BIG V SUPERMARKETS, INC.
Florida, New York 10921

ENGINEERING REPORT
FOR
GROUNDWATER PUMP AND TREAT REMEDIATION SYSTEM

AT BALDWIN PLACE MALL

SOMERS, NEW YORK

SITE No. 36-0023

June 1997

LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

1 INTRODUCTION

Objective

This Engineering Report has been prepared by Lawler, Matusky & Skelly Engineers LLP (LMS) to support New York State Department of Environmental Conservation (NYSDEC) approval of plans and specifications for a groundwater remediation pump and treat system at Baldwin Place Mall. This document conforms to NYSDEC Bureau of Wastewater Facilities Design guidelines for engineering reports on proposed industrial wastewater treatment facilities.

Background

As a result of perchloroethylene contamination of soil and groundwater, Baldwin Place Mall is on NYSDEC's list of inactive hazardous waste sites. On 9 November 1995 NYSDEC issued its Record of Decision (ROD) concerning remediation of the site. The ROD requires, among other actions, the construction and operation of a pump and treat groundwater remediation system in the soil and weathered bedrock in the immediate vicinity of the spill location. Generalized design features of the system were described in a 1995 LMS feasibility study (FS), which is incorporated into the ROD.

Under New York State's Superfund law, actions taken to implement an ROD are exempt from permitting. However, in accordance with NYSDEC procedures, on 25 July 1996 LMS submitted application forms for a "permit-equivalent" to set the effluent limitations, monitoring requirements, and other conditions for discharge from the remediation system. NYSDEC issued the permit-equivalent on 7 February 1997.

2 DESCRIPTION OF INDUSTRY

The process from which the wastewater is derived is not an industry; rather, pumped groundwater is to be treated. There are no applicable U.S. Environmental Protection Agency (EPA) effluent guidelines.

3 TREATMENT OBJECTIVES

The treatment objective is to provide an effluent that achieves the limitations in the attached State Pollutant Discharge Elimination System (SPDES) permit-equivalent. These limitations are for pH (range of 6 to 9 standard units [SU]) and for volatile organic compounds (VOCs):

	LIMIT (µg/l)
Total 1,2-dichloroethylene (DCE)	10
Methyl tert butyl ether (MTBE)	50
Tetrachloroethylene (PCE)	10
Trichloroethylene (TCE)	10

4 EXISTING TREATMENT FACILITIES

There are no existing facilities pertinent to the groundwater remediation system.

5 WASTEWATER CHARACTERISTICS FOR DESIGN OF PROPOSED TREATMENT FACILITIES

The influent VOC concentrations shown below have been projected based on worst-case flow-weighted concentrations from the individual pumping wells.

	RW-1S	RW-2D	COMBINED	EFFLUENT LIMIT
Flow (GPM ~~gpd~~)	0.5	3	3.5	no limit
DCE (µg/l)	61	28	33	10
MTBE (µg/l)	<10	11	10	50
PCE (µg/l)	24,000	3200	6200	10
TCE (µg/l)	160	15	36	10
pH (SU)	7.2-7.6	7.5-11.4	7.5-11.9	6-9

As indicated, the required removals for VOCs are 70% (DCE), 0% (MTBE) 99.8% (PCE), and 72% (TCE). The raw water concentrations are worse-case projections that might be achieved during initial operation of the system. Long term concentrations will most likely be lower by at least an order of magnitude.

A high worse-case pH is possible based an 11.4 SU reading in well MW-3D. This unusually high pH is probably not representative of the actual groundwater, which is near neutral over most of the site. Therefore, no treatment is proposed at this time to correct for high pH.

6 BASIS FOR DEVELOPMENT OF TREATMENT FACILITY DESIGN PARAMETERS

Based on literature evaluations of similar operations, activated carbon has been selected to treat the wastewater. Calgon Flowsorb (or equal) activated carbon will be provided. Calgon's projected performance is described in the brochure presented in the appendix of this report. As indicated 0.13 lb of PCE can be absorbed by 1 lb of carbon at the projected influent loading rate.

Two 165 lb units will be provided in series. After VOCs break through the first (upstream) unit at concentrations in excess of the effluent limitations, the carbon will be rebedded. Rebedding consists of:

(1) Disposing of the old upstream unit
(2) Placing the old downstream unit in the upstream position
(3) Installing a new unit in the downstream position

Based on Calgon's calculations, and the worst case loading of 6200 μg/l, theoretically the first rebed will not be needed until 81 days after startup. In order to fully describe the absorptive capacity, it is recommended that water samples be collected from the system on a monthly basis for the first four months of operation. After that time, quarterly sampling can be conducted in accordance with the schedule in the SPDES permit equivalent.

7 DESIGN OF TREATMENT SYSTEM

Pumping Wells

Two pumping wells, RW-1S and RW-1D, are provided. The depths, projected yields, and locations were determined during the FS:

	RW-1S	RW-2D
Depth (ft below grade)	48	80
Average yield (gpm)	0.5	3.0

A pump test was conducted to make these determinations, and the reader is referred to the FS for the design basis of the pumping configuration.

The screen and sand pack were determined after review of sieve analysis on soil samples archived during the remedial investigation (RI) completed at the site. Results of the sieve analysis are attached.

Although the plans describe specific depths for the screened interval, split-spoon soil samples will be collected during the well drilling and adjustments to the screen intervals may be made, if appropriate.

Groundwater will be pumped from the wells with one-third horsepower submersible pumps.

Water will flow from the pumps up through polyethylene risers to pitless adaptors, from which the water will be conveyed through forcemains to the treatment building. Each well will have its own forcemain.

Well Head

Each well will terminate in a concrete chamber, approximately 4 ft deep with a heavy-duty cover. The depth of the chamber will be greater than would normally be required for this application. The final grades for the future development of the shopping center are not known at this time. Therefore, the extra depth was provided in case the future grades are lower in the area of the wells. The chambers can be lowered by 1 ft.

Transmission

As stated previously, separate forcemains will transmit water from each well to the treatment building.

The transmission trench to RW-1S has been designed to drain perched water from the crushed stone backfill of the February 1997 excavation to the well, so that this water can be pumped to the treatment facility. From the edge of the backfill to the well, the trench will be 10 ft deep, and the bottom 6 ft of the trench will be backfilled with crushed stone.

Based on prior sampling, it is believed that the soils excavated or drilled near the source area will be uncontaminated or slightly contaminated. Accordingly, NYSDEC has agreed to allow these soils to be spread on the adjacent concrete to allow what little chemical there is in the soil to volatilize prior to the soils being backfilled on site. The details of the spreading are provided in the specifications.

Treatment Building

A building 10 ft, 8 in. wide by 16 ft, 0 in. long will be constructed to house the treatment and control systems. There will be no floor drains in the building. However, a small concrete sump will be provided to capture stray drainage. In the building, each well will have individual water meters and sample taps. Fittings will be provided to allow backflushing of the forcemains from the wells in case of sediment buildup.

Treatment

Course (50-micron) and fine (5-micron) bag filters will be provided upstream of the activated carbon to reduce the potential of plugging of the carbon.

As stated previously, treatment centers around two 55-gal drums (165 lb of carbon each) arranged in series. The drums have a flow-through capacity of 10 gpm, well in excess of the 3.5 gpm design flow rate.

Controls

The well pump operation will be controlled by pressure transducers, which will transmit signals to a control panel in the treatment building. The control panel will indicate the amount (in feet) of water in the well above the transducer. The transducers will have the following set points.

- Pump on
- Pump off
- High water alarm
- Low water alarm

These settings are shown in the plans.

Outfall

The treated effluent will be piped under pressure to the outfall at the swale south of the building.

8 FINAL EFFLUENT CHARACTERISTICS

As stated previously, rebeds will be scheduled after the PCE detected between canisters (drums) approaches 10 μg/l (i.e., the effluent limitation in the permit-equivalent). The low-level PCE detected between canisters will be removed by the downstream unit until the rebed occurs. Accordingly, <1 μg/l of PCE is expected at the outfall.

APPENDIX

1. **SPDES PERMIT-EQUIVALENT**
2. **INFORMATION ON ACTIVATED CARBON**
3. **SIEVE ANALYSIS**

APPENDIX 1

SPDES PERMIT-EQUIVALENT

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 -3505

John P. Cahill
Acting Commissioner

To: Ram Pergadia, Division of Environmental Remediation
Region 3, New Paltz
From: Angus Eaton, Chief - Chemical Systems Section, BWP, DOW
Subject: Balwin Place Shopping Center/Big V Supermarkets
Site No. 3-60-023

Date: February 7, 1997

In response to your request dated July 29, 1996 to me, attached please find effluent criteria for the above noted groundwater remediation discharge.

The DOW does not have any regulatory authority over a discharge from a State, PRP, or Federal Superfund Site. DER will be responsible for ensuring compliance with the attached effluent criteria and approval of all engineering submissions. Footnote 1 identifies the Bureau of Site Control as the place to send all effluent results, engineering submissions and modification requests. The Regional Water Engineer should be kept appraised of the status of this discharge and, in accordance with the attached criteria, receive a copy of the effluent results for informational purposes.

If you have any questions, please call me a 7-6717.

Attachments (Effluent Criteria, General Conditions)

cc: Regional Water Engineer (w/Effluent Criteria)
Steve Hammond
A. Eaton, DOW
Al Bromberg, DOW

Post-it® Fax Note 7671	Date	# of pages ▶
To Stu Bassell	From K Pergadia	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

1-20-2a (1/89)

Site No.: 3 - 60 - 023
Part 1, Page 1 of 2

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning March 1, 1997

and lasting until February 28, 2002

the discharges from the treatment facility to water index number H-31-P44-14-3, Class D tributary of the Muscoot River shall be limited and monitored by the operator as specified below:

Outfall Number and Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements	
	Daily Avg.	Daily Max		Measurement Frequency	Sample Type
Outfall 002 - Treated Groundwater Remediation Discharge:					
Flow	Monitor	Monitor	GPD	Continuous	Meter
pH (range)	6 to 9		SU	Quarterly	Grab
Total 1,2 Dichloroethylene		0.010	mg/l	Quarterly	Grab
Methyl tert butyl ether		0.050	mg/l	Quarterly	Grab
Tetrachloroethylene		0.010	mg/l	Quarterly	Grab
Trichloroethylene		0.010	mg/l	Quarterly	Grab

Outfall Number and Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements	
	Daily Avg.	Daily Max		Measurement Frequency	Sample Type
Outfall 003 - Treated Groundwater Remediation Discharge:					
Flow	Monitor	Monitor	GPD	Continuous	Meter
pH (range)	6 to 9		SU	Monthly	Grab
Iron (total recoverable)		0.30	mg/l	Monthly	Grab
Total 1,2-Dichloroethylene		0.010	mg/l	Monthly	Grab
Tetrachloroethylene		0.010	mg/l	Monthly	Grab
Trichloroethylene		0.010	mg/l	Monthly	Grab

Additional Conditions:

(1) Discharge is not authorized until such time as an engineering submission showing the method of treatment is approved by the Department. The discharge rate may not exceed the effective or design treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to:

Chief - Operation Maintenance and Support Section
Bureau of Hazardous Site Control
Division of Environmental Remediation
NYSDEC
50 Wolf Road
Albany, N.Y. 12233-7010

With a copy sent to:

Joseph Marcogliese
Region 3 Water Engineer
NYSDEC Region 3 Suboffice
200 White Plains Road, 5th Floor
Tarrytown, NY 10591-5805

(2) Only site generated wastewater is authorized for treatment and discharge.

(3) Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.

(4) Both concentration (mg/l or µg/l) and mass loadings (lbs/day) must be reported to the Department for all parameters except flow and pH.

(5) For Outfall 002: to comply with the monitoring requirements specified above, samples and measurements shall be taken from Activated Carbon treatment system effluent prior to discharge to discharge to the unnamed tributary of the Muscoot River at Latitude 41°20'37" and Longitude 73°45'19".

(6) For Outfall 002 the minimum measurement frequency for all the parameters (except flow) shall be quarterly following a period of 12 consecutive weekly sampling events showing no exceedances of the stated discharge limitations. If a discharge limitation for any parameter is exceeded the measurement frequency for all parameters shall again be weekly, until a period of 4 consecutive sampling events shows no exceedances at which point quarterly monitoring may resume.

(7) For Outfall 003: to comply with the monitoring requirements specified above, samples and measurements shall be taken from shopping center water supply treatment system effluent prior to discharge to the unnamed tributary of the Muscoot River at Latitude 41°20'30" and Longitude 73°45'19".

(8) For Outfall 003 the minimum measurement frequency for all the parameters (except flow) shall be monthly following a period of 12 consecutive weekly sampling events showing no exceedances of the stated discharge limitations. If a discharge limitation for any parameter is exceeded the measurement frequency for all parameters shall again be weekly, until a period of 4 consecutive sampling events shows no exceedances at which point monthly monitoring may resume.

(9) Any use of corrosion/scale inhibitors or biocidal-type compounds used in the treatment process must be approved by the department prior to use.

(10) This discharge and adminstration of this discharge must comply with the attached General Conditions.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

APPENDIX A

GENERAL CONDITIONS (Consent Orders)*

* This version of General Conditions is intended to be incorporated as Appendix A of all Consent Orders for site remediation projects where a State Pollutant Discharge Elimination System permit is not required but where the order authorizes the treatment and discharge of wastewaters to the surface or groundwaters of New York State.

1. GENERAL PROVISIONS

a. This order, or a true copy, shall be kept readily available for reference at the wastewater treatment facility.

b. A determination has been made on the basis of a submitted plans, or other available information, that compliance with the provisions specified in this order will reasonably protect classified water use and assure compliance with applicable water quality standards. Satisfaction of these provisions notwithstanding, if operation pursuant to the order causes or contributes to a condition in contravention of State water quality standards, or if the Department determines, on the basis of notice provided by the operator and any related investigation, inspection or sampling, that a modification of the order is necessary to prevent impairment of the best use of the waters or to assure maintenance of water quality standards or compliance with other provisions of ECL, the Department may require such a modification and may require abatement action to be taken by the operator and may also prohibit the noticed act until the order has been modified.

c. All discharges authorized by this order shall be consistent with the terms and conditions of this order. Facility expansion or other modifications, treatment and disposal system changes which will result in new or increased discharges of pollutants into the waters of the state must be reported by submission of a formal request for modification of this order. The discharge of any pollutant, not identified and authorized, or the discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this order shall constitute a violation of the terms and conditions of this order. Facility modifications which result in decreased discharges of pollutants must be reported by submission of written notice to the Department.

d. Where the operator becomes aware that he/she failed to submit any relevant facts or submitted incorrect information prior to or in pursuit of this order or in any report to the Department, the operator shall promptly submit such facts or information.

e. It shall not be a defense for an operator in an enforcement action that it would have been necessary to halt or reduce the authorized activity in order to maintain compliance with the conditions of this order, unless directed by the Department to continue the activity.

f. The filing of a request for a modification of this order, or a notification of planned changes or anticipated noncompliance, does not stay any condition of this order.

g. The operator shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, suspending, or revoking this order, or to determine compliance with this order. The operator shall also furnish to the Department, upon request, copies of records required to be kept by this order.

2. SPECIAL REPORTING REQUIREMENTS

Dischargers must notify the Department as soon as they know or have reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant (USEPA Priority Pollutants plus phenols, total) which is not specifically controlled in the order, pursuant to General Provision 1 (c) herein: For the purposes of this section, recurrent accidental or unintentional spills or releases on a frequent basis shall be considered to be a discharge.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the order, if that discharge will exceed five times the maximum concentration value reported for that pollutant in the information submitted prior to this order; or the level established by the Department.

c. That they will begin to use any toxic pollutant which was not reported prior to this order and which is being or may be discharged to waters of the state.

3. EXCLUSIONS

a. The issuance of this order by the Department and the receipt thereof by the operator does not supersede, revoke or rescind an order or modification thereof on consent or determination by the Commissioner issued heretofore by the Department or any of the terms, conditions or requirements contained in such order or modification thereof unless specifically intended by said order.

b. The issuance of this order does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations; nor does it obviate the necessity of obtaining the assent of any other jurisdiction as required by law for the discharge authorized.

c. Unless specifically authorized in this order, the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters is not approved.

4. REPORTING NONCOMPLIANCE

a. Anticipated noncompliance. The operator shall give advance notice to the Department of any planned changes in the authorized facility or activity which may result in noncompliance with this order as soon as the operator becomes aware that non-compliance will be unavoidable.

b. Immediate and twenty-four hour reporting. The operator shall report any noncompliance which may endanger health or the environment. Any unusual situation, caused by a deviation from normal operation or experience (e.g. upsets, bypasses, inoperative treatment process units, spills or illegal chemical discharges or releases to the collection system) which create a potentially hazardous condition shall be orally reported immediately. Other information shall be provided orally within 24 hours from the time he or she becomes aware of the circumstances. A written noncompliance report shall also be provided within five (5) days of the time the operator becomes aware of the circumstances. The written noncompliance report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent the noncompliance and its reoccurrence.

(1) The following shall be included as information which must be reported within 24 hours under paragraph (b) above:

(i) any unanticipated bypass which violates any effluent limitation in the order;

(ii) any upset which violates any effluent limitation in the order;

(iii) violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the order to be reported within 24 hours.

(2) The Department may waive, at their discretion, the written report on a case-by-case basis if the oral report has been received within 24 hours.

(3) Reports required by this section shall be filed with the Department's regional office having jurisdiction over the facility. During weekends and holidays, oral noncompliance reports, required by this paragraph, may be made at (518) 457-7362.

c. Duty to mitigate. The operator shall take all reasonable steps to minimize or prevent any discharge in violation of this order which has a reasonable likelihood of adversely affecting human health or the environment.

5. INSPECTION AND ENTRY

The operator shall allow the Commissioner of the Department, the New York State Department of Health, the County Health Department, or their authorized representatives, upon the presentation of credentials and other documents as may be required by law, to:

a. enter upon the operator's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this order;

b. have access to and copy, at reasonable times, any records that must be kept under the conditions of this order, including records maintained for purposes of operation and maintenance;

c. inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this order, and

d. sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the Environmental Conservation Law, any substances or parameters at any location.

6. SPECIAL PROVISIONS - NEW OR MODIFIED DISPOSAL SYSTEMS

a. Prior to construction of any new or modified waste disposal system or modification of a facility generating wastewater which could alter the design volume of, or the method or effect of treatment or disposing of the wastes from an existing waste disposal system, the operator shall submit to the Department or its designated field office for review, an approvable engineering report, plans, and specifications which have been prepared by a person or firm licensed to practice Professional Engineering in the State of New York.

b. The construction of the above new or modified disposal system shall not start until the operator receives written approval of the system from the Department or its designated field office.

c. The construction of the above new or modified disposal system shall be under the general supervision of a person or firm licensed to practice Professional Engineering in New York State. Upon completion of construction, that person or firm shall certify to the Department or its designated field office that the system has been fully completed in accordance with the approved engineering report, plans and specifications and letter of approval; and the operator shall receive written acceptance of such certificate from the Department or designated field agency prior to commencing discharge.

d. The Department and its designated field offices review wastewater disposal system reports, plans, and specifications for treatment process capability only, and approval by either office does not constitute approval of the system's structural integrity.

7. MONITORING, RECORDING, AND REPORTING

7.1 GENERAL

a. The operator shall comply with all recording, reporting, monitoring and sampling requirements specified in this order and such other additional terms, provisions, requirements or conditions that the Department may deem to be reasonably necessary to achieve the purposes of the Environmental Conservation Law, or rules and regulations adopted pursuant thereto.

b. Samples and measurements taken to meet the monitoring requirements specified in this order shall be representative of the quantity and character of the monitored discharges. Composite samples shall be composed of a minimum of 8 grab samples, collected over the specified collection period, either at a constant sample volume for a constant flow interval or at a flow-proportioned sample volume for a constant time interval, unless otherwise specified in this order. For GC/MS Volatile Organic Analysis (VOA), aliquots must be combined in the laboratory immediately before analysis. At least 4 (rather than 8) aliquots or grab samples should be collected over the specified collection period. Grab sample means a single sample, taken over a period not exceeding 15 minutes.

c. Accessable sampling locations must be provided, maintained and identified by the operator. New sampling locations shall be provided if proposed or existing locations are deemed unsuitable by the Department or its designated field agency.

d. Actual measured values of all positive analytical results obtained above the Practical Quantitation Limit (PQL)[1] for all monitored parameters shall be recorded and reported, as required by this order; except, for parameters which are limited in this order to values below the PQL, actual measured values for all positive analytical results above the Method Detection Limit (MDL)[2] shall be reported.

e. The operator shall periodically calibrate and perform manufacturer's recommended maintenance procedures on all monitoring and analytical instrumentation to insure accuracy of measurements. Verification of maintenance shall be logged into the daily record book(s) of the facility. The operator shall notify the Department's regional office immediately if any required instrumentation becomes inoperable. In addition, the operator shall verify the accuracy of their measuring equipment to the Department's Regional Office annually.

