KBN

August 5, 1992

RECEIVED

AUG 7 1992

Bureau of
Air Regulation

Mr. Clair F. Fancy
Chief, Bureau of Air Regulation
Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Gadsden County - A.P.
City of Gretna Resource Recovery Facility
AC 20-212334 (MSW Incinerator)

Dear Mr. Fancy:

This letter is written in response to the Department's requests dated June 10th and July 13th for additional information concerning the construction permit application for the above-referenced source. Before responding to those letters, the City of Gretna (the City) is hereby revising the potential emissions of any air pollutant from the proposed Auger combustor to less than 100 tons per year (TPY). This revision of the potential emissions of the regulated pollutants from the proposed source are shown in Attachment 1.

In the original construction application, sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO) were listed as the regulated pollutants with potential emissions greater than 100 TPY (i.e., 202.4 TPY of SO_2, 248.8 TPY of NO_x, and 227.3 TPY of CO). In this revision, the potential emissions for each of those pollutants will be approximately 65.70 TPY for SO_2, 99.16 TPY for NO_x, and 98.11 TPY for CO. The revised or lower potential emissions of SO_2, NO_x, and CO from the proposed Auger combustor will be achieved by using a spray-dryer scrubber for SO_2 control, a selective noncatalytic reduction (SNCR) process for NO_x control, and a favorable combustion process for CO control. In addition, the potential emissions of particulate matter (both TSP and PM10) were reduced from to 90.7 TPY to approximately 25.97 TPY.

The Department's requests are addressed chronologically. Where applicable, the requested information or question is given or answered in a line-by-line manner corresponding to the items in the Department's letters. This letter also includes two separate attachments covering the revision of the potential emissions (Attachment 1) and the cumulative modeling analyses (Attachment 2). All information given reflects the revised potential emission rates.

First Request--Letter Dated June 10, 1992

1. *According to the letter...*

The City understands the potential applicability of the federally enforceable regulations, codified

KBN ENGINEERING AND APPLIED SCIENCES, INC.
1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

in the 40 Code of Federal Regulations (CFR) 60 Subparts A and Ea, to the Auger combustor depending on its fuel charging rate limit. Pertaining to the emission limit, the revised potential emissions of less than 100 TPY for all regulated pollutants will maintain the status of the proposed facility as a minor source; therefore, PSD review will not be applicable.

2. *How much MSW, including waste tires, is generated in the City of Gretna?*

Approximately 5 to 6 tons per day (TPD) of MSW is generated in the City of Gretna. Also, Gadsden County presently generates approximately 80 TPD of MSW.

Do you expected to receive MSW and scrap tires from other sources, who are they and how much from each source?

The City expects to receive an additional 250 to 300 TPD of non-recycled MSW and scrap tires from other Florida counties. Although City representatives have discussed receiving MSW from other surrounding counties and municipalities, it is premature at this point to identify any specific providers of such material.

922-4627

In addition, Mr. Robert McKnight of the Executive Office of the Governor has offered assistance in providing additional quantities of MSW for this project. Also, the City's Operator has been offered substantial quantities of supplemental baled paper fuel from sources located outside Florida.

How much is the tipping fee for each class of waste now and will it increase once this facility becomes operational?

The current tipping fee at the City of Quincy landfill is $44.00 per ton. The projected tipping fee for the proposed facility will be approximately $35.00 per ton for nonrecyclable MSW; the tipping fee for recyclable MSW has not been determined at this point of time. It is projected that all tipping fees will be increased by approximately 5 percent annually.

Provide copies of all firm contract(s) or a written statement from potential purchasers, acknowledging their intent to consider the purchase of energy and/or recyclables.

Written contracts or statements are not available at this time. This type of information is not necessary to process this air construction permit application.

How will the recyclables be stored? Provide details on storage of recyclables for the maximum expected volume.

The majority of all recyclables will be baled and stored under cover at the facility until sufficient quantities are ready for shipment by trucks. The plant will be built with sufficient covered storage space for holding the majority of all recyclables until shipped via truck. The expected maximum quantity to be stored for each type of recyclable material is approximately two to three truckloads.

Recycled plastics will be baled and stored under cover until loaded onto trucks for shipping.

Recycled glass will be stored in open top containers until loaded onto trucks for shipping.

Recycled aluminum cans will be flattened and continuously loaded onto truck vans located at the site.

Recovered steel, cans, and other recoverable metals will be stored in open top containers until loaded onto trucks for shipping.

Recovered steel obtained from the tire de-beading operation will be stored in open top containers until loaded onto trucks for shipping.

Also, provide us with the names of the owners and operators of this facility.

The City is the owner of the proposed facility. The operator of this facility will be the Florida Reduction Corporation (FRC), a Florida corporation. FRC has entered into an agreement with Texas Gulf Industries (TGI) of Houston, Texas, wherein TGI will own 70 percent of all issued and outstanding shares of FRC.

The Department is concerned that the 250 TPD charging limit may be exceeded if a satisfactory answer to these questions has not been fully evaluated by the city.

The concern of the Department is noted. The City hereby assures the Department that the charging rate for the proposed Auger combustor unit will not exceed the proposed charging rate limit of 245 TPD. The City will keep a record of the hourly fuel charging rate. See also discussions for Items 4 and 6 below.

Upon the completion of construction and at the onset of the startup of the Auger combustor, the City will implement an operating audit program to ensure that the facility meets the charging rate limit, all permit conditions, and any other applicable federal, state, or local environmental regulations.

3. *Identify the source and quantity of medical or hazardous waste that will be received or combusted at this facility. Do you plan to burn any other type of wastes not already identified?*

The proposed facility will not knowingly accept any medical or hazardous waste. No medical wastes are expected. However, household hazardous waste may be inadvertently unloaded onto the tipping floor area. Such hazardous waste is estimated to constitute 1.0 to 1.5 percent of the total solid waste delivered to the facility. All hazardous waste will be separated from other MSW on the tipping floor and disposed of properly. No medical or hazardous waste will be combusted at the proposed facility. Other than RDF and TDF, no other type of wastes will be burned.

4. *Submit a make and model number for the automatic weighing device that feeds the RDF/TDF to the combustor along with the manufacturer's guarantee that the weigh scales will always be calibrated to within + or - 2.0%. If the weigh scales exceed 2.0%, then the charging rate will exceed 250 TPD.*

Vendor and model for the automatic weighing scale have not been selected. The City will guarantee that the weigh scale will be maintained and calibrated properly when the weigh scale is put in service. During actual operation, the average daily charging rate will be about 240 TPD; thus, the maximum charging rate of 245 will not be exceeded.

At the start of a day of operation, the daily maximum fuel load of 240 TPD will be preweighed, designated, and set aside in a fuel holding area to ensure that the maximum charging rate will not be exceeded. See also the discussions on the operating fuel options in Item No. 6 below.

5. *The solid waste processing plant is designed to process 500 TPD of MSW. Provide a process flow diagram along with maximum process input rates for this plant.*

Figure 1, a process flow diagram for the proposed facility with maximum process rates, is attached.

Also, provide details of the tire de-beading and shredding operation indicating fugitive or other emissions and how they are controlled. What is the form of RDF/TDF (pellets, bales, or briquettes)?

A standard off-the-shelf tire debeader and a water-cooled tire shredder will be utilized. The scrap tires will be debeaded and shredded into a maximum size of approximately 6 inches square. No fugitive emissions are expected from the tire debeading and shredding operations since these processes do not generate fine particles.

6. *Submit a process flow diagram indicating how the two separate waste streams, the 80-20 and 75-25 mixture of RDF/TDF (heat input ratio) is fed to the combustor, and how can the Department be assured that proper heat input ratios are being maintained in each waste stream at all times?*

During actual operation, the fuel mixture fed into the Auger combustor will be one of the following two options:

Option A. RDF Only--18,800 lb/hr of RDF only

> 18,800 lb/hr RDF x 5,500 Btu/hr = 103.4 MMBtu/hr, or 80.2% of maximum heat input to the combustor.

Option B. 78-22 Mixture of RDF/TDF--A fuel mixture that constitutes the average ratio between the 80-20 and 75-25 mixture of RDF/TDF (in terms of heat input ratio). This average fuel mixture will consist of the following:

KBN

~42 TPD of whole tire is equivalent to 2100 LB/HR TDF

41.6 TPD x 2000 lb/Ton / 24 Hr/Day = 3467 lb/hr

3467 x .60 = 2080 lb/hr TDF

2080 x 15,500 Btu/h

18,000 lb/hr RDF x 5,500 Btu/hr = 99.0 MMBtu/hr (78% heat input), and
1,800 lb/hr TDF x 15,500 Btu/hr = 27.9 MMBtu/hr (22% heat input). 32.24 MMBtu/h

32.24 + 99 = 131.24 > 126.9

The total heat input is approximately 126.9 MMBtu/hr or 98.4% of the maximum heat input into the combustor.

The actual hourly fuel charging rates of RDF and TDF will be recorded and maintained by the operator. The heat input ratio of RDF to TDF will be calculated and recorded to ensure that the TDF in the fuel mixture is not more than 25 percent the total heat input rate. For fuel Option A, the maximum fuel charging rate will be approximately 225.6 TPD. For fuel Option B, the maximum fuel charging rate will be approximately 237.6 TPD. At the beginning of each hour, the operator may choose to switch the fuel option; however, the maximum daily charging rate of 245 TPD will not be exceeded. The mass balances for these fuel options are included in Figure 1. These mass balances represent the average fuel input expected during the operation of the Auger combustor.

In order to maintain a reasonable degree of operating flexibility, the City hereby requests that the Department incorporate the originally proposed 80-20 and 75-25 fuel mixtures (by heat input) of RDF and TDF into any issued permit for this proposed facility.

7. *What is the quantity, pressure, and temperature of the steam that you propose to generate? Also, provide us with the details of the steam turbine that you propose to install.*

The maximum steam quantity produced is approximately 75,000 lb/hr at 400 psia and 650°F. The proposed steam turbine-generator system will be a General Electric 7,500 kilowatt (kW) condensing unit with cooling towers and solid-state switchgear. The generator will produce a projected 13,000 volts of electricity which will be passed through a small substation and transformed into higher voltage level for before connecting to the utility's 69-kilovolt (kV) powerline.

8. *Provide detailed drawings of the Auger Combustor System showing the primary and secondary chamber locations and their operating temperatures;*

Detailed drawings of the Auger combustor system are provided in Figures 2 and 3. The Auger combustor system consists of two chambers: the Auger combustor as the primary chamber, and the afterburner as the secondary chamber. As indicated on these two figures, the operating temperatures for the two chambers are 1,200 to 1,800°F for the primary chamber and 1,700 to 1,900°F for the secondary chamber.

also provide the location of the lime spray injection.

The lime (or calcium carbonate) spray injection system will be installed after the waste-heat boiler system and upstream from the fabric filter system (see Figure 3).

KBN

Provide material balance for this (Auger Combustor System) flow sheet.

See "Auger Combustor Fuel Input Option and Mass Balance" chart in Figure 1.

Which lime injection system do you propose to install, the dry lime or the spray dryer?

The flue gas desulfurization system will be a spray dryer scrubber that will use either lime [$Ca(OH)_2$] or sodium carbonate [Na_2CO_3] as reagent.

9. *How much natural gas and/or No. 2 fuel oil is used in the four auxiliary burners? What is the maximum sulfur content in these fuels? Recalculate and submit emission estimates for all pollutants with auxiliary burners in operation.*

The total maximum heat input for the four auxiliary burners is 12.0 MMBtu/hr. These auxiliary burners will be used only during startup or shutdown period. Therefore, the maximum natural gas or No. 2 fuel oil used will be approximately 11,650 cf/hr or 87 gal/hr, respectively. The maximum sulfur content for natural gas is 0.08 gr/cf as supplied by the Florida Gas Transmission Company. The maximum sulfur content in No. 2 diesel fuel will be limited 0.5 percent. Emission estimates with auxiliary burners in operation will not be greater than the proposed emissions from the primary fuel mixtures. Therefore, emissions from firing auxiliary burners during startup or shutdown will not have any potential adverse effects toward producing higher emissions of any regulated pollutants.

10. *Submit detailed drawings of the following: (a) (combustor) fabric filter (baghouse), including the specification sheet; and, (b) the baghouse stack showing sampling location (upstream/downstream distance) and gas flow rates.*

The fabric filter system has not been selected. A typical design of a fabric filter system has an air (in acfm) to cloth (in square feet) ratio of 3:1 to 4:1. For the proposed Auger combustor, the baghouse inlet flow rate of approximately 70,000 acfm will require a total cloth area of about 20,000 square feet. Vendor information for a typical baghouse design is included in Exhibit I. The final design will be of a similar design with a guaranteed outlet dust loading of 0.02 gr/dscf or less.

Item 10(b) is not necessary for processing the permit application; all future baghouse stack testing will comply with FDER's stack testing protocol in Chapter 17.2-700, F.A.C.

11. *Submit baghouse specification sheets for the lime silo and flyash storage bin. Please submit the preliminary engineering calculations that were used to determine that the proposed filtration area of the baghouses will be adequate.*

The baghouse equipment for the lime silo and the flyash storage bin has not been selected.

KBN

However, a typical bin vent design for controlling particulate emissions from storage silos will achieve greater than 99.9% control efficiency. Some general sales literature on two bin vent systems is included in Exhibit I; both systems are capable of achieving 99.9 percent dust control. The final design and equipment selection of bin vents for the proposed facility will specify an equivalent unit with similar control efficiency.

12. *How do you propose to control fugitive dust emissions expected from transporting and storage of ashes?*

All ash will be slightly moistened and auger transferred to closed containers where it will be stored until made ready for transfer. Thus, fugitive emissions of flyashes due to transport and storage processes will be minimal.

Submit an updated site map. Is this site off of S.R. 12 or U.S. Highway 90?

The updated site map and a partial layout plan of the City of Gretna industrial park are included in Exhibit II. The proposed site is located off S.R. 12.

13. *Please describe the type of fans that will be used in the proposed incinerator system. Explain whether the proposed fans will be fixed speed or variable speed fans and provide copies of the manufacturer's curve for each fan for the proposed system.*

This information is unnecessary to process the air construction permit application.

14. *NO_x, SO_2, and CO Emissions - Based on the permit application, the proposed maximum 1-hour emissions of NO_x and SO_2 are almost twice the estimated annual average emissions. The maximum hourly emissions of NO_x and SO_2 would be sufficient to trigger PSD New Source Review if the source was continuously operated at the maximum rate. Please provide the Department with continuous reasonable assurance (i.e., continuous emission monitoring) that the emissions of NO_x, SO_2, and CO will not reach the levels that would trigger a full PSD New Source Review. Submit the make and model number of any monitors that you propose to install.*

Based on the revised maximum hourly emission rate of 22.40 lb/hr for CO, the maximum annual CO emissions will not exceed the 100 TPY threshold limit to trigger PSD New Source Review. Since the maximum and annual emissions are based on the hourly emissions, a continuous monitoring system for CO is not necessary.

Continuous emission monitor systems (CEMS) for SO_2 and NO_x will be installed. Specific equipment has not been selected. The proposed CEMS for SO_2 and NO_x will meet all standards listed in 40 CFR 60, Appendix B on performance standard and test procedure for SO_2 and NO_x continuous emission monitoring systems in stationary sources. Specific equipment has not been selected. Vendor information can be provided upon the completion of construction.

KBN

15. *Submit a plot plan showing the ash transporting and storage system and the roads in the plant yards. How do you plan to control the fugitive emissions generated due to the vehicular traffic?*

The ash transporting and storage system will be included in the solid waste permit application. Potential fugitive emissions generated by vehicular traffic will be controlled by paving the roads.

16. *Provide emission rates for all pollutants and provide basis for the estimates. Include estimates of all toxic or potentially toxic emissions (such as dioxins, furans, etc.) in addition to pollutants identified in your application.*

Emission rates for all regulated pollutants and air toxic pollutants were provided in Tables 2-4 and 2-5 in Attachment A of the original permit application. Bases for the estimates were shown in the footnotes of these tables; and references were provided in Appendix B in the original permit application. The revised Tables 2-3 and 2-5 are included in Exhibit II as replacement pages.

The revised potential emission rates for all regulated pollutants (i.e., TSP, PM10, SO_2, NO_x, and CO) are shown in the Attachment 1 of this correspondence, along with bases for the estimates and the revised emission calculations. The revised emission rate of MSW organics (i.e., total dioxins and furans) is also shown in Attachment 1.

17. *Maximum concentration values for sulfur dioxide emissions in Table 5-5 appear to be in error. Please provide a corrected Table 5-5.*

Table 5-5 in Attachment A of the original permit application is replaced by Table 4-9 in Attachment 2.

18. *Even though this project as proposed will not be subject to PSD review and is only subject to the provisions of F.A.C. Rule 17-2.520, paragraph (3) (b) of that section states that no permit shall be issued to any source subject to this section unless the Department determines that the construction of the source would not interfere with the attainment and maintenance of any state or national ambient air quality standard or maximum allowable increase. Based on the air quality modeling and ambient air monitoring results presented in the permit application, we do not have that assurance for particulate matter PM_{10}, sulfur dioxide and nitrogen oxides. Please perform cumulative modeling analysis, including all applicable sources in the area, for all averaging times for these pollutants for the comparison with the Class I and Class II PSD increments and with the appropriate ambient air quality standards.*

The cumulative modeling analysis and resulting impacts of the proposed Auger combustor based on the revised potential emissions are presented in Attachment 2. A matrix of the cumulative modeling analysis that were performed is shown in Table 1.

19. *Except for the 8 and 24 hour no-threat levels for nickel, the values used by the City of Gretna reflect the correct no-threat levels used by the Department to review permit applications for toxic air emissions. The Department's 8 and 24 hour no-threat levels for nickel are 10 and 2.4, respectively.*

    Corrections of the no-threat levels for nickel have been made. Updated Table 5-7 is provided in Exhibit II.

20. *Please provide comments to the concerns of the United States Department of the Interior Fish and Wildlife Service letter (attached).*

    Concerning comments of the United States Department of the Interior, Fish and Wildlife Service (DIFWS) on the best available control technology aspect of the proposed project, the revised potential emissions have accounted for higher control efficiencies for PM and SO_2 emissions. The revised emission rate for PM is 0.02 gr/dscf compared to the originally proposed value of 0.08 gr/dscf. The revised SO_2 removal efficiency is now 88 percent compared to the originally proposed value of 75 percent. The 80 percent emission control of HCl has remained unchanged since this represents an average removal efficiency for HCl. Although NO_x emission control was not addressed previously, the revised emission rate of NO_x represents a 60 percent control efficiency via a SNCR process.

    Concerning the DIFWS's comments on the air quality analysis, there was no specific request for additional modeling. However, KBN Engineering and Applied Sciences, Inc. (KBN) has performed a cumulative modeling analysis because of the Department's request (see Item No. 18) and the results of this analysis are presented in Attachment 2. The cumulative modeling analysis reflects the revised potential emissions from the proposed Auger combustor.

21. *Please be advised that this facility will require a separate solid waste permit. For details contact the Department's Northwest District office in Pensacola. You may want to contact other Bureaus in the Department for additional permitting requirements.*

    A separate solid waste permit application will be filed with the Department's Northwest District office in Pensacola.

<u>FDER's Second Letter Dated July 13, 1992</u>

Based on the revised emissions of the regulated pollutants from the proposed Auger combustor unit, the proposed facility will potentially emit less than 100 TPY of any regulated pollutant. Since PSD applicability only applies to a major facility with emissions of 100 TPY or greater for any regulated pollutant, the proposed facility will not be subject to PSD permitting requirement. Subsequently, the additional permit fee of $2,500 and any PSD information should not be required to process the air permit application.

<u>EPA's Letter Dated July 8, 1992</u>

Concerning the PSD applicability comments from EPA, the revised potential emissions of all regulated

KBN

pollutants (less than 100 TPY) will effectively classify the proposed facility as a minor source. Therefore, a preconstruction permit or any requirements related to a PSD review process are not required for the proposed facility based on the revised emissions.

Concerning the modeling/monitoring comments from EPA, these three comments are addressed as follows:

1. *The Class I analysis only includes the new source. Additional information should be provided whether there are other increment consuming sources that need to be included in the analysis.*

   KBN has performed a cumulative modeling analysis because of the Department's request (see Item No. 18 above), and the results of this analysis are presented in Attachment 2. The cumulative modeling analysis reflects the revised potential emissions from the proposed Auger combustor.

2. *On page 27, the wrong upper station (Tallahassee, FL) is listed. The correct station is Waycross, GA.*

   Correction has been made, replacement Page 27 is provided in Exhibit II.

3. *On page 35, the wrong numbers are inserted for the Florida AAQS.*

   Correction has been made, replacement Page 35 is provided in Exhibit II. Because of the revision of the potential emissions of regulated pollutants, the up-to-date information is shown in Table 4-9 in Attachment 2.

If you have any questions or comments on this submittal, please contact either me or Mr. Tai Tang of my staff at your earliest convenience.

