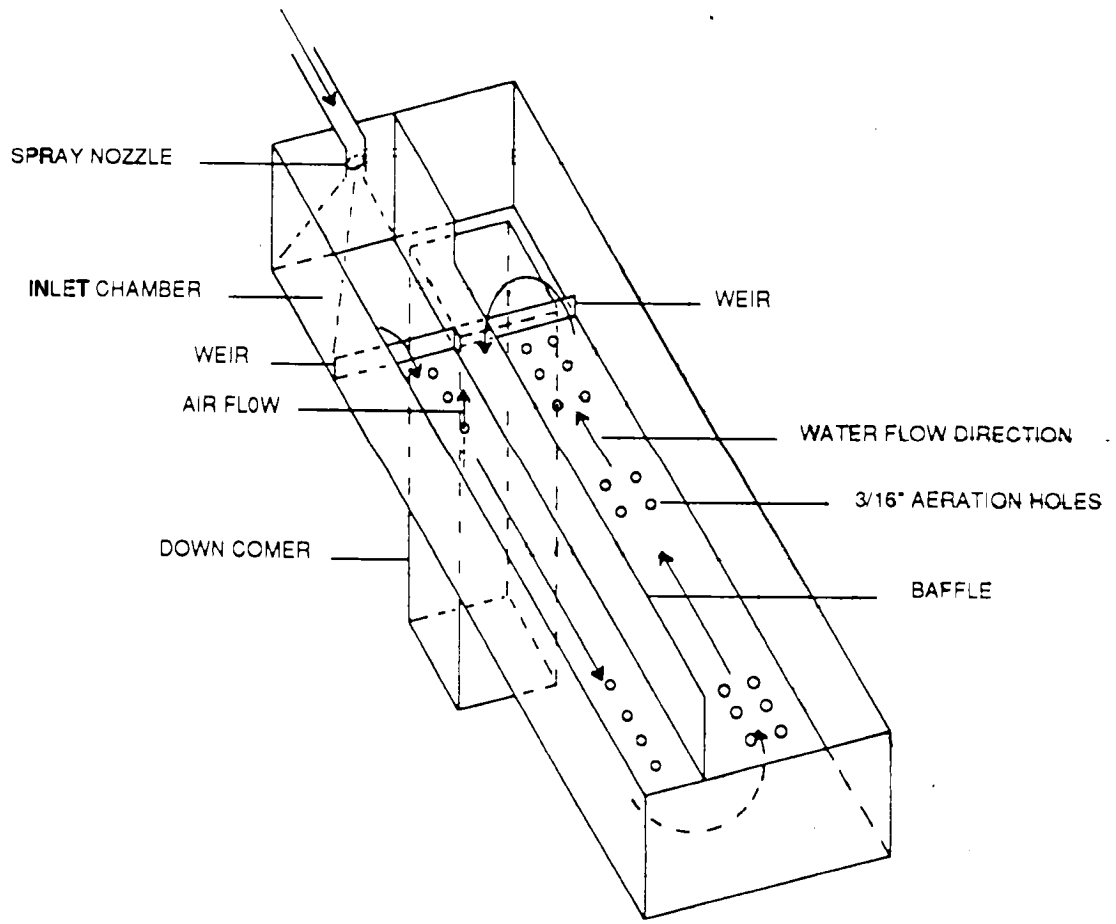
ShallowTray
aeration systems

FIGURE 2 - Aeration Tray Detail



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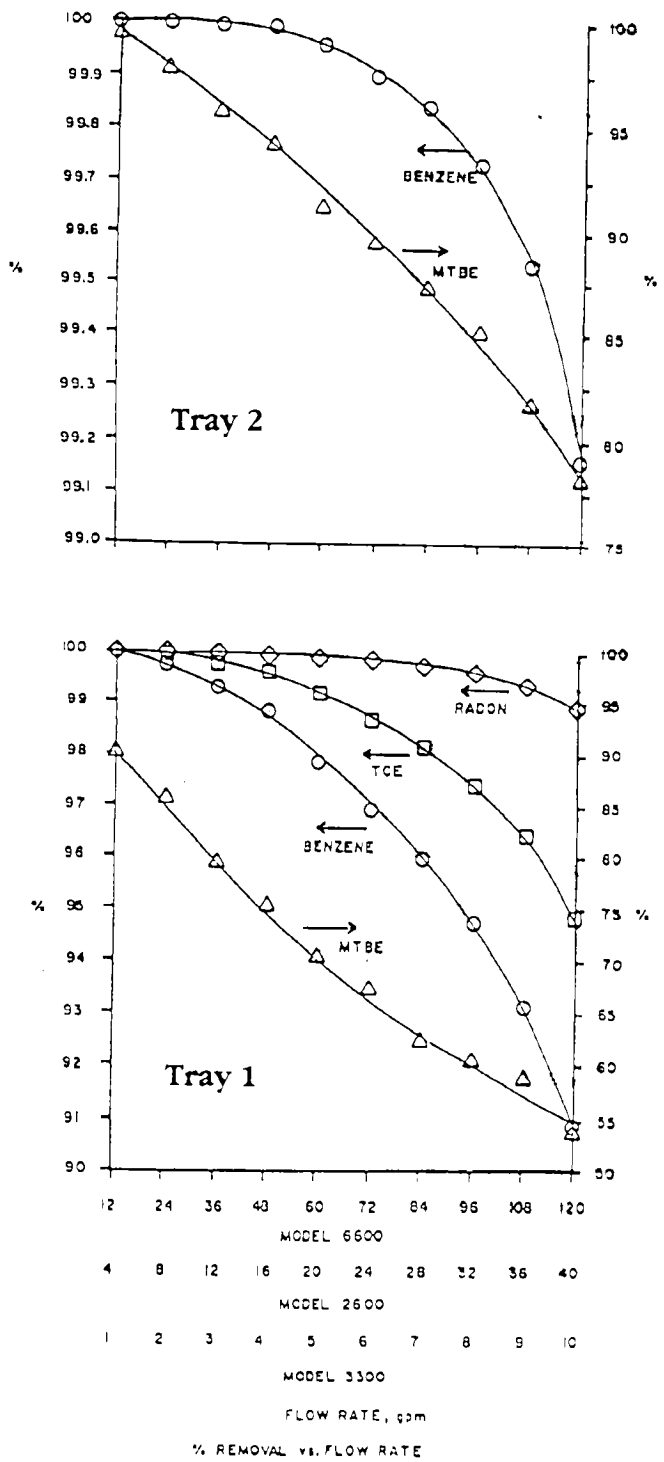
ShallowTray
aeration systems

FIGURE 3 - VOC Removal Performance



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(603) 298-7061

ShallowTray aeration systems

Table 1 presents the capacity and dimensions of the standard ShallowTray systems.

Model series 4600 units are comprised of two 2600 units coupled together, series 6600 units are comprised of three 2600 units coupled together.