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1 Practical Quantitation Limit (PQL) is the lowest level that can be measured within specified limits of precision and accuracy during routine laboratory operations on most effluent matrices.

2 Method Detection Limit (MDL) is the level at which the analytical procedure referenced is capable of determining with a 99% probability that the substance is present. This value is determined in distilled water with no interfering substances present. The precision at this level is +/- 100%.

7.2 SIGNATORIES AND CERTIFICATION

a. All reports required by this order shall be signed as follows:

(1) for a corporation: by a responsible corporate officer. For the purposes of this section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or a vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making function for the corporation, or

(ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars),if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) for a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or.

(3) for a municipality, state, federal, or other public agency: by either a principal or executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency; or

(4) a duly authorized representative of the person described in items (1), (2), or (3). A person is a duly authorized representative only if:

(i) the authorization is made in writing by a person described in paragraph (a)(1), (2), or (3) of this section;

(ii) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(iii) the written authorization is submitted to the Department.

b. Changes to authorization: If an authorization under subparagraph (a)(4) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of subparagrapph (a)(4) of this section must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

c. Certification: Any person signing a report shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision, in accordance with a system, designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the order or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

7.3 RECORDING OF MONITORING ACTIVITIES AND RESULTS

a. The operator shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this order, and records of all data used to complete the application for this order, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

b. Records of monitoring information shall include:

(1) the date, exact place, and time of sampling or measurements;

(2) the individual(s) who performed the sampling or measurements;

(3) the date(s) analyses were performed;

(4) the individual(s) who performed the analyses;

(5) the analytical techniques or methods used; and

(6) the results of such analyses.

7.4 TEST AND ANALYTICAL PROCEDURES

a. Monitoring and analysis must be conducted using test procedures promulgated, pursuant to 40 CFR Part 136, except:

(1) should the Department require the use of a particular test procedure, such test procedure will be specified in this order.

(2) should the operator desire to use a test method not approved herein, prior Department approval is required, pursuant to paragraph (b) of this section.

b. Application for approval of test procedures shall be made to the **Director of DEC's Division of Water**, and shall contain:

(1) the name and address of the applicant or the responsible person making the discharge, identification of this particular order and the telephone number of applicant's contact person;

(2) the names of the pollutants or parameters for which an alternate testing procedure is being requested, and the monitoring location(s) at which each testing procedure will be utilized;

(3) justification for using test procedures, other than those approved in paragraph (a) of this section; and

(4) a detailed description of the alternate procedure, together with:

(i) references to published studies, if any, of the applicability of the alternate test procedure to the effluent in question;

(ii) information on known interferences, if any; and

(5) a comparability study, using both approved and proposed methods. The study shall consist of 8 replicates of 3 samples from a well mixed waste stream for each outfall if less than 5 outfalls are involved, or from 5 outfalls if 5 or more outfalls are involved. Four (4) replicates from each of the samples must be analyzed using a method approved in paragraph (a) of this section, and four replicates of each sample must be analyzed using the proposed method. This results in 24 analyses per outfall up to a maximum of 120 analyses. A statistical analysis of the data must be submitted that shall include, as a minimum:

(i) calculated statistical mean and standard deviation;

(ii) a test for outliers at the mean ±3 standard deviations level. Where an outlier is detected, an additional sample must be collected and 8 replicates of the sample must be analyzed as specified above;

(iii) a plot distribution with frequency counts and histogram;

(iv) a test for equality among with-in sample standard deviation;

(v) a check for equality of pooled with-in sample variance with an F-Test;

(vi) a t-Test to determine equality of method means; and

copies of all data generated in the study.

Additional information can be obtained by contacting the Bureau of Technical Services & Research (NYSDEC, 50 Wolf Road, Albany, New York 12233 - 3502).

8. DISPOSAL SYSTEM OPERATION AND QUALITY CONTROL

8.1 GENERAL

a. The disposal system shall not receive or be committed to receive wastes from unapproved sources, nor wastes beyond its design capacity as to volume and character of wastes treated, nor shall the system be materially altered as to: type, degree, or capacity of treatment provided; disposal of treated effluent; or treatment and disposal of separated scum, liquids, solids or combination thereof resulting from the treatment process without written approval of the Department of Environmental Conservation or its designated field office.

b. The operator shall, at all times, properly operate and maintain all facilities and systems of treatment and control (or related appurtenances) which are installed or used by the operator to achieve compliance with the conditions of this order. Proper operation and maintenance also includes as a minimum, the following: 1) A preventive/corrective maintenance program. 2) A site specific action orientated operation and maintenance manual for routine use, training new operators, adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of installed backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the order.

c. The operator shall not discharge floating solids or visible foam.

8.2 BYPASS

a. Definitions:

(1) "Bypass" means the intentional or unintentional diversion of waste stream(s) around any portion of a treatment facility for the purpose or having the effect of reducing the degree of treatment intended for the bypassed portion of the treatment facility.

(2) "Severe property damage" means substantial damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which would not reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations:

The operator may allow any bypass to occur which does not cause effluent limitations to be violated, but only if it also is for essential maintenance, repair or replacement to assure efficient and proper operation. These bypasses are not subject to the provisions of pargraph (c) and (d) of this section, provided that written notice is submitted prior to bypass (if anticipated) or as soon as possible after bypass (if unanticipated), and no public health hazard is created by the bypass.

c. Notice:

(1) Anticipated bypass - If the operator knows in advance of the need for a bypass, it shall submit prior written notice, at least forty five (45) days before the date of the bypass.

(2) Unanticipated bypass - The operator shall submit notice of an unanticipated bypass as required in Section 4, paragraph b. of this Part (24 hour notice).

d. Prohibition of bypass:

(1) Bypass is prohibited, and the Department may take enforcement action against a operator for bypass, unless:

(i) bypass was unavoidable to prevent loss of life, personal injury, public health hazard, or severe property damage;

(ii) there were no feasible alternatives to the bypass such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal period of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance or if designed and installed backup equipment which could have prevented or mitigated the impact of the bypass is not operating during the bypass; and

(iii) the operator submitted notices as required under paragraph (c) of this section and, excepting emergency conditions, the proposed bypass was accepted by the Department.

8.3 UPSET

a. Definition:

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with order effluent limitations because of factors beyond the reasonable control of the operator. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset:

An upset constitutes an affirmative defense to an action brought for noncompliance with such order effluent limitations if the requirements of paragraph (c) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset:

An operator who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operation logs, or other relevant evidence that:

(1) an upset occurred and that the operator can identify the cause(s) of the upset;

(2) the facility was at the time being properly operated; and

(3) the operator submitted notice of the upset as required in Section 4, paragraph b of this part (24 hour notice).

(4) the operator complied with any remedial measures required under Section 4, paragraph d of this part.

d. Burden of proof:

In any enforcement proceeding the operator seeking to establish the occurrence of an upset has the burden of proof.

8.4 SPECIAL CONDITION - DISPOSAL SYSTEMS WITH SEPTIC TANKS

If a septic tank is installed as part of the disposal system, it shall be inspected by the operator or his agent for scum and sludge accumulation at intervals not to exceed one year's duration, and such accumulation will be removed before the depth of either exceeds one-fourth (1/4) of the liquid depth so that no settleable solids or scum will leave in the septic tank effluent. Such accumulation shall be disposed of in an approved manner.

8.5 SLUDGE DISPOSAL

The storage or disposal of collected screenings, sludges, other solids, or precipitates separated from the authorized discharges and/or intake or supply water by the operator shall be done in such a manner as to prevent creation of nuisance conditions or entry of such materials into classified waters or their tributaries, and in a manner approved by the Department. Any live fish, shellfish, or other animals collected or trapped as a result of intake water screening or treatment should be returned to their water body habitat. The operator shall maintain records of disposal on all effluent screenings, sludges and other solids associated with the discharge(s) herein described. The following data shall be compiled and reported to the Department or its designated field office upon request:

a. the sources of the materials to be disposed of;

b. the approximate volumes, weights, water content and (if other than sewage sludge) chemical composition;

c. the method by which they were removed and transported, including the name and permit number of the waste transporter; and

d. their final disposal locations.

APPENDIX 2

INFORMATION ON ACTIVATED CARBON

LAWLER, MATUSKY & SKELLY ENGINEERS LLP
One Blue Hill Plaza, P.O. Box 1509, Pearl River, NY 10965

Sheila McGroddy **FACSIMILE TRANSMISSION COVER PAGE**

For fax reply, dial 914-735-7466; our receiving fax machine is a Canon FAX-L770. Any transmission problems, please call 914-735-8300.

800/422-7266

To: LOIS FULLER X 4769	**From: SHEILA MCGRODDY**
Company: CALGON CARBON	**Date: 2/28/96**
Phone: 412-787-6324	**Job No.: 722-001**
Total Number of Pages Including This Cover Page: 1	

MESSAGE:

The groundwater flow rate for this site is 3.5 gallons per minute. There are three contaminants that need to be removed and there is some uncertainty as to the expected concentrations, so I've listed two sets of concentrations below. I'm not sure of the actual effluent limits; you can assume that we need almost complete removal (say effluent concentrations of ≤ 1 µg/l).

CARBON USAGE RATE

Assume 2 Fbeds in Series

CASE 1

Contaminant	Concentration, µg/l
Tetrachloroethylene	400
1,2-Dichloroethylene	12
Trichloroethylene	12

$\frac{0.1\ lb.}{1000\ gal.}$ = 0.5 lbs/day = 330 days

CASE 2

Contaminant	Concentration, µg/l
Tetrachloroethylene	6200
1,2-Dichloroethylene	12
Trichloroethylene	40

$\frac{0.4\ lbs}{1000\ gal.}$ = 2 lbs/day = 81 days

We'd like to get your estimate of the carbon usage rate for each of these cases. Please call me if you need any additional information. My phone no. is 914-735-8300 Ext. 253, and our fax no. is 914-735-7466.

Thanks very much.

Lois Fuller
Calgon Carbon
2-28-96

CALGON

CALGON CARBON CORPORATION

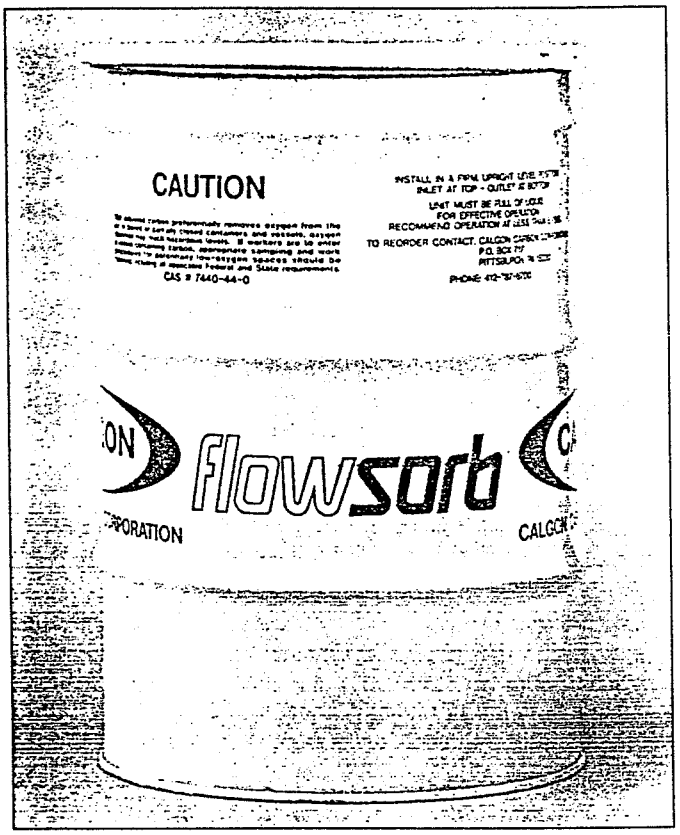
EQUIPMENT BULLETIN

FLOWSORB

GENERAL DESCRIPTION

Designed for low-flow water treatment applications, prefabricated 55-gallon FlowSorb™ canisters contain all the operating elements found in a full-scale adsorption system. These small, economical treatment systems hold 165 pounds of granular activated carbon for applications including:

- Small wastewater streams
- Groundwater remediation
- Underground storage tank leaks
- Well pump tests
- Product purification or decolorization
- Tank cleaning water treatment
- Batch water or product treatment
- Carbon adsorption pilot testing
- Emergency spill treatment
- Monitoring well water treatment



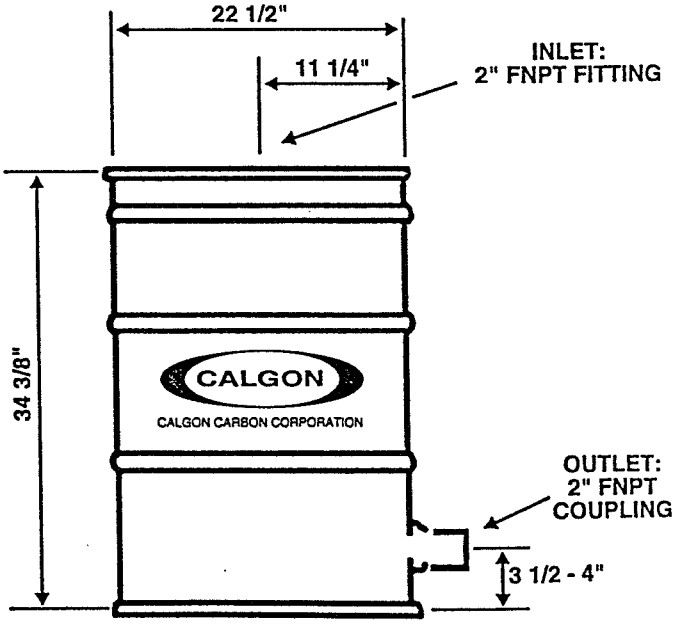
FEATURES

FlowSorb offers several features and benefits to industrial, commercial and municipal users including:

- Sturdy 16 gauge steel construction per DOT specifications
- Continuous treatment at varying flow rates and concentrations
- Simple installation and operation
- Space above carbon bed facilitates flow distribution or backflushing
- Flexibility to be used in series or parallel operation
- Supplied with virgin or reactivated carbon
- May also be supplied with Klensorb, an oil absorbent media
- 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

FLOWSORB SPECIFICATIONS

Vessel:	Open head 16 gauge steel canister
Pressure:	15 psig per DOT 17C
Cover:	Removable steel cover, 12 gauge bolt ring with butyl rubber sponge gasket
Internal Coating:	Heat cured phenolic epoxy
External Coating:	Baked enamel (gray)
Temperature Limit:	150° F (65.6° C) continuous 350°F (176.7°C) intermittent
Inlet:	2" FNPT Nylon fitting
Outlet:	2" FNPT Galvanized steel coupling; 304 stainless steel collector in nylon drum fitting
Carbon:	165 pounds granular activated carbon: Specify Filtrasorb 300 or reactivated grade
Ship Weight:	232 pounds (105 kg)
Identification:	Sequentially numbered for reference



FLOWSORB DIMENSIONS

YPICAL FIOWSORB PERATING PARAMETERS

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es re Drop: ..... < 1 psi (clean water and carbon)
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LOWSORB INSTALLATION

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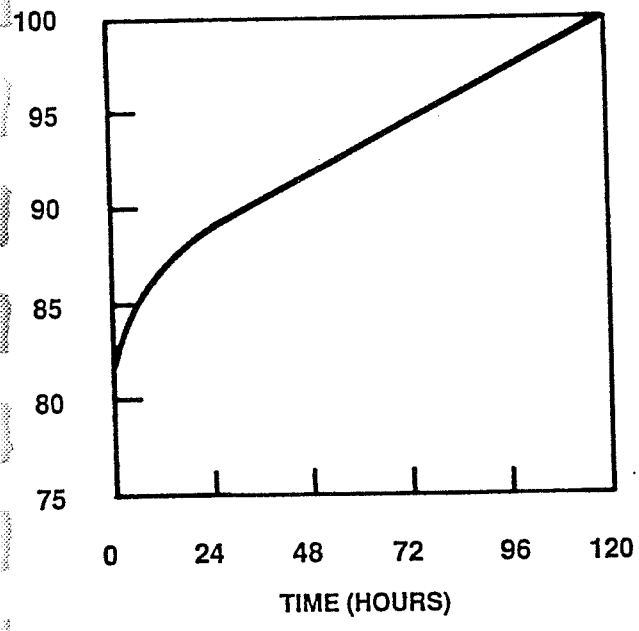
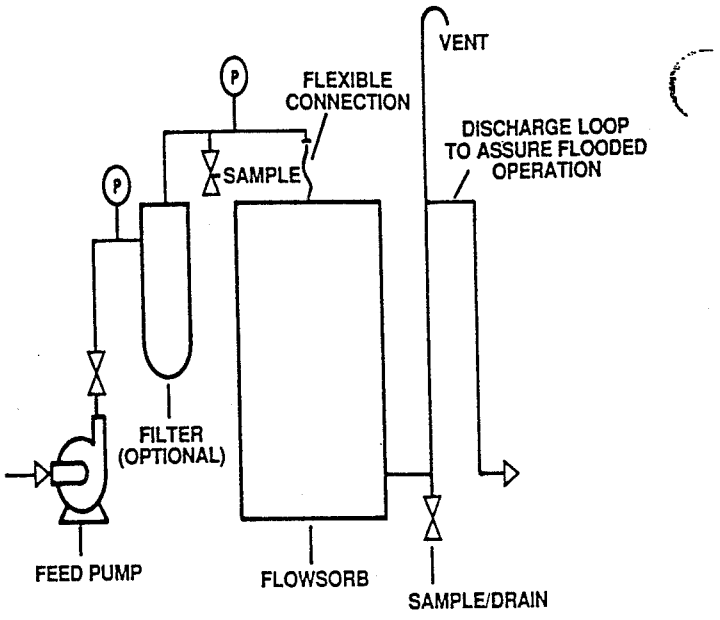
Prior to operation, each canister must be filled with clean at the water should be introduced into the bottom outlet on ction. The unit should set for approximately 48 hours — is allows most of the carbon's internal surface to become etted, as shown on the wetting curve below.

ter wetting, the carbon bed can be deaerated by draining e anister and again filling the canister upflow with clean water. his procedure will eliminate any air pockets which may have rm d between the carbon granules. The FlowSorb is now a for operation.

Canisters should be set on a flat, level surface and piped as ecommended in the installation illustration. The influent pipe on ction should be attached to the unit by using a flexible on ection, as some minor deflection of the lid may occur if ressure builds due to filtration or other flow blockage down- trea m.

WETTING CURVE FOR GAC (77°F/25°C)





TYPICAL FLOWSORB INSTALLATION

FlowSorb discharge piping should include an elevated piping loop to assure that the canister remains flooded with water at all times. In addition to the piping loop, a drain connection is recommended on the discharge piping; this allows drainage of the unit prior to disconnection or temporary shutdown.

A filter should be installed if the liquid to be treated contains substantial amounts of suspended solids. A simple cartridge or screen filter helps prevent pressure buildup in the carbon bed.

FIOWSORB OPERATION

FlowSorb canisters should be full of clean water before treatment begins. Flow rate to the canister should be determined based on required contact time between the liquid and the carbon media. In groundwater treatment applications, the recommended contact time is typically 8-10 minutes with a resultant flow of approximately 5 gpm. Consult your Calgon Carbon Technical Sales Representative for advice about proper contact time for your application.

FlowSorbs can be manifolded in parallel operation for higher flow rates. For series operation, two FlowSorbs can be piped together sequentially, as normal pressure drop will not exceed the recommended operating pressure.

These canisters have space for bed expansion and can be backflushed by introducing clean water or liquid at approximately 20-25 gpm to the outlet and taking backflush water from the inlet.

If the operating pressure is expected to exceed 5 psig, an application of adhesive caulk at the lid gasket is recommended to prevent leakage. With all surfaces dry, apply the adhesive caulk to the lid recess and lip of the drum per the manufacturer's procedure and set the FlowSorb gasket into the lid recess. After allowing the caulk to set, install the drum lid and tighten the bolt ring.

THEORETICAL FLOWSORB TREATMENT CAPACITY FOR TYPICAL CASES

	Case 1		Case 2		Case 3	
	Conc.	Gallons	Conc.	Gallons	Conc.	Gallons
Benzene	20 ppb	1,600,000	200 ppb	400,000	2 ppm	85,000
Toluene	40 ppb		400 ppb		4 ppm	
Xylene	40 ppb		400 ppb		4 ppm	

	Case 4		Case 5		Case 6	
	Conc.	Gallons	Conc.	Gallons	Conc.	Gallons
TCE	50 ppb	1,900,000	500 ppb	550,000	5 ppm	125,000
PCE	50 ppb		500 ppb		4 ppm	

	Case 7		Case 8		Case 9	
	Conc.	Gallons	Conc.	Gallons	Conc.	Gallons
Phenol	1 ppm	230,000	10 ppm	50,000	100 ppm	10,000
Total SOC	10 ppm		100 ppm		1,000 ppm	

Each case represents a groundwater or wastewater stream that contains the combination of contaminants listed. The treatment capacity indicates the total gallons of that particular water that may be treated before any of the specific contaminants are present in the treated water as noted. Theoretical capacity based on 5 gpm, water at 70°F or less and 165 pounds of Filtrasorb 300. Background TOC is less than 1 ppm except phenol cases as noted. Contaminants reduced to < 5 ppb, except phenol case which is for 95% phenol reduction.

HOW TO ESTIMATE FLOWSORB LIFE

The treatment table on this page lists the volume of water that can be purified by the FlowSorb for typical contamination situations. However, most applications involve a unique mixture of organic chemical contaminants including some chemicals that adsorb at different capacities or strengths. Please consult with your Calgon Carbon Technical Sales Representative for more information about carbon usage rates.

RETURN OF FLOWSORBS

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 FlowSorbs for landfill, incineration or other means of disposal.

FlowSorbs 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.

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

SAFETY CONSIDERATIONS

It is unlikely that a worker would be able to physically enter a FlowSorb canister. However, the following information and precautions apply to a partially closed canister or situations where carbon is to be removed from the canister and stored elsewhere.

Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed containers, oxygen depletion may reach hazardous levels. If workers must enter a vessel containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen spaces – including all applicable federal and state requirements.

CALGON CARBON LIQUID PURIFICATION SYSTEMS

FlowSorb is a unit specifically designed for a variety of small flow 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.

RRANTY

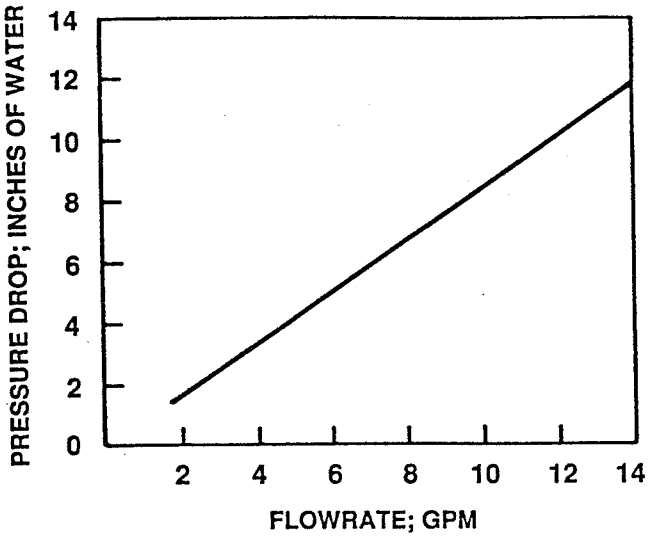
re are no expressed or implied warranties – or any nt of merchantability or fitness – for a particular purpose iated with the sale of this product.

II ATION OF LIABILITY

he Purchaser's exclusive remedy for any cause of action g o t of purchase and use of the FlowSorb, including but not d t breach of warranty, negligence and/or indemnifications, ressly limited to a maximum of the purchase price of the Sorb unit as sold. All claims of whatsoever nature shall be e waived unless made in writing within forty-five (45) days o urrence giving rise to the claim. In no event shall Calgon on Corporation for any reason be liable for incidental or equential damages, in excess of the purchase price of the Sd unit, loss of profits or fines imposed by governmental cie

or information regarding incidents involving human and on ental exposure, please call (412) 787-6700 and ask for .eg latory and Trade Affairs Department.

FLOWSORB PRESSURE DROP



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.

any time our products or services do not meet your requirements or expectations, or if you would like to suggest any ideas for ov ent, please call us at 1-800-548-1999. From outside the U.S. please call +1-412-787-6700.

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

Ne Jersey
Bridgewater, NJ 08807
Tel (908) 526-4646
Fa 908) 526-2467

Pennsylvania
Pit burgh, PA 15230-0717
Te (412) 787-6700
800/4-CARBON
Fax (412) 787-6676

Illi ois
Li , IL 60532
Tel (708) 505-1919
Fax (708) 505-1936

California-North
San Mateo, CA 94404
Tel (415) 572-9111
Fax (415) 574-4466

Texas
Houston, TX 77040-6071
Tel (713) 690-2000
Fax (713) 690-7909

California-South
Carlsbad, CA 92008
Tel (619) 431-5550
Fax (619) 431-8169

Latin America/ Asia-Pacific
Pittsburgh, PA 15230-0717
Tel (412) 787-4519
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Calgon Carbon Canada, Inc.
Mississauga, Ontario
Canada L4V 1N3
Tel (416) 673-7137
Fax (416) 673-8883

Europe
Chemviron Carbon
Brussels, Belgium
Tel 32 2 773 02 11
Fax 32 2 770 93 94

CALGON

CALGON CARBON CORPORATION

CALGON CARBON CORPORATION

EQUIPMENT BULLETIN

FLOWSORB

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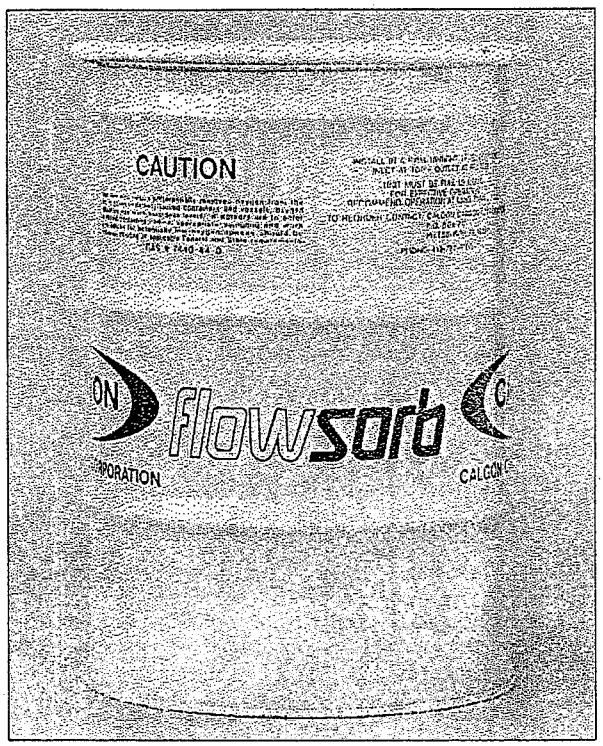
- Carbon adsorption pilot testing
- Emergency spill treatment
- Monitoring well water treatment



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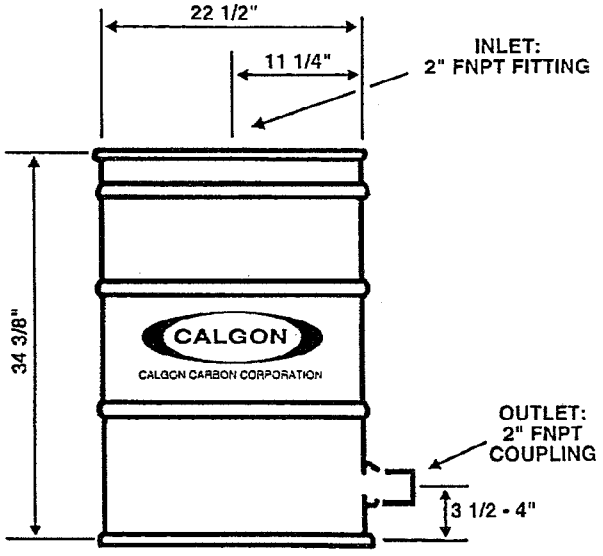
FLOWSORB SPECIFICATIONS

Vessel: ..... Open head 16 gauge steel canister
Pressure: ..... 15 psig per DOT 17C
Cover: ..... Removable steel cover, 12 gauge bolt ring with butyl rubber sponge gasket
Internal Coating: ..... Heat cured phenolic epoxy
External Coating: ..... Baked enamel (gray)
Temperature Limit: ..... 150° F (65.6° C) continuous
350°F (176.7°C) intermittent
Inlet: ..... 2" FNPT Nylon fitting
Outlet: ..... 2" FNPT Galvanized steel coupling; 304 stainless steel collector in nylon drum fitting
Carbon: ..... 165 pounds granular activated carbon: Specify Filtrasorb 300 or reactivated grade
Ship Weight: ..... 232 pounds (105 kg)
Identification: ..... Sequentially numbered for reference



FLOWSORB DIMENSIONS

CALGON CARBON CORPORATION • P.O. BOX 717 • PITTSBURGH, PA 15230-0717 • PHONE 1-800-4CARBON

THEORETICAL FLOWSORB TREATMENT CAPACITY FOR TYPICAL CASES

	Case 1		Case 2		Case 3	
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	Conc.	Gallons	Conc.	Gallons	Conc.	Gallons
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FlowSorbs cannot 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.

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

SAFETY CONSIDERATIONS

It is unlikely that a worker would be able to physically enter a FlowSorb canister. However, the following information and precautions apply to a partially closed canister or situations where carbon is to be removed from the canister and stored elsewhere.

Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed containers, oxygen depletion may reach hazardous levels. If workers must enter a vessel containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen spaces – including all applicable federal and state requirements.

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TYPICAL FLOWSORB OPERATING PARAMETERS

Flow Rate: ..... 10 gpm (37.8 l/m)
Contact Time: ..... 4.5 minutes
Pressure Drop: ..... < 1 psi (clean water and carbon)
Operating Pressures: ..... Recommend operation at less than 5 psig, but higher pressures, up to 12 psig, possible with tight cover closure

FLOWSORB INSTALLATION

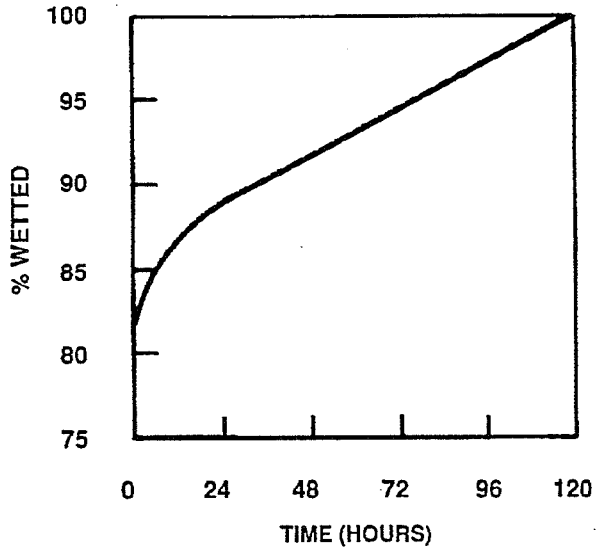
FlowSorb canisters are shipped with dry activated carbon; the carbon must be wetted and deaerated prior to use. This procedure displaces air from the internal structure of the carbon granule, thus assuring that the liquid to be treated is in contact with the carbon surface.

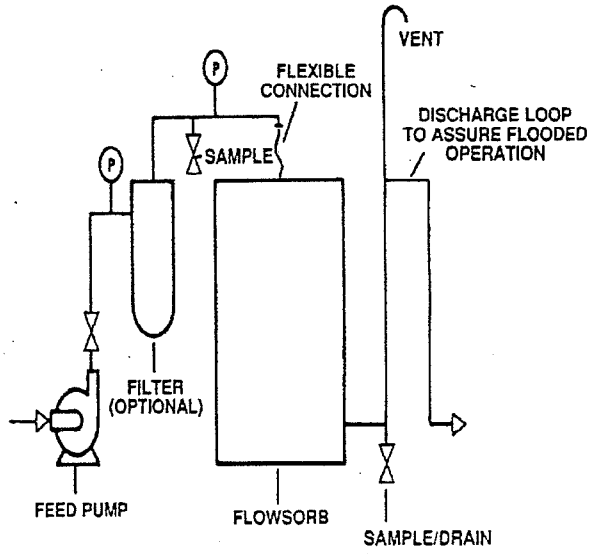
Prior to operation, each canister must be filled with clean water; the water should be introduced into the bottom outlet connection. The unit should set for approximately 48 hours — this allows most of the carbon's internal surface to become wetted, as shown on the wetting curve below.

After wetting, the carbon bed can be deaerated by draining the canister and again filling the canister upflow with clean water. This procedure will eliminate any air pockets which may have formed between the carbon granules. The FlowSorb is now ready for operation.

Canisters should be set on a flat, level surface and piped as recommended in the installation illustration. The influent pipe connection should be attached to the unit by using a flexible connection, as some minor deflection of the lid may occur if pressure builds due to filtration or other flow blockage downstream.

WETTING CURVE FOR GAC
(77°F/25°C)





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These canisters have space for bed expansion and can be backflushed by introducing clean water or liquid at approximately 20-25 gpm to the outlet and taking backflush water from the inlet.

If the operating pressure is expected to exceed 5 psig, an application of adhesive caulk at the lid gasket is recommended to prevent leakage. With all surfaces dry, apply the adhesive caulk to the lid recess and lip of the drum per the manufacturer's procedure and set the FlowSorb gasket into the lid recess. After allowing the caulk to set, install the drum lid and tighten the bolt ring.

WARRANTY

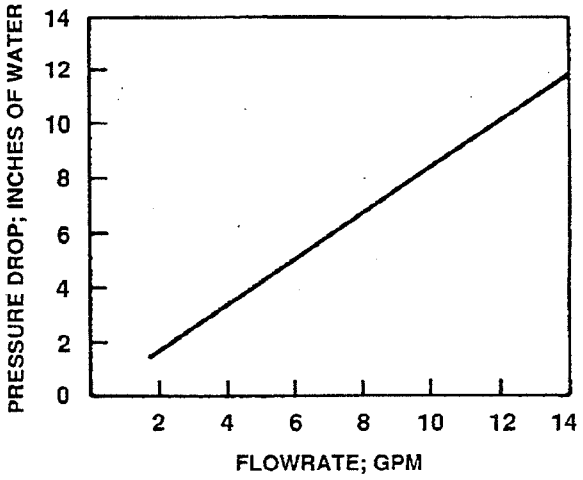
There are no expressed or implied warranties – or any warranty of merchantability or fitness – for a particular purpose associated with the sale of this product.

LIMITATION OF LIABILITY

The Purchaser's exclusive remedy for any cause of action arising out of purchase and use of the FlowSorb, including but not limited to breach of warranty, negligence and/or indemnifications, is expressly limited to a maximum of the purchase price of the FlowSorb 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, in excess of the purchase price of the FlowSorb 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.

FLOWSORB PRESSURE DROP



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. From outside the U.S. please call +1-412-787-6700.

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
Tel (412) 787-6700
800/4-CARBON
Fax (412) 787-6676

Illinois
Lisle, IL 60532
Tel (708) 505-1919
Fax (708) 505-1936

California-North
San Mateo, CA 94404
Tel (415) 572-9111
Fax (415) 574-4466

Texas
Houston, TX 77040-6071
Tel (713) 690-2000
Fax (713) 690-7909

California-South
Carlsbad, CA 92008
Tel (619) 431-5550
Fax (619) 431-8169

Latin America/ Asia-Pacific
Pittsburgh, PA 15230-0717
Tel (412) 787-4519
Fax (412) 787-4523

Canada
Calgon Carbon Canada, Inc.
Mississauga, Ontario
Canada L4V 1N3
Tel (905) 673-7137
Fax (905) 673-8883

Europe
Chemviron Carbon
Brussels, Belgium
Tel 32 2 773 02 11
Fax 32 2 770 93 94

CALGON

CALGON CARBON CORPORATION

CALGON

CALGON CARBON CORPORATION

CALGON CARBON CORPORATION
PO BOX 717-0717
PITTSBURGH PA 15230
Telephone: 412-787-6700
800-422-7266
Fax: 412-787-6324

PRICING
FLOWSORB CANISTER
NON-RETURNABLE AND RETURNABLE

NON-RETURNABLE	1 to 3	4 to 9	10 to 29	30 or MORE
FLOWSORB DSR-A	$ 460	$ 436	$ 418	$ 407
FLOWSORB BG830	489	463	440	425
FLOWSORB BG1240	499	473	450	435
FLOWSORB F300	509	480	454	441
FLOWSORB CENTAUR8X30	775	750	720	685

RETURNABLE	1 to 3	4 to 9	10 to 29	30 or MORE
FLOWSORB DSR-A	$ 560	$ 536	$ 518	$ 507
FLOWSORB BG830	589	563	540	525
FLOWSORB BG1240	599	573	550	535
FLOWSORB F300	609	580	554	541
FLOWSORB CENTAUR8X30	875	850	820	785

Carbon Acceptance Fee

Prior to return of a unit for reactivation, we are required to sample the spent carbon to ensure a safe reactivation process. This is a one-time per site per application charge.

Non-RCRA Acceptance $400
RCRA Acceptance $1,000

Carbon Acceptance testing will take approximately 3-4 weeks once the sample and paperwork are received by Calgon Carbon Corporation.

The above prices are F.O.B. Pittsburgh, PA 15225.
Pricing excludes any applicable taxes.
Terms are net 30 days.

Effective 05-01-97

CALGON CARBON CORPORATION
PO BOX 717
PITTSBURGH PA 15230
Telephone: 412-787-6700
800-422-7266
Fax: 412-787-6324

RETURNABLE VENTSORB AND FLOWSORB UNITS AND 55-GALLON DRUM(S) OF SPENT CARBON GUIDELINES

RETURNABLE VENTSORB AND FLOWSORB

To assure safe handling and reactivation of the VENTSORB or FLOWSORB unit, Calgon Carbon Corporation cannot accept the return of any unit until the spent carbon has been tested and approved by Calgon Carbon.

The 55-gallon VENTSORB contains 200 pounds of carbon and the 55-gallon FLOWSORB contains 165 pounds of carbon. The units have removable heads for the option of emptying and refilling.

Non-Calgon Carbon units may be returned provided replacement units are purchased from Calgon Carbon and appropriate Carbon Acceptance testing is completed. These units may not contain gravel or any extraneous material. The fee for the return of a non-Calgon Carbon unit is $200. Carbon Acceptance Fees are extra: $400 if Non-RCRA or $1,000 if RCRA.

There is no minimum number of drums to be returned, but Carbon Acceptance testing and approval process must be completed even if you only have a single drum to return. (This is a one-time test per application.)

Once you have a Carbon Acceptance Number (CAN), this is all that is needed to identify future returns of spent units from that specific application. However, if the application for the unit changes, a "new" CAN must be acquired.

The Non-RCRA or RCRA spent units may be returned to the reactivation plant located in Catlettsburg, KY. Return instructions are included in the information packet provided with each unit.

When requested, we can issue to you a Certificate of Destruction. This will identify the date(s) the carbon was reactivated and the serial number(s) of the unit(s) returned.

55-GALLON DRUM(S) OF SPENT CARBON

Before a 55-gallon drum of spent carbon is returned for reactivation, a Carbon Acceptance Kit will need to be sent and returned to Calgon Carbon. Upon receiving the Carbon Acceptance, a charge of $400 for Non-RCRA or $1,000 for RCRA will be applied. A charge of $200 per 55-gallon drum of spent carbon will be billed. Carbon Reactivation Services only can be applied if our activated carbon is purchased as a replacement carbon on an on-going basis. For return of Calgon Carbon spent carbon in the future, the fee will be $100 per 55-gallon drum, and the Carbon Acceptance remains valid.

The customer is responsible for the freight to the Calgon Carbon plant.

CALGON CARBON CORPORATION

RETURNABLE VENTSORB AND FLOWSORB UNITS AND 55-GALLON DRUM(S) OF SPENT CARBON GUIDELINES

Carbon Acceptance Kit

Included in the Carbon Acceptance Kit are the following:

1. General carbon acceptance instructions including a list of regional offices.
2. Sample instructions.
3. Carbon Acceptance request (this form must be completed and accompany the return sample) and instructions for completion.
4. Adsorbate profile document (this form must be completed and accompany the return sample) and instructions for completion.
5. Two-quart sample bottle with identification label.
6. Return shipping box with sealing tape and return shipping/sample identification labels.

Return Shipping Information Packet

Included in the Return Shipping Information Packet are the following:

1. Instructions for the return of units.
2. Instructions to properly obtain a sample of spent carbon. Follow the instructions to collect an appropriate sample.
3. Map of return locations and addresses.
4. Carbon Acceptance requirements and sales office list.
5. Return label.

CALGON CARBON CORPORATION

PRODUCT BULLETIN

DSR-A 8x40

GRANULAR REACTIVATED CARBON

DESCRIPTION

DSR-A is a grade of reactivated carbon designed for the removal of organic contaminants from industrial wastewater or process water. The carbon is manufactured by the reactivation of bituminous coal based virgin and reactivated products to produce a high-density, high surface area and durable product capable of withstanding repeated cycles of use and reactivation.

DSR-A is effective in a wide range of applications and fluctuating flows providing reliable removal of dissolved organic compounds.

DSR-A is screened prior to packaging to insure consistent performance and low pressure drop. DSR-A is not to be used for food grade or potable applications.

APPLICATIONS

- Point source treatment to remove chemicals
- Pre-treatment to biological waste treatment systems
- Product recovery from wastewater
- Recycling wastewater
- Polishing effluent from biological waste treatment systems
- Providing total wastewater treatment

DESIGN CONSIDERATIONS

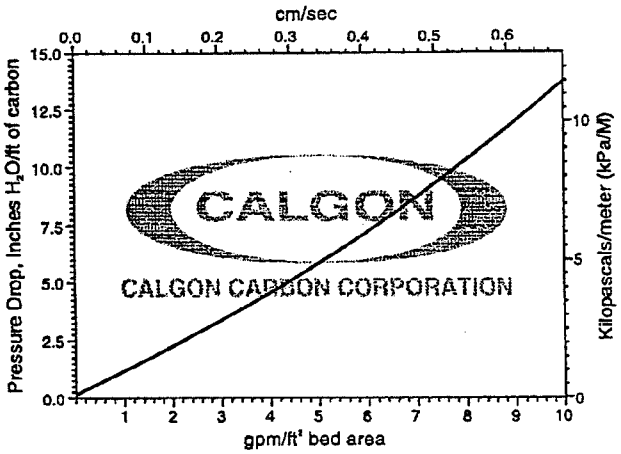
The design of an activated carbon adsorption system is dependent on the adsorbate type, influent concentration, temperature, flow rate, performance objective, and other factors. Calgon Carbon has experience designing systems and can help evaluate the suitability of DSR-A to satisfy specific needs and assist in the design of an adsorption system. In addition to the supply of activated carbon, Calgon Carbon offers a complete line of standardized, pre-engineered adsorption systems. For additional information on adsorption capacity of organic compounds, please contact the Calgon Carbon Technical Sales Representative for your area.

SPECIFICATIONS

Iodine No., mg/g:	750 min
Screen distribution:	<40 U.S. Mesh 5% max
Ash content:	9% max

PRESSURE DROP

Liquid downflow through DSR-A 8x40 carbon



PACKAGING

1000 lb. supersacks, bulk

MANUFACTURING

Catlettsburg, KY

RECYCLED
THIS PRODUCT IS MADE FROM RECYCLED ACTIVATED CARBON

DSR-A is not for use in potable water or food grade applications.

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. From outside the U.S. please call +1-412-787-6700.

FEATURES	BENEFITS
Raw Material:	
• Metallurgical grade, bituminous coal based	• Produces a strongly adsorbing pore structure for a broad range of contaminants and concentrations.
Miscellaneous:	
• Reactivated product	• Economical alternate to virgin carbon. • Provides ultimate disposal of pollutants.
• Recyclable product	• Eliminates landfill costs and concerns. • Propagates the cycle of responsible resource utilization.
• High surface area/pore structure	• Efficient in removing a wide range of dissolved organic compounds. • Reliable - accommodates variations in flows or concentrations.
• Product is screened prior to packaging	• Results in less fines and lower pressure drop. • Minimizes backwashing.

PRODUCT OPTIONS

In addition to DSR-A, Calgon Carbon offers a variety of products and services to meet your treatment requirements:

Granular Carbon Products

- Filtrasorb 300 & 400 - virgin liquid phase products.
- React pH - for pH sensitive applications.
- React AW - for acid purification.

Equipment Products

- Standardized, pre-engineered adsorption systems capable of treatment flows from 1 gpm to 1400 gpm.
- Custom engineered systems - to meet unique treatment requirements.

Service Products

- Technical services including design assistance, calculations of carbon use rates, laboratory and pilot studies, start-up and operations assistance.
- On-site exchange services and reactivation service reduce labor requirements and minimize disposal cost.

SAFETY MESSAGE

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 carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable federal and state requirements.

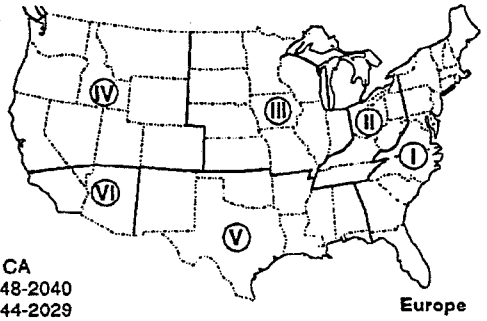
1-800-4-CARBON

Domestic Sales Offices

Region I
Bridgewater, NJ
Tel (908) 526-4646
Fax (908) 526-2467

Region II
Pittsburgh, PA
Tel (412) 787-6700
1-800-4-CARBON
Fax (412) 787-6676

Region III
Lisle, IL
Tel (708) 505-1919
Fax (708) 505-1936



Region IV
Burlingame, CA
Tel (415) 548-2040
Fax (415) 344-2029

Region V
Houston, TX
Tel (713) 690-2000
Fax (713) 690-7909

Region VI
Carlsbad, CA
Tel (619) 431-5550
Fax (619) 431-8169

International Sales Offices

Canada
Calgon Carbon Canada, Inc.
Mississauga, Ontario
Tel (905) 673-7137
Fax (905) 673-8883

Europe
Chemviron Carbon
B-1200 Brussels,
Belgium
Tel 32 2 773 02 11
Fax 32 2 770 93 94

Latin America/Australasia/ Philippines
Pittsburgh, PA
Tel (412) 787-4519
Fax (412) 787-4523

Singapore/Asia Pacific
Calgon Carbon Corp.
Tel (65) 221-3500
Fax (65) 221-3554

Calgon Carbon Corporation's activated carbon products are continuously being improved and changes may have taken place since this publication went to press.

CALGON
CALGON CARBON CORPORATION

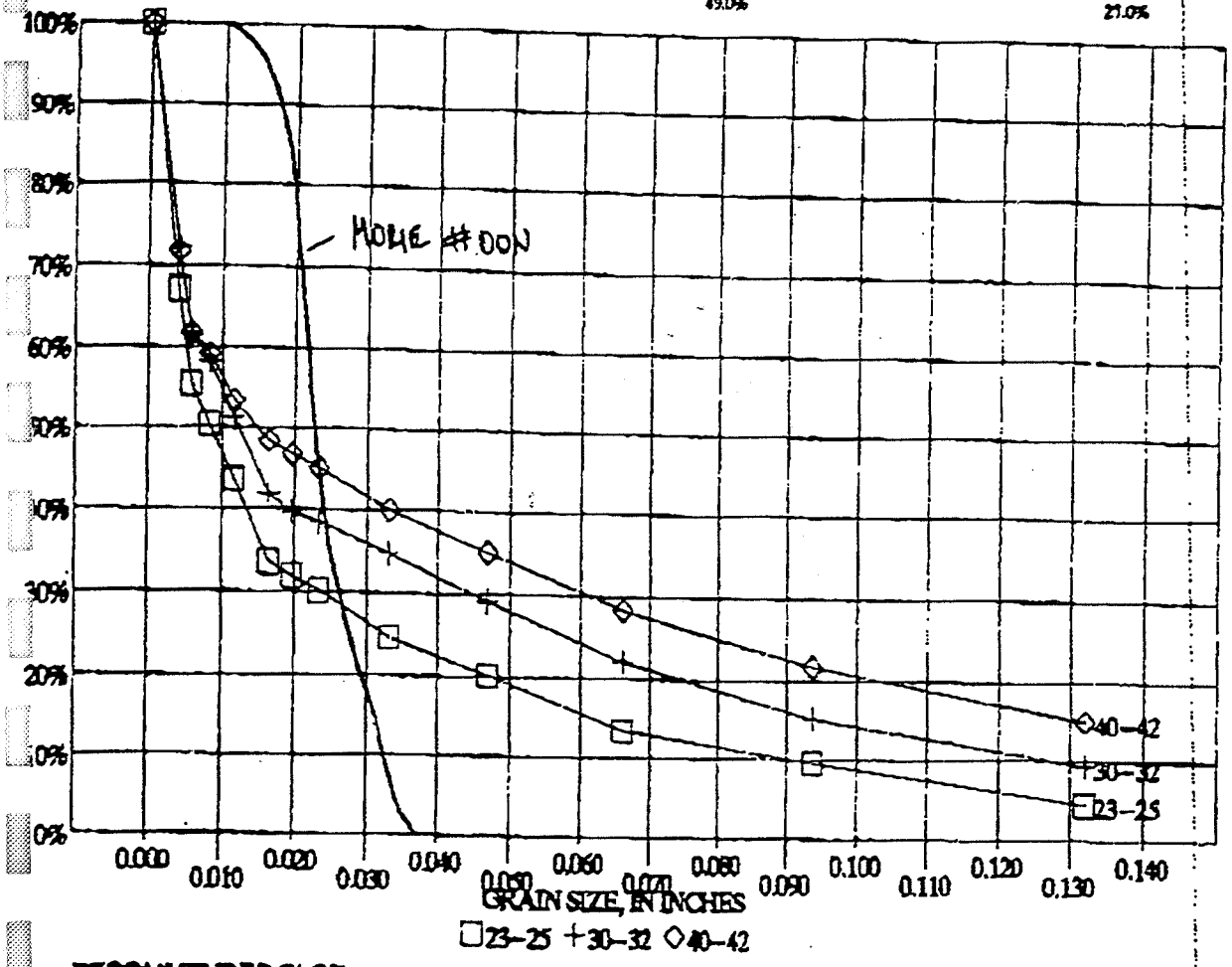
APPENDIX 3

SIEVE ANALYSIS

COOK SCREEN TECHNOLOGIES, INC
1292 GLENDALE–MILFORD ROAD
CINCINNATI, OH 45215
SAND SAMPLE ANALYSIS RESULTS:

DATE: 1ST MAY 1997
CUSTOMER: VINCE UHL AND ASSOC
CONTACT: VINCE
PROJECT: PROJECT
ANALYSIS BY: MIKE PICHE

(FEED) MESH	23–25 CUM WT RETAINED GRAMS DISCARDED	CUM PERCENT RETAINED XXXXXXX	(FEED) MESH	30–32 CUM WT RETAINED GRAMS DISCARDED	CUM PERCENT RETAINED XXXXXXX	(FEED) MESH	40–42 CUM WT RETAINED GRAMS DISCARDED	CUM PERCENT RETAINED XXXXXXX
3/8	3/8	0.0%	3/8	3/8	0.0%	3/8	3/8	0.0%
4	4	0.0%	4	4	0.0%	4	4	0.0%
6	6	0.0%	6	6	0.0%	6	6	0.0%
8	8	0.0%	8	8	0.0%	8	8	0.0%
10	10	0.0%	10	10	0.0%	10	10	0.0%
12	12	0.0%	12	12	0.0%	12	12	0.0%
14	14	0.0%	14	14	0.0%	14	14	0.0%
16	16	0.0%	16	16	0.0%	16	16	0.0%
18	18	0.0%	18	18	0.0%	18	18	0.0%
20	20	0.0%	20	20	0.0%	20	20	0.0%
25	25	0.0%	25	25	0.0%	25	25	0.0%
30	30	0.0%	30	30	0.0%	30	30	0.0%
35	35	0.0%	35	35	0.0%	35	35	0.0%
40	40	0.0%	40	40	0.0%	40	40	0.0%
45	45	0.0%	45	45	0.0%	45	45	0.0%
50	50	0.0%	50	50	0.0%	50	50	0.0%
60	60	0.0%	60	60	0.0%	60	60	0.0%
70	70	0.0%	70	70	0.0%	70	70	0.0%
80	80	0.0%	80	80	0.0%	80	80	0.0%
100	100	0.0%	100	100	0.0%	100	100	0.0%
120	120	0.0%	120	120	0.0%	120	120	0.0%
140	140	0.0%	140	140	0.0%	140	140	0.0%
170	170	0.0%	170	170	0.0%	170	170	0.0%
200	200	0.0%	200	200	0.0%	200	200	0.0%
230	230	0.0%	230	230	0.0%	230	230	0.0%
PAN	248	0.0%	PAN	248	0.0%	PAN	248	0.0%
SAMPLE WEIGHT	1		SAMPLE WEIGHT	2		SAMPLE WEIGHT	3	
RECOVERED CLAY	49	43.0%	RECOVERED CLAY	44	49.0%	RECOVERED CLAY	43	27.0%
	1	43.0%		2	49.0%		3	27.0%
	2	86.0%		4	98.0%		6	54.0%
	3	129.0%		6	147.0%		9	81.0%
	4	172.0%		8	196.0%		12	108.0%
	5	215.0%		10	245.0%		15	135.0%
	6	258.0%		12	294.0%		18	162.0%
	7	301.0%		14	343.0%		21	189.0%
	8	344.0%		16	392.0%		24	216.0%
	9	387.0%		18	441.0%		27	243.0%
	10	430.0%		20	490.0%		30	270.0%
	11	473.0%		22	539.0%		33	297.0%
	12	516.0%		24	588.0%		36	324.0%
	13	559.0%		26	637.0%		39	351.0%
	14	602.0%		28	686.0%		42	378.0%
	15	645.0%		30	735.0%		45	405.0%
	16	688.0%		32	784.0%		48	432.0%
	17	731.0%		34	833.0%		51	459.0%
	18	774.0%		36	882.0%		54	486.0%
	19	817.0%		38	931.0%		57	513.0%
	20	860.0%		40	980.0%		60	540.0%
	21	903.0%		42	1029.0%		63	567.0%
	22	946.0%		44	1078.0%		66	594.0%
	23	989.0%		46	1127.0%		69	621.0%
	24	1032.0%		48	1176.0%		72	648.0%
	25	1075.0%		50	1225.0%		75	675.0%
	26	1118.0%		52	1274.0%		78	702.0%
	27	1161.0%		54	1323.0%		81	729.0%
	28	1204.0%		56	1372.0%		84	756.0%
	29	1247.0%		58	1421.0%		87	783.0%
	30	1290.0%		60	1470.0%		90	810.0%
	31	1333.0%		62	1519.0%		93	837.0%
	32	1376.0%		64	1568.0%		96	864.0%
	33	1419.0%		66	1617.0%		99	891.0%
	34	1462.0%		68	1666.0%		102	918.0%
	35	1505.0%		70	1715.0%		105	945.0%
	36	1548.0%		72	1764.0%		108	972.0%
	37	1591.0%		74	1813.0%		111	999.0%
	38	1634.0%		76	1862.0%		114	1026.0%
	39	1677.0%		78	1911.0%		117	1053.0%
	40	1720.0%		80	1960.0%		120	1080.0%
	41	1763.0%		82	2009.0%		123	1107.0%
	42	1806.0%		84	2058.0%		126	1134.0%
	43	1849.0%		86	2107.0%		129	1161.0%
	44	1892.0%		88	2156.0%		132	1188.0%
	45	1935.0%		90	2205.0%		135	1215.0%
	46	1978.0%		92	2254.0%		138	1242.0%
	47	2021.0%		94	2303.0%		141	1269.0%
	48	2064.0%		96	2352.0%		144	1296.0%
	49	2107.0%		98	2401.0%		147	1323.0%
	50	2150.0%		100	2450.0%		150	1350.0%
	51	2193.0%		102	2499.0%		153	1377.0%
	52	2236.0%		104	2548.0%		156	1404.0%
	53	2279.0%		106	2597.0%		159	1431.0%
	54	2322.0%		108	2646.0%		162	1458.0%
	55	2365.0%		110	2695.0%		165	1485.0%
	56	2408.0%		112	2744.0%		168	1512.0%
	57	2451.0%		114	2793.0%		171	1539.0%
	58	2494.0%		116	2842.0%		174	1566.0%
	59	2537.0%		118	2891.0%		177	1593.0%
	60	2580.0%		120	2940.0%		180	1620.0%
	61	2623.0%		122	2989.0%		183	1647.0%
	62	2666.0%		124	3038.0%		186	1674.0%
	63	2709.0%		126	3087.0%		189	1701.0%
	64	2752.0%		128	3136.0%		192	1728.0%
	65	2795.0%		130	3185.0%		195	1755.0%
	66	2838.0%		132	3234.0%		198	1782.0%
	67	2881.0%		134	3283.0%		201	1809.0%
	68	2924.0%		136	3332.0%		204	1836.0%
	69	2967.0%		138	3381.0%		207	1863.0%
	70	3010.0%		140	3430.0%		210	1890.0%
	71	3053.0%		142	3479.0%		213	1917.0%
	72	3096.0%		144	3528.0%		216	1944.0%
	73	3139.0%		146	3577.0%		219	1971.0%
	74	3182.0%		148	3626.0%		222	1998.0%
	75	3225.0%		150	3675.0%		225	2025.0%
	76	3268.0%		152	3724.0%		228	2052.0%
	77	3311.0%		154	3773.0%		231	2079.0%
	78	3354.0%		156	3822.0%		234	2106.0%
	79	3397.0%		158	3871.0%		237	2133.0%
	80	3440.0%		160	3920.0%		240	2160.0%
	81	3483.0%		162	3969.0%		243	2187.0%
	82	3526.0%		164	4018.0%		246	2214.0%
	83	3569.0%		166	4067.0%		249	2241.0%
	84	3612.0%		168	4116.0%		252	2268.0%
	85	3655.0%		170	4165.0%		255	2295.0%
	86	3698.0%		172	4214.0%		258	2322.0%
	87	3741.0%		174	4263.0%		261	2349.0%
	88	3784.0%		176	4312.0%		264	2376.0%
	89	3827.0%		178	4361.0%		267	2403.0%
	90	3870.0%		180	4410.0%		270	2430.0%
	91	3913.0%		182	4459.0%		273	2457.0%
	92	3956.0%		184	4508.0%		276	2484.0%
	93	3999.0%		186	4557.0%		279	2511.0%
	94	4042.0%		188	4606.0%		282	2538.0%
	95	4085.0%		190	4655.0%		285	2565.0%
	96	4128.0%		192	4704.0%		288	2592.0%
	97	4171.0%		194	4753.0%		291	2619.0%
	98	4214.0%		196	4802.0%		294	2646.0%
	99	4257.0%		198	4851.0%		297	2673.0%
	100	4300.0%		200	4900.0%		300	2700.0%



RECOMMENDED SLOT:
RECOMMENDED GRAVEL PACK:
DISK FILE: