APPENDIX B-2

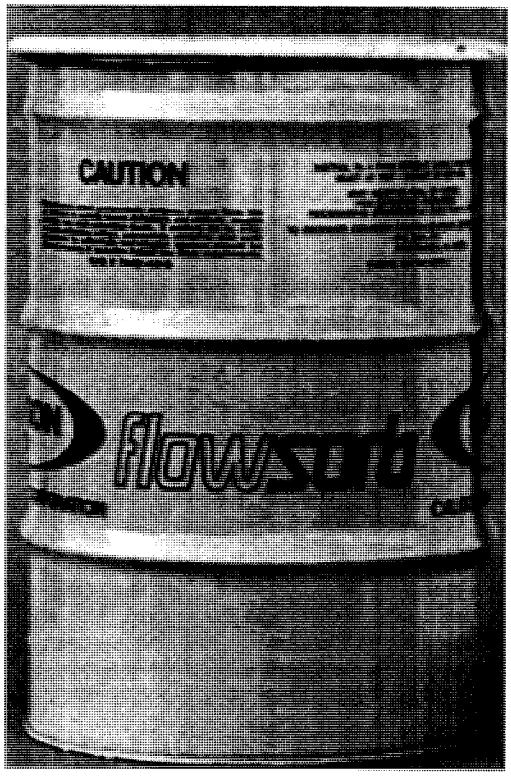
(CARBON VESSEL SPECIFICATION)
(LOAD LINE DISCHARGES)

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 de-colorization
- 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
- Low cost per unit makes carbontreatment economical
- Simple installation and operation
- Space above carbon bed facilitates flow distribution or back-flushing
- Flexibility to be used in series or parallel operation
- Supplied with virgin or reactivated carbon
- Practical disposal option, as pre-approved spent carbon canisters may be returned to Calgon Carbon Corporation for safe carbon reactivation
- Continuous treatment at varying flow rates and concentrations

Flowsorb Specifications

Vessel	Open head 16 gauge steel canister
Max Operating Pressure	5 psig
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) continuous350°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 traceability

Typical Flowsorb Operating Parameters

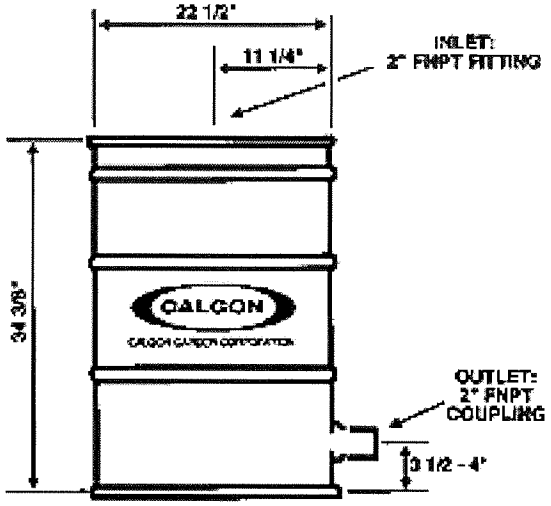
Flow Rate	10 gpm (37.8 l/m)
Contact Time	4.5 minutes
Pressure Drop	< 1 psi (clean water and carbon)
Operating Pressures	Recommend operation at less than5 psig, but higher pressures, up to12 psig, possible with tight cover closure

Flowsorb Installation

Flowsorb canisters are shipped with dry activated carbon; the carbon must be wetted and de-aerated 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.

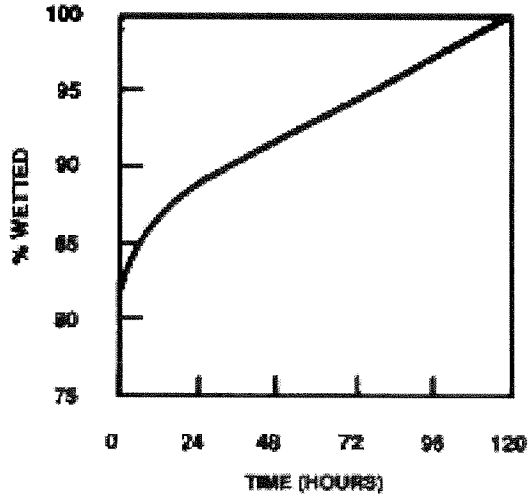
Prior to operation, each canister must be filled with clean water; the water should be introduced into the bottom outlet connection. The unit should set for approximately 48 hours - this allows most of the carbon's internal surface to become wetted, as shown on the wetting curve below.

After wetting, the carbon bed can be de-aerated by draining the canister and again filling the canister up-flow 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.



Flowsorb Dimensions

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.



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.

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.

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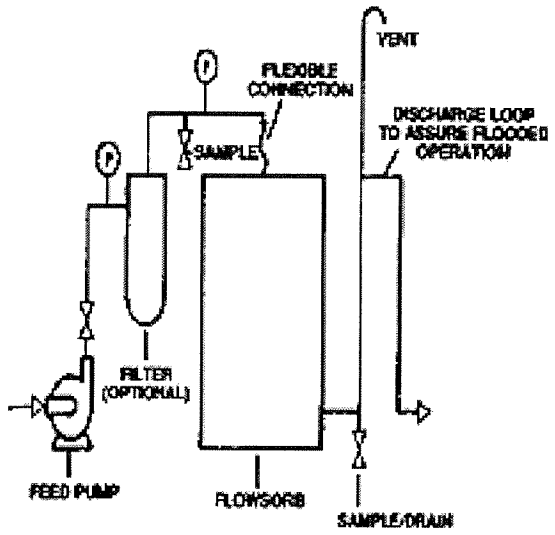
Flowsorb Operation

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 ground-water treatment applications, the recommended contact time is typically 8-10 minutes with a resultant flow of approximately 5 gpm. Consult you Calgon Carbon Corporation 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 back flushed by introducing clean water or liquid at approximately 20-25 gpm to the outlet and taking back-flush water from the inlet.



Typical Flowsorb Installation

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		200 ppb		2ppm	
Toluene	40ppb	1,600,000	400 ppb	400,000	4ppm	85,000
Xylene	40ppb		400 ppb		4ppm	

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

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

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 you Calgon Carbon Technical Sales Representative for more information about carbon usage rates.