TABLE 1 - Sizing Chart

Model No	No. of Trays	Width (ft.)	Length (ft.)	Height (ft.)	Air Flow Rate (cfm)	Capacity (gpm) min.	norm	max.
3311	1	28"	28"	3	150	1	6	10
3321	2	28"	28"	5	150	1	6	10
3322	2	28"	28"	5	300	1	6	10
2611	1	4	6	4	600	4	24	40
2621	2	4	6	5	600	4	24	40
2631	3	4	6	6	600	4	24	40
4612	1	8	6	4	1200	8	48	80
4622	2	8	6	5	1200	8	48	80
4632	3	8	6	6	1200	8	48	80
6613	1	6	11	4	1800	12	72	120
6623	2	6	11	5	1800	12	72	120
6633	3	6	11	6	1800	12	72	120

COMPONENT DESCRIPTIONS

Water Inlet

The water inlet connection is a 2-inch NPT stainless steel bushing, located in the top of the aeration tray cover. Model series 4600 and 6600 inlet piping is manifolded together.

Water Outlet

The water outlet is a 2-inch NPT stainless steel bushing located on the side of the holding tank on Model series 2600 and 4600. On series 6600 models the water outlet connection is located at the end of the holding tank.

Aeration Tray

The aeration tray is shown in detail in Figure 2. The tray is sealed to the top of the holding tank by a gasketed flange. The top of the tray is sealed with a stainless steel cover. Up to three trays can be stacked on top of one another in cases where higher removal efficiencies are needed. Most cases will not require more than two trays. Water is sprayed into the inlet chamber through a coarse mist spray nozzle. It then flows over a flow distribution weir and along the aeration tray. Air is blown up through hundreds of 3/16" diameter holes in the aeration tray. The air forms a froth of bubbles approximately 6 inches deep on the aeration tray which generates a very large amount of mass transfer surface area. The air is then vented out the top of the unit. The treated water flows over an effluent weir and down a downcomer to the holding tank below. The total height of each tray is only 12 inches.

The turbulent action of the froth scours the surfaces of the tray and prevents build-up of an iron film. The water turbulence makes the unit virtually fouling free as compared to air stripping towers with dumped packing. In the event that under extreme conditions the tray does accumulate an iron film, the trays can be easily cleaned with a brush and a mild acid solution (such as citric acid). There is no packing to replace.

Air Vent

The exhaust air is vented from the center of the aeration tray cover. The vent line connection is an 8-inch slip-over fitting. A vent pipe must be extended from the outlet connection to an approved discharge height. The vent line should be supported by guy wires or otherwise if the extension is over 10 feet.

ShallowTray
aeration system

Air Blower

The air blower is a radial wheel type pressure blower that provides up to 15 inches of water column air pressure for a three-tray unit. The blowers can be fitted with inlet filters and silencers when required. The blower forces air into the holding tank and up through the aeration tray holes and out the vent line. The noise generated by the blower is low frequency and of an intensity and quality that is acceptable in both industrial and commercial applications. There is no annoying high-pitched whine associated with regenerative-type blowers.

Controls

Standard controls include a manual blower Start/Stop switch and a low-air pressure switch. The air pressure can then be interlocked with the contaminated water feed pump so that, in the event of a blower failure, the feed pumps will shut off.

Options

Optional equipment includes:

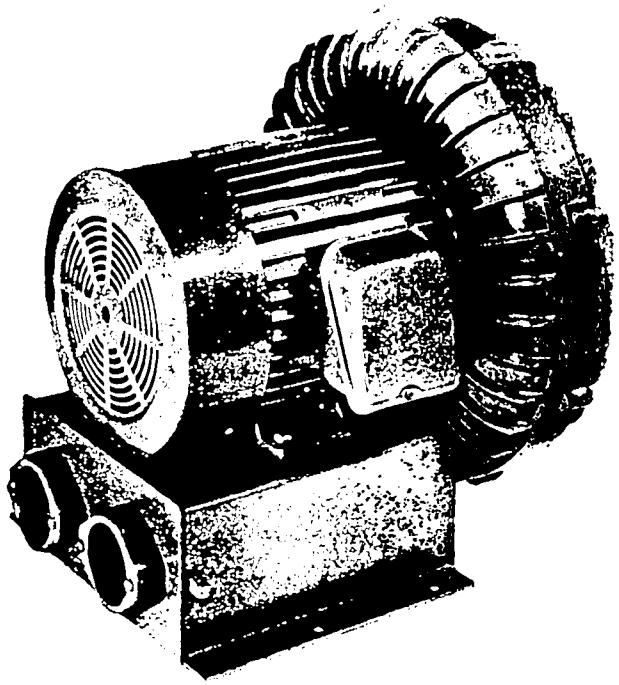
- inlet flow controls
- level controls
- discharge transfer pumps
- temperature gauges
- pressure gauges
- sampling ports
- air flow meters
- off gas treatment, vapor phase GAC, steam regenerated GAC & catalytic
- oil/water separator
- liquid phase carbon
- trailer/skid mounting
- pump test package
- air pressure interlock controls
- high water level interlock controls
- microprocessor based controls
- ODP, TEFC or explosion proof construction

North East
Environmental Products, Inc.
17 Technology Drive, West Lebanon, NH 03784
(603) 298-7061

Spencer VB-055-E Vortex Blower

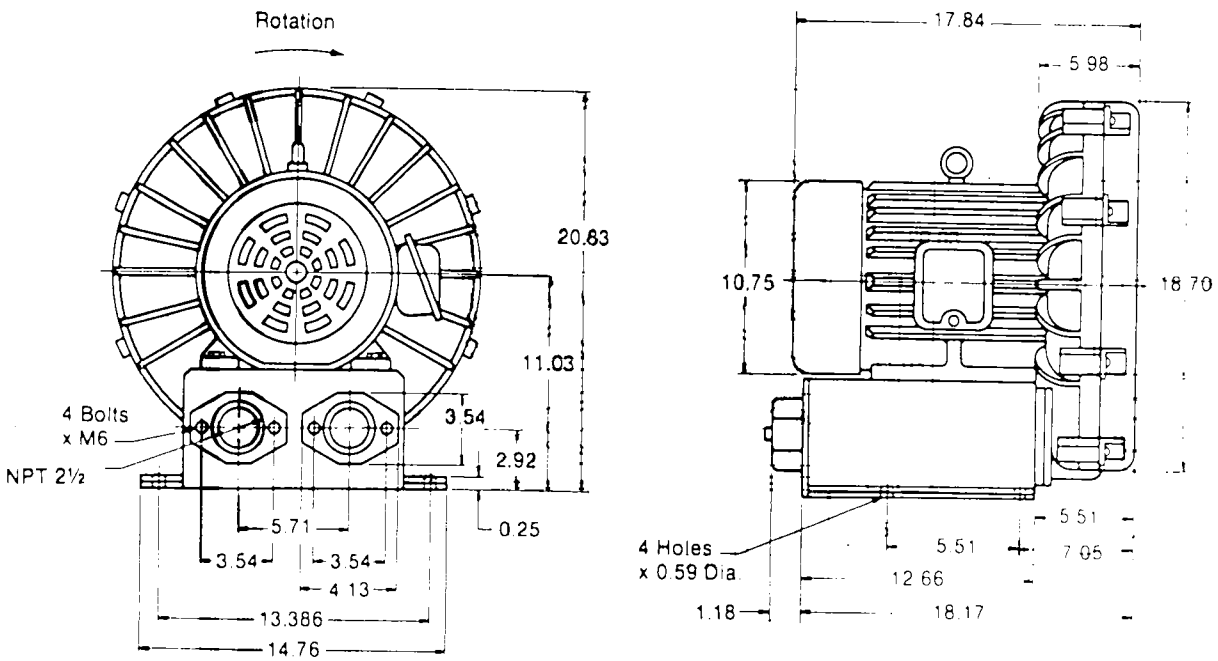
Bulletin 406D

General Specifications:	
Model	VB-055-E
Maximum volume	370 CFM
Maximum operating vacuum/pressure	87/91" H_2O
Maximum ambient	40°C
Acoustical noise @ 1.5 meters	77 dBA at 60 Hz
Weight	207 lbs.
Motor Specifications:	TEFC
Standard voltage	200-230/460, 3 phase, 60 Hz
Power input	6.4 kw
FLA current	20/18/9 amps
Locked rotor current	100/120/55 amps
Insulation	Class B (UL yellow card recognition File E49389)
Speed	3500 RPM at 60 Hz

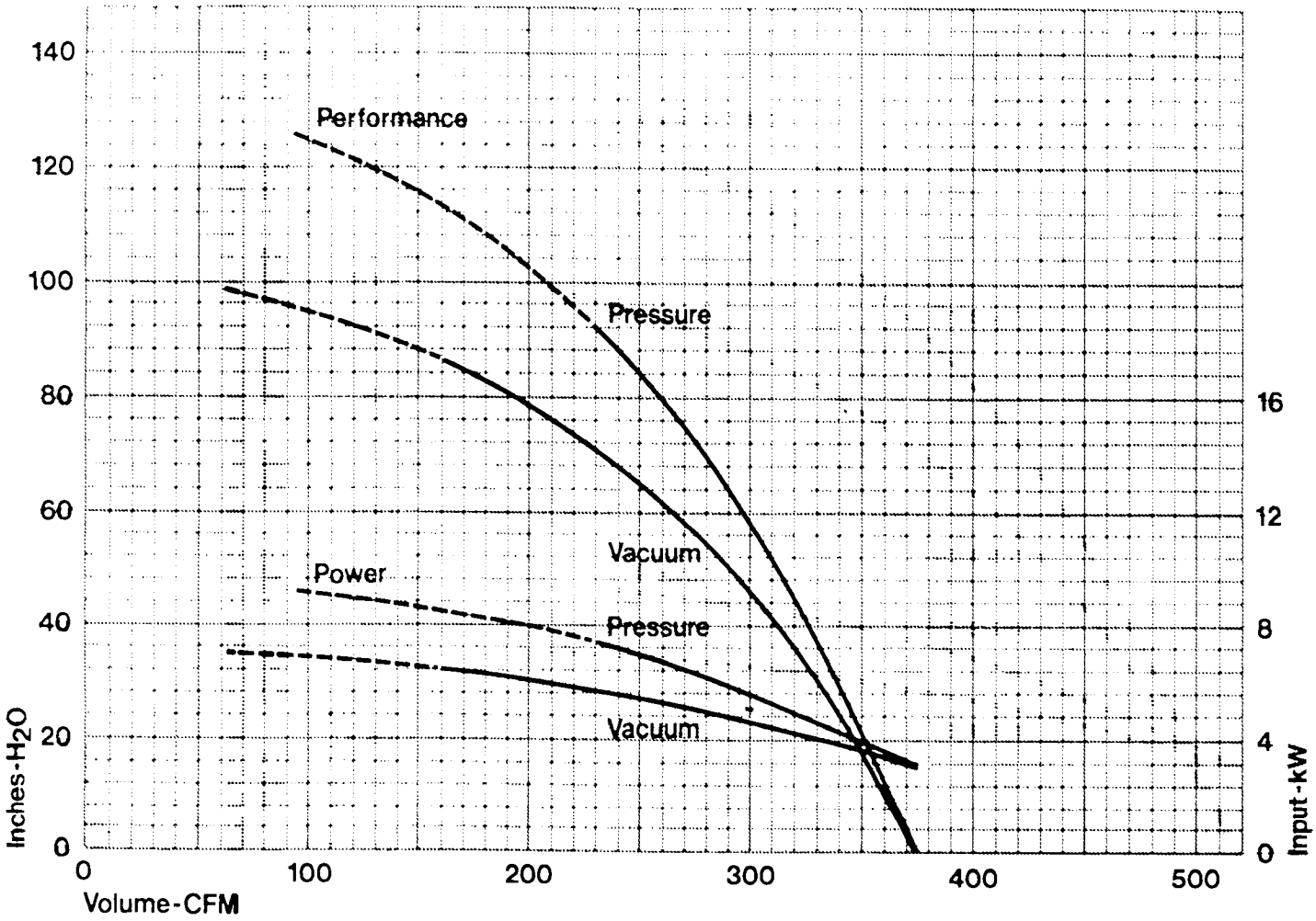


Note: Motor can be operated at 50 Hz. For performance and voltage variation contact factory representative.

Dimensions for VB-055-E in inches.

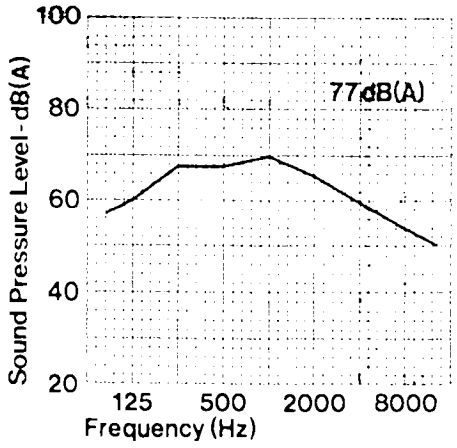


Performance and Power Curves **VB-055-E**



Notes:
1. Atmospheric conditions equal 20°C (68°F) at 29.92 Hg.
2. Measurements taken with unit at operating temperature.
3. Scattering ± 10% on the resistance curve.
4. Continuous operation should be maintained on the solid-line.
5. Specifications subject to change without notice.

Acoustical Noise Notes
1. Inlet and outlet open.
2. At distance of 1.5 meters.
3. ⅓ Octave band center frequency.



MODEL 3885

ETL LISTED
SUBMERSIBLE PUMP
CLASS I AND II D.V. 2 AND CLASS II D.V. 1 AND 2
G1086131480
ETL TESTING LABORATORIES INC
CORTLAND NEW YORK 13045

APPLICATIONS

Specifically designed for the following uses:
- Homes
- Farms
- Trailer Courts
- Motels
- Schools
- Hosptitals
- Industry
- Effluent Systems

SPECIFICATIONS

Pump:
- Solids Handling Capabilities: ¾" Maximum
- Discharge size: 2" NPT
- Capacities: Up to 114 GPM
- Total Heads: Up to 123 Feet TDH
- Mechanical Seal: Carbon-Rotary Seat/Ceramic-Stationary Seat 300 Series Stainless Steel Metal Parts BUNA-N Elastomers
- Temperature: 160°F (71°C) Maximum
- Fasteners: 300 Series Stainless Steel
- Capable of Running Dry Without Damage to Components

Motor:
- Single Phase: ⅓ HP, 115 or 230V 60 Hz, 1750 RPM
  ½ HP, 115V, 60 Hz, 3500 RPM
  ½ HP thru 1½ HP, 230V, 60 Hz, 3500 RPM
  Built-in overload with automatic reset
  Class B insulation
- Three Phase: ½ HP thru 1½ HP 208/230V, 460V, 60 Hz, 3500 RPM
  Class B Insulation, overload protection must be provided in starter unit
- Shaft: Threaded, 400 series stainless steel.
- Bearings: Ball bearings upper and lower
- Power Cord: 15 foot standard length (optional lengths available)
  Single Phase: ⅓ and ½ HP-16/3 SJTO with three prong plug.
  ¾ thru 1½ HP-14/3 STO with bare leads
  Three Phase: ½ thru 1½ HP-14/4 STO with bare leads
  On CSA listed models — 20' length SJTW and STW are standard.

FEATURES

Impeller: Cast iron, semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Bronze impeller available as an option.

Casing: Cast iron volute type for maximum efficiency. 2" NPT discharge adaptable for slide rail systems.

Mechanical Seal: Ceramic vs carbon sealing faces. Stainless steel metal parts, BUNA-N elastomers.

Shaft: Corrosion-resistant stainless steel. Threaded design. Locknut on three phase models to guard against component damage on accidental reverse rotation.

Motor: Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.

Designed for Continuous Operation: Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage.

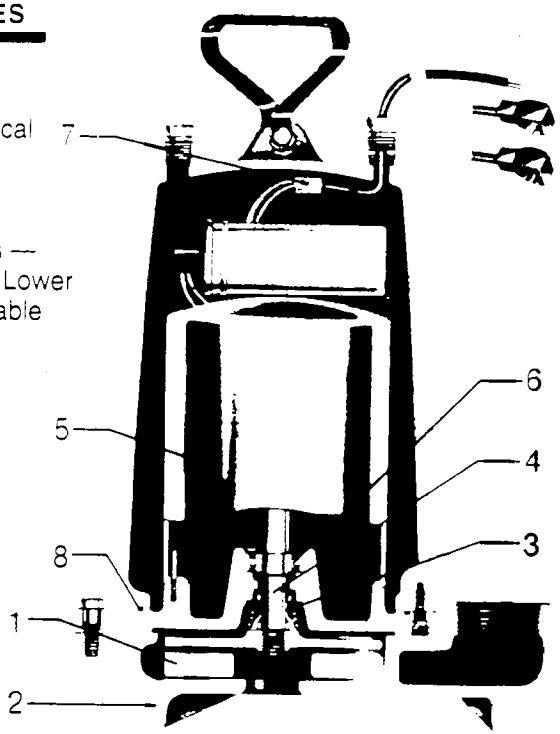
Bearings: Upper and Lower heavy duty ball bearing construction.

Power Cable: Severe duty rated, oil and water resistant. Epoxy seal on motor-end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking.

O-Ring: Assures positive sealing against contaminants and oil leakage.

FEATURES

1. Impeller
2. Casing
3. Mechanical Seal
4. Shaft
5. Motor
6. Bearings — Upper & Lower
7. Power cable
8. O-Ring



MODEL 3885

MODELS

Series	HP	Volts	Phase	Max.Amp.	RPM	Solids	Wt.
WE0311L	⅓	115	1	9.4	1750		56
WE0312L		230		4.7			
WE0311M		115		9.4			
WE0312M		230		4.7			
WE0511H	½	115	1	13.0			60
WE0512H		230		6.5			
WE0532H		208/230	3	3.4			
WE0534H		460		1.7			
WE0511HH		115	1	13.0			
WE0512HH		230		6.5			
WE0532HH		208/230	3	3.3			
WE0534HH		460		1.65			
WE0712H	¾	230	1	10.0	3500	¾"	70
WE0732H		208/230	3	5.4			
WE0734H		460		2.7			
WE1012H	1	230	1	12.5			
WE1032H		208/230	3	7.0			
WE1034H		460		3.5			
WE1512H	1½	230	1	15.0			80
WE1532H		208/230	3	9.2			
WE1534H		460		4.6			
WE1512HH		230	1	15.0			
WE1532HH		208/230	3	9.2			
WE1534HH		460		4.6			

PERFORMANCE RATINGS (Gallons Per Minute)

Series No.	WE0311L WE0312L	WE0311 WE0312M	WE0511H WE0512H WE0532H WE0534H	712H 732H WE0734H	WE1012H WE1032H WE1034H	WE1512H WE1532H WE1534H	WE0511HH WE0512HH WE0532HH WE0534HH	WE1512HH WE1532HH WE1534HH
HP	⅓	⅓	½	¾	1	1½	½	1½
RPM	1750	1750	3500	3500	3500	3500	3500	3500
5	100	70	80	90	106	—	60	—
10	80	65	76	87	102	112	56	84
15	60	57	72	84	100	108	53	82
20	36	45	65	79	95	105	48	77
25		25	59	74	91	100	45	75
30			50	67	85	96	40	72
35			40	61	79	92	35	70
40			26	52	72	86	30	67
45			10	43	64	80	25	64
50				30	54	73	18	60
55				17	42	65	12	58
60				6	30	54	3	54
65					16	40		51
70					5	26		47
75						14		43
80						4		40
90								33
100								24
110								15
120								5

Total Head Feet of Water

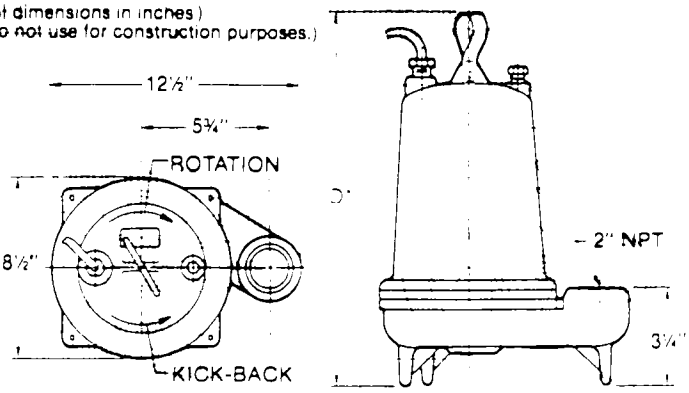
EFFLUENT EJECTOR SYSTEM

Effluent ejector system offers ease of ordering and installation. A single ordering number specifies a complete system designed for most residential and commercial sump and effluent pump applications.

Package Includes:
Submersible Effluent Pump,
WE[illegible]L, 12L or WE0311M,
12[illegible]E0511HH, 12HH
M[illegible] Level Control Switch
A[illegible]15V), A2-6 (230V)
Ba[illegible]7-1801S
Basin Cover A8-1822
Check Valve A9-2P
Order No.: SWE0311L,
SWE0312L,
SWE0311M, SWE0312M,
SWE0511HH, SWE0512HH

DIMENSIONS

(All dimensions in inches)
(Do not use for construction purposes.)



D* ⅓, ½, ¾ and 1 HP = 15" except for model WE0712H & WE1012H = 18";
1½ HP = 18"

Available Certifications: CSA Canadian Standards Association
ETL Testing Laboratories

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

PRINTED IN U.S.A.

CALGON

CALGON CARBON CORPORATION

SERVICE BULLETIN

VAPOR PAC

Calgon Carbon's Vapor Pac Service meets industrial needs for cost-effective removal of volatile organic compounds (VOCs) at air emission sources.

The Vapor Pac Service features a small, easily transportable adsorber which contains 1,800 pounds of activated carbon. The adsorber can handle air flows up to 1,000 cfm.

Designed to remove both toxic and non-toxic VOCs, the adsorption system is especially useful for short-term projects and for treatment of low volume flows that contain low to moderate VOC concentrations. Common applications include VOC removal from process vents, soil remediation vents, and air stripper off-gases.

To accommodate a wide variety of process conditions, Vapor Pac adsorbers are available in two basic designs: a polyethylene model that offers excellent corrosion-resistance, and a stainless steel model than can withstand higher temperatures, and slight pressure or vacuum conditions.

Calgon Carbon provides the adsorber, carbon, spent carbon handling and carbon reactivation (after the carbon meets the company's acceptance criteria) as part of the Vapor Pac Service. Ductwork and fans are the only equipment requiring a capital expenditure by the user.

When carbon becomes saturated with VOCs, the system is replaced with another adsorber containing fresh carbon.

By utilizing this unique service, users can generally achieve VOC removal and regulatory compliance objectives, minimize operating costs, and eliminate maintenance costs* (as the equipment is owned and maintained by Calgon Carbon). Furthermore, because organic compounds are safely destroyed through the carbon reactivation process, costs and regulations typically associated with waste disposal can be eliminated.

Please contact a Calgon Carbon Technical Sales Representative to learn more about the advantages of the Vapor Pac Service for your specific VOC control needs.

**Damage to Vapor Pac Unit caused by negligence or misapplication is the responsibility of the user.*

FEATURES AND BENEFITS OF VAPOR PAC SERVICE

- Adsorbers are specifically designed for ease of installation and operation.
- Adsorbers are available in plastic (polyethylene) and metal (stainless steel) construction to accommodate a wide variety of applications.
- System can be operated in series or parallel mode or a combination of both modes to handle a variety of flows and concentrations.
- System exchange eliminates on-site carbon handling.
- Recycling of spent carbon eliminates disposal problems.
- Capital expenditure is eliminated since Calgon Carbon Corporation owns and maintains equipment.

VAPOR PAC (PLASTIC) SPECIFICATIONS

Vessel dimensions:	44¼" x 44¼" x 89⅜"
Inlet & discharge connections:	6" PS 15-69 duct flanges
Carbon volume:	60 cu. ft. (1800 lbs)
System shipping weight:	New - 2200 lbs Spent - 4000 lbs
Temperature rating:	150°F max
Static pressure rating above carbon level:	20" W.C. max
Vacuum pressure rating above carbon level:	2" W.C. max

All units shipped F.O.B., Pittsburgh, Pennsylvania

MATERIALS OF CONSTRUCTION

Vessel:	Polyethylene
Frame:	Carbon steel coated with Sherwin Williams Tile Clad II
Inlet flanges, elbow, septum:	PVC
Discharge flange:	Polyethylene
Fasteners & bottom valve support plate:	Steel, plated
Sample fittings & sample canister:	PVC

VAPOR PAC (STAINLESS STEEL) SPECIFICATIONS

Vessel dimensions, diameter:	5'
height:	7'3"
Inlet & discharge connections:	8" PS 15-69 duct flanges
Carbon volume:	60 cu. ft. approx. (1800 lbs)
System shipping weight:	New - 2840 lbs Spent - 4640 lbs
Static pressure rating above carbon level:	15 psig
Vacuum pressure rating above carbon level:	Full

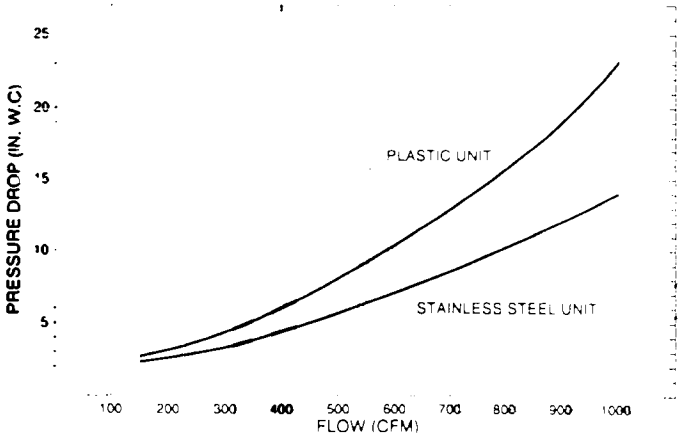
All units shipped F.O.B., Pittsburgh, Pennsylvania

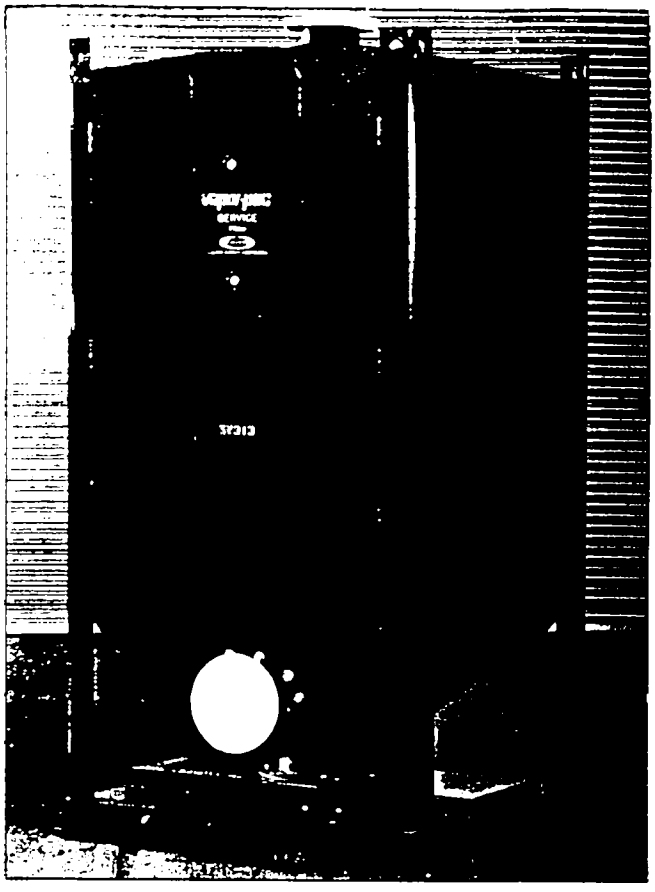
MATERIALS OF CONSTRUCTION

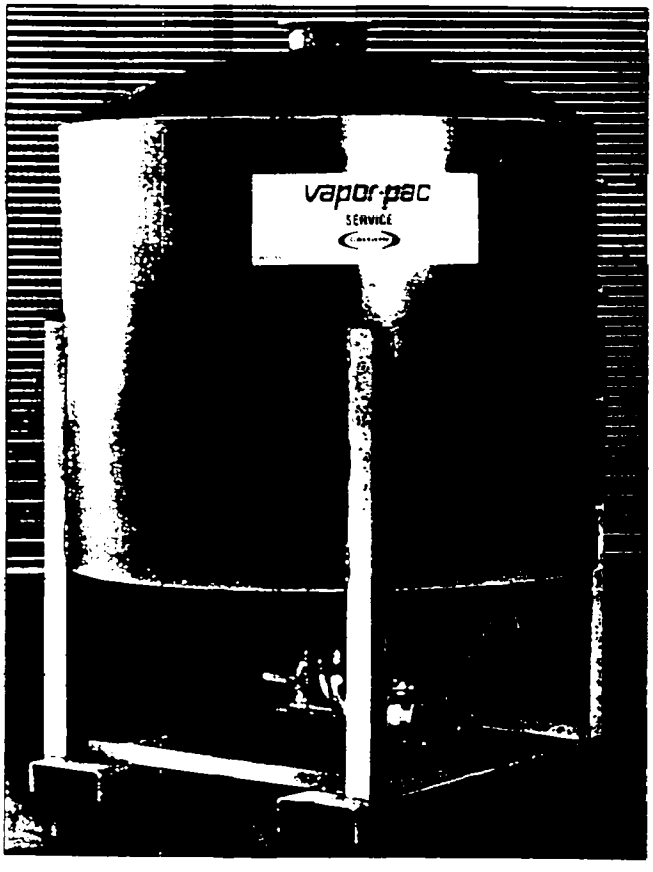
Vessel	316L stainless steel
Skid and support frame:	304 stainless steel
Inlet flanges, elbow, septum:	316L stainless steel
Discharge flange	316L stainless steel
Fasteners & bottom valve support plate	Steel, plated
Sample fittings & sample canister:	316L stainless steel

VAPOR-PAC UNIT PRESSURE DROP

UPFLOW WITH 1800LBS., 4x10 MESH CARBON DENSE PACKED







CAUTION

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing activated carbon, appropriate sampling and work procedures should be followed, including all applicable federal and state requirements.

For information regarding human and environmental exposure, call Calgon Carbon's Regulatory and Trade Affairs personnel at (412) 787-6700.

INSTALLATION INSTRUCTIONS

See Bulletin #27-199 for details on how to install a Vapor-Pac.

SAFETY CONSIDERATIONS

See Safety Bulletin #27-198 for important safety considerations.

OPTIONAL EQUIPMENT

Inlet and outlet flange connectors for ANSI hose connections.

For additional information, contact
Calgon Carbon Corporation,
Box 717, Pittsburgh, PA 15230-0717,
Phone (414) 787-6700

CALGON

CALGON CARBON CORPORATION

CALGON

CALGON CARBON CORPORATION

EQUIPMENT BULLETIN

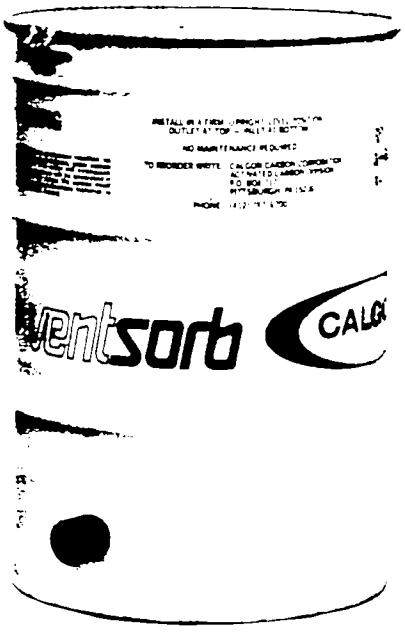
VENTSORB

GENERAL DESCRIPTION

VentSorb canisters – each containing 200 pounds of activated carbon – are ideal for low-flow air purification applications at industrial and municipal facilities. These economical adsorption systems control small volume organic contaminant and/or odorous gas emissions from:

- Storage tank vents
- Reactor vents
- API separator vents
- Sludge thickener tanks at waste treatment plants
- Sewer gas vents, wet stations and weir boxes at chemical and municipal waste treatment plants
- Chemical plant wastewater holding tanks
- Laboratory hood exhausts
- Landfills
- Airstripper off-gases

The 55-gallon VentSorb canisters contain all the elements found in a full-scale adsorption system-vessel; activated carbon, inlet connection and distributor, and an outlet connection for the purified air stream. Air is distributed across the carbon bed with a corrosion-resistant stainless steel septum.



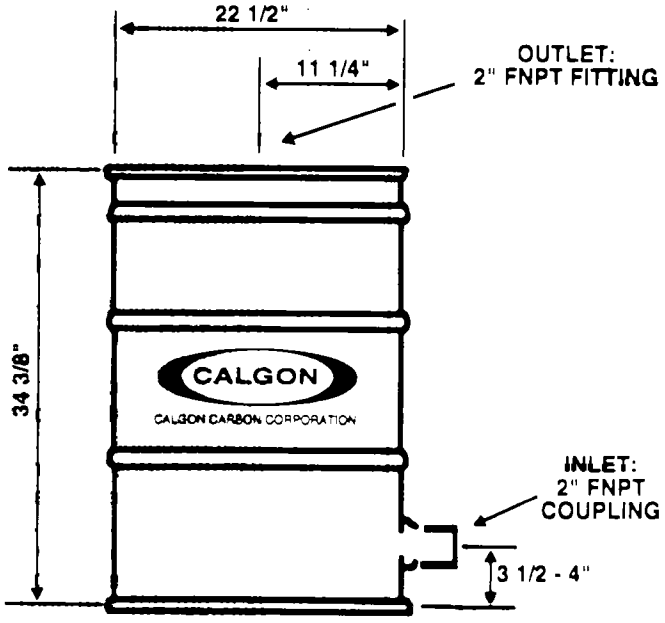
FEATURES AND BENEFITS

VentSorb canisters offer industrial and municipal users several important features and benefits, including:

- Effective treatment to remove a variety of vapor phase organic contaminants and odor-causing compounds.
- Continuous treatment at varying flow rates and concentrations.
- Simple installation and operation.
- Flexibility to be installed in series or multiple units in parallel.
- Supplied with the type of activated carbon selected specifically for the application.
- Practical disposal option, as pre-approved spent carbon canisters may be returned to Calgon Carbon for safe carbon reactivation.
- Low cost per unit makes carbon treatment economical.

VENTSORB SPECIFICATIONS

Vessel:	Open head 16 gauge steel canister
Pressure:	15 psig per DOT 17C
Cover:	Removable steel cover, 12 gauge bolt ring with polycord gasket
Internal Coating:	Heat cured 100% phenolic
External Coating:	High solids enamel
Temperature:	350°F(intermittent) (176.7°C)
Inlet: 2" FNPT:	304 stainless steel screen distributor
Outlet:	2" FNPT
Flow:	100 cfm (2.83 m^3/min)
Carbon:	200 pounds Type BPL 4x10 or Type IVP 4x6 (90.7kg)
Ship Weight:	260 pounds (117.9kg)
Identification:	VentSorbs sequentially numbered for reference



VENTSORB DIMENSIONS

TYPICAL VENTSORB APPLICATIONS

Chemical, petrochemical, food, pulp and paper, and many other industrial plants – along with municipal sewage treatment facilities – are frequent users of VentSorbs for continuous control of vented emissions. Here are a few examples of user applications:

Storage Tank Vents – VentSorbs are widely used to control evaporative losses vented from storage tanks. Typically, these vapors are emitted during tank filling and emptying. In one application, a glycerin manufacturer is using the canisters to purify ambient air drawn into storage tanks during product transfer. The adsorption process helps prevent contamination of the company's glycerin product. The VentSorb units provide over six months of service for this application.

Reactor Vents – A pesticide manufacturer is using multiple VentSorbs on five reactor vessels to control trace amounts of odorous methylamine and diethylamine (which are byproducts of a caustic scrubbing process). Each VentSorb unit handles a 30 cfm air stream containing 15 ppm of amine vapors. The units provide over three months of service for this application.

API Separator Vents – A major refinery is using VentSorb units to control odorous emissions from settling basins where oil is separated from wastewater that is discharged in condensate, blowdown or drain systems. For this application, API separators are covered and vented to comply with local air pollution control regulations. The air stream is pulled through two VentSorb units, operating in parallel configuration, at 100 cfm.

VENTSORB INSTALLATION

VentSorb canisters are shipped ready for installation. Each canister is self-supporting and should be placed on a level, accessible area as near as possible to the emission source. Installation is simple, requiring just a flexible hose or pipe to connect the vent to the 2-inch FNPT bottom inlet of the canister.

If the VentSorb will be vented directly to outside air, a U-shaped outlet pipe or rain hat – such as a pipe tee – is recommended to prevent precipitation from entering the unit.

VentSorb canisters operate from a continuous suction across the vent. The suction can be produced by a blower or by using the positive pressure inside the tank or process vessel. In many cases, the pressure or surge of pressure within the tank or vessel is sufficient to overcome the pressure drop across the canister – thus eliminating the need for a blower. Please consult pressure drop data in this bulletin for more information.

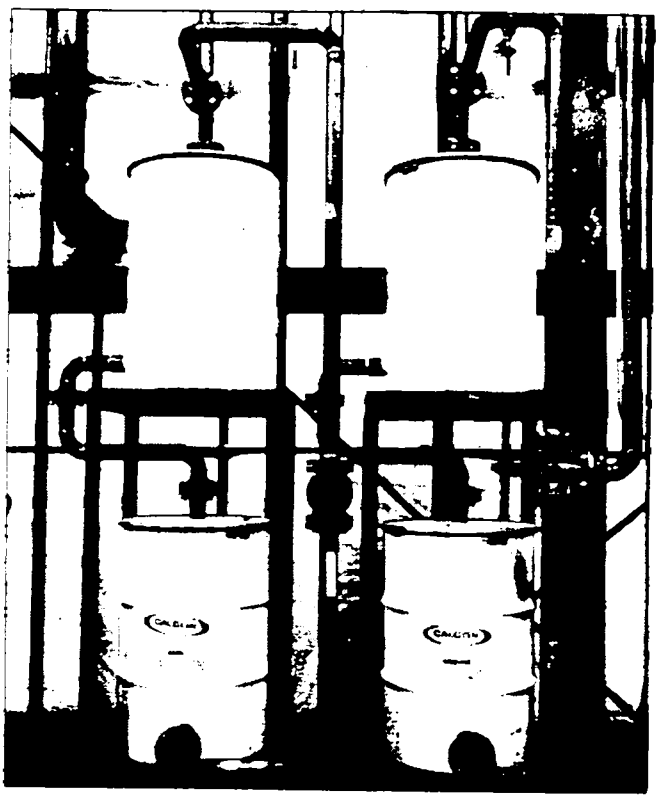
Assembled VentSorb canisters are shop-tested to 4 psig, but they are intended to operate at minimal backpressure.

Maximum recommended air flow through a VentSorb is 100 cfm. If higher flows are encountered, plant operators should install two or more canisters in parallel configuration.

When VentSorb canisters are used to control vapors from organic solvent storage tanks, the following precautions are recommended:

- A safety relief valve must be provided. This protects the storage tank should the VentSorb become plugged or blocked in any fashion. Such a vent would open in this emergency situation, thereby relieving pressure.
- Under appropriate conditions, a flame arrestor and/or backflow preventer must be installed as shown in this bulletin's storage tank installation drawing. This prevents backflow of air through the VentSorb when the storage tank is empty.
- Pre-wetting the carbon helps dissipate excessive heat that may be caused by high organic compound concentration (>0.5 to 1.0 Vol. %).

Also, if VentSorb canisters are used to control organic emissions from airstrippers or other high moisture content air streams, Calgon Carbon recommends that humidity in the air stream be reduced to under 50 percent. Lower humidity optimizes adsorptive capacity of the carbon. In addition, for similar applications that generate a condensate, Calgon Carbon recommends installation of a drain on the inlet piping.



Four VentSorb units at a chemical plant are installed to operate in series and in parallel. More than 25 odorous and/or toxic vapors are controlled by 80 VentSorb units at this plant.

RETURN OF VENTSORBS

Arrangements should be made at the time of purchase regarding the future return of canisters containing spent carbon. Calgon Carbon will provide instructions on how to sample the spent carbon and arrange for carbon acceptance testing. The spent carbon is reactivated by Calgon Carbon and all of the contaminants are thermally destroyed. The company will not accept VentSorbs for landfill, incineration or other means of disposal.

No VentSorbs can be returned to Calgon Carbon unless the carbon acceptance procedure has been completed, an acceptance number provided, and the return labels (included with the units at the time of purchase) are attached.

VentSorbs must be drained – and inlet/outlet connections must be plugged – prior to return to Calgon Carbon.

THEORETICAL VENTSORB CAPACITIES

	Theoretical VentSorb Capacity Lb Adsorbed/VentSorb*				
	BOILING POINT/°C	MOLECULAR WEIGHT	10 PPM	100 PPM	1,000 PPM
Acrylonitrile	77.3	53.1	9	18	37
Benzene	80.1	78.1	27	39	55
n-Butane	-0.5	58.1	5	9	17
Carbon Tetrachloride	76.8	153.8	46	66	97
Dichloroethylene	37.0	97.0	16	29	53
Methylene Chloride	40.2	84.9	6	13	30
Freon 115	-37.7	154.5	6	11	21
n-Hexane	68.7	86.2	23	31	43
Styrene	145.2	104.1	56	68	82
Toluene	110.6	92.1	44	56	70
Trichloroethylene	87.2	131.4	45	65	95

* Theoretical capacity based on 70 degrees F., atmospheric pressure, less than 50 percent humidity and 200 pounds of carbon using isotherm data for Type BPL carbon.

VENTSORB CARBON LIFE ESTIMATE

This table lists the theoretical adsorption capacities for several compounds. The adsorption capacity for nonpolar organics increases with the boiling point, molecular weight and concentration of the air contaminant. Estimate the life of a VentSorb canister for other organic compounds by matching them with compounds of similar boiling point and molecular weight in this table. Low molecular weight (less than 50) and/or highly polar compounds such as formaldehyde, methane, ethanol, etc., will not be readily adsorbed at low concentrations.

Note: The standard VentSorb canister contains 200 pounds of BPL carbon. When removing hydrogen sulfide and mercaptans from moist air vented from sewage operations, greater efficiency will be achieved by using a VentSorb canister which contains specially impregnated Type IVP carbon. A VentSorb containing IVP carbon can remove up to 40 pounds of hydrogen sulfide and 15 pounds of methyl mercaptan.

VENTSORB SAFETY CONSIDERATIONS

While complying with recommended installation instructions, plant operators should also be aware of these additional heat-related safety considerations:

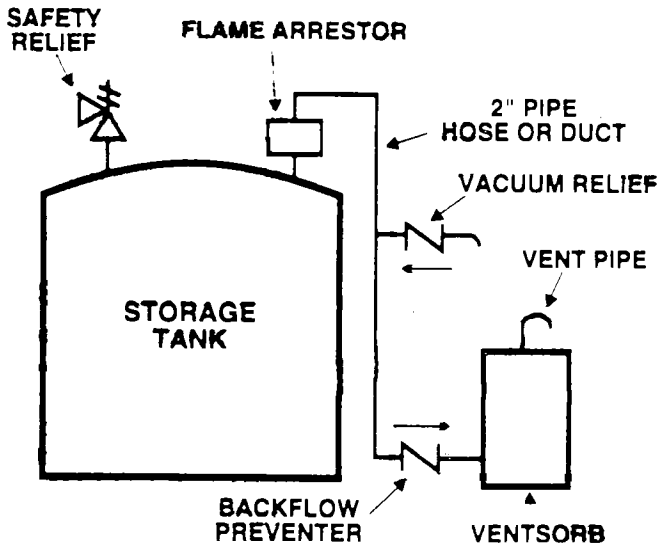
1. When contacting with activated carbon, some types of chemical compounds – such as those from the ketone and aldehyde families and some organic acids or organic sulfur compounds – may react on the carbon surface causing severe exotherms or temperature excursions. **If you are unaware or unsure of the reaction of an organic compound on activated carbon, appropriate tests should be performed before putting a VentSorb in service.**

2. Heat of adsorption can lead to severe temperature excursions at high concentrations of organic compounds. Heating may be controlled by diluting the inlet air, time weighting the inlet concentration to allow heat to dissipate, or pre-wetting the carbon.

3. **Do not use VentSorbs with Type IVP carbon in petrochemical or chemical industry applications.**

4. Type IVP carbon can liberate heat by reacting chemically with oxygen. To prevent heat within a vessel, the carbon must not be confined without adequate air flow to dissipate the heat. In situations where there is insufficient or disrupted air flow through the vessel, the chemical reaction can be prevented by sealing the inlet and outlet connections to the vessel.

NOTE: CONTACT YOUR LOCAL CALGON CARBON TECHNICAL SALES REPRESENTATIVE FOR CLARIFICATION OR TO ANSWER ANY QUESTIONS.



Typical VentSorb Installation at Storage Tank

CALGON CARBON AIR PURIFICATION SYSTEMS

VentSorb is a unit specifically designed for a variety of small applications. Calgon Carbon Corporation offers a wide range of carbon adsorption systems and services for a greater range of flow rates and carbon usages to meet specific applications.

WARRANTY

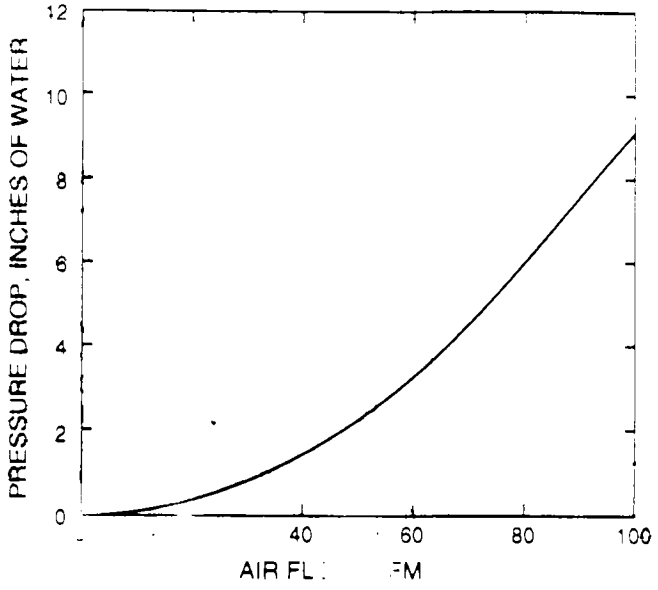
There are no expressed or implied warranties – or any warranty of merchantability or fitness – for a particular purpose associated with the sale of this product.

LIMITATION OF LIABILITY

The Purchaser's exclusive remedy for any cause of action arising out of purchase and use of the VentSorb, including but not limited to breach of warranty, negligence and/or indemnification, is expressly limited to a maximum of the purchase price of the VentSorb unit as sold. All claims of whatsoever nature shall be deemed waived unless made in writing within forty-five (45) days of the occurrence giving rise to the claim. In no event shall Calgon Carbon Corporation for any reason be liable for incidental or consequential damages, damages in excess of the purchase price of the VentSorb unit, loss of profits or fines imposed by Governmental agencies.

For information regarding incidents involving human and environmental exposure, please call (412) 787-6700 and ask for the Regulatory and Trade Affairs Department.

VENTSORB PRESSURE DROP



Pressure drop th· ugh a Ve unit is a function of the process air flow as shown in · oh. A VentSorb canister can handle up to 100 cfm at = sure drop of less than 15 inches water column. If higher ows or lower pressure drop is needed, multiple canisters may be installed in parallel operation. The maximum canister pressure should not exceed 4 psig.

Application information provided in this bulletin is based upon theoretical data. Calgon Carbon Corporation assumes no responsibility for the use of the information in this product bulletin.

If at any time our products or services do not meet your requirements or expectations, or if you would like to suggest any ideas for improvement, please call us at 1-800-548-1999.

For detailed information on the products described in this bulletin, please contact one of our Regional Sales Offices located nearest to you:

New Jersey
Bridgewater, NJ 08807
Tel (908) 526-4646
Fax (908) 526-2467

Pennsylvania
Pittsburgh, PA 15230-0717
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