Sincerely,

David A. Buff

David A. Buff, M.E., P.E.
Principal Engineer
Florida Registration 19011

SEAL

DAB/TTT/dmpm

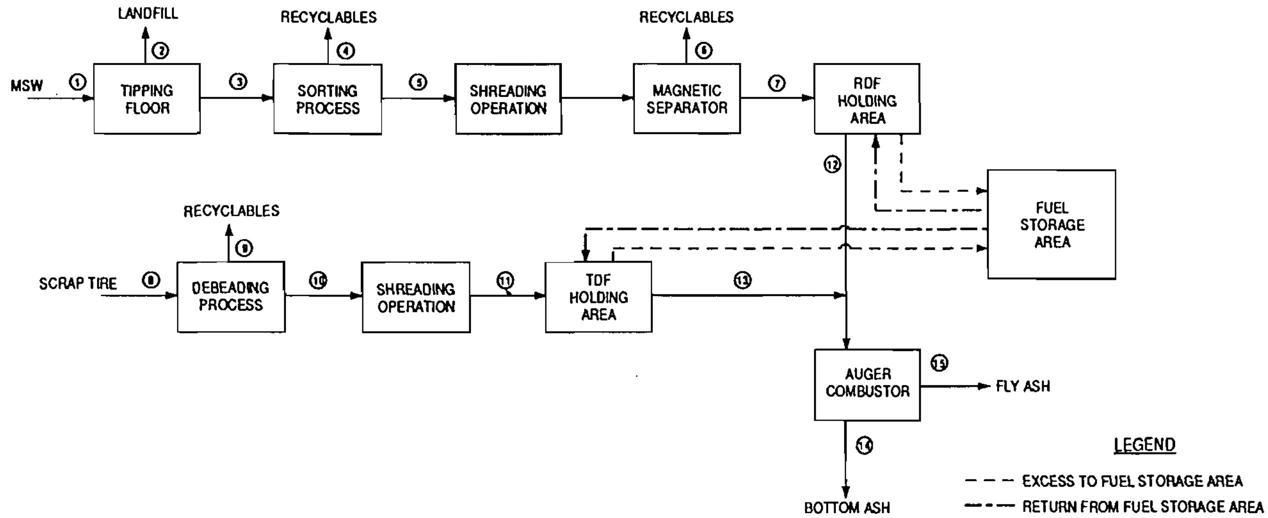
cc: Chris Shaver, National Park Service
Jewell Harper, EPA Region IV
James Pulliam, Jr., FWS
Dave Arnspiger, TGI
John Matthews, FRC
O.C. Allen, Financial Advisor, City of Gretna
James Carter, Gretna City Manager
Ed Middleswart, P.E., Northwest District
Harry Meshaw, EIS
File (2)

Table 1. Matrix of the Cumulative Modeling Analysis Performed for the Proposed Source.

Pollutants*	Averaging Period	Cumulative Modeling Performed		
		Class I	Class II	AAQS
SO_2	3–Hour	Yes	Yes	Yes
	24–Hour	Yes	Yes	Yes
	Annual	Yes	Yes	Yes
NO_x	Annual	N.A.	Yes	Yes

* Cumulative modelings were performed for SO_2 and NO_x only since the screening analysis has identified only these pollutants as those having signficant impacts in both Class I and Class II areas. when their maximum predicted impacts were higher than the National Park Service's and the EPA's standards for Class I and Class II areas, respectively.

N.A. = Not Applicable.



MSW Processing Line Mass Balance

Stream Number		1	2	3	4	5	6	7
Description	Unit							
MSW	TPD	450.0	--	450.0	--	235.0	--	--
Non-Combustible	TPD	42.5	42.5	--	--	--	--	--
Household Harz. Waste	TPD	7.5	7.5	--	--	--	--	--
Recyclables	TPD	--	--	--	215.0	--	--	--
Misc. Ferrous Metals	TPD	--	--	--	--	--	10.0	--
Refuse-Derived Fuel	TPD	--	--	--	--	--	--	225.0
TOTAL	TPD	500.0	50.0	450.0	215.0	235.0	10.0	225.0

Scrap Tire Processing Line Mass Balance

Stream Number		8	9	10	11
Description	Unit				
Scrap Tire	TPD	42.0	--	25.0	--
Tire Bead	TPD	--	17.0	--	--
Tire-Derived Fuel	TPD	--	--	--	25.0
TOTAL	TPD	42.0	17.0	25.0	25.0

Auger Combustor-- Fuel Input Option and Mass Balance

Fuel Option			A	B
Stream Number	Fuel Type	Unit		
12	RDF (12.48% Ash)	lb/hr	18,800	18,000
13	TDF (4.78% Ash)	lb/hr	--	1,800
14	Bottom Ash (50%)	lb/hr	1,173	1,166
15	Fly Ash (50%)	lb/hr	1,173	1,166
TOTAL	Fuel Charging	TPD	225.6	237.6
TOTAL	Total Ash	TPD	28.2	28.0

Figure 1 SIMPLIFIED FLOW DIAGRAM AND MASS BALANCES FOR THE PROPOSED RESOURCE RECOVERY PLANT

KBN

7/27/92

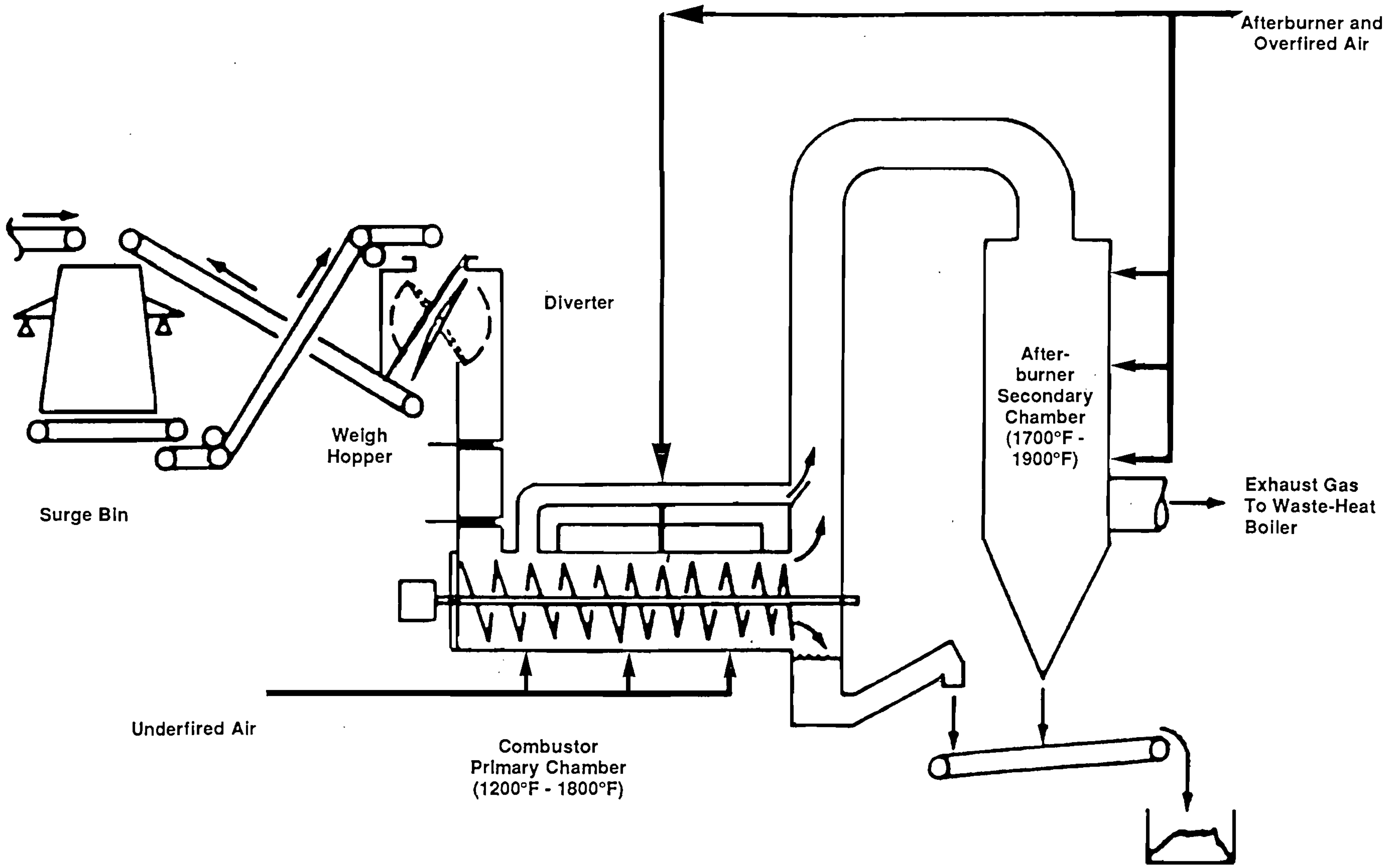


Figure 2 THE PRIMARY AND SECONDARY CHAMBERS OF THE AUGER COMBUSTION SYSTEM

KBN

7/27/92

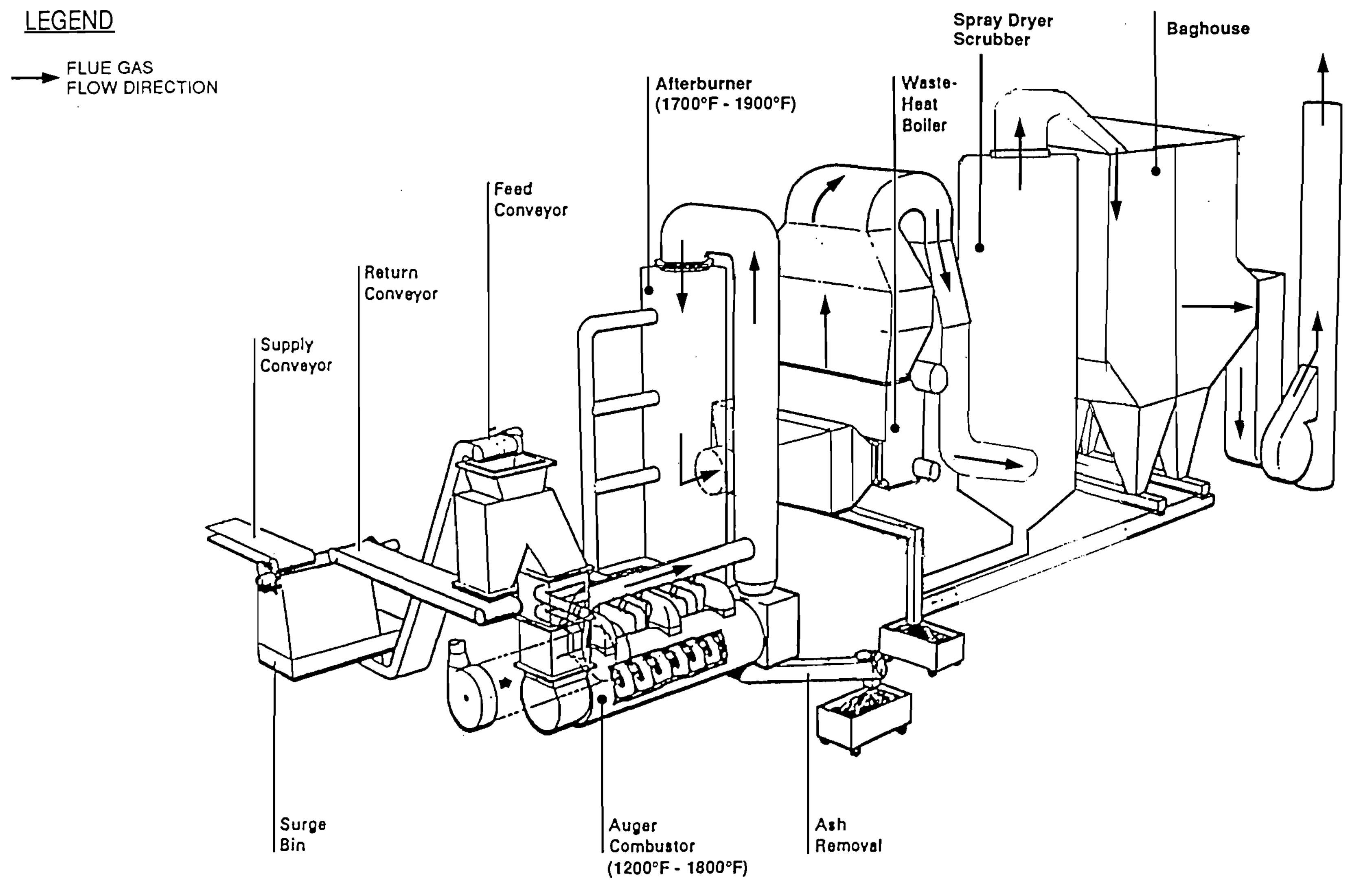


Figure 3 THE AUGER COMBUSTOR SYSTEM

KBN

ATTACHMENT 1

REVISION OF THE POTENTIAL EMISSIONS

1.0 OVERVIEW

This revision of the potential emissions from the proposed Auger combustor will reduce the emissions of the following pollutants: particulates (TSP and PM10), sulfur dioxide, nitrogen oxides, carbon monoxide, and MSW organics (total dioxins/furans). Emissions of other pollutants as presented in Tables 2-4 and 2-5 in Attachment A of the original permit application remain unchanged. Updated information reflecting this revision of potential emissions from the proposed Auger combustor system are provided as replacement pages in Exhibit II.

In the following, the revised calculations of the potential emissions for the above-mentioned pollutants are shown in Section 2. A description of the newly proposed selective noncatalytic reduction (SNCR) process as the control technology for NO_x emissions is presented in Section 3.

2.0 REVISED EMISSION CALCULATIONS

2.1 REVISED PM EMISSIONS

Emission factor-- 0.02 gr/dscf. Basis-- fabric filter system.

Flow rate is 34,600 dscfm at the afterburner outlet.

34,600 dscfm x 0.02 gr/dscf x 60 min/hr / 7,000 gr/lb

= 5.93 lb/hr

5.93 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 25.97 TPY

5.93 lb/hr / 10.2 TPH = 0.58 lb/ton

2.2 REVISED SO_2 EMISSIONS

Sulfur content in RDF and TDF is approximately 0.21% and 1.23%, respectively. Thus, more SO_2 emissions are produced by the 75/25 fuel mixture (see Table 2-2 in Attachment A of the original permit application).

Maximum hourly charging rate for 75/25 RDF/TDF fuel mixture is:

8.79 TPH of RDF + 1.04 TPH of TDF = 9.83 TPH or

17,580 lb/hr of RDF + 2,080 lb/hr of TDF = 19,660 lb/hr

Maximum sulfur present in fuel on an hourly basis is:

17,580 lb/hr x 0.0021 + 2,080 lb/hr x 0.0123 = 62.50 lb/hr of S.

Uncontrolled emissions (assuming that all sulfur in the fuel is converted into SO_2):

62.50 lb/hr S x 2 lb SO_2/lb S = 125.00 lb/hr

Controlled emissions:

Basis-- Combination of inherent removal within the combustor, spray dryer and fabric filter provides an average 88% SO_2 removal efficiency.

Annual SO_2 Emissions: 125.00 lb/hr x (1-0.88% Eff) = 15.00 lb/hr

15.00 lb/hr x 8,760 / 2,000 = 65.70 TPY

15.00 lb/hr / 9.83 TPH = 1.53 lb/ton

Calculate ppmv in exhaust flue gas stream:

$$PV = nRT;\ V = nRT/P$$

$$\text{Volume of } SO_2 = \frac{15.00\ lb_m}{hr}\ \frac{1{,}545\ ft\text{-}lb_f}{64\ lb_m\text{-}^{o}R}\ (200+460)^{o}R\ \frac{ft^2}{2{,}116.8\ lb_f}$$

$$= 112.90\ ft^3/hr\ = 1.88\ ft^3/min$$

$$\text{ppmv } SO_2 = 1.88/49{,}600 \times 10^6 = 37.90 \text{ ppmv}$$

Maximum short term:

Assume maximum hourly SO_2 emissions are twice typical value

15.00 lb/hr x 2 = 30.00 lb/hr

30.00 lb/hr / 9.83 TPH = 3.05 lb/ton

2.3 REVISED NO_x EMISSIONS

Uncontrolled emissions:

Based on 200 ppmv (as NO_2) at the outlet of the Auger combustor (first chamber)

$$PV = nRT;\ n = PV/RT$$

$$NOx = \frac{(2,116.8\ lb_f/ft^2)(170,500\ ft^3/min)}{\frac{1,545\ ft\text{-}lb_f}{lb\text{-}mole\ ^oR} \times (1818+460)^oR}$$

$$\times (60\ min/hr)(46\ lb_m/lb\text{-}mole)(200/10^6)$$

$$= 56.61\ lb/hr$$

1810° → original application

= 56.805 #/Hr.

Controlled emissions:

Basis-- Selective noncatalytic reduction, 60% removal efficiency.

Annual NO_x Emissions: 56.61 lb/hr x (1-0.60% Eff) = 22.64 lb/hr

22.64 lb/hr x 8,760 / 2,000 = 99.16 TPY

eff

22.64 lb/hr / 10.2 TPH = 2.12 lb/ton

Calculate ppmv of the controlled NO_x emissions in exhaust flue gas stream:

$$PV = nRT;\ V = nRT/P$$

$$\text{Volume of } NO_x = \frac{22.64\ lb_m}{hr}\ \frac{1,545\ ft\text{-}lb_f\ (200+460)^oR}{46\ lb_m\text{-}^oR}\ \frac{ft^2}{2,116.8\ lb_f}$$

$$= 237.09\ ft^3/hr\ = 3.95\ ft^3/min$$

$$ppmv\ NO_x = 3.95/49,600 \times 10^6 = 79.64\ ppmv$$

Maximum short term:

Assume maximum hourly NO_x emissions are twice typical value

22.64 lb/hr x 2 = 45.28 lb/hr

45.28 lb/hr / 10.2 TPH = 4.44 lb/ton

2.4 REVISED CO EMISSIONS

Annual emissions:

Emission factor-- 130 ppmv at outlet of combustor. Basis-- Good combustion practice.

$$PV = nRT;\ n = PV/RT$$

$$CO = \frac{(2,116.8\ lb_f/ft^2)(170,500\ ft^3/min)}{\frac{1,545\ ft\text{-}lb_f}{lb\text{-}mole\ ^oR} \times (1818+460)^oR}$$

$$\times (60\ min/hr)(28\ lb_m/lb/mole)(130/10^6)$$

$$= 22.40\ lb/hr = 98.11\ TPY$$

22.40 lb/hr / 10.2 TPH = 2.20 lb/ton

2.5 REVISED TOTAL DIOXINS/FURANS EMISSIONS AND TOXICITY EQUIVALENCE

Emission factor-- 30 ng/dscm or 12 gr/ billion dscf. Basis-- Spray dryer, fabric filter, and good combustion based on NSPS Subpart Ea.

Annual emissions:

Stack flow rate is 34,600 dscfm at the afterburner outlet.

34,600 dscfm x 12 gr/10^9 dscf x 60 min/hr / 7,000 gr/lb

= 3.56 x 10^{-6} lb/hr

3.56 x 10^{-6} lb/hr x 8,760 hr/yr / 2,000 lb/ton = 1.56 x 10^{-5} TPY

3.56 x 10^{-6} lb/hr / 10.2 TPH = 3.49 x10^{-7} lb/ton.

Toxicity Equivalence (TEQ) of the total dioxins/furans. Based on the international toxicity equivalent factor (I-TEF) conversion of total dioxins/furans to TEQ's of 2,3,7,8-tetrachlorobenzo-p-dioxin, the 30 ng/dscm (12 gr/billion dscf) total furans/dioxins is equivalent to a TEQ of approximately 0.98 ng/dscm (0.39 gr/billion dscf). Both the emission rate (12 gr/billion dscf) and the TEQ (0.39 gr/billion dscf) are based on NSPS Subpart Ea for MSW organics. Therefore, the potential hourly emissions of total dioxins/furans in terms of TEQ is:

34,600 dscfm x 0.39 gr/10^9 dscf x 60 min/hr / 7,000 gr/lb

= 1.16 x 10^{-7} lb/hr or 1.46 x 10^{-8} g/sec.

The TEQ emission rate will be used to compute its potential impact predicted by modeling analysis and to compare with the annual no-threat level for tetrachlorobenzo-p-dioxin (2.2 x 10^{-8} $\mu g/m^3$).

3.0 SELECTIVE NONCATALYTIC REDUCTION PROCESS FOR NO_x CONTROL

The NO_x emissions from industrial boiler or incinerator can be lowered via a NO_x reduction reactions by injecting a reducing reagent (i.e., either ammonia or urea) into the flue gas stream. The injection process produces a selective reaction with NO_x primarily at a high temperature condition without the aid of catalyst; hence, it is called selective noncatalytic reduction (SNCR) process. This SNCR process is currently determined as the best available control technology for controlling NO_x from MSW incinerators. In general, SNCR technology can be either Nalco Fuel

Tech's NO_xOUT process, Exxon's Thermal DeNO_x process, or an ammonia injection process designed by a third party. Brief descriptions of the NO_xOUT Process and Thermal DeNO_x process are discussed below:

NO_xOUT Process--The NO_xOUT process originated from the initial research by the Electric Power Research Institute (EPRI) in 1976 on the use of urea to reduce NO_x. EPRI licensed the proprietary process to Fuel Tech, Inc., for commercialization. In the NO_xOUT process, aqueous urea is injected into the flue gas stream, ideally within a temperature range of 1,600°F to 1,900°F. In the presence of oxygen, the following reaction occurs:

$$CO(NH_2)_2 + 2NO + 1/2\ O_2 \dashrightarrow 2N_2 + CO_2 + 2H_2O$$

The amount of urea required is most cost-effective when the treatment rate is 0.5 to 2 moles of urea per mole of NO_x. In addition to the original EPRI urea patents, Fuel Tech claims to have a number of proprietary catalysts capable of expanding the effective temperature range of the reaction to between 1,000°F and 1,950°F.

Thermal DeNO_x--Thermal DeNO_x is Exxon Research and Engineering Company's patented process for NO_x reduction. The process is a high temperature selective noncatalytic reduction (SNCR) of NO_x using ammonia as the reducing agent. Thermal DeNO_x requires the exhaust gas temperature to be above 1,800°F. However, use of ammonia plus hydrogen lowers the temperature requirement to about 1,000°F.

For the proposed Auger combustion, the application of either the NO_xOUT Process or Thermal DeNO_x will be designed for the afterburner. The favorable characteristics of the afterburner that would allow the design of a high NO_x reduction process include high temperature range, sufficient residence time, no internal obstruction for installing the injection grids, and the inherent flexibility of being a modular unit. Vendor of the NO_xOUT Process was contacted and they have verbally confirmed that a maximum NO_x removal efficiency of 60% is achievable when the urea injection process is applied to the modular afterburner unit. The final design of the NO_x control system will utilize either one of the two SNCR processes.

ATTACHMENT 2
ADDITIONAL AIR DISPERSION MODELING ANALYSES REQUESTED BY THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

1.0 INTRODUCTION

At the request of the Florida Department of Environmental Regulation (the Department), additional air dispersion modeling analyses have been performed in support of the air permit application for the proposed municipal solid waste (MSW) incinerator for the City of Gretna (AC42-212334). These additional modeling analyses were performed in two tiers: the Tier I screening analysis which addresses the proposed source's impact only and the Tier II analysis which addresses the cumulative impacts from proposed and other emission sources.

The Tier I screening analysis is used to determine if the predicted impacts due to the emissions of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and particulate matter (PM) from the proposed source alone are greater than the significant impact levels in prevention of significant deterioration (PSD) Class I and Class II areas. The maximum predicted impacts from the proposed source are compared to the significant impact levels for Class I areas as recommended by the National Park Service (NPS), and for Class II areas as designated by the U.S. Environmental Protection Agency (EPA). If the predicted impacts for a given pollutant exceed the significant impact values, the pollutant is considered to have a defined significant impact for the applicable area. If a source's impacts are significant, a more detailed modeling analysis is required for that particular pollutant. If a source's impacts are not significant, additional modeling is not required. Thus, the Tier I screening analysis determines the extent to which additional modeling is required for SO_2, NO_x, and PM for PSD Class I and Class II areas. The Tier I screening analysis can also be used to compare the proposed source's impacts of toxic air pollutants to the Department's no-threat levels (NTL) for these air toxic pollutants.

The Tier II modeling analysis is a more detailed air dispersion analysis which examines the air dispersion modeling impacts due to the emissions from the proposed source (for those pollutants which have significant impacts) and other major emission sources in the surrounding area. Where applicable, the Tier II analysis compares the predicted cumulative impacts of the significant pollutant to the Florida AAQS and the allowable PSD Class I and Class II increments.

2.0 METHODOLOGY AND ASSUMPTIONS USED IN THE AIR DISPERSION MODELING ANALYSES

The general modeling approach and assumptions used in the Tier I and Tier II modeling analyses, including model selection, meteorological data, and building data used to address building downwash, were presented previously (see Sections 5.1, 5.2, and 5.5 in Attachment A of the original permit application). The stack and operating parameters for the proposed source are the same as those shown in Table 2-3 in Attachment A of the original permit application.

The potential emission rates of SO_2, NO_2, PM, carbon monoxide (CO), and total dioxins/furans from the proposed Auger combustor have been revised and are used in both Tier I and Tier II modeling analyses. These revisions of the potential emissions are discussed in Attachment 1. The revised potential emission tables (i.e., Tables 2-4 and 2-5 in Attachment A) are presented in Exhibit II.

Other changes relating to the additional modeling analyses, such as the receptor locations, background concentrations, and emission inventory of other emission sources, are discussed in Sections 3.0 and 4.0. As discussed, different receptor grids were used in the Tier I and Tier II modeling analyses. Additional receptors were used in the Tier I modeling analysis from those used in the previous modeling analysis. Also, a denser array of receptors was used in the Tier II modeling analysis to ensure that maximum concentrations were predicted.

3.0 TIER I SCREENING ANALYSIS AND RESULTS

3.1 RECEPTOR LOCATIONS

The Tier I modeling analysis included four additional downwind distances [7,500; 10,000; 12,500; and 15,000 meters (m)] in order to determine the SO_2 and NO_2 significant impact areas for the proposed source. The original downwind distances were 500; 1,000; 1,500; 2,000; 2,500; 3,000; 4,000; and 5,000 m. The additional downwind distances increased the number of receptors from 308 to 432 total receptors.

3.2 CLASS I IMPACT ANALYSIS

The proposed facility's impacts in the Class I Bradwell Bay and the St. Marks National Wilderness Areas (NWA) were predicted using a generic emission rate of 10 grams per second (g/sec). A summary of these results is presented in Table 3-1. Based on these generic impacts, the proposed facility's predicted concentrations using specific emission rates for comparison to the NPS-recommended Class I increment values are presented in Table 3-2. As the results indicate,

Table 3-1. Summary of Highest Predicted Impacts for the Proposed Facility at the Bradwell Bay NWA and the St. Marks NWA PSD Class I Areas Using the Generic Emission Rate of 10 g/s

Averaging Period	Highest Concentration (µg/m³)*	Receptor Location		Time Period			
		East UTM (meters)	North UTM (meters)	Year	Month	Day	Hour Ending
3-hour	5.81	733000	3343000	82	10	17	3
	7.09	733000	3343000	83	10	17	3
	6.29	736000	3346000	84	12	26	6
	4.34	731000	3341000	85	11	12	6
	5.33	728000	3343000	86	12	29	24
24-hour	1.50	733000	3343000	82	10	17	24
	1.18	728000	3343000	83	10	20	24
	0.89	736000	3341000	84	4	29	24
	0.93	741000	3341000	85	3	10	24
	1.09	728000	3341000	86	12	4	24
Annual	0.049	733000	3343000	82	NA	NA	NA
	0.048	728000	3343000	83	NA	NA	NA
	0.052	736000	3341000	84	NA	NA	NA
	0.048	731000	3343000	85	NA	NA	NA
	0.073	728000	3343000	86	NA	NA	NA

Note: Highest concentrations reported for all averaging periods.

g/s=grams per second.
NA=not applicable.
NWA=National Wilderness Area.
PSD=Prevention of Significant Deterioration.
µg/m³=micrograms per cubic meter.
UTM=Universal Transverse Mercator.

* Based on modeling at a generic emission rate of 10.0 g/s.

Table 3-2. Summary of Highest Predicted SO2, TSP, and NO2 Concentrations for the Proposed Facility at the PSD Class I Areas for Comparison to the PSD Class I Significance Levels Recommended by the NPS

Pollutant	Averaging Period	Proposed Source Emissions		Receptor Location		Time Period				Predicted Concentration ($\mu g/m^3$)	NPS Class I Significant Impact Level ($\mu g/m^3$)
		Rate	Units	UTM East (meters)	UTM North (meters)	Year	Month	Day	Hour Ending		
Sulfur Dioxide (SO_2)	3-Hour	30.0	lb/hr	733000	3343000	83	10	17	3	2.65	0.48
	24-Hour	30.0	lb/hr	733000	3343000	82	10	17	24	0.57	0.07
	Annual	65.7	TPY	728000	3343000	86	--	--	--	0.01	0.03
Particulate Matter (TSP)	24-Hour	5.93	lb/hr	733000	3343000	82	10	17	24	0.11	0.33
	Annual	26.0	TPY	728000	3343000	86	--	--	--	0.005	0.1
Nitrogen Dioxide (NO_2)	Annual	99.2	TPY	728000	3343000	86	--	--	--	0.021	0.025

Note: Highest concentrations reported for all averaging periods.

lb/hr=pounds per hour.
NPS=National Park Service.
PSD=Prevention of Significant Deterioration.
TPY=tons per year.
TSP=total suspended particulates.
$\mu g/m^3$=micrograms per cubic meter.
UTM=Universal Transverse Mercator.

the proposed facility's predicted impacts in the Class I area are below the NPS-suggested significance values for all pollutants except SO_2. Therefore, a cumulative modeling analysis was performed for SO_2 for comparison to the Class I increment values.

3.3 CLASS II IMPACT ANALYSIS

Because the emission rates for several pollutants have been revised since the construction application was submitted, the proposed facility's impacts in the Class II area have been reevaluated. The proposed facility's highest impacts using a generic emission rate of 10 g/sec are presented in Table 3-3. These impacts were refined and the results presented in Table 3-4. Based on these generic refined impacts, the proposed facility's predicted impacts for all pollutants with revised emission rates are presented in Table 3-5. As shown, the proposed facility's predicted impacts are below the EPA significant impact levels for all pollutants except SO_2 and NO_2. Therefore, a cumulative impact analysis was performed for each of these pollutants for comparison to the Florida AAQS and PSD Class II increment values.

3.4 AIR TOXICS IMPACT ANALYSIS

Air toxics impact analysis, shown in Table 5-7, Attachment A of the original permit application, has been updated and the revised Table 5-7 is included in Exhibit II. As shown, the predicted concentrations from the proposed facility will not exceed any proposed Florida NTL values. Therefore, the emissions of toxic air pollutants from the proposed facility are not expected to pose a health risk to the general public.

4.0 <u>TIER II CUMULATIVE ANALYSIS AND RESULTS</u>

4.1 RECEPTOR LOCATIONS

Concentrations were calculated in the Tier II modeling analysis using three different sets of receptors to determine compliance with the SO_2 and NO_2 AAQS and PSD Class II increments and the SO_2 PSD Class I increments. For the AAQS and PSD Class II increment analysis, concentrations were calculated at 416 receptors for the SO_2 analysis and 236 receptors for the NO_2 analysis. For the SO_2 analysis, concentrations were predicted at 92 plant property receptors (as described in the original permit application, see Table 5-2 in Attachment A) and at 324 general grid receptors located at distances of 500; 1,000; 1,500; 2,000; 3,000; 4,000; 5,000; 6,000; and 7,500 m along 36 radials spaced at 10-degree increments. For the NO_2 analysis, concentrations were predicted at 92 plant property receptors and at 144 general grid

Table 3-3. Summary of Highest Predicted Impacts for the Proposed Facility Using the Generic Emission Rate of 10 g/s in the Screening Analysis

Averaging Period	Highest Concentration ($\mu g/m^3$)*	Receptor Location** Direction (degrees)	Receptor Location** Distance (meters)	Time Period Year	Time Period Month	Time Period Day	Time Period Hour Ending
1-hour	214.7	260	114	82	10	18	4
	338.7	260	114	83	10	30	22
	256.6	260	114	84	2	26	8
	237.1	250	117	85	9	1	13
	210.8	240	104	86	3	8	7
3-hour	129.4	260	114	82	10	18	6
	166.2	250	117	83	2	27	21
	133.7	240	104	84	9	20	12
	156.3	240	104	85	9	1	6
	150.4	240	104	86	1	8	15
8-hour	76.1	250	117	82	4	23	16
	103.5	250	117	83	2	27	24
	83.2	230	100	84	9	17	24
	112.9	250	117	85	9	1	16
	114.3	240	104	86	1	8	16
24-hour	59.6	240	104	82	2	26	24
	59.2	250	117	83	2	27	24
	53.8	240	104	84	9	17	24
	60.8	230	100	85	8	31	24
	55.2	240	104	86	1	8	24
Annual	3.76	360	1,000	82	NA	NA	NA
	3.36	360	500	83	NA	NA	NA
	3.71	360	500	84	NA	NA	NA
	3.05	360	1,000	85	NA	NA	NA
	4.65	190	1,000	86	NA	NA	NA

Note: Highest concentrations reported for all averaging periods.

g/s=grams per second.
NA=not applicable.
$\mu g/m^3$=micrograms per cubic meter.

* Based on modeling at a generic emission rate of 10.0 g/s.
** Relative to the proposed stack.

Table 3-4. Summary of Highest Predicted Impacts for the Proposed Facility Using the Generic Emission Rate of 10 g/s in the Refined Analysis

Averaging Period	Highest Concentration (µg/m³)*	Receptor Location**		Time Period			
		Direction (degrees)	Distance (meters)	Year	Month	Day	Hour Ending
1-hour	339.8	260	115	83	10	30	22
3-hour	193.4	248	122	83	2	27	21
8-hour	156.0	254	118	85	9	1	16
	122.5	242	123	86	1	8	16
24-hour	64.0	244	99	82	2	26	24
	62.9	246	117	83	2	27	24
	60.8	230	100	85	8	31	24
Annual+	4.65	190	1,000	86	NA	NA	NA

Note: g/s=grams per second.
NA=not applicable.
µg/m³=micrograms per cubic meter.

* Based on modeling at a generic emission rate of 10.0 g/s.
** Relative to the proposed stack.
\+ Annual averaging period not refined.

Table 3-5. Summary of Highest SO2, PM, NO2, and CO Predicted Concentrations for the Proposed Facility for Comparison to PSD Significant Impact Levels

Pollutant	Averaging Period	Proposed Source Emissions		Receptor Location*		Time Period				Predicted Concentration ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
		Rate	Units	Direction (degrees)	Distance (meters)	Year	Month	Day	Hour Ending		
Sulfur Dioxide (SO2)	3-Hour	30.0	lb/hr	248	122	83	2	27	21	73.1	25
	24-Hour	30.0	lb/hr	244	99	82	2	26	24	24.2	5
	Annual	65.7	TPY	190	1,000	86	--	--	--	0.88	1
Particulate Matter (PM)	24-Hour	5.93	lb/hr	244	99	82	2	26	24	4.78	5
	Annual	26.0	TPY	190	1,000	86	--	--	--	0.35	1
Nitrogen Dioxide (NO2)	Annual	99.2	TPY	190	1,000	86	--	--	--	1.33	1
Carbon Monoxide (CO)	1-Hour	22.4	lb/hr	260	115	83	10	30	22	95.9	2,000
	8-Hour	22.4	lb/hr	254	118	85	9	1	16	44.0	500

Note: Highest refined concentrations reported for all short-term averaging periods.

lb/hr=pounds per hour.
TPY=tons per year.
$\mu g/m^3$=micrograms per cubic meter.

* Relative to the proposed stack location.

receptors located at distances of 500; 1,000; 1,500; and 2,000 m (the maximum impacts occur within this receptor grid) along 36 radials spaced at 10-degree increments.

For all short-term averaging periods, a refined modeling analysis was performed. For the PSD Class I analysis of SO_2, impacts were predicted at 33 receptors in the St. Marks and the Bradwell Bay NWA, which are presented in Table 4-1.

4.2 BACKGROUND CONCENTRATIONS

Background SO_2 and NO_2 concentrations were determined in order to account for pollutant concentrations from other emission sources that were not included in the cumulative modeling analysis. In order to determine SO_2 and NO_2 background concentrations for the area near the proposed source, an examination was made of existing monitoring data compiled by FDER. The availability of SO_2 and NO_2 monitoring data near the proposed facility is limited. The nearest and most recent data were collected at monitors located near the Gulf Power Corporation's Scholz power plant facility in Gadsden County. The most recent (i.e., 1990) data available from these monitors are presented in Table 4-2. These monitors are source-oriented monitors and are specifically located to measure maximum ambient air pollution from the Scholz facility. As a result, the measured concentrations are expected to include contributions from this facility. Because the cumulative modeling analysis included modeling the emissions from the Scholz facility and, due to a lack of more recent (i.e., 1991) monitoring data in this area, the lowest concentrations among the three monitors for 1990 were selected to represent background concentrations.

In this analysis, the lowest SO_2 concentrations were recorded at monitor 0540-001-J02 from October through December of 1990. The measured concentrations of 151, 32, and 5 $\mu g/m^3$ were selected for SO_2 background values for the 3-hour, 24-hour and annual averaging periods. The lowest NO_2 concentrations were recorded at monitor 0540-002-J02 from January through December of 1990. An annual background NO_2 concentration of 7 $\mu g/m^3$ was selected.

Table 4-1. PSD Class I Receptors at the Bradwell Bay and St. Marks NWR Used in the Modeling Analysis

Receptor Number	Receptor Location UTM-E (m)	UTM-N (m)	Location
1	728000	3343000	Bradwell Bay NWA
2	728000	3341000	Bradwell Bay NWA
3	731000	3343000	Bradwell Bay NWA
4	731000	3341000	Bradwell Bay NWA
5	731000	3338000	Bradwell Bay NWA
6	733000	3343000	Bradwell Bay NWA
7	733000	3341000	Bradwell Bay NWA
8	733000	3338000	Bradwell Bay NWA
9	733000	3336000	Bradwell Bay NWA
10	733000	3333000	Bradwell Bay NWA
11	736000	3346000	Bradwell Bay NWA
12	736000	3343000	Bradwell Bay NWA
13	736000	3341000	Bradwell Bay NWA
14	736000	3338000	Bradwell Bay NWA
15	736000	3336000	Bradwell Bay NWA
16	738000	3343000	Bradwell Bay NWA
17	738000	3341000	Bradwell Bay NWA
18	741000	3341000	Bradwell Bay NWA
19	770000	3338000	St. Marks NWA
20	770000	3336000	St. Marks NWA
21	772000	3336000	St. Marks NWA
22	772000	3333000	St. Marks NWA
23	772000	3331000	St. Marks NWA
24	775000	3333000	St. Marks NWA
25	775000	3331000	St. Marks NWA
26	777000	3333000	St. Marks NWA
27	780000	3333000	St. Marks NWA
28	782000	3336000	St. Marks NWA
29	782000	3333000	St. Marks NWA
30	785000	3336000	St. Marks NWA
31	785000	3333000	St. Marks NWA
32	787000	3336000	St. Marks NWA
33	787000	3333000	St. Marks NWA

Note: m = meter.
NWA = National Wilderness Area.
UTM-E = east Universal Transverse Mercator coordinate.
UTM-N = north Universal Transverse Mercator coordinate.

Table 4-2. Summary of SO2 and NO2 Air Quality Monitoring Data for 1990

Pollutant	Site No.*	Site Name/Location	Sampling Period	Number of Obs.	Maximum Observed Concentrations ($\mu g/m^3$)				
					Maximum 3-Hour	2nd Maximum 3-Hour	Maximum 24-Hour	2nd Maximum 24-Hour	Arithmetic Mean
SO2	0540-001-J02	Chattahoochee-Scholz East	Jan-Jun, 1990	3558	249	200	59	54	7
	0540-001-J02	Chattahoochee-Scholz East**	Oct-Dec, 1990	2156	172	151	34	32	5
	0540-002-J02	Chattahoochee-Scholz South**	Oct-Dec, 1990	1889	368	283	85	80	7
	0540-002-J02	Chattahoochee-Scholz South	Jan-Jun, 1990	4142	690	346	119	91	8
NO2	0540-002-J02	Chattahoochee-Scholz South	Jan-Dec, 1990	6045	NA	NA	NA	NA	7

Note: NA=not applicable
NO2=nitrogen dioxide.
SO2=sulfur dioxide.
$\mu g/m^3$=micrograms per cubic meter.

* All monitors listed are source-specific ambient monitors.
** Continuous SO2 monitors.

4.3 EMISSION INVENTORY

The proposed facility is located in Gadsden County, just south of the City of Gretna. A survey of the FDER Air Pollutant Information System (APIS) shows that there are six facilities within 50 kilometers (km) of the proposed facility that have SO_2 or NO_2 emissions that may interact with the proposed source's emissions. These facilities are presented in Table 4-3. In order to eliminate sources that will most likely not affect air quality within the proposed facility's significant impact area, the EPA- and FDER-approved North Carolina Screening Technique was applied. This technique includes two methods (i.e., a short-term and annual) to compute an emission threshold (in tons per year) for comparison to a source's maximum allowable emissions. For the short-term method, an emission threshold is calculated by applying a factor of 20 to the distance from the source in question to the proposed source. For the annual method, the threshold is calculated by applying a factor of 20 to the distance from the source in question to the edge of the proposed source's impact area (i.e., 7.5 km for SO_2, 2 km for NO_2). If the source's maximum allowable emissions are below this threshold limit, the source is eliminated from the modeling analysis. Because the significant impacts distances for SO_2 and NO_2 are different, a different threshold emission value is calculated for each pollutant. For this modeling analysis, the annual method was employed since it is the most conservative of the two methods (i.e., would potentially eliminate fewer sources from the analysis). Based on using this source screening technique (see Table 4-3), the City of Tallahassee's Hopkins Generating Station and Gulf Power Corporation's Scholz plant were included in the cumulative modeling analysis for comparison to AAQS and PSD Class II increments. The emissions from the Hopkins and Scholz facilities account for approximately 99 percent of the total SO_2 and 98 percent of the total NO_2 emissions within 50 km of the proposed facility. Therefore, impacts predicted using these sources should represent impacts that would be predicted using the full compliment of emission sources (i.e., all facilities included in Table 4-3).

For the PSD Class I analysis, the City of Tallahassee's Hopkins and Purdom facilities were included in the modeling analysis along with the proposed facility's emissions.

The source stack and operating parameters for the facilities used in the AAQS and PSD Class I and Class II analysis are presented in Table 4-4. Although Purdom is located near the Class I area, it is beyond 50 km of the proposed source and, therefore, was not considered in the AAQS or Class II analysis.

Table 4-3. SO2 and NO2 Emission Inventory of Sources Within 50 km of the Proposed Facility

APIS Number	Facility	UTM Coordinates East (km)	UTM Coordinates North (km)	Location Relative to Proposed Facility+ Direction (degrees)	Location Relative to Proposed Facility+ Distance (km)	SO2 Screening Threshold Emissions (TPY)*	SO2 Maximum Allowable Emissions (TPY)	SO2 Included in the Modeling Analysis?	NO2 Screening Threshold Emissions (TPY)*	NO2 Maximum Allowable Emissions (TPY)	NO2 Included in the Modeling Analysis?
10PCY320014	Gulf Power-Scholz	702.4	3395.8	291	23.8	327	28,676	Yes	437	3,977	Yes
10TLH200004	Florida State Hospital	707.6	3399.2	305	20.8	266	214	No	376	89	No
10TLH200029	Florida Gas Transmission	720.0	3377.4	205	11.0	71	2	No	181	46	No
10TLH370003	City of Tallahassee-Hopkins	749.4	3371.7	122	29.3	435	18,257	Yes	545	6,073	Yes
10TLH370009	Florida A&M University	760.5	3368.9	117	40.3	656	27	No	766	19	No
10TLH370012	Sonas Systems of Florida	754.5	3370.4	120	34.3	536	308	No	646	0	No

Note: km=kilometers.
NO2=nitrogen dioxide.
SO2=sulfur dioxide.
TPY=tons per year.
UTM=Universal Transverse Mercator.

* Screening Threshold emissions are equal to 20 times the distance from the source in question to the edge of the proposed facility's significant impact area (i.e., 7.5 km for SO2 and 2 km for NO2). Sources with emissions less than this threshold were not included in the AAQS or PSD modeling analyses.

\+ Proposed facility located at UTM 724.7 km east and 3387.4 km north.

Source: APIS, 1992.
KBN, 1992.

Table 4-4. Summary of Source Stack and Operating Parameters Used in the AAQS, PSD Class II, and PSD Class I Analyses

Facility Name	Location Relative to Proposed Source* X (km)	Y (km)	Unit	SO2 Emission Rate (lb/hr)	(g/s)	NO2 Emission Rate (TPY)	(g/s)	Stack Height (ft)	(m)	Stack Diameter (ft)	(m)	Temperature (deg F)	(K)	Exit Velocity (ft/s)	(m/s)	Applicable Analyses**
City of Tallahassee-Hopkins+	24.7	-15.7	Unit 1 (projected)	677	85.30	1767	50.82	200.0	61.0	11.0	3.35	260	400	39.3	11.99	A,P1,P2
			Unit 1 (baseline)	2483	312.86	NA	NA	200.0	61.0	11.0	3.35	260	400	39.3	11.99	P1,P2
			Unit 2 (projected)	3255	410.15	3055	87.88	250.0	76.2	14.0	4.27	260	400	68.9	21.00	A,P1,P2
			Comb Turbine 1	90	11.29	475	13.67	29.0	8.8	9.2	2.80	803	701	114.8	35.00	A
			Comb Turbine 2	146	18.42	775	22.30	30.0	9.1	14.7	4.48	875	741	68.9	21.00	A
Gulf Power-Scholz	-22.3	8.4	Unit 1	3178	400.38	1928	55.46	150.0	45.7	13.5	4.11	330	439	40.0	12.19	A
			Unit 2	3369	424.47	2049	58.95	150.0	45.7	13.5	4.11	330	439	40.0	12.19	A
City of Tallahassee-Purdom++	45.2	-47.6	Units 1-4 (baseline)	1265	159.39	NA	NA	85.3	26.0	6.4	1.95	400	478	19.3	5.87	P1
			Units 5-6 (baseline)	1650	207.90	NA	NA	125.3	38.2	13.8	4.21	344	446	21.2	6.45	P1
			Unit 7 (baseline)	1708	215.18	NA	NA	180.0	54.9	9.0	2.74	300	422	47.5	14.49	P1
			Units 1-4 (current)	860	108.41	NA	NA	85.3	26.0	6.4	1.95	400	478	19.3	5.87	P1
			Units 5-6 (current)	1122	141.37	NA	NA	125.3	38.2	13.8	4.21	344	446	21.2	6.45	P1
			Unit 7 (current)	1161	146.32	NA	NA	180.0	54.9	9.0	2.74	300	422	47.5	14.49	P1

Note: AAQS=Ambient Air Quality Standard.
d=degrees Fahrenheit.
ft=feet.
ft/s=feet per second.
g/s=grams per second.
K=Kelvin.
km=kilometers.
lb/hr=pounds per hour.
lb/MMBtu=pounds per million British thermal units.
m/s=meters per second.
NA=not applicable.
NO2=nitrogen dioxide.
PSD=Prevention of Significant Deterioration.
TPY=tons per year.

* Proposed facility located at 724.7 km east and 3387.4 km north.
** Denotes the analyses this source was included in. The following codes apply:
A = SO2 and NO2 AAQS
P1 = SO2 PSD Class I
P2 = SO2 PSD Class II

\+ For PSD purposes, Unit 1 was modeled as a negative emission for the baseline (2.75 lb/MMBtu) and as a positive emission for projected (0.75 lb/MMBtu). Unit 2 is not in the baseline and therefore was modeled at its positive projected emissions (1.4 lb/MMBtu). See text for explanation of the projected emission reduction at this facility.

++ This facility is beyond 50 km from the proposed source but is near the Class I area and therefore was included in the Class I analysis. For PSD purposes the emissions from this facility were modeled as the difference between baseline (2.75 lb/MMBtu) and current (1.87 lb/MMBtu) emissions and, therefore, were modeled as net negative emissions for all sources presented.

The SO_2 emission rates used for the Hopkins facility's Units 1 and 2 are based on a proposed emission reduction plan recently presented by the City of Tallahassee to the FDER. This plan proposes to reduce the permitted allowable SO_2 emission rate for Hopkins Unit 1 from 1.87 to 0.75 pound per million British thermal units (lb/MMBtu). The permitted allowable SO_2 emission rate for Hopkins Unit 2 will be reduced from 1.87 to 1.4 lb/MMBtu. These proposed emission limitations were included in the modeling analysis.

4.4 AAQS, PSD ClASS II, AND PSD CLASS I ANALYSIS

The maximum predicted SO_2 and NO_2 impacts due to all sources are presented in Tables 4-5 and 4-6, respectively. The highest, second-highest short-term impacts were refined and the results presented in Table 4-7. The maximum SO_2 impacts in the PSD Class I area are presented in Table 4-8. Based on these results, the maximum predicted impacts for comparison to AAQS and allowable Class I and Class II increments are summarized in Table 4-9.

For comparison to AAQS, the maximum 3-hour, 24-hour, and annual predicted SO_2 impacts are 312, 78, and 9.3 $\mu g/m^3$, respectively. As shown, these predicted impacts are well below the respective Florida AAQS of 1,300, 260, and 60 $\mu g/m^3$. The maximum predicted NO_2 annual average is 8.8 $\mu g/m^3$, which is well below the Florida NO_2 AAQS of 100 $\mu g/m^3$. As the selected SO_2 3- and 24-hour background concentrations are considered to be conservative, the total SO_2 3- and 24-hour concentrations are also expected to be conservative.

For comparison to PSD Class II increments, the maximum 3-hour, 24-hour, and annual predicted SO_2 impacts due to PSD sources are 59, 24, and 1.9 $\mu g/m^3$, respectively. These predicted impacts are well below the allowable SO_2 PSD Class II increments of 512, 91, and 20 $\mu g/m^3$, respectively. The maximum predicted NO_2 annual average is 1.3 $\mu g/m^3$, which is well below the NO_2 PSD Class II increment of 25 $\mu g/m^3$.

The maximum 3-hour, 24-hour, and annual predicted SO_2 impacts in the PSD Class I areas are 19.8, 4.76, and - 0.09 $\mu g/m^3$, respectively. These impacts are below the respective PSD Class I allowable increments of 25, 5, and 2 $\mu g/m^3$.

Table 4-5. Summary of Maximum Predicted SO2 and NO2 Screening Impacts for Modeled Sources Only for the AAQS Modeling Analysis

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Receptor Location* Direction (degrees)	Receptor Location* Distance (meters)	Time Period Year	Time Period Month	Time Period Day	Time Period Hour Ending
SO2	3-hour	136.8	280	7,500	82	10	14	21
		160.6	240	4,000	83	3	2	3
		149.2	230	7,500	84	2	14	21
		141.1	230	7,500	85	11	5	9
		146.6	280	5,000	86	3	14	6
	24-hour	35.0	270	6,000	82	1	4	24
		36.2	270	7,500	83	11	16	24
		34.5	300	4,000	84	11	11	24
		32.8	310	6,000	85	3	24	24
		41.6	270	6,000	86	5	2	24
	Annual	3.36	360	1,000	82	NA	NA	NA
		4.29	360	500	83	NA	NA	NA
		3.90	360	500	84	NA	NA	NA
		3.80	240	500	85	NA	NA	NA
		3.97	190	1,000	86	NA	NA	NA
NO2	Annual	1.56	360	1,000	82	NA	NA	NA
		1.58	360	500	83	NA	NA	NA
		1.64	360	500	84	NA	NA	NA
		1.48	360	1,000	85	NA	NA	NA
		1.80	190	1,000	86	NA	NA	NA

Note: Highest, second-highest concentrations reported for all short-term averaging periods.

AAQS=Ambient Air Quality Standard.
NA=not applicable.
NO2=nitrogen dioxide.
SO2=sulfur dioxide.
$\mu g/m^3$=micrograms per cubic meter.

* Relative to the proposed stack.

Table 4-6. Summary of Maximum Predicted SO2 and NO2 Screening Impacts for Modeled Sources Only for the PSD Class II Modeling Analysis

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Receptor Location* Direction (degrees)	Receptor Location* Distance (meters)	Time Period Year	Time Period Month	Time Period Day	Time Period Hour Ending
SO2	3-hour	39.9	260	114	82	9	29	12
		49.3	250	117	83	2	27	18
		43.5	240	104	84	12	26	18
		52.9	260	114	85	9	1	15
		39.5	230	100	86	1	8	18
	24-hour	12.0	250	117	82	4	23	24
		22.3	250	117	83	1	20	24
		13.8	230	100	84	9	27	24
		14.0	230	100	85	9	14	24
		15.7	210	100	86	8	29	24
	Annual	1.52	360	1,000	82	NA	NA	NA
		1.42	360	500	83	NA	NA	NA
		1.57	360	500	84	NA	NA	NA
		1.32	360	1,000	85	NA	NA	NA
		1.89	190	1,000	86	NA	NA	NA
NO2	Annual	1.08	360	1,000	82	NA	NA	NA
		0.96	360	500	83	NA	NA	NA
		1.06	360	500	84	NA	NA	NA
		0.87	360	1,000	85	NA	NA	NA
		1.33	190	1,000	86	NA	NA	NA

Note: Highest, second-highest concentrations reported for all short-term averaging periods.

NA=not applicable.
NO2=nitrogen dioxide.
PSD=Prevention of Significant Deterioration.
SO2=sulfur dioxide.
µg/m³=micrograms per cubic meter.

* Relative to the proposed stack.

Table 4-7. Summary of Predicted Short-Term SO2 Refined Impacts for the AAQS and PSD Class II Analysis

Analysis	Averaging Period	Maximum Concentration (μg/m³)	Receptor Location*		Time Period			
			Direction (degrees)	Distance (meters)	Year	Month	Day	Hour Ending
AAQS	3-hour	161.2	248	4,500	83	3	2	3
		152.1	229	7,400	84	9	10	9
		150.6	282	5,900	86	3	14	6
	24-hour	46.4	274	7,400	86	5	2	24
PSD Class II	3-hour	58.9	246	124	83	7	29	12
		57.5	256	117	85	8	31	9
	24-hour	23.8	246	124	83	1	20	24

Note: Highest, second-highest concentrations are reported for all averaging periods.

AAQS=Ambient Air Quality Standard.
NA=not applicable.
PSD=Prevention of Significant Deterioration.
SO2=sulfur dioxide.
μg/m³=micrograms per cubic meter.

* Relative to the proposed stack.

Table 4-8. Summary of Cumulative Predicted SO2 Impacts at the Bradwell Bay NWA and the St. Marks NWA PSD Class I Areas

Averaging Period	Maximum Concentration ($\mu g/m^3$)	Receptor Location		Time Period			
		East UTM (meters)	North UTM (meters)	Year	Month	Day	Hour Ending
3-hour	11.4	728000	3343000	82	9	5	21
	19.8	728000	3343000	83	10	31	6
	14.2	728000	3343000	84	5	16	24
	13.4	728000	3343000	85	9	16	3
	14.7	736000	3346000	86	12	14	3
24-hour	2.92	728000	3341000	82	12	8	24
	2.46	728000	3343000	83	11	1	24
	2.70	731000	3343000	84	9	16	24
	2.98	728000	3343000	85	9	17	24
	4.76	733000	3343000	86	10	19	24
Annual	-0.14	787000	3336000	82	NA	NA	NA
	-0.25	728000	3343000	83	NA	NA	NA
	-0.28	728000	3343000	84	NA	NA	NA
	-0.34	728000	3343000	85	NA	NA	NA
	-0.090	733000	3336000	86	NA	NA	NA

Note: Highest, second-highest concentrations reported for all short-term averaging periods.

NA=not applicable.
NWA=National Wilderness Area.
PSD=Prevention of Significant Deterioration.
SO2=sulfur dioxide.
$\mu g/m^3$=micrograms per cubic meter.
UTM=Universal Transverse Mercator.

Table 4-9. Summary of Predicted SO2 and NO2 Concentrations for Comparison to AAQS and Allowable PSD Class I and Class II Increments

		AAQS Analyis				PSD Class II Analysis		PSD Class I Analysis	
		Concentration ($\mu g/m^3$) Due To							
Pollutant	Averaging Period	All Modeled Sources	Background	Total	Florida AAQS ($\mu g/m^3$)	Concentration Due to All Modeled Sources ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	Concentration Due to All Modeled Sources ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)
Sulfur Dioxide (SO2)	3-Hour	161	151	312	1,300	59	512	19.8	25
	24-Hour	46	32	78	260	24	91	4.76	5
	Annual	4.3	5	9.3	60	1.9	20	-0.090	2
Nitrogen Dioxide (NO2)	Annual	1.8	7	8.8	100	1.3	25	NA	NA

Note: Highest, second-highest concentrations reported for all 3- and 24-hour averaging periods.

AAQS=Ambient Air Quality Standard.
NA=not applicable since this pollutant did not have a significant impact in the Class I area.
PSD=Prevention of Significant Deterioration.
$\mu g/m^3$=micrograms per cubic meter.

EXHIBIT I

MANUFACTURERS' LITERATURE

SPRAY DRYER SCRUBBER

AND

FABRIC FILTER SYSTEMS

United McGill
Corporation 1779 Refugee Road, P.O. Box 820, Columbus, Ohio 43216-0820, 614/443-0192, Fax: 614/445-8759

July 23, 1992

Engineered Systems and Equipment
P.O. Box 180517
Casselberry, FL 32718-0517

Attention: Jim Holloway

Subject: RDF & TDF Project in Gretna, FL

Dear Mr. Holloway:

In response to your request for guarantee information on the Florida Waste Reduction RDF - TDF Incineration project in Gretna, FL, we have outlined the emission limits that we would guarantee with our Spray Dry Scrubber - Fabric Filter System.

Inlet Conditions

Gas Volume=70,100 ACFM
Temperature=400°F
SO_2 Inlet=184.8 lbs/HR
HCl Inlet=50.4 lbs/HR

Guaranteed Emission Limits

SO_2 - 88% Removal or 50 PPM outlet, whichever is less stringent
HCl - 80% Removal or 50 PPM outlet, whichever is less stringent
Particulate - 0.02 Grs/DSCF Outlet

The above emission limits simply confirms that United McGill can achieve the requirements the customer presently has permitted with a Spray Dry Scrubber-Fabric Filter System. Please keep in mind, more stringent outlet emissions can be guaranteed with a Spray Dry Scrubber-Fabric Filter System if required.

Since the customer is considering using an existing Fabric Filter, there are a few things they need to keep in mind. First, the Fabric Filter needs to be sized properly. The approximate cloth area needed for this project would be around 20,000 ft^2. Other factors that effect sizing are cloth selection, particulate loading, and can velocity. The Fabric Filter should also have a bypass and have multiple compartments to allow for service of a compartment while the system is on line.

If there are any questions to above information, please do not hesitate to call.

Sincerely,

UNITED McGILL CORPORATION

Dan Grieshop

Daniel J. Grieshop
Sales Engineer
Air Pollution Control Group

DJG/mg
2130C

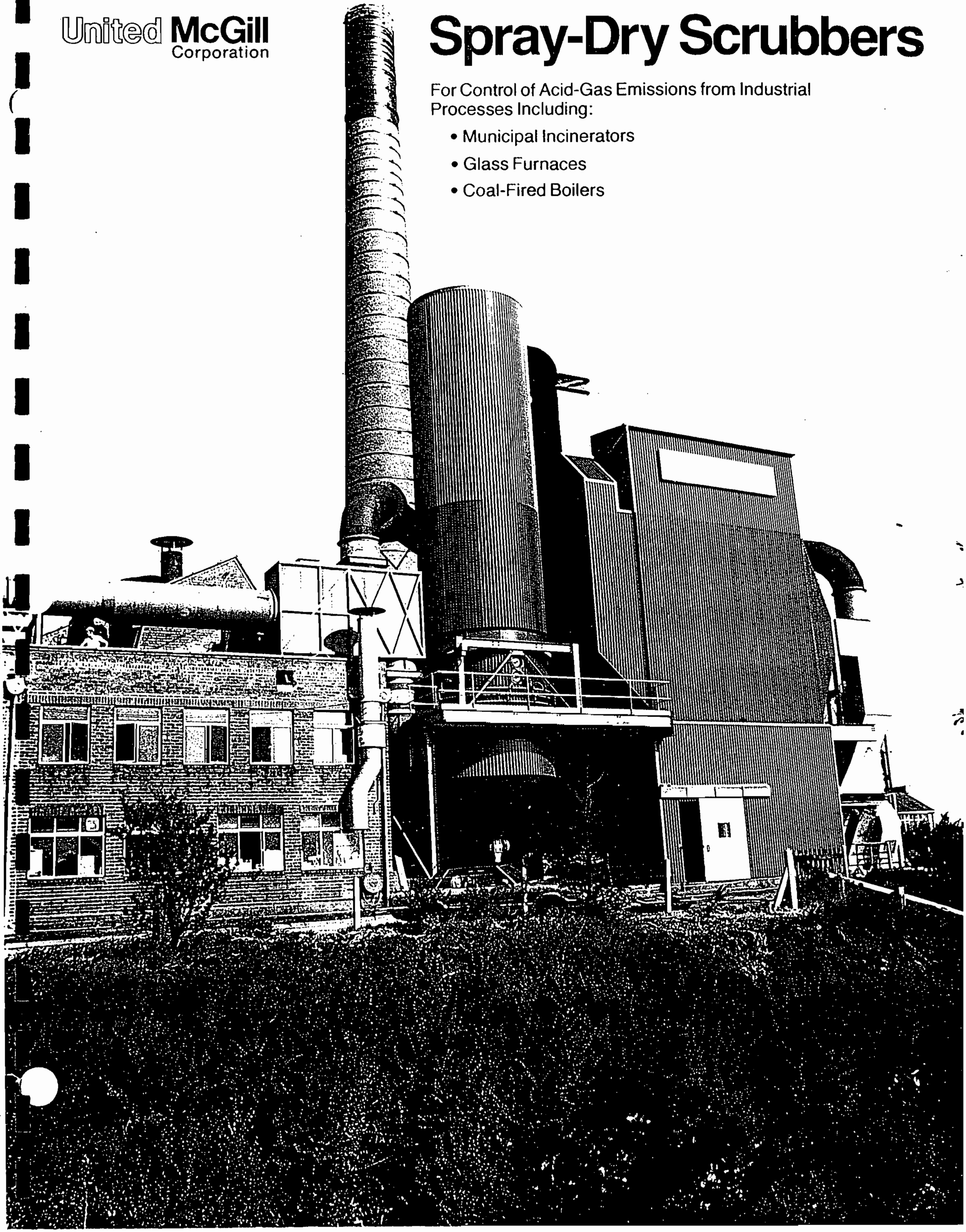
cc: E. Brabham/FF Correspondence
J. Childress

United McGill Corporation

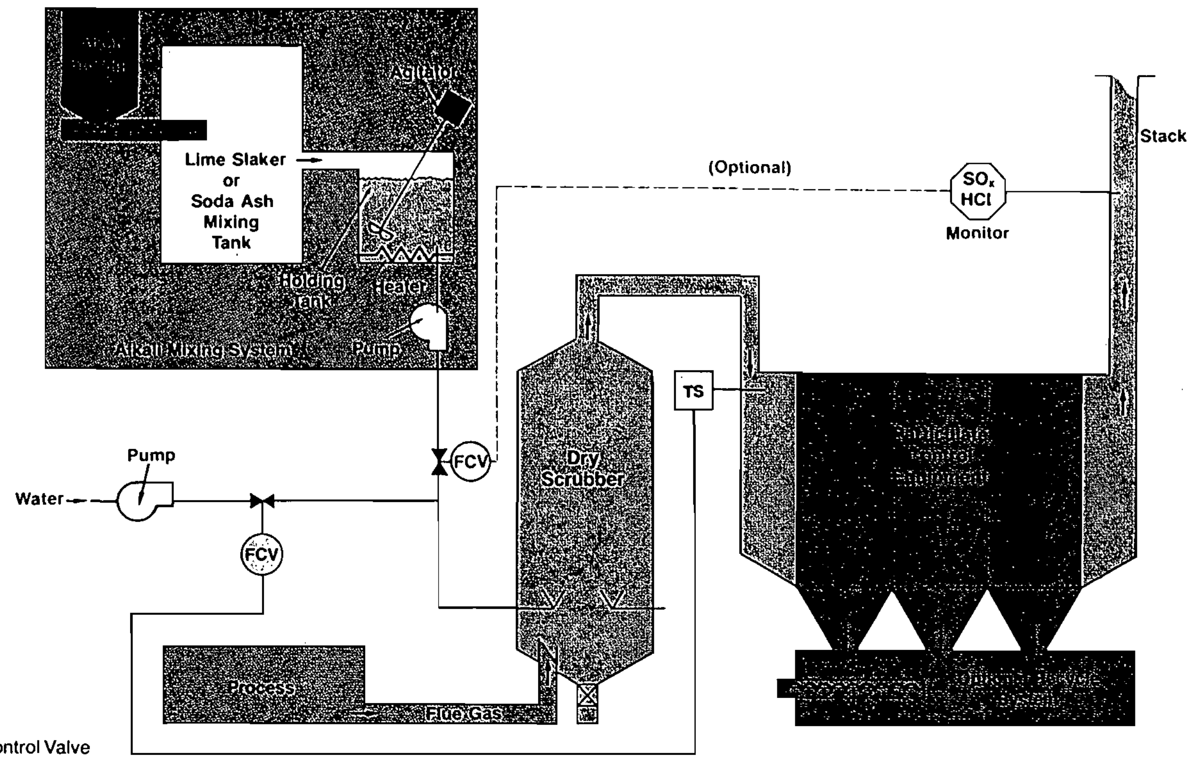
Spray-Dry Scrubbers

For Control of Acid-Gas Emissions from Industrial Processes Including:

- Municipal Incinerators
- Glass Furnaces
- Coal-Fired Boilers



A Dry-Product System that Removes Both Acid Gases and Particulates



FCV = Flow Control Valve
TS = Temperature Sensor

Alkali mixes with acid gases in the dry scrubber to produce salts. The salts and other particulates are collected in the particulate control equipment.