Return of Flowsorbs

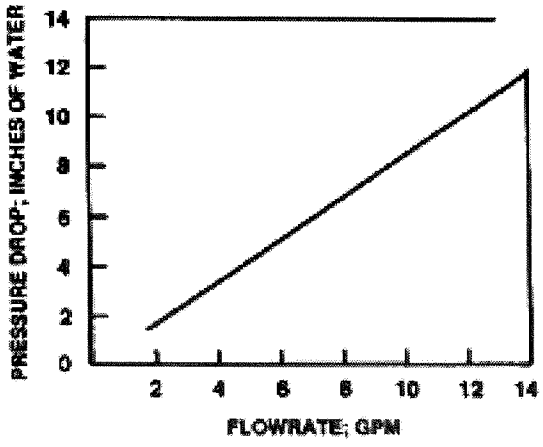
Arrangements should be made at the time of purchase regarding the future return of canisters containing spent carbon. Calgon Carbon will provide instructions on how to sample the spent carbon and arrange for carbon acceptance testing. The spent carbon is reactivated by Calgon Carbon and all of the contaminants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

Calgon Carbon Liquid Purification System

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.



Flowsorb Pressure Drop

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. **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.

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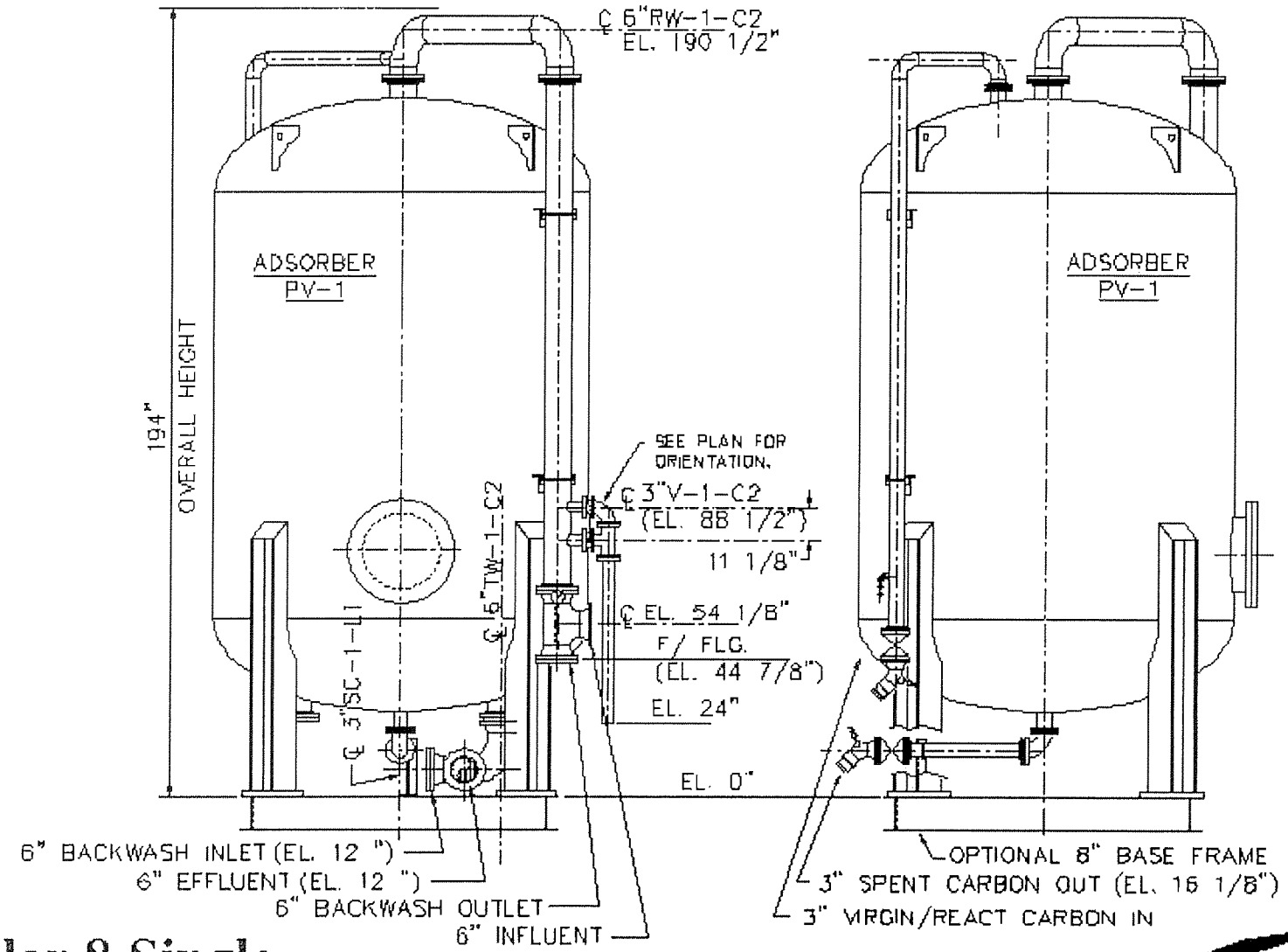

Modular 8 Single
Elevation View

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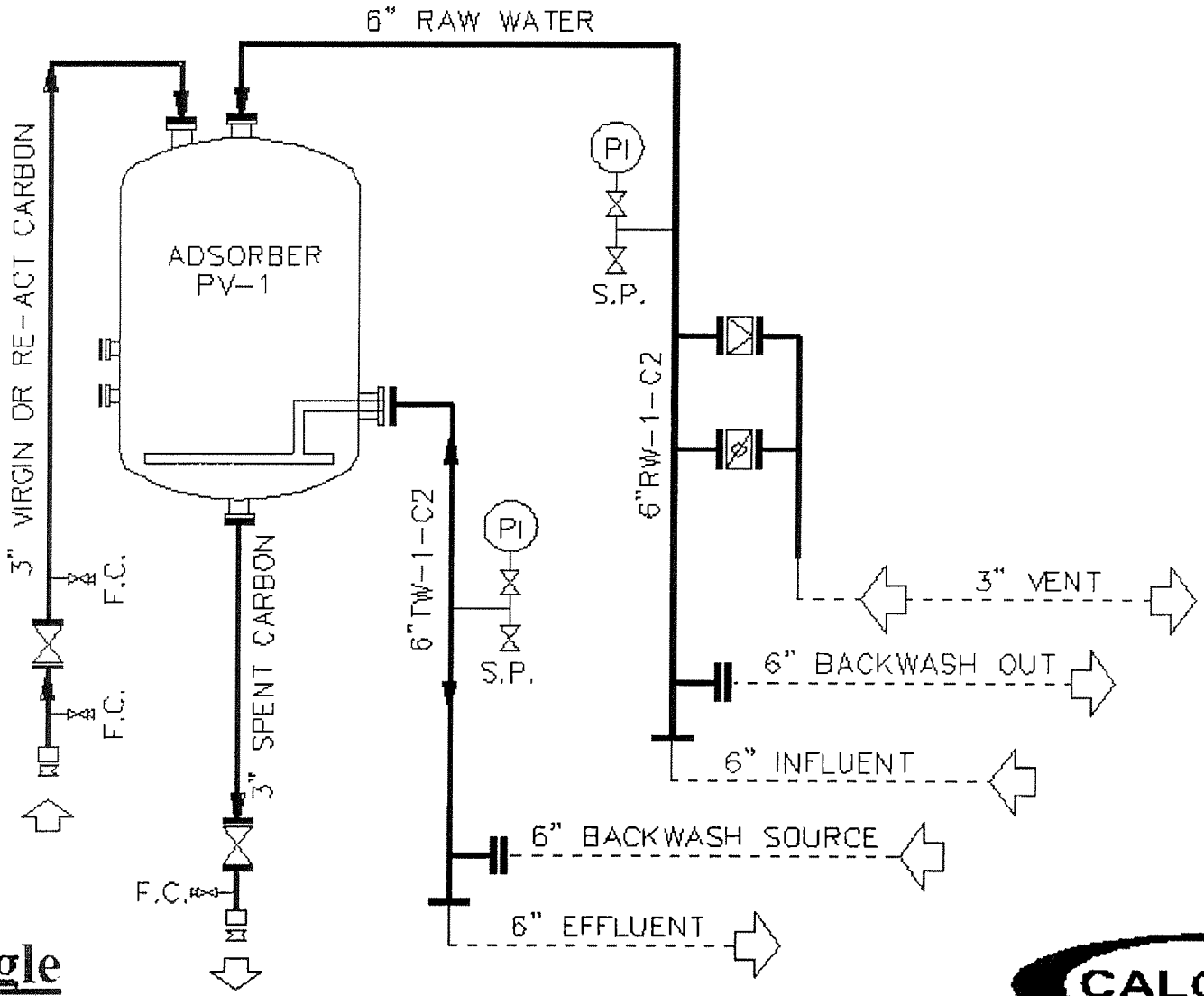

Modular 8 Single Flow Diagram

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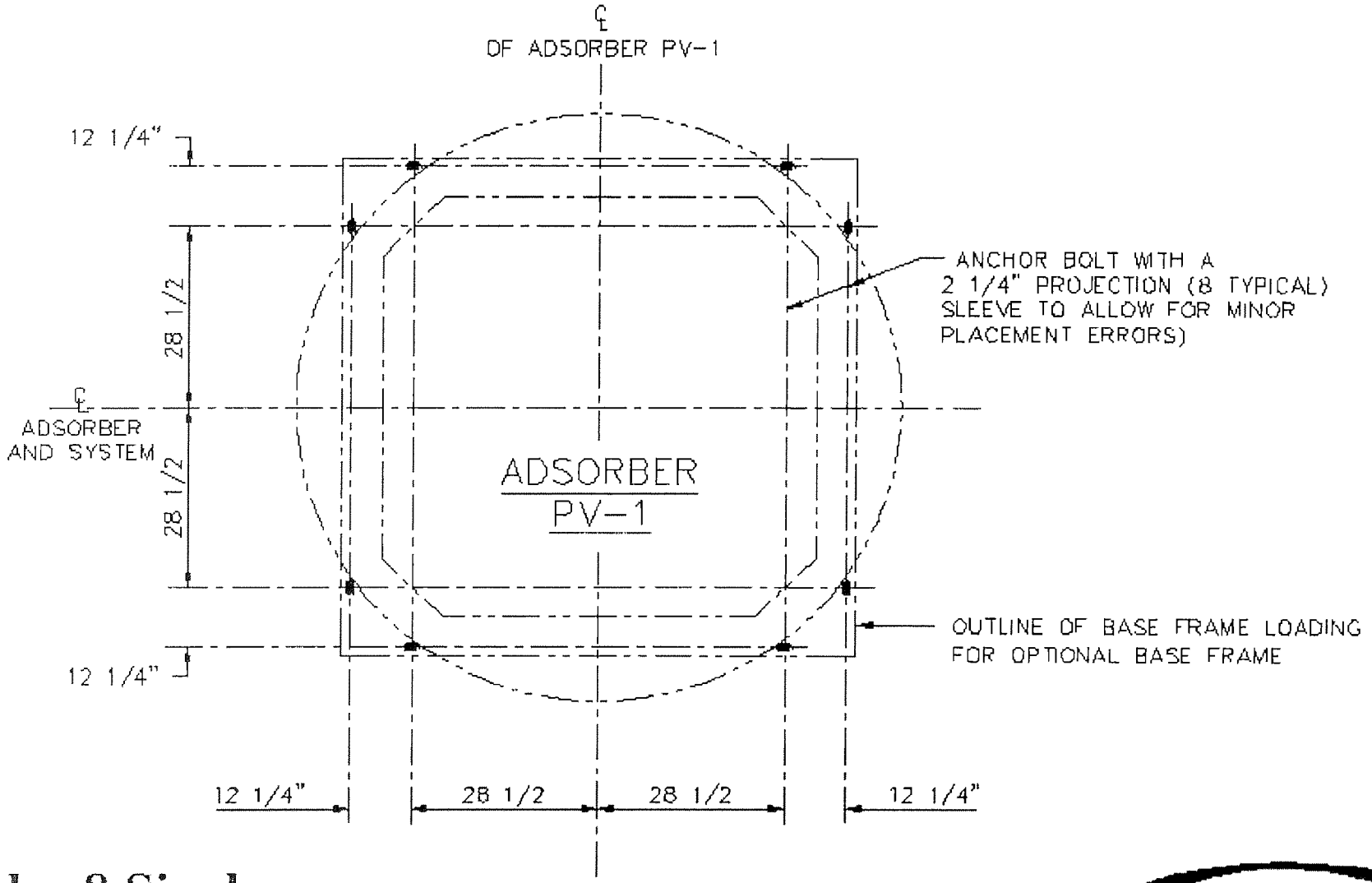

Modular 8 Single Footprint

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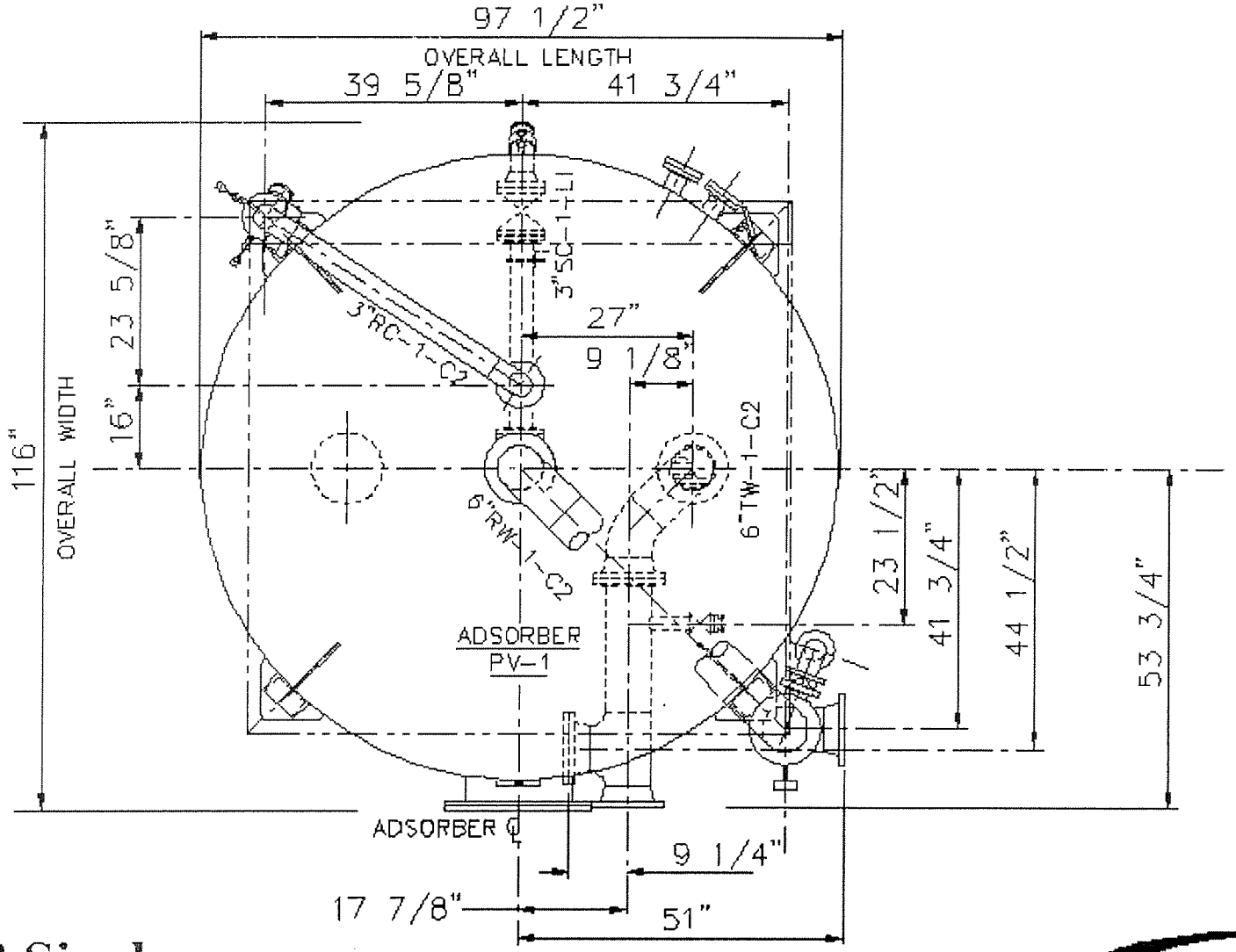

Modular 8 Single
Plan View

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Equipment Bulletin

MODEL 8 MODULAR CARBON ADSORPTION SYSTEM

Description

The Calgon Carbon Model 8 is an adsorption system designed for the removal of dissolved organic contaminants from liquids using granular activated carbon. The modular design concept allows selection of options or alternate materials to best meet the requirements of the customer's site and treatment application.

The Model 8 system is delivered as two adsorbers and a separate compact center piping network, requiring only minimal field assembly and site connections. An optional platform skid is available to facilitate installation. The pre-engineered Model 8 design assures that all adsorption system functions can be performed with the equipment process design.

The process piping network for the Model 8 offers operation of the adsorbers in parallel or series flow (with either adsorber placed in the lead stage). The piping can also isolate either adsorber from the process flow. This permits carbon exchange or backwash operations to be performed on one adsorber without interrupting treatment.

The under-drain design provides for the efficient collection and uniform distribution of treated water and the uniform distribution of backwash water. The Model 8 system is designed for use with Calgon Carbon's closed loop carbon exchange service. Using special designed trailers, spent carbon is removed from the adsorbers in a close loop and returned to Calgon Carbon for reactivation. The transfer is accomplished without exposure of operating personnel to contaminated liquid. The trailers also recharge the adsorbers with fresh activated carbon.

System Specifications

Available Options

- System platform skid.
- In-bed water sample collection probes.
- PPL lined steel pipe for carbon discharge.
- Full bore stainless steel ball valves for carbon fill and discharge pipelines.
- Independent backwash source
- Carbon exchange package
- Pre-loaded carbon materials
- In-line carbon retention screens
- Differential pressure switches
- Suitable application linings
- Multiple man-way sizes
- Process pipe sizes and materials of construction
- Pressure relief valves
- Pressure gauges
- Multiple under-drain designs
- Vessel pressure ratings 75 lb - 125 lb
- Multiple internal linings

Carbon Adsorbers

- Carbon steel ASME code stamped pressure vessels.
- Internal vinyl ester lining (25 to 35 mils) for potable water and most liquid applications. (Recommended)
- Polypropylene slotted nozzles for water collection and backwash distribution.

Standard Adsorption System Piping

- Schedule 40 carbon steel process piping with cast iron fittings.
- Cast iron butterfly valves for process piping.

System External Coating

- Epoxy mastic paint

Operating Conditions

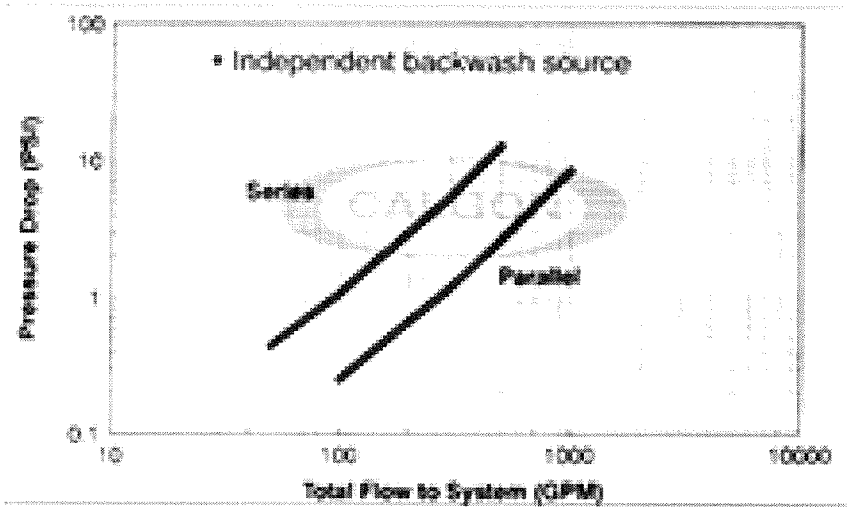
Carbon per Adsorber
10,000 lbs. (4540 kg)

Pressure Rating
75 psig (517 kPa)

Pressure Relief
Graphite rupture disk (67 psig)

Vacuum Rating
14 psig

Temperature Rating
150°F maximum (65°C)

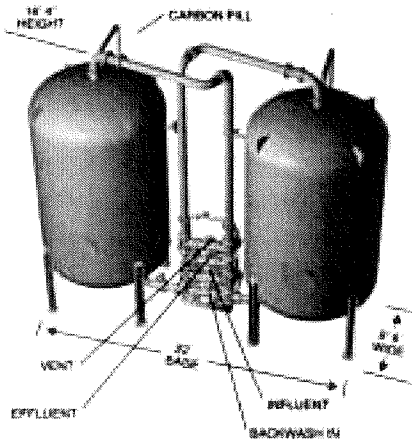


Backwash Rate
Typical 640 gpm (30% expansion)

Carbon Transfer	Air pressure slurry transfer
Utility Air	100 scfm at 30 psig (reduce to 15 psig for trailer)
Utility Water	100 gpm at 30 psig
Freeze Protection	None provided; enclosure or protection recommended

Dimensions and Field Connections

Adsorber Vessel Diameter	8 ft. (2440 mm)
Process Pipe	4 in.
Process Pipe Connection	125# ANSI flange
Utility Water Connection	3/4 in. hose connection
Utility Air Connection	3/4 in. hose connection
Carbon Hose Connection	4 in. Kamlock type
Backwash Connections	4 in. or 6 in. flange
Adsorber Maintenance Access	20 in. round flanged man-way
Adsorber Shipping Weight	16,000 lbs. (empty) (7300 kg)
System Operating Weight	92,000 lbs (41,800 kg)



Model B Adsorption System

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.

Calgon Carbon Corporation reserves the right to change specifications without notice for components of equal quality.

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.

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APPENDIX C

(CALCULATIONS)

APPENDIX C-1

(LOAD LINE DISCHARGES)

CLIENT:	IAAAP		JOB NUMBER:
SUBJECT:	Load Line Discharges Carbon Vessel Calculations		
BASED ON:			DRAWING NUMBER:
By: Date:	PKJ 07/24/04	Checked By: Date:	Approved by: Date:

OBJECTIVE:

Load Line Discharges Carbon Vessel Calculations

CALCULATIONS:

SOLUTION:

(a) Carbon Usage

Flow (assume for two years)	100,000	gallons

Carbon Consumption Rate = 0.1 lbs of carbon per 1,000 gallons of RDX contaminated water

Total Carbon usage (lbs)	10	lbs

(b) Vessel Sizing

Use 55 gallon carbon vessel with 165 pounds of carbon.
(See Appendix A-1 and A-2 for information on Flowsorb by Calgon Carbon).

APPENDIX C-2

(WWTP DISCHARGES)

CLIENT:	IAAAP		**JOB NUMBER:**
SUBJECT:	Sizing of equalization tank		
BASED ON:			**DRAWING NUMBER:**
By:	PKJ	**Checked By:**	**Approved by:**
Date:	07/24/04	**Date:**	**Date:**

OBJECTIVE:

Sizing of equalization tank

CALCULATIONS:

Assume a minimum run time for treatment plant = 40 minutes

Average flow rate through treatment = 250 gpm

Size of equalization tank

$Volume_{eq}$ = 10000

Size of equalization tank = 10,000 gallons

CLIENT:	IAAAP		**JOB NUMBER:**
SUBJECT:	WWTP Carbon Column Calculations		
BASED ON:			**DRAWING NUMBER:**
By:	PKJ	**Checked By:**	**Approved by:**
Date:	07/24/04	**Date:**	**Date:**

OBJECTIVE:

WWTP Carbon Column Calculations

CALCULATIONS:

SOLUTION:

(a) Adsorber Volume

$$v = \frac{(CUR \times COP)\ SF}{P}$$

(United States Army Corps of Engineers)
(Adsorption Design Guide, 2001)

v = volume of adsorber, ft^3

Flowrate 250 gpm

Carbon Consumption Rate = 0.1 lbs of carbon per 1,000 gallons of RDX contaminated water

CUR = carbon usage rate, lbs/day 36 lbs/day

COP = carbon changeout period, days 210 days

[The carbon usage rate and the carbon changeout period is based on the Calgon Carbon information for the influent concentration given below]

RDX = 5 ug/L

P = bulk density of carbon, lb/ft3 = 29.965 lb/ft^3 (F-300 spec)

SF = Safety factor 1.2 Assume

v = 302.8 ft^3

(b) Bed Depth

Diameter of vessel= 8 ft

$$\text{Bed depth} = L = \frac{V}{A}$$

L= 6.0 ft (approximately)

(c) Contact Time

$$EBCT = \frac{V}{Q} = \frac{LA}{Q}$$

V = bulk volume of GAC in contactor (ft^3)
Q = volumetric flow rate, gpm 250
Q = volumetric flow rate, ft^3/min 33.42

EBCT = 9 minutes

CLIENT:	IAAAP		**JOB NUMBER:**
SUBJECT:	WWTP Carbon Column Calculations		
BASED ON:			**DRAWING NUMBER:**
By:	PKJ	**Checked By:**	**Approved by:**
Date:	07/24/04	**Date:**	**Date:**

(d) Surface Loading Rate

Flow rate = 250.00 gpm

Diameter of carbon vessel = 8 ft

Surface Loading Rate= 4.98 gpm/ft^2

(e) Carbon Quantity

Volume of Carbon = 302.8 ft^3

Density of Carbon = 29.965 lb/ft3

wt of carbon = 9,072 lbs of carbon

Use one vessel with approximately 10,000 lbs of carbon in one vessel

APPENDIX D

(EPA COMMENTS AND ARMY RESPONSES)

EPA Comments and Corresponding Reponses - DRAFT BRUSH CREEK POINT SOURCE CONTROL WORK PLAN AUGUST 2004

	Comment Identification	Comment	Response to Comment
1.	General	The Work Plan does not include information regarding the proposed analytical laboratory and associated quality assurance/quality control (QA/QC) procedures, including collection of QA/QC samples (i.e., field replicates, field blanks, laboratory split samples, among others), and data validation. Implementation of QA/QC procedures are necessary to ensure that the data collection and evaluation process is effective and that data are useable. The Work Plan also does not contain references to any Standard Operating Procedures or examples of any field forms or checklists that will be used during Operation and Maintenance (O&M) activities. Please revise the Work Plan to include this information.	The proposed analytical laboratory (Laucks) is the same as that specified in the 2002 Installation-Wide SAP/QAPP which is referenced in the document. QA/QC procedures are the same as those in the referenced 2002 Installation-Wide SAP/QAPP. An O&M manual will be developed for the systems constructed and implemented for this project during system startup. The O&M manual will be submitted as an addendum to this work plan. The O&M manual will be used primarily by field staff as a guide to performing routine operations checks and maintaining the effective operation of the systems. Pertinent SOPs and field forms will also be contained in the O&M manual.
2.	General	The Work Plan does not include a schedule for proposed activities. Please revise the Work Plan to include a schedule for installation of the treatment systems, including sampling events.	A schedule will be provided in the revised work plan.
3.	General	The Work Plan does not provide sufficient detail regarding the design specifications for the treatment systems. It is assumed that a detailed Work Plan, including design specifications for each individual treatment system planned, will be prepared and submitted for regulatory review prior to installation of the treatment systems.	Additional design details were not included in the work plan as the Brush Creek Point Source activities are considered interim or temporary measures. The system will be in place for 2 years to evaluate the effect of RDX point source control on Brush Creek surface water quality. In addition, Tetra Tech will be self performing the installation, maintenance, and monitoring of the system and therefore detailed design specs and drawings are not needed for bidding or subcontractor implementation.
4.	General	We noted several typographical errors, including - Page 1-2, 2nd paragraph; Section 2.1.1.7 - “be seized” should be “cease”; Section 2.1.2.7 - “be seized” should be “cease”.	The typos will be fixed and the document edited to remove spelling and grammatical issues.

	Comment Identification	Comment	Response to Comment
5.	Section 1.1, page 1-1	The last paragraph suggests that the Plan addresses all point source discharges of RDX to Brush Creek which may be occurring. While this may be an accurate statement at the moment, other discharges to Brush Creek are permitted via the IAAP NPDES permit. Please describe the universe of possible RDX point source discharges to Brush Creek, including those that are permitted via NPDES, and from non-NPDES sources. Describe how you have determined that only those sources addressed in this Plan are potentially contributing RDX to Brush Creek. While RDX is not addressed in some NPDES outfalls, it would be appropriate to insure that RDX, in fact, is not being discharged from those outfalls. Keep in mind that RDX is not included in the permit conditions for the WWTP outfall.	In reviewing historical documents and discussing future operations plans with the Army and American Ordnance, the current NPDES discharge points are all that are expected for the 2 year duration of the point source control project. If historical NPDES point sources are reactivated, the Army and AO will work cooperatively with Tetra Tech to add appropriate RDX discharge controls to ensure that the discharge meets the RDX discharge goal of 2 ug/L. It is evident from historical studies conducted by Harza in 2001 and Johnson et al in 2003 that the point sources were significant historical contributors of RDX and other explosives to Brush Creek. These historical discharges were also the source of the off-site groundwater plume (URS 2004). These historical point sources, with the exception of the WWTP, are no longer contributing RDX into Brush Creek. Recent sampling performed by Tetra Tech in September 2004 as part of a pre-design data gathering effort for the WWTP point source control system also supports the conclusion that concentrations of RDX being discharged from it during low and high flow conditions are less than those from upstream areas. No other point sources are currently discharging to Brush Creek. Therefore the elevated upstream concentrations are attributed to non-point source discharges such as overland flow from un-remediated soil contamination areas and contaminated groundwater seepage into Brush Creek. The non-point source discharges are beyond the scope of the point source control activities, but will be addressed during planned remedial

	Comment Identification	Comment	Response to Comment
			activities related to OU-1 soils and OU-3 groundwater.
6.	Section 1.3.1, page 1-3	a. The second paragraph states that water samples were collected from the load line discharge storage tanks in 2003, and provides a summary table of RDX concentrations. It is unclear from the text and table whether the data is from a one-time sampling event or an average, based on multiple sampling events. This is an essential detail since the data was used for determining the anticipated maximum RDX influent concentration for the proposed treatment system. Basing the design on a one-time measurement may not accurately reflect the range of RDX concentrations that are possible. Please provide additional information regarding the 2003 sampling events, and indicate whether the data used for determining the maximum designed RDX influent concentration (less than 200 µg/L), was based on data obtained from one or multiple sampling events. b. Additionally, it would be beneficial to clearly indicate the locations of the 2003 sampling points on Figure 1-2. Please revise Figure 1-2 to clearly indicate the 2003 sampling points.	a. Table 1-1 contains one-time sampling data collected in 2003 by Johnson et al during the Sampling and Reconnaissance Study of Brush Creek. Although these data were used to estimate the influent concentration and thereby estimate the carbon loading rate, RDX and TNT concentrations in the 1,000s of ug/l can be accommodated by the GAC vessels. The carbon within the GAC vessels will merely require more frequent changeout under higher concentration loading. Recent sampling performed by Tetra Tech in September 2004 as part of a pre-design data gathering effort for the Waste Water Treatment Plant point source control system also supports the conclusion that concentrations of RDX being discharged from the Waste Water Treatment Plant during low and high flow conditions are within the range of 2003 RDX concentrations detected by Johnson et al. b. The monitoring points will be added to Figure 1-2 and it will be enlarged to more clearly show historical sampling points relative to Brush Creek.
7.	Table 1-1, page 1-3	Table 1-1 is titled “Surface Water Results” and contains a column heading titled “Surface Water RDX Result (µg/L).” Based on the information presented in the Work Plan, the samples were not actually collected from surface water, but from discharge water. Please revise the terminology used to more accurately reflect the source of the collected samples.	The column title will be modified to “Point Source RDX Discharge Result” since the column contains discharge analyses from the Waste Water Treatment Plant and load lines.
8.	Section 1.3.1, pages 1-3 and	a. The last three paragraphs of this section describe the RDX load calculated for Brush Creek discharges from Line 2 [0.2 percent (%)], Line 3 (0.3%), and	a. A copy of Johnson et al 2004 will be provided as an appendix to this work plan.

	Comment Identification	Comment	Response to Comment
	1-4	the wastewater treatment plant (21%). The assumptions used in making these RDX mass balance determinations should be illustrated. Please note that the reference "Johnson, 2004", is not a document that was subject to the FFA. Information excerpted from that document should be described in greater detail. b. The text should discuss the remaining 78.5% of the RDX load to Brush Creek, whether it is from point sources or non-point sources, and how the remaining RDX load to Brush Creek can be controlled. It would be prudent to evaluate methods for controlling the remaining RDX load since measures are being taken to reduce 21.5% of the point source contributions. Please revise the text to describe the remaining 78.5% of the RDX load, and how it will be controlled to further reduce the RDX concentration in surface water leaving the installation. c. On page 1-4, please clarify that the water sample from the WWTP collected in October 2003 does not truly represent an "average" RDX concentration in the WWTP discharge, but represents a single point in time. It has not been demonstrated whether this is representative of general discharge conditions at the WWTP.	b. The remaining 78.5% of the RDX load is interpreted to be from non-point sources. Non-point source contributions are discussed further in the document currently in review by the EPA and IDNR titled "Draft Brush Creek Watershed Evaluation and Supplemental Workplan". c. The 3.3 ug/l concentration is an average as indicated in the text. It represents an average of the original and duplicate sample collected during the same sampling event in October 2003.
9.	Section 2.1.1.3, page 2-3	a. The treatment systems will be designed to treat an average flow of 10 GPM, with an influent RDX concentration of 200 ug/L, to an effluent with RDX less than 2 ug/L. Please clarify what the theoretical maximum influent RDX concentration the systems will be capable of treating to reach 2 ug/L. If the maximum treatment capability of the system is actually 200 ug/L, we suggest that you evaluate the representativeness of the historical influent data in greater detail, to determine whether influent concentrations of greater than 200 ug/L are likely to occur over the period of operation of the system. b. The third bullet item in this section states that bag filters will be disposed of in a sanitary landfill, if acceptable. However, the text does not describe the criteria to be evaluated to determine disposal options for the bag filters. Please revise the text to discuss the criteria to be evaluated to determine disposal options for the bag filters. This comment also applies to Sections 2.1.1.5, 2.1.2.3, and 2.1.2.5. c. The fourth bullet item in this section states that the new treatment system will be installed in the same area as the existing treatment system, if space is available. However, the Work Plan does not describe the contingent location, should sufficient space not be available. Revise the text to discuss a contingent location for the new treatment system.	a. The theoretical maximum concentration that the GAC units can treat is in the 1,000s of ug/l, i.e. well in excess of 200 ug/l. Carbon loading and the time before changeout are determined by the influent concentration and other non-contaminant factors. b. Used bag filters generated from aqueous treatment plants have been routinely disposed in Trench 6 at the IDA. This has been a standard operating procedure approved by the EPA and employed at the IDA. Therefore, this manner of disposal will be used for bag filters generated from the point source control systems as well. c. An additional sentence will be added to clarify that if sufficient space is not available inside of the buildings that contain the current load line effluent treatment systems, the GAC

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			canisters will be placed outside of the buildings.
10.	Section 2.1.1.4, page 2-3	This section states that influent and effluent samples will be collected up to four times in one year. Since the discharge events at Lines 2 and 3 appear to be rather limited, effluent sampling should be conducted for every discharge event. Further, we suggest that you collect a samples at location SP-2 to evaluate the performance/status of the GAC unit.	The sampling frequency will be changed to indicate that it will occur during each discharge event. The sample collected from location SP-3 would produce more accurate concentrations of RDX and other explosives being discharged from the treatment system (including post carbon concentrations). Therefore, the sample locations will remain as contained in the draft work plan.
11.	Section 2.1.1.6, page 2-4	a. This section describes the O&M procedures planned for the treatment system, including sampling. Item No. 6 states that O&M, including sampling, will be performed weekly. This contradicts information in Section 2.1.1.4 that states that influent and effluent samples will be collected up to four times per year. Please revise the text in Section 2.1.1.6 to present the correct sampling frequency information. b. Please clarify what organization will be responsible for operating the new treatment systems at Load Lines 2 and 3. We presume that some interface between Tetra Tech and American Ordnance will be required. The Plan should discuss how this coordination will occur.	a. Operation and Maintenance (Section 2.1.1.6) is segregated from sampling and analysis activities (Section 2.1.1.4). The frequency specified in Section 2.1.1.6 pertains only to operation and maintenance of the system, not to sampling. Section 2.1.1.6 will be modified to more clearly reflect the absence of sampling under this activity and that monitoring and maintenance checks will be performed during operation of the GAC system. O&M is not necessary during the anticipated long periods between discharge events. b. Tetra Tech will be responsible for operating the new treatment system that will be coupled with the existing treatment system at the load lines. Coordination will be necessary between Tetra Tech and American Ordnance to ensure the safe and effective operation of this system. If possible, Tetra Tech will obtain prior notification for planned discharges. Unexpected (i.e. catastrophic) discharges will also be passed through the Tetra Tech treatment system, but prior notification by

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			American Ordnance will obviously not be feasible.
12.	Section 2.1.2.1, page 2-5	a. The Confirmation Sampling subsection states that samples of treated wastewater discharge will be collected weekly for one month to evaluate the presence of RDX and the need for a new treatment system. Thus, it appears the Army is proposing a decision point to determine whether a treatment system is needed at the WWTP. Please describe how you are intending to evaluate the data to determine whether GAC treatment is needed to abate RDX at the WWTP. The Plan does not provide sufficient information to determine whether the four samples to be collected over the span of a month will be adequate to obtain representative data to evaluate RDX in the WWTP discharge. For example, the various influents to the WWTP should be described to determine whether RDX load to the WWTP may vary with the day of the week, or the time of day. Since we do not believe that with limited data you will be able to reliably assess RDX discharge from the WWTP, and since abating this potentially significant source of RDX to Brush Creek is very important, the Army should simply plan to install an RDX treatment system on the WWTP. We agree that data should be collected to evaluate important design parameters of such a system. However, if the limited data collection proposed fails to indicate RDX above 2 ug/L in the WWTP outfall, we recommend that you use historical data (see Harza 2001) to determine the likely maximum RDX influent for system design purposes. b. No details on the location proposed for sampling are included. Revise the text to provide additional details on the proposed sampling location. Additionally, the text states that if RDX is present above 2 µg/L, a representative concentration of RDX will be used to design the treatment system. The text does not state whether the highest RDX concentration will be used or an average of the RDX concentrations. Please identify the RDX concentrations to be used for treatment system design.	a. Pre-design effluent confirmation samples will be collected from the WWTP discharge at discrete intervals representing high and low flow conditions. To capture the range of possible concentrations associated with high and low flow, as few as 2 and as many as 4 sample events may be required. The text will be revised to reflect this. Also, surface water samples will be collected from Brush Creek upstream and downstream of the discharge to determine the corresponding concentration trend associated with high and low WWTP discharge. These data will be collected primarily to assess the existence of RDX at concentrations exceeding the health advisory level of 2 ug/l in WWTP discharge and Brush Creek. The decision point would be triggered once the RDX concentrations from the WWTP outfall/discharge are determined. If RDX is not being discharged at concentrations exceeding 2 ug/l, additional monitoring will be conducted prior to determining the need for a treatment system. If RDX is being discharged above 2 ug/l, the treatment system will be installed. Note: two rounds of pre-design discharge and Brush Creek sampling data have been collected. Concentrations are higher than observed in October 2003 by Johnson et al. Detected concentration of 7.5 ug/l in September 2004 compared with 3.5 ug/l detected in October 2003. Therefore, the system will be installed. b. The highest historical concentration will be used.
13.	Section 2.1.2.1,	The last sentence in the Confirmation Sampling subsection states that	The preliminary design was based on the only