United McGill integrates two well-known and well-practiced processes—spray drying and dry-particulate collection—to effectively (and economically) remove acid gases and particulates from flue gas streams.

Compared with conventional wet scrubbing, spray-dry scrubbing offers a number of **advantages that have made it the best control technology available for many industrial applications:**

- A dry product is produced—avoiding sludge handling/dewatering.
- Less power is needed—no reheat is required; draft losses are less.
- Much less potential for corrosion exists—components can be made of mild steel.
- Less capital is typically required.
- Greater reliability is achieved—there are few moving parts; redundancy is built in.

Spray-dry scrubbing can be used to control acid-gas emissions from virtually all industrial processes including municipal incinerators, glass furnaces, and coal-fired boilers.

United McGill has been controlling acid-gas emissions with spray-dry scrubbing since 1974. All of the major acid gases:

- HCl—Hydrogen Chloride
- SO_2—Sulfur Dioxide
- HF—Hydrogen Fluoride
- H_3BO_3—Boric Acid

have been treated with a variety of alkaline materials:

- $Ca(OH)_2$—Calcium Hydroxide (hydrated lime)
- Na_2CO_3—Sodium Carbonate (soda ash)
- Na OH—Sodium Hydroxide (caustic soda)
- Sodium Sesquicarbonate (trona)
- NH_3—Ammonia

Major System Components

- Chemical-preparation system
- Spray-dry reactor/scrubber
- Particulate removal system
- Microprocessor-based controls

The Process

Spray-dry scrubbing is based on the general principle that an **acid** gas can be treated with an **alkali** to form a **salt.** Once excess water evaporates, the salts in the gas stream can be collected by conventional particulate control equipment.

Example:

acid gas	+	alkali	➜	solid salt
2 HCl (gas)	+	$Ca(OH)_2$ (slurry)	➜	$CaCl_2 \cdot 2H_2O$ (solid)

The flue gas is ducted to the spray-dry scrubber. As the gas stream enters the scrubber, it mixes with a finely atomized spray of water and alkali. Acid gases rapidly interact with the liquid droplets to form salts.

The heat of the flue gas evaporates any excess water. The cooled flue gas, containing particulates and scrubber-generated salts, is ducted to particulate control equipment. A flow diagram that details the process is shown above.

Reactivity

Some acid gases are easier to scrub than others. Strong acids such as H_2SO_4 and HCl are the easiest to remove. Weaker acids such as SO_2 require more effective alkalis or lower temperatures to achieve high efficiencies. Figure 2 shows the removal of HCl and SO_2 under the same scrubber conditions. For a given amount of added alkali, more HCl is removed than SO_2.

Reactivity of Acid Gases:

more reactive — **less reactive**

$H_2SO_4 > HCl > HF > SO_2 > H_3BO_3$

Requirements

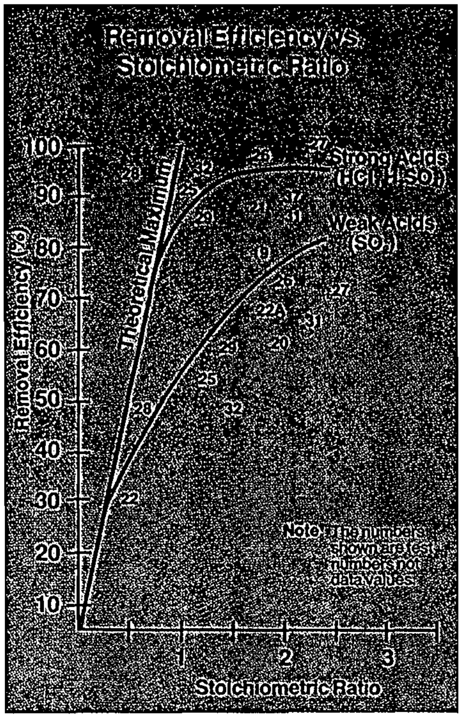
Acid removal efficiency with a spray-dry scrubber depends on the nature of the acid scrubbed, the chemical used, and the amount of time that the acid, chemical, and water are in contact with one another. To effectively scrub acid gases from a given process, one must:

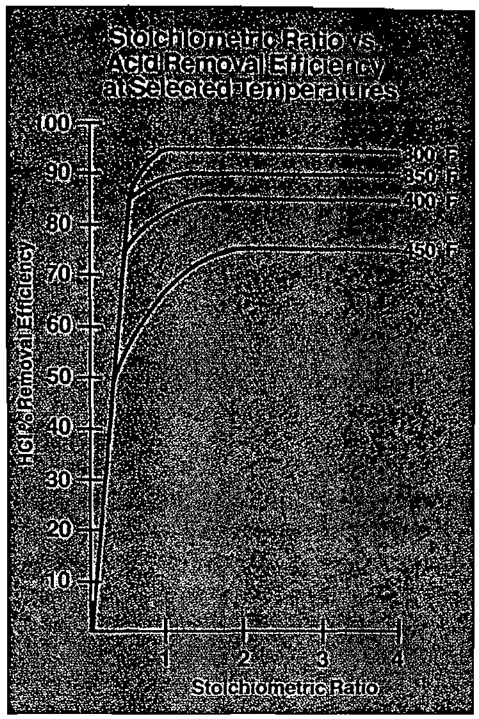
1. Note the acid gases to be scrubbed.
2. Select an appropriate alkali.
3. Design the system to achieve intimate gas/alkali contact.
4. Select an outlet temperature. The lower the temperature, the longer it takes the water to evaporate. The unevaporated liquid water enhances the neutralization reaction.

Alkali

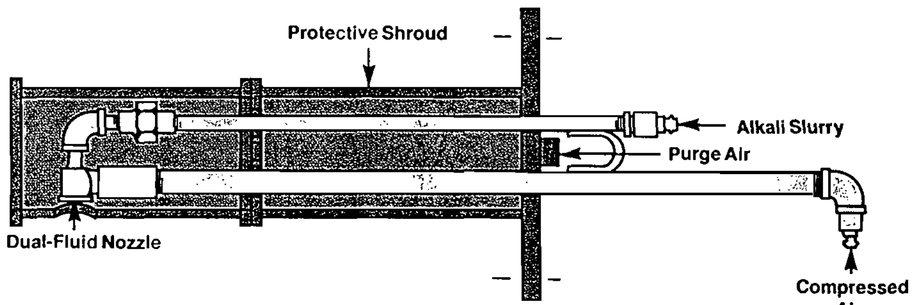
Any alkali can be used to remove acid gases; however, sodium-based chemicals (Na_2CO_3, NaOH) are markedly better than calcium-based ones for removing the weaker acids (SO_2, H_3BO_3). Unfortunately, these sodium-based reagents cost more than equivalent calcium-based ones [e.g., hydrated lime, $Ca(OH)_2$]. The water solubility of the sodium-based materials makes their disposal an additional problem.

Therefore, sodium-based alkalis are used only in the most difficult applications or where the waste products can be recycled. Most high-volume systems use hydrated lime as the reagent because it is less expensive. Its lower solubility makes by-product disposal less of a problem.





Note: The curves shown above are not exact but only show relative positions for the variables indicated. Additional variables that affect actual data include: the process, acid concentration, scrubber inlet temperature, and alkali used.



Cross section of nozzle/spray lance assembly

Atomization

The United McGill spray-dry scrubber uses dual-fluid, air-atomizing nozzles to disperse its reagent in the gas stream. Air-atomizing nozzles disperse chemicals at a low initial cost and with low operating costs—especially for systems operating at less than 200,000 cfm. Since a typical system contains more than one nozzle, redundancy is built-in. Multiple-nozzle systems allow on-line removal, replacement, and maintenance. This minimizes downtime.

Easy removal and replacement of the lance assemblies facilitate maintenance.

Particulate Removal

Particulates from the process as well as solids generated in the spray-dry scrubber are directed to particulate removal equipment—either an electrostatic precipitator or a baghouse. Both act as secondary collectors of acid.

The secondary contact between acid and alkali can be somewhat more intimate in the baghouse. On the other hand a baghouse should operate at a higher temperature than a precipitator. Higher temperatures are necessary to protect the baghouse from catastrophic damage caused by low-temperature condensation. However, these higher temperatures **reduce** acid-removal efficiency.

Total system acid removal efficiencies will be comparable whether a baghouse or a precipitator is used. Site conditions may determine which device is specified.

Summary

The United McGill spray-dry scrubber/particulate control system:

- Effectively removes acid gases
- Effectively controls particulate emissions
- Can be set up to control any acid gas
- Is proven in both pilot- and full-scale operations
- Has low capital and operating costs
- Comes complete with United McGill's proven experience and turnkey responsibility

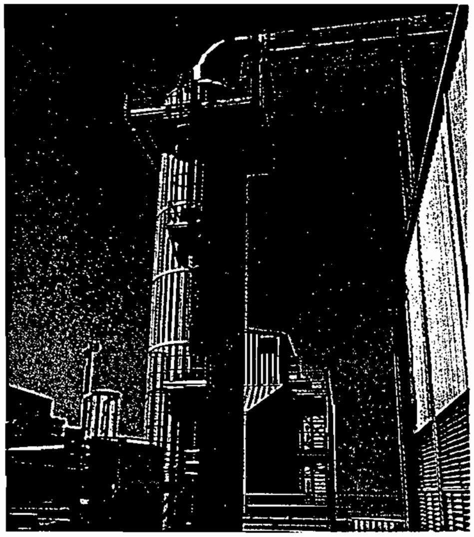
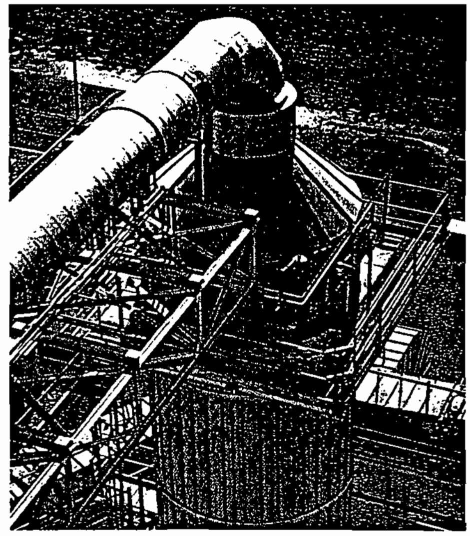
Mobile Testing Equipment

United McGill can supply a **mobile** spray-dry scrubber/particulate control system to resolve any questions you may have about the ability of our dry scrubber system to remove acid-gas emissions from your process. This mobile unit will treat a significant slipstream of your process gas (up to 8,000 cfm) and prove the effectiveness of our dry scrubber/particulate control system.

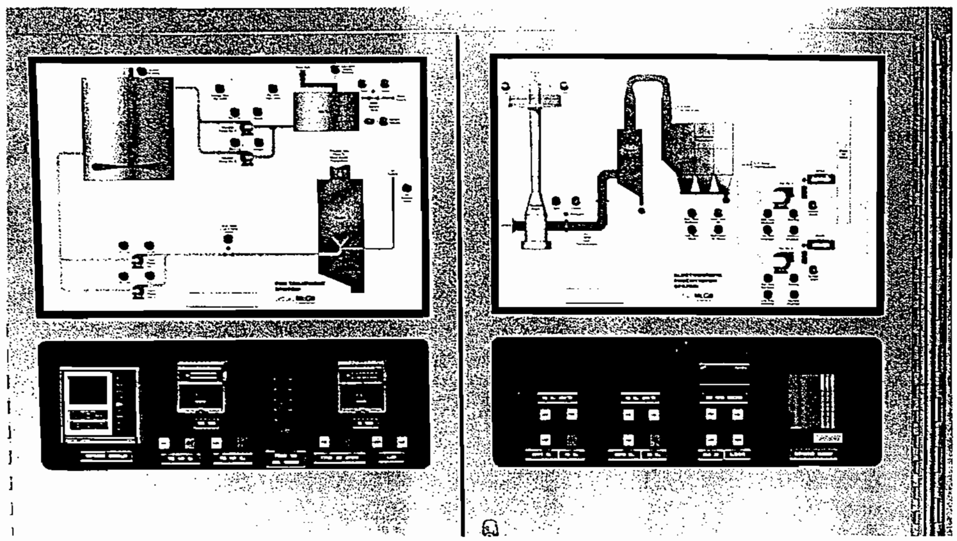
- Fully automated
- Microprocessor controlled
- Significant sample size (8,000 cfm)
- Crew tests using EPA methods

United McGill Corporation

2400 Fairwood Avenue, P.O. Box 820
Columbus, Ohio 43216
614/443-0192 Telex: 245-384

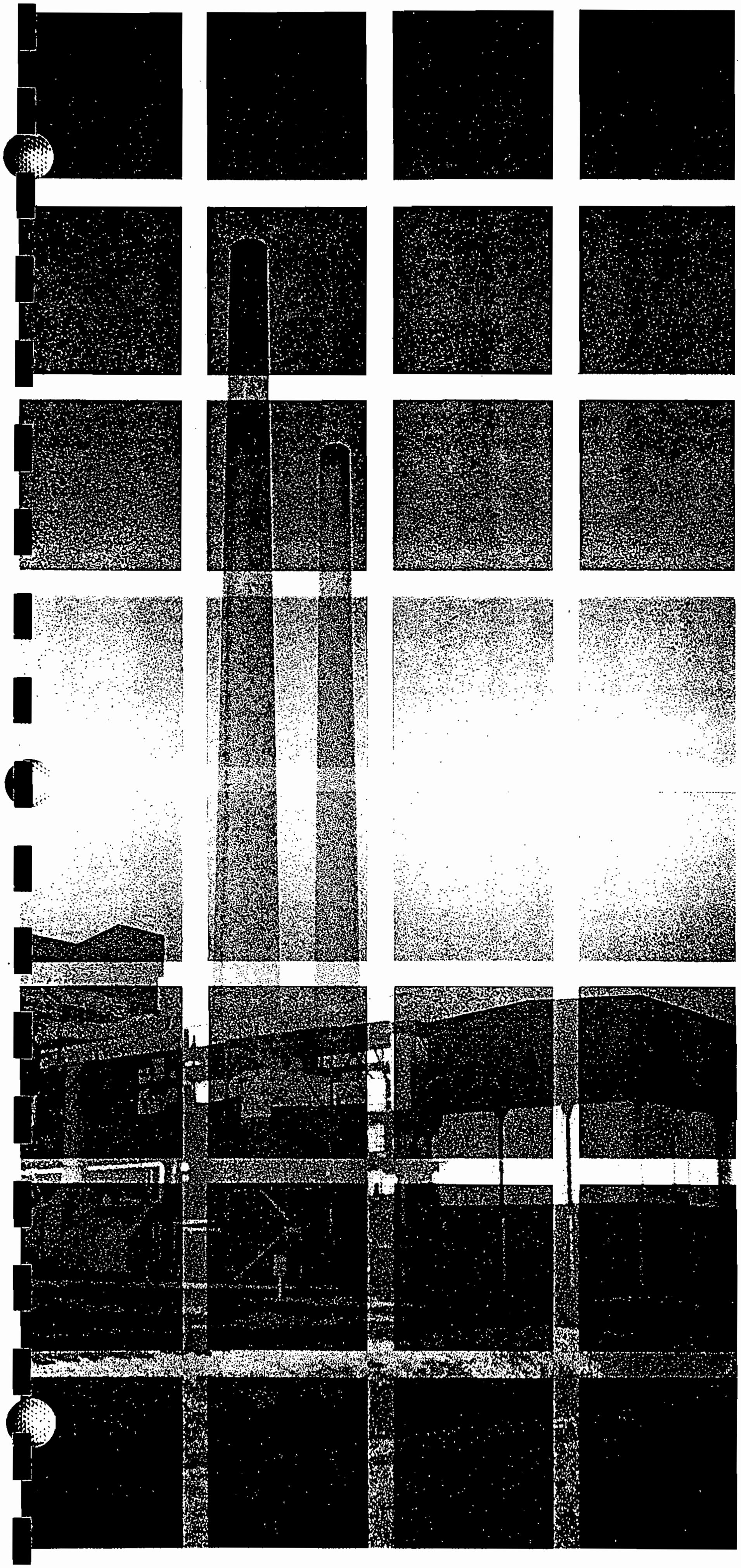



A typical United McGill spray-dry scrubber/electrostatic precipitator installation scrubbing boric acid from a fiberglass melting furnace.



Typical control panel with graphic flow diagrams of United McGill's spray-dry scrubber system.

The mobile spray-dry scrubber (right) is connected to the process. Acid gases are scrubbed in the tower and particulates are collected in the mobile electrostatic precipitator. Tests are performed in the mobile testing lab (front).

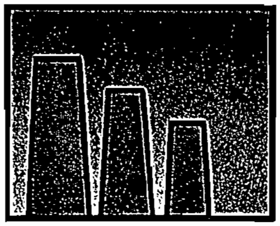


Fabric Filter Systems

for High-Efficiency Air Pollution Control

United **McGill** Corporation

Air Pollution Control Experience



Founded in 1951, United McGill is a single source for engineering, manufacturing, and field construction of a wide variety of industrial products. Specializing in custom-design projects, we supply sheet metal duct and fittings, noise control devices, air pollution control systems, heat exchangers, autoclaves, and vacuum dryers. We also offer specialized engineering services such as mobile labs for air pollution testing, an airflow lab, and a computer design service for duct systems.

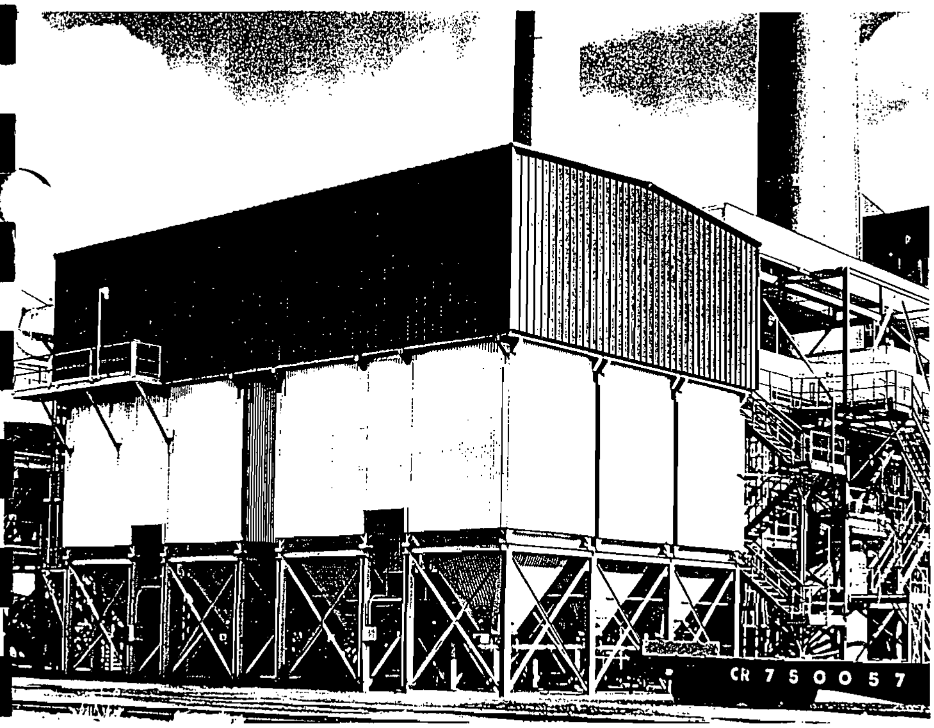
When you do business with United McGill you are drawing upon our years of experience providing air pollution control systems that are efficient, economical, and easy to maintain. Our staff handles the entire operation, from analyzing your emissions problem to designing, building, and installing an effective solution.

We have supplied air pollution control equipment for numerous applications and industries, including municipal solid waste incineration, power and steam generation, glass, cement, iron and steel, pulp and paper, agricultural, petrochemical, and automotive. Each pollution control system is designed specifically for the individual application.

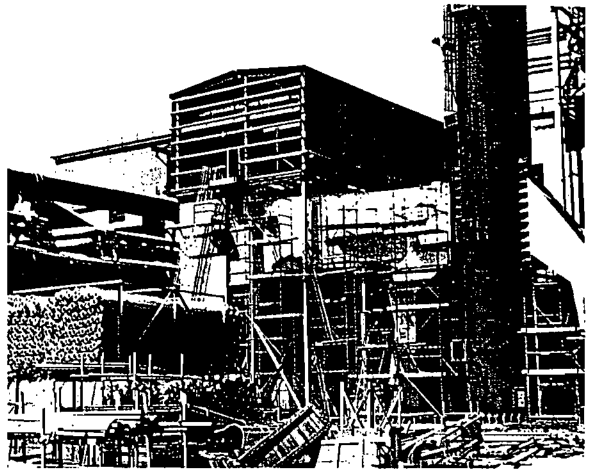
United McGill's line of pollution control systems includes fabric filters, electrostatic precipitators (wet and dry), and spray-scrubbers for acid-gas emissions. We also supply all flue gas handling products that are needed for each system, including ductwork, stacks, valves, dampers, and pretreatment chambers. Complete field construction service is available, including foundations, civil and mechanical erection, wiring, piping, and insulation.

Our range of products and our service capability enable us to solve very complex emissions problems. For example, we can handle a high-temperature, acid-laden combustion process and ensure compliance with gaseous and particulate regulations by installing a dry scrubber and fabric filter. By engineering, manufacturing, and installing all components, we can lower the cost of your system.

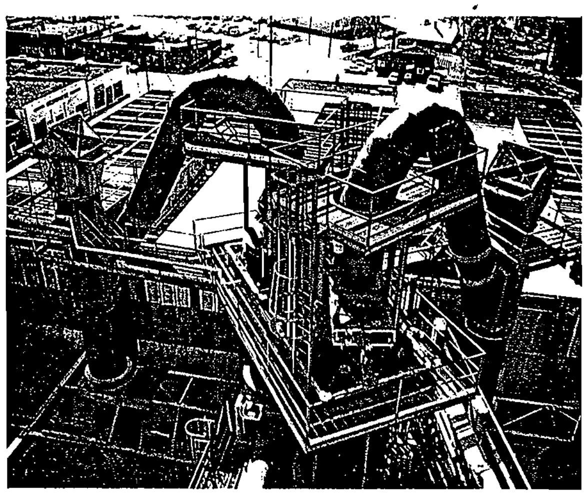
Contents



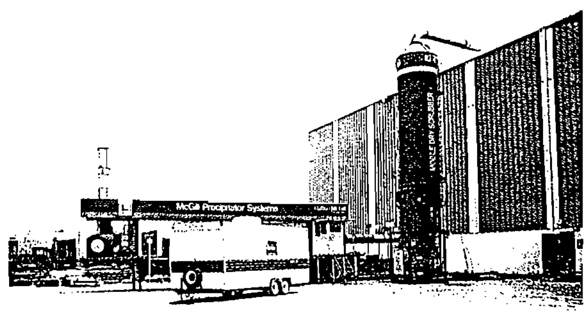
1



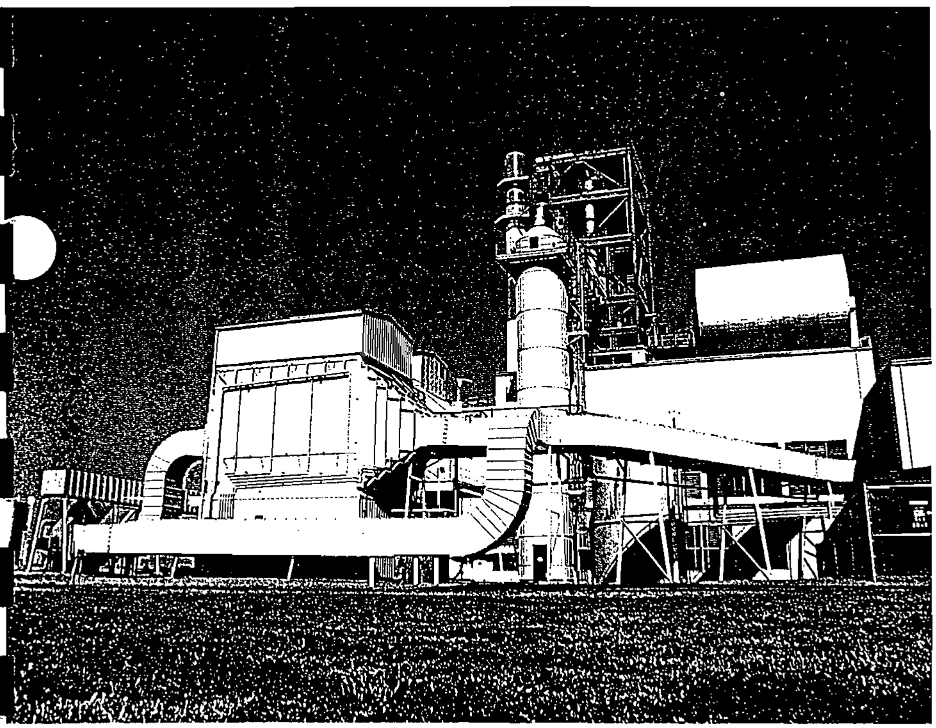
4



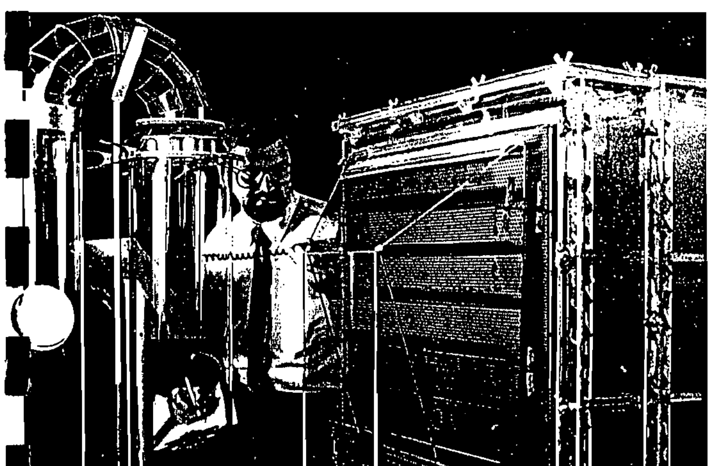
5



6



2



3

1. Two Beta/Mark fabric filters operate on stoker, coal-fired boilers at a Tennessee chemical plant.

2. United McGill combined a spray-dry scrubber, dry electrostatic precipitator, and two wet electrostatic precipitators to provide complete air pollution control for this California fiberglass plant.

3. United McGill uses its own fully equipped airflow lab to develop flow control devices that distribute gas evenly within air pollution control systems.

4. One of United McGill's international applications, this Beta/Mark system operates on a 200,000-lb/hr pulverized coal-fired boiler in Australia.

5. United McGill manufactures complete flue gas systems, including stacks, ductwork, and stack caps.

6. United McGill uses its mobile testing equipment on-site to determine the best way to solve specific air pollution control problems.

United McGill Fabric Filter Systems

Applications

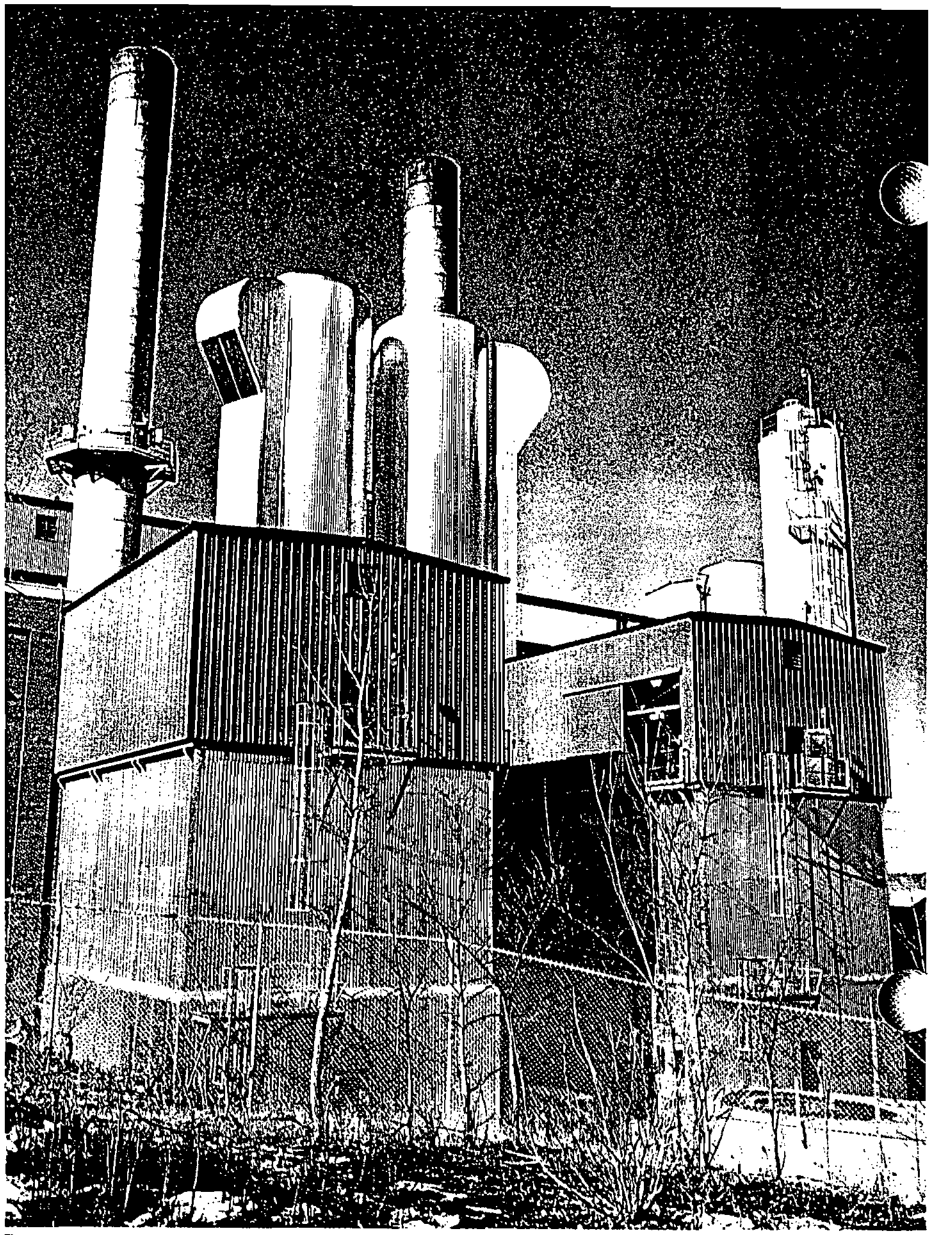
United McGill provides Beta/Mark and DEPARTURE™ fabric filter systems. We lead the industry in solid-fuel-fired combustion applications. Our proven track record covers some of the newest and most difficult installations, such as solid waste incinerators and circulating fluidized-bed boilers. We have fabric filters operating successfully with virtually all types of combustion devices:

- Spreader Stoker
- Underfeed Stoker
- Chain Grate Stoker
- Pulverized Fuel
- Circulating Fluidized-Bed
- Bubbling Fluidized-Bed
- Atomized Slurry
- Cyclone
- Dutch Oven
- Rotary Kiln
- Incinerator

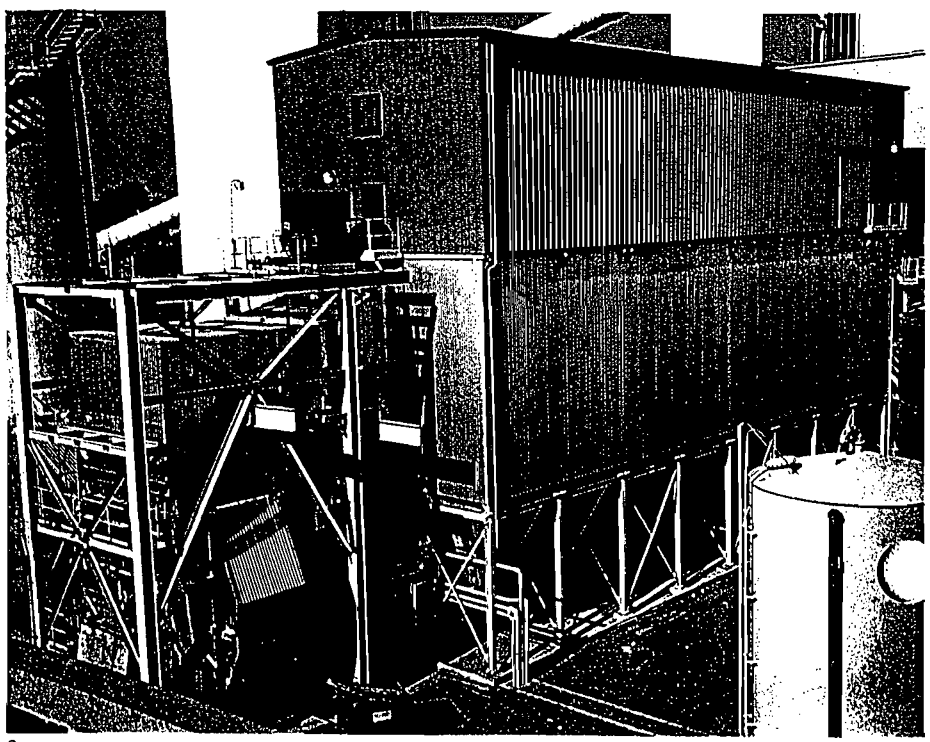
Fuels

We have experience with many fuels, including the following:

- Coal
- Salt-Laden Hogged Fuel
- Solid Waste
- Cellulose
- Oil Refuse
- Manure
- Lignite
- Hazardous Waste
- Coke
- Culm
- Pitch
- Refuse-Derived Fuel
- Shredded Tires
- Paint Sludge
- Wood Waste
- Medical Waste



7



8

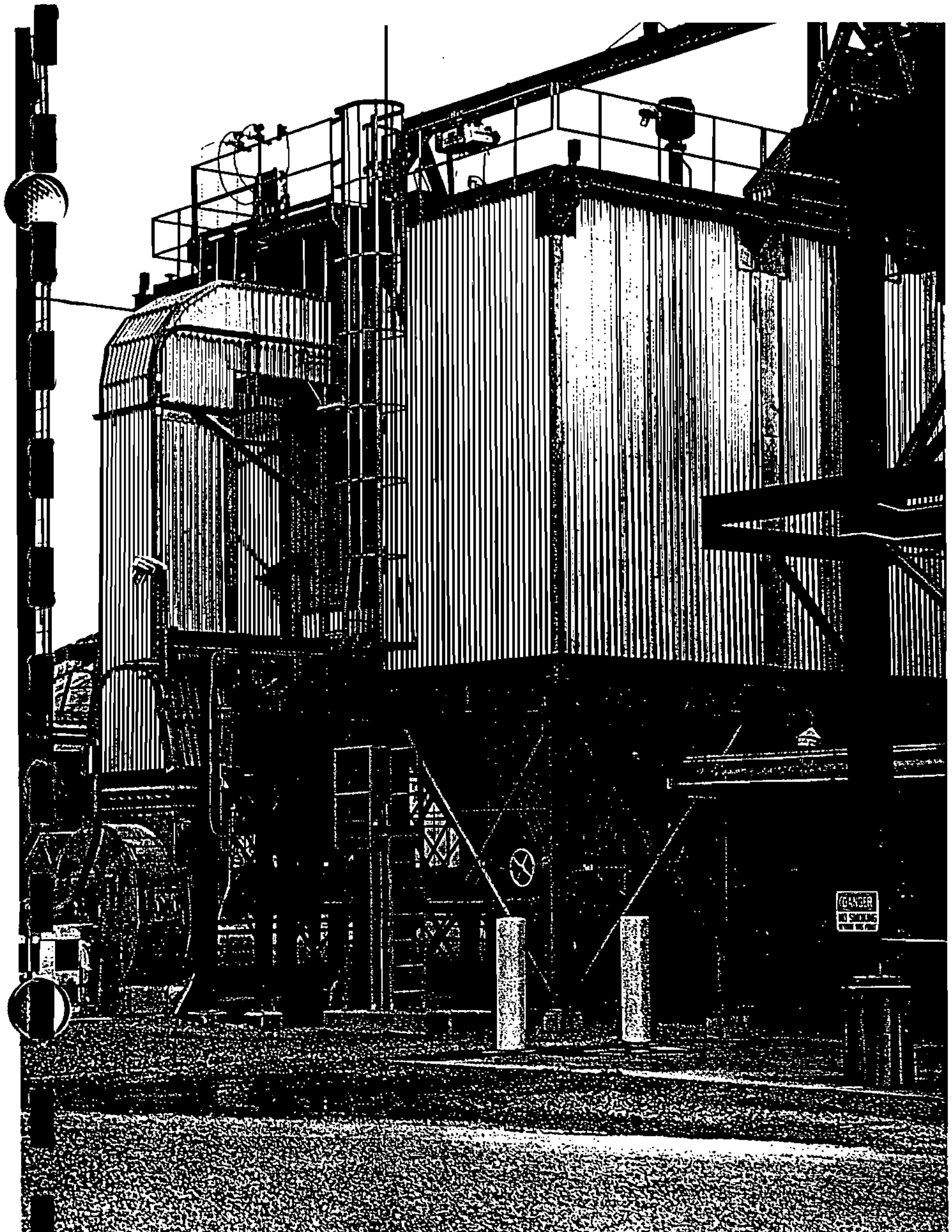
7. A pair of six-module Beta/Mark fabric filter systems with spray-dry scrubbers operate on spreader-stoker, traveling-grate boilers that burn refuse-derived fuel at this power plant in Minnesota.

8. At this cogeneration facility, a 16-module Beta/Mark system controls emissions from a 650,000-lb/hr circulating fluidized-bed boiler that burns anthracite culm.

Benefits

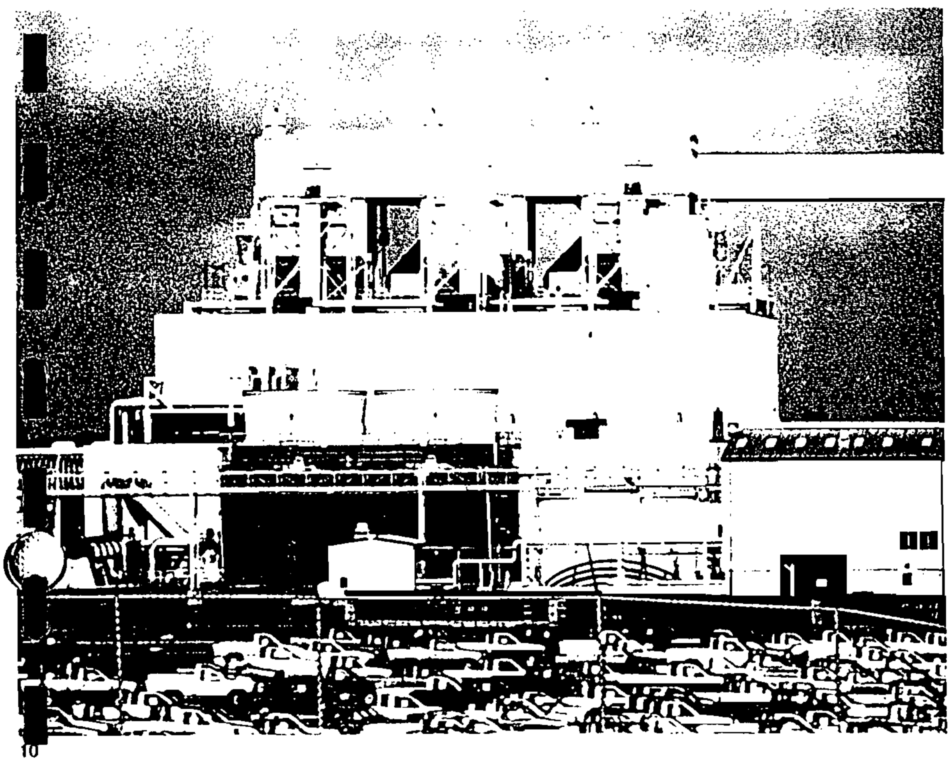
United McGill's fabric filter systems enable you to meet the most stringent air pollution control requirements. They provide reliable, high-efficiency control of emissions, even where high temperatures and corrosive elements exist. Our systems offer five major benefits:

- Very High Collection Efficiency
- Economy — designed for low cost over the system's life
- Reliability — reduces the need for your plant to shut down
- Overall Capability — we can take sole-source responsibility for a job
- Flexibility — adapts to new fuels, code requirements, and product developments



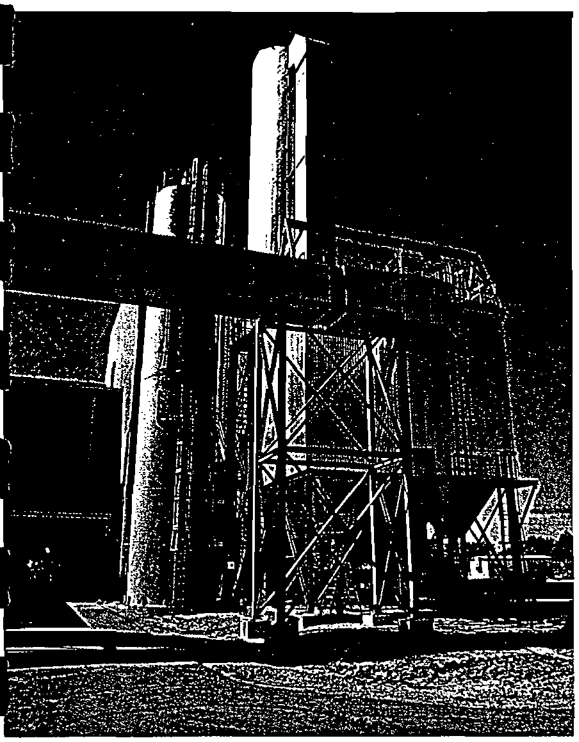
9

9. This four-module system located in Tennessee is the third Beta/Mark fabric filter purchased by this food-processing company.

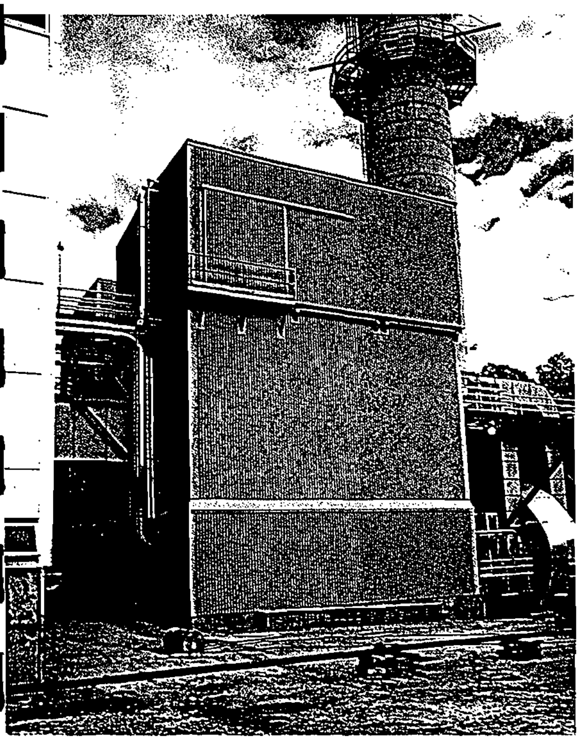


10

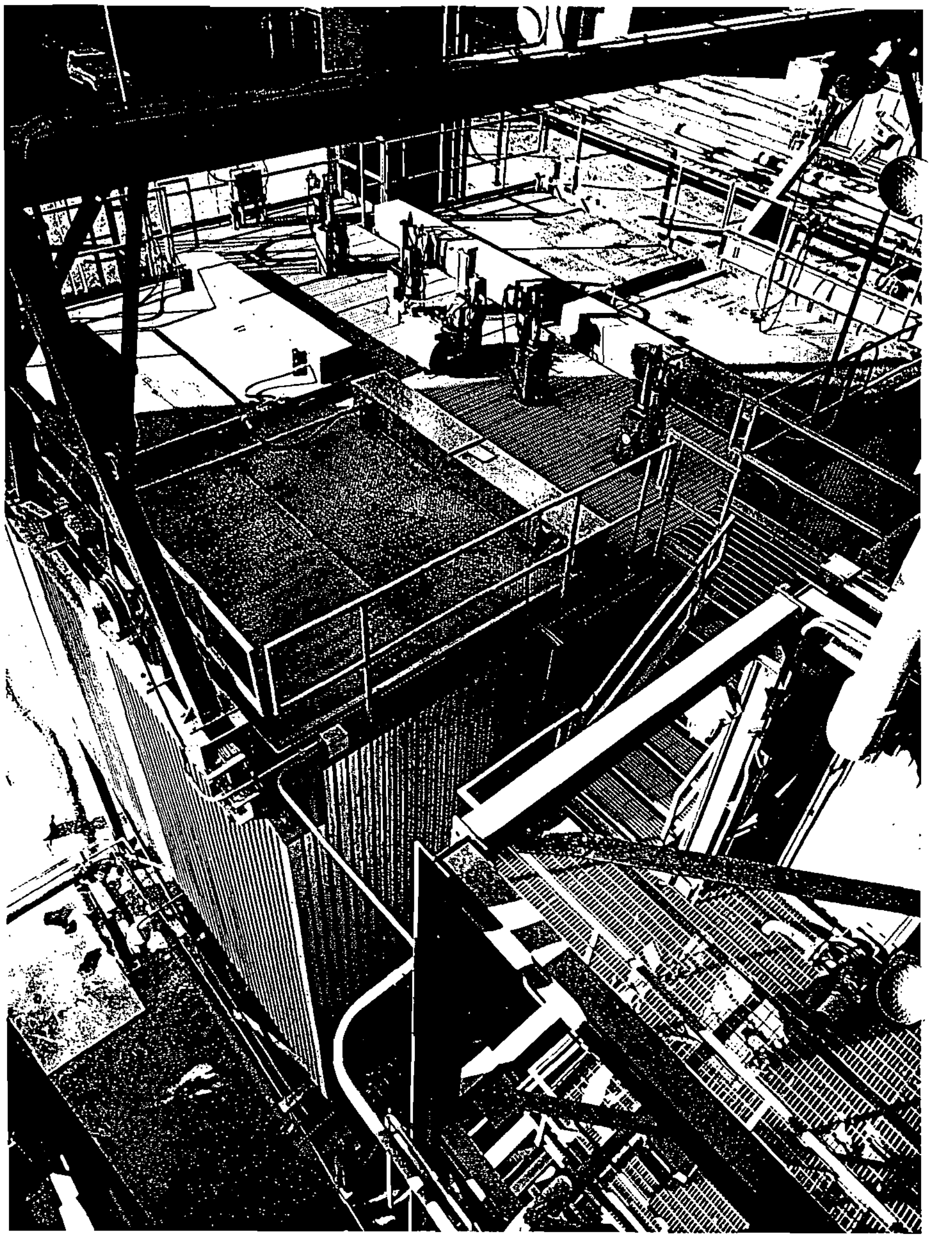
10. This midwest automotive manufacturer has three Beta/Mark fabric filters handling three spreader-stoker, coal-fired boilers.



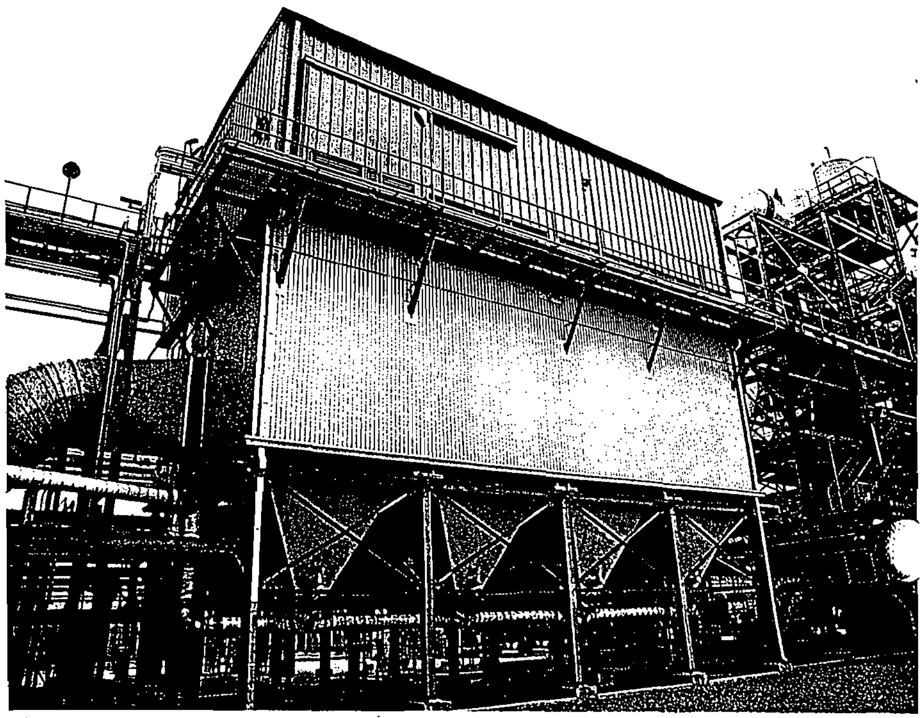
11



12



13



14

11. United McGill supplied a fabric filter, spray-dry scrubber, and electrostatic precipitators for this waste-to-energy plant. The four-module fabric filter system controls emissions from a 249-ton/day municipal solid waste incinerator.

12. A pair of six-module fabric filters control emissions from a 275,000-lb/hr circulating fluidized-bed boiler that burns coal at this southern university.

13. This Beta/Mark fabric filter has been operating since 1985 on the circulating fluidized-bed boiler at a grain-processing plant in Tennessee.

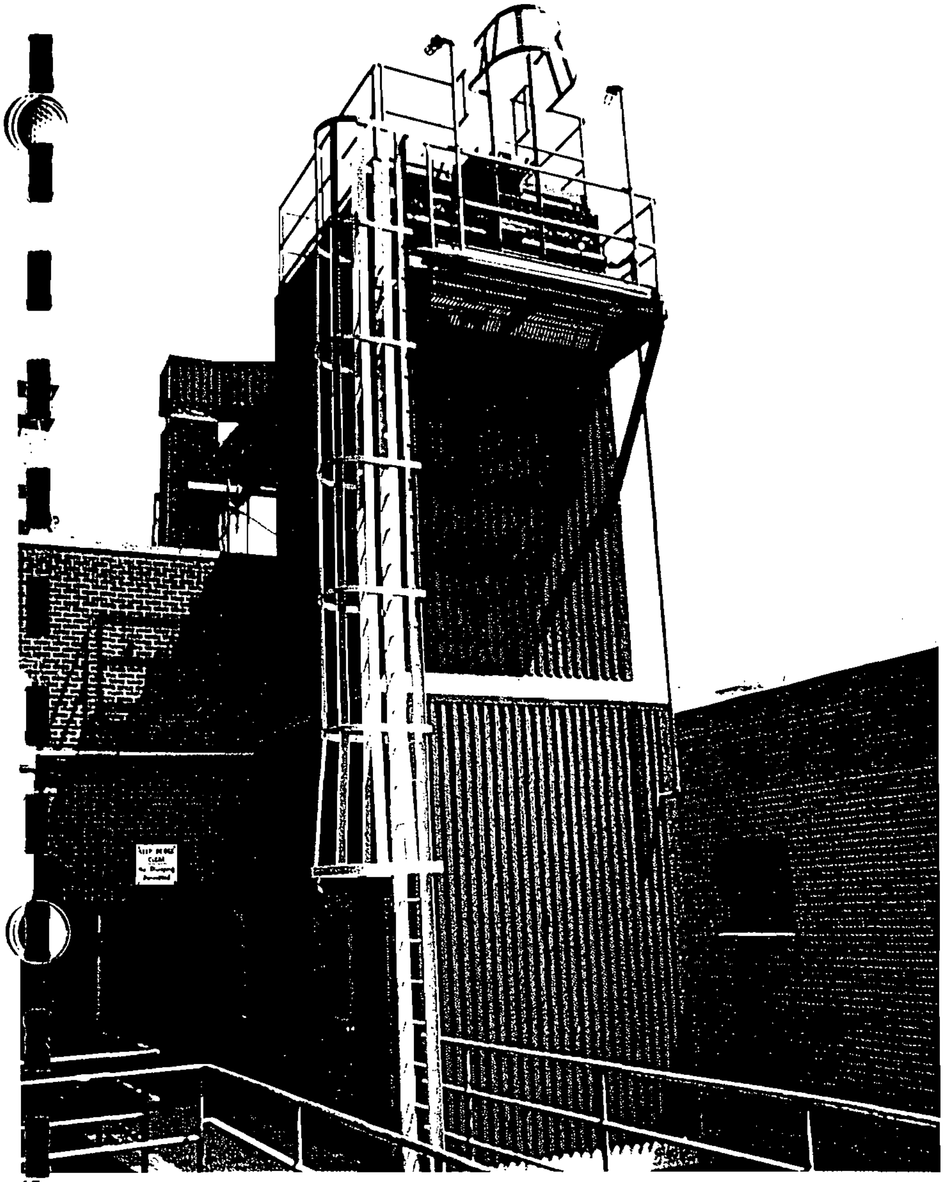
14. An eight-module fabric filter controls emissions from a rotary kiln incinerator that burns hazardous waste at this Texas chemical plant.

DEPARTURE™ Fabric Filter Systems

Incinerators that burn infectious and hazardous waste have special emissions control requirements. Our DEPARTURE™ fabric filter system is designed to meet these requirements. This system is sized specifically for the lower gas volumes and emissions limitations of infectious and some hazardous waste incinerators.

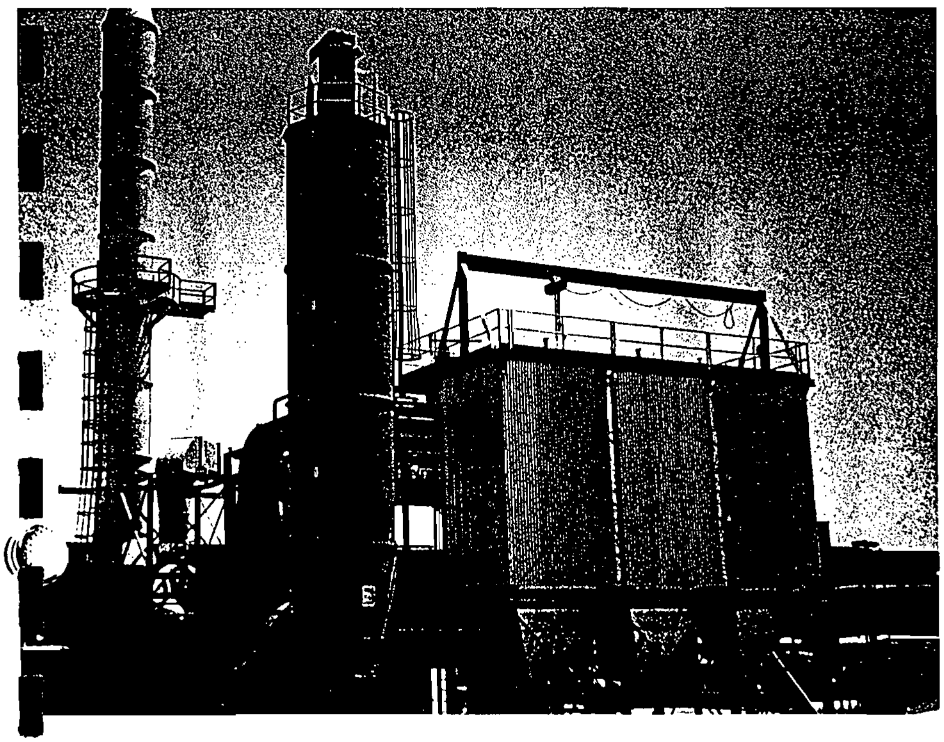
The DEPARTURE™ system incorporates temperature reduction, dry reagent injection, and ash/reactant collection. Temperature reduction is important because it improves acid gas reaction and allows the use of fabric filter bags that cost less. Reagent injection is important because it converts acid gases to solids that can be collected by the fabric filter.

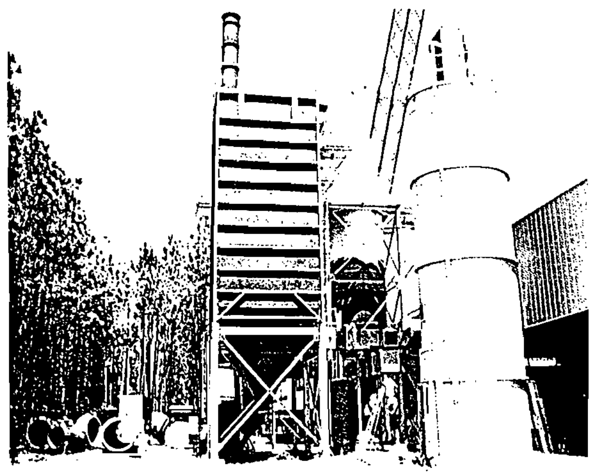
This system provides totally dry removal of acid gas and particulate. The benefits of a dry system are (1) ash disposal is easy, (2) the low pressure drop means low operating costs, and (3) there is no visible steam plume. We can help your infectious or hazardous waste incinerator meet emissions standards with a DEPARTURE™ fabric filter system that is economical and easy to maintain.



15

15. Emissions from this Ohio hospital's 1,250-lb/hr medical waste incinerator are handled by a DEPARTURE™ fabric filter system with dry lime injection.





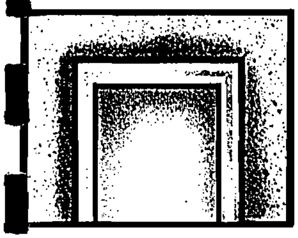
17

16. To control emissions from this 72-ton/day medical waste incinerator in Oklahoma, United McGill supplied a three-module DEPARTURE™ fabric filter system with dry lime injection and condensing heat exchanger.

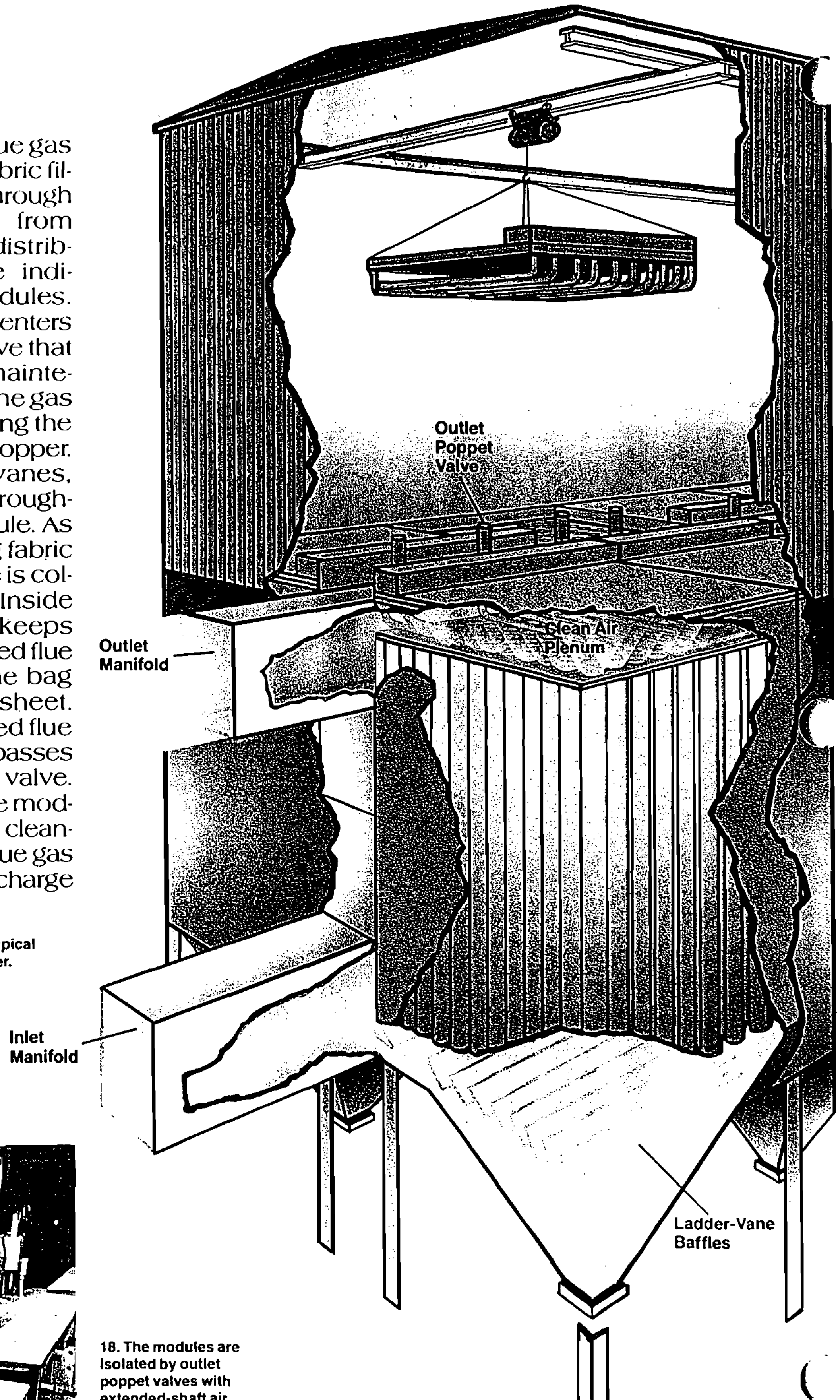
17. United McGill supplied a complete emissions control system for this 1,900-lb/hr medical waste incinerator in Florida, including a one-module fabric filter, dry lime injection, evaporative cooler, ductwork, fan, and stack.

How Our Fabric Filters Work

Collection Process

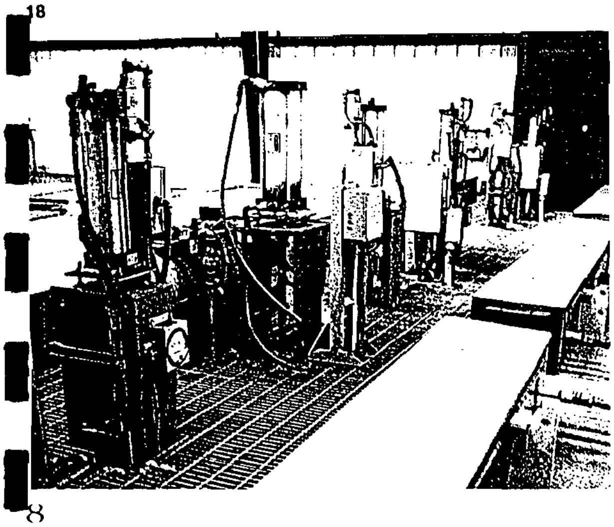


Ash-laden flue gas enters the fabric filter system through a manifold, from which it is distributed to the individual modules. The flue gas enters each module through an inlet valve that remains open except during maintenance. Once inside the module, the gas strikes a ladder-vane baffle, causing the largest particulate to fall into the hopper. The flue gas continues past the vanes, which distribute the gas evenly throughout the bag matrix within the module. As the flue gas flows through the bag fabric from outside to inside, particulate is collected on the outside of the bag. Inside each bag is a rigid wire cage that keeps the bag from collapsing. The cleaned flue gas then flows out the top of the bag through an opening in the tubesheet. Upon exiting the bags, the cleaned flue gas enters a clean-air plenum and passes from the module through an outlet valve. This valve can be closed to isolate modules for either maintenance or bag cleaning. A manifold system ducts the flue gas from all modules to a common discharge point.

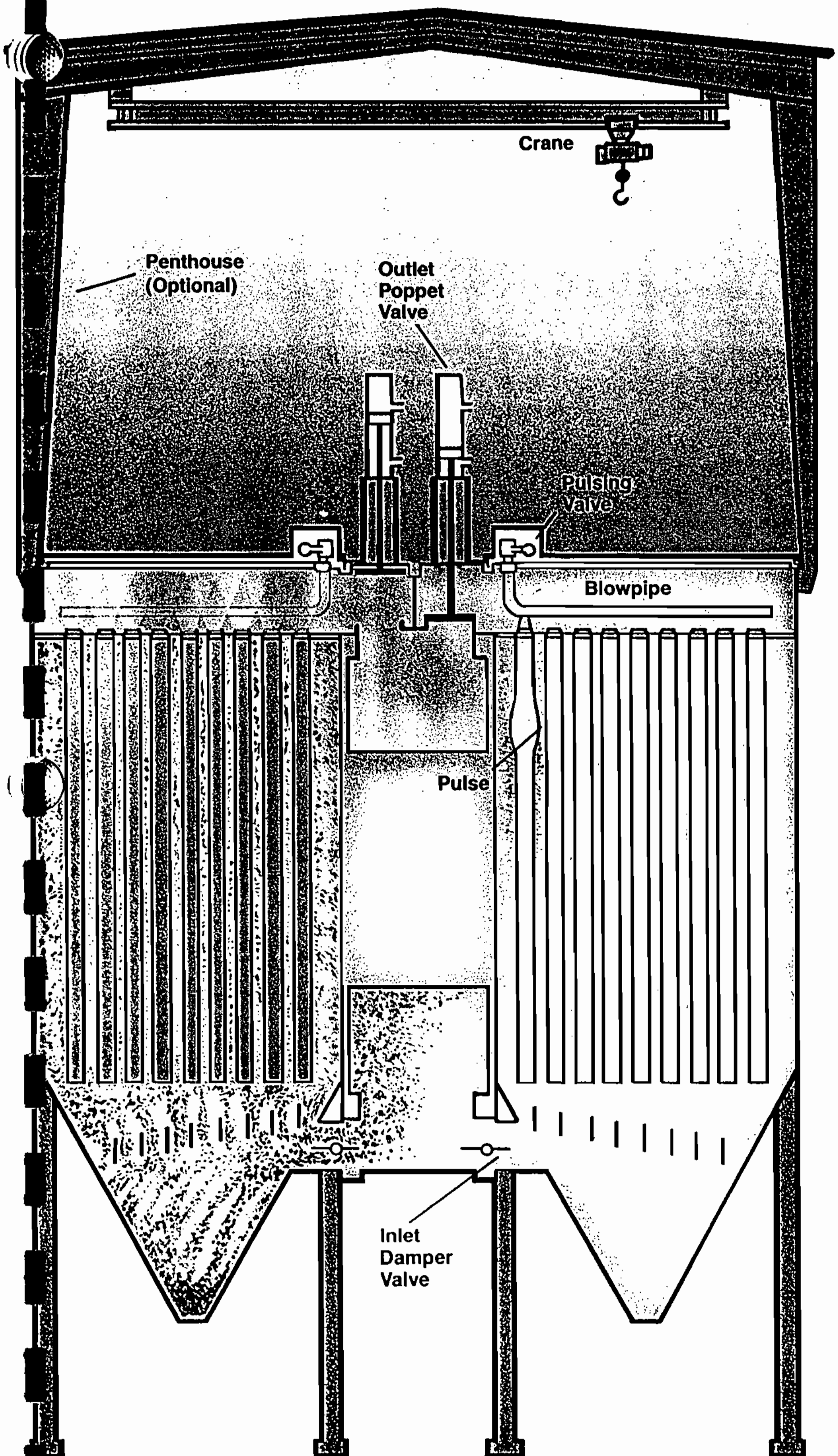


Cutaway view of a typical Beta/Mark fabric filter.

18



18. The modules are isolated by outlet poppet valves with extended-shaft air cylinder operators.

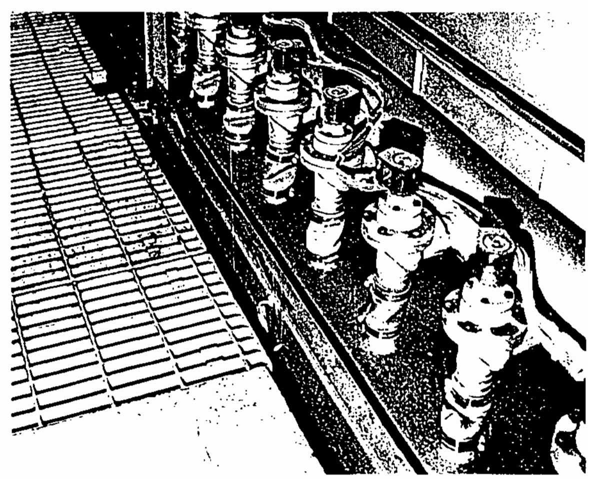


Cleaning Process

The control system automatically begins the cleaning sequence when the buildup of particulate on the bags causes the pressure differential to reach a preset level (a timed override is also provided). A module is isolated for cleaning by closing its outlet valve to the pulse position. The bags in the isolated module are then pulsed one row at a time. Solenoid-piloted diaphragm valves provide bursts of compressed air that travel the length of the bags, causing the bags to snap outward. These pulses dislodge particulate from the outer surface of the bags, and it drops into the hopper where it is collected for removal. When all bags within the module have been cleaned, there is a null period to allow particulate to settle into the hopper. The module is then returned to service and the next module is isolated for cleaning.

Artist's rendering of gas flow and distribution by ladder-vane baffles.

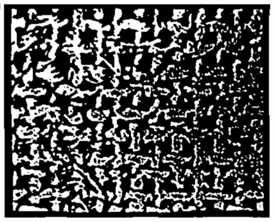
19. Pulsing valves and solenoids are enclosed in a service module to protect them from damage and weather.



19

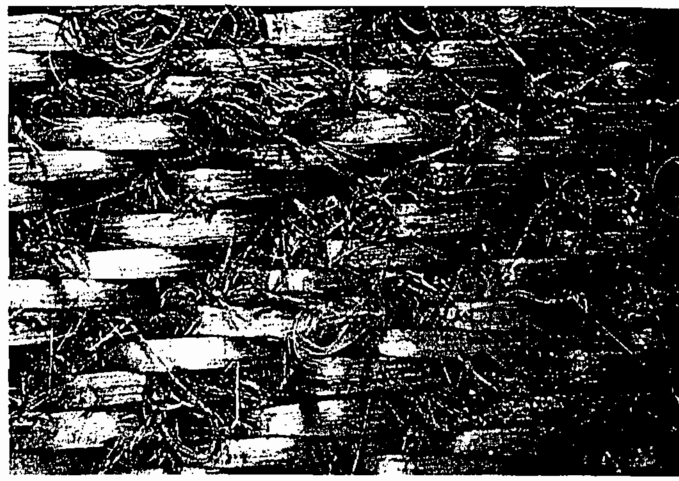
Design Considerations

Fabric Selection



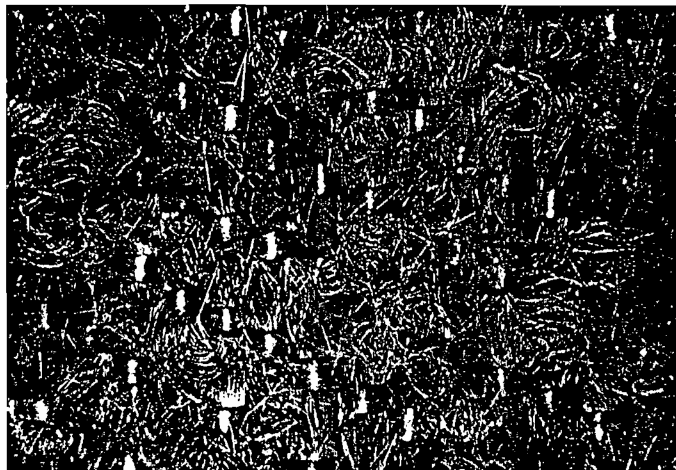
More than a decade ago United McGill's Beta/Mark fabric filter was the first outside-bag collector to use woven fiberglass bags successfully. Since then, woven fiberglass has become the standard fabric for conventional solid-fuel-fired boilers and incinerators. Many newer applications, however, present problems such as varying temperatures, high particulate loadings, and the need for desulfurization or acid removal. As a result, it is necessary to study an individual application before choosing a fabric.

In addition to being the first to use woven fiberglass successfully, we have stayed abreast of the changing fabric technology. Our experience working with and evaluating other fabrics qualifies us to select the fabric that suits your application best. By designing systems for use with woven fiberglass, we make them versatile enough to use a felted fabric if it proves better in a particular application. Fabric filters that are designed specifically for felted fabrics, however, cannot use woven fiberglass without substantial design modifications. The versatility of our design makes it easy for us to adapt our systems to the newest fabric developments.



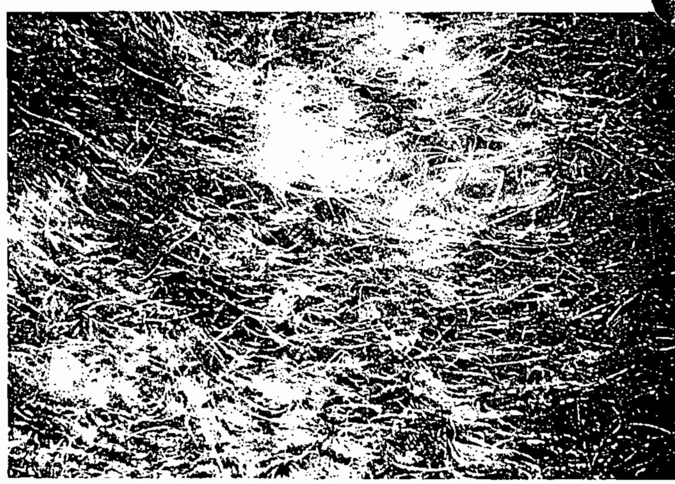
20

20. Woven fiberglass, such as this 16.5-ounce sample with a Teflon®B finish, has become the industry standard for bag material on most boiler applications. Teflon® is a registered trademark of Du Pont.



21

21. Woven fiberglass that is highly texturized has been developed for collecting extremely fine particulate.



22

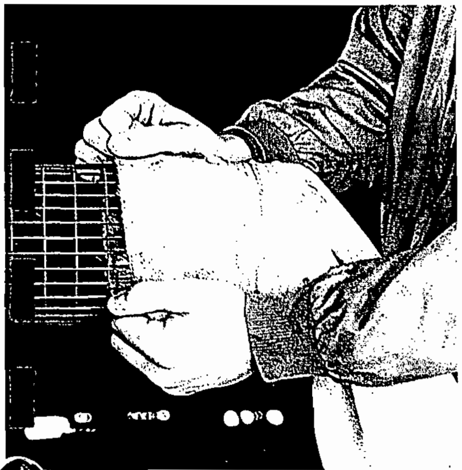
22. Felted fabric is suitable for low-acid applications and high grain loadings of abrasive particulate.

23

23. A membrane with submicron pores is laminated to a backing material to provide extremely high collection efficiency and easy release of sticky materials.

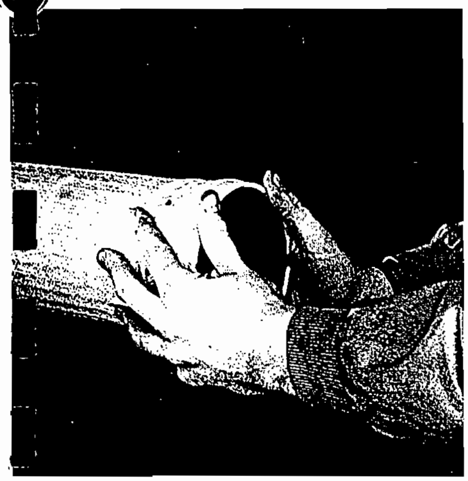
24

25

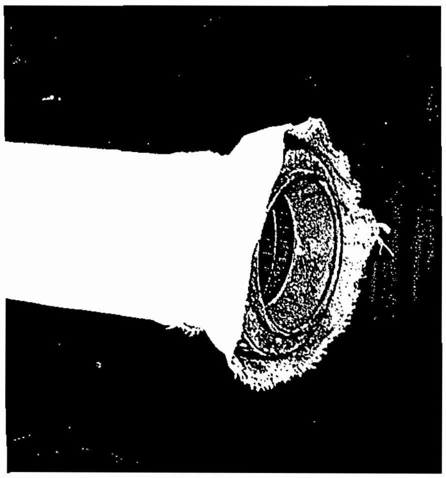


26

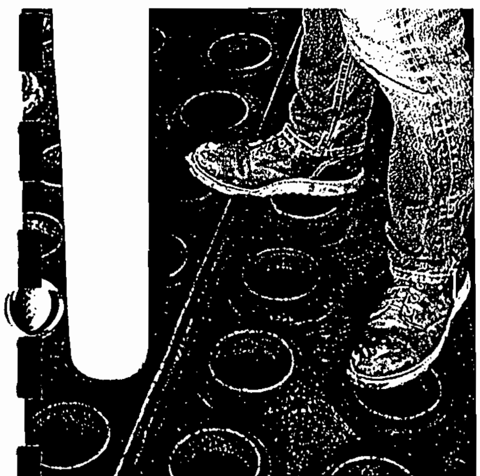
27



28



29



30

31

Bag/Cage Connection

A poorly designed connection between the tubesheet and the bag/cage can lead to a number of problems, especially with woven fiberglass bags. Particulate will leak through the system if the connections are not gastight. Replacing bags will be more difficult and time-consuming if the connection is not designed to engage and disengage easily. Bags will wear out too quickly if a connection is not conducive to bag tensioning and a tight bag/cage fit.

The bag/cage apparatus is rigidly clamped to a drawn cup on the tubesheet, preventing ash from leaking out or bags from rubbing against each other. To make bag installation and removal easier, the tubesheet holes are approximately ½ inch in diameter larger than the bag/cage. The top of each bag is flared so that it can be pulled up until it fits the cage properly. Tension is maintained by a compression band sewn in at the bottom edge of the bag. Alternative bag/cage designs are also available.

24. Bag clamp is removed to start bag-changing procedure.

25. Bag/cage assembly is pulled up through tubesheet opening.

26. After removing old bag from cage, bottom of cage is inserted into new bag.

27. New bag is fitted over entire cage.

28. Compression band is attached at bottom of cage.

29. Flared bag top allows bag to be tensioned on cage.

30. Bag/cage assembly is lowered through tubesheet opening.

31. Drawn cup on tubesheet helps provide tension for bag.

Gas Velocity and Distribution

Many engineers size fabric filters strictly on the basis of air-to-cloth ratio, overlooking flue gas distribution and "can" velocity (see Figure 1). Yet these considerations are particularly important with woven fiberglass, a fabric that is very sensitive to abrasion. When gas distribution is uneven or internal velocities are too high, frequent bag cleaning, high abrasion, and high particulate re-entrainment can cause premature bag failure.

When designing a fabric filter, United McGill considers both flue gas distribution and can velocity within the system. We equip each module with ladder-vane baffles rather than the conventional strike plates or diffusers used by many manufacturers. In addition to removing large particulate, the baffles distribute flue gas evenly throughout the module. By spacing bags far enough apart (3 inches or more), we reduce gas velocity around the bags to an acceptable rate. These design features prolong bag life and allow us to use bags of up to 20 feet long, making the system less expensive and maintenance simpler.

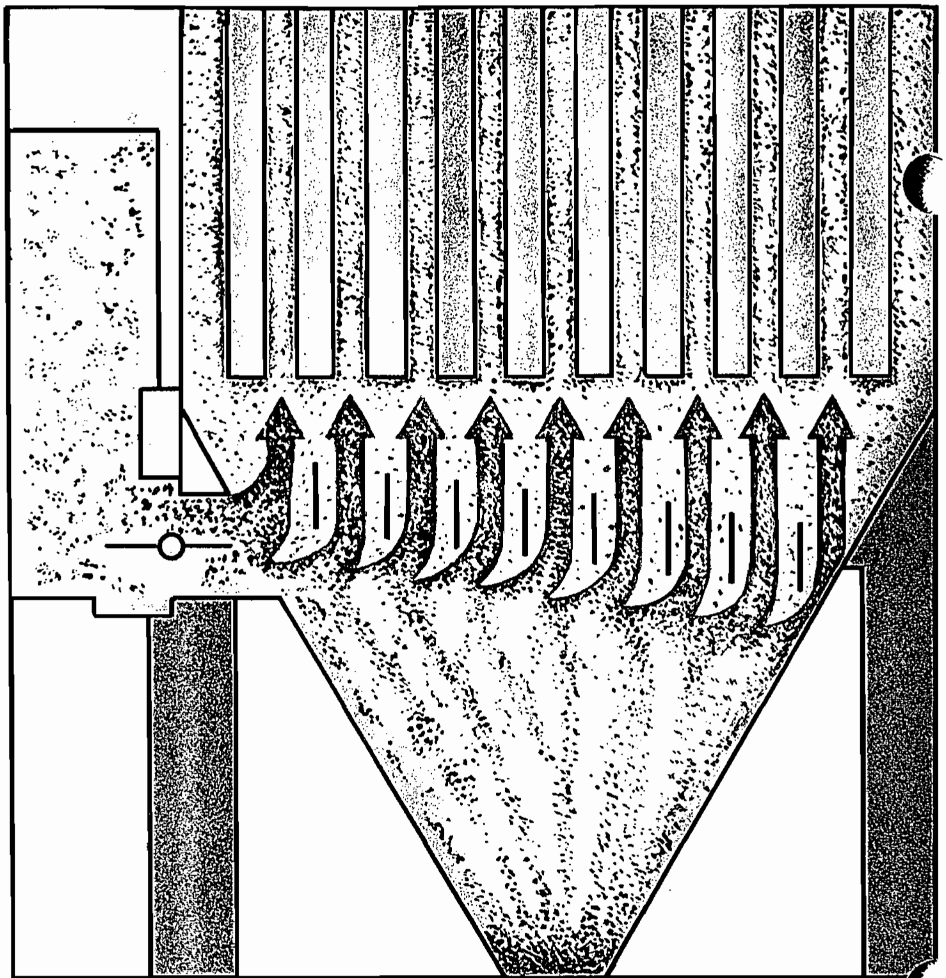
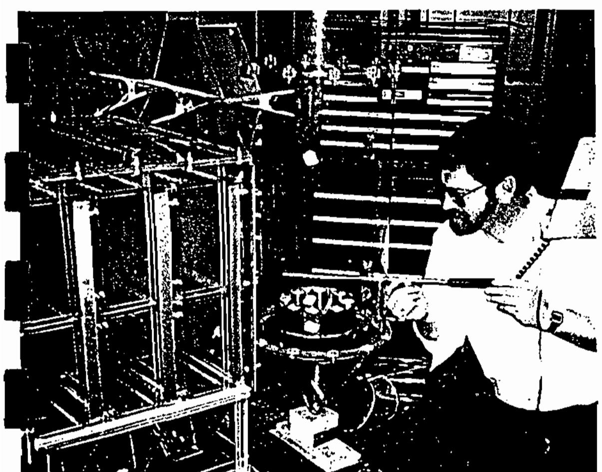


Figure 1 — Can Velocity

Can velocity is the velocity of the flue gas as it passes the bottom of the bags (maximum abrasive velocity), as shown in the illustration above. It can be determined by using the following equation.

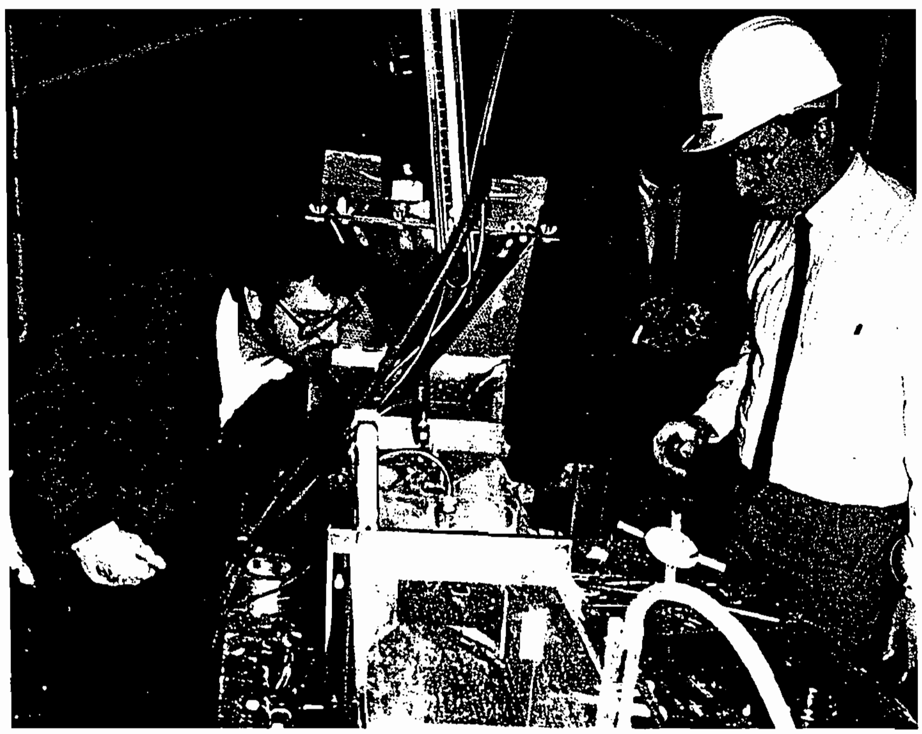
$$\text{Can Velocity} = \frac{\text{Gas Volume/Module (net conditions)}}{\text{(Module Cross-Section Area)} - \text{(Bag Bottom Area)}}$$



32

32. Models of spray-dry scrubbers and evaporative coolers are tested in our airflow lab to make sure that flow distribution provides complete evaporation of water.

33. Model testing of different reagent injection techniques optimizes the system design and ensures that the reagent will be used as fully as possible.



33

Table A—Beta/Mark Standard Module Sizes

Module Size	Cloth Area (sq ft)	Approximate Dimensions (ft)				
		A	B	C	D	E
210-19	5,954	12	12	21	11	5
210-16.5	5,170	12	12	18.5	11	5
210-14	4,387	12	12	16	11	5
156-19	4,423	10.5	10.5	21	9	4
156-16.5	3,841	10.5	10.5	18.5	9	4
156-14	3,259	10.5	10.5	16	9	4
110-19	3,119	9	9	21	7.5	3
110-16.5	2,708	9	9	18.5	7.5	3
110-14	2,298	9	9	16	7.5	3

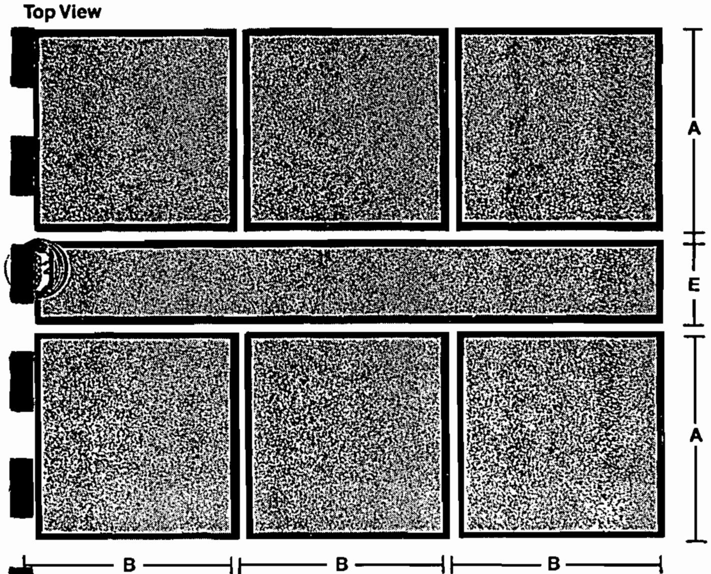
Sizing