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	page 2-5	preliminary conceptual design of the treatment system was based on an average concentration of 3.3 µg/L during the first nine months of October 2003. This sentence contradicts the information in the second to last paragraph of Section 1.3.1 that states that a water sample and field duplicate collected on October 12, 2003, had an average RDX concentration of 3.3 µg/L. This implies that design of the treatment system was based on data from only one sampling event which may not account for fluctuations in RDX concentrations. Please revise the text as necessary so that correct and consistent information is presented. Also, it is unclear what is meant by "the first nine months of October 2003." Please provide the necessary clarification.	recent sample results available at the time that the draft work plan was developed. This consisted of a single sampling event in October 2003 where an original and duplicate sample were collected from the WWTP discharge. The average RDX concentration in the discharge was 3.3 ug/l with a range of 3.05 to 3.58 ug/l. The text will be revised accordingly. Please note that the design of the system is not sensitive to the low concentrations observed during 2003 or 2004 sampling events.
14.	Section 2.1.2.1, page 2-5	a. The last two sentences in the Treatment System subsection state that any flow greater that 500 gallons per minute (gpm), will bypass the treatment system and that the water will be less than 2 µg/L RDX due to dilution within the sanitary sewer system. It is unclear how you have determined that any flow to the WWTP in excess of 500 gpm will likely have RDX levels less than 2 ug/L. It is not obvious that flows greater than 500 gpm would contain less RDX than would flows less than 500 gpm. Water samples should be collected during peak flow discharges to Brush Creek to confirm the discharge concentrations. Please revise the text to include any historical RDX data for peak flow discharges to Brush Creek, and include water sampling during peak flow discharges to document the RDX concentrations. b. Further, please provide the historical average flow and peak flow from the WWTP.	a. The assumption that diluted discharge water greater than the maximum flow capacity of the GAC units was approximated based on the October 2003 average RDX discharge concentration of 3.3 ug/l. Assuming that 500 gpm of the peak flow will be treated to nondetect levels and the bypassed discharge water would contain 3.3 ug/l, a 1:1 diluted discharge of treated and untreated discharge water would contain RDX at a combined discharge concentration of approximately 1.7 ug/l. b. WWTP flow data from January through June 2003 has been obtained, tabulated, and graphed and can be provided in summary graphical form. Data beyond this timeframe could be requested from American Ordnance and added to the already compiled data set , if needed.
15.	Section 2.1.2.2, page 2-6	The last sentence in the Equalization Tank subsection states that any flow in excess of 200 gpm will be passed directly to Brush Creek. This contradicts information in the Treatment System subsection of Section 2.1.2.1 which states that flow greater than 500 gpm will be passed directly to Brush Creek. Please revise the text so that correct flow rates are presented.	The typo will be modified to reflect the 500 gpm maximum treatment flow of the system. Flow in excess of 500 gpm would be bypassed to Brush Creek.
16.	Section 2.1.2.2,	The first full paragraph in the Liquid-Phase GAC Adsorption subsection on this	The criteria for changeout will be added to the

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	page 2-7	page states that the operating GAC column will be taken out of service for replacement when "significant contaminant breakthrough" is detected. The criteria that will be used to make this determination are not presented. Please revise the text to describe the criteria that will be used to determine whether significant contaminant breakthrough is occurring.	text.
17.	Section 2.1.2.2, page 2-8	In the subsection entitled "Treatment Building", please clarify whether the building will be heated.	The building will be heated and the subject text in the work plan will be modified accordingly.
18.	Section 2.1.2.3, page 2-8	a. In the second bullet, you indicate an assumed maximum influent of RDX to the treatment unit of 5 ug/L. Given that a sample of 3.3 ug/L in the WWTP effluent has already been detected, it is unclear that this provides for sufficient headroom, given the potential variability in the discharge. We suggest that you review Harza, 2001, to evaluate the potential range/maximum of RDX in the WWTP effluent. b. The last sentence of the third bullet item is incomplete and should be revised as necessary.	a. The design of the system is not sensitive to the influent concentration and merely helps estimate the loading rate and therefore the approximate timeframe until changeout may be required. Since effluent samples will be collected to determine the need for changeout, further consideration of the influent concentration range is not necessary for design purposes. b. The sentence will be revised.
19.	Section 2.1.2.6, page 2-9	This section describes the O&M procedures planned for the treatment system, including sampling. Item No. 11 states that O&M, including sampling, will be performed weekly. This contradicts information in Section 2.1.2.4 that states that influent samples will be collected quarterly and effluent samples will be collected monthly. Please revise the text in Section 2.1.2.6 to present the correct sampling frequency information.	Sampling requirements are addressed under a previous section (Section 2.1.2.4 on page 2-8). Item 11 in Section 2.1.2.6 does not contain a reference to sampling.
20.	Section 2.1.2.7, page 2-10	The Plan indicates that you will sample downstream of the WWTP on a quarterly basis to evaluate the impacts of adding RDX treatment. We suggest that Brush Creek samples be collected upstream and downstream of the WWTP, at specified locations (for consistency), at a monthly frequency to better evaluate the effects of RDX treatment at the WWTP.	The sampling approach will be revised to include an initial 6-month program whereby samples within Brush Creek and the WWTP discharge would be collected relative to high and low rainfall events combined with high and low WWTP discharge events. This sampling strategy was employed during the pre-design sampling effort to obtain a more representative range (reasonable minimum and reasonable maximum) of RDX and explosives concentrations being discharged under varying meteorological and discharge conditions. A review of historical Brush Creek surface water

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			results upstream and downstream of the WWTP discharge, suggests a correlation between very high rainfall and high RDX concentrations in Brush Creek. Following the initial 6-month period, sampling would be reduced for the remaining 18 months of the point source control project to those time periods containing the maximum RDX concentrations (currently anticipated to be associated with high rainfall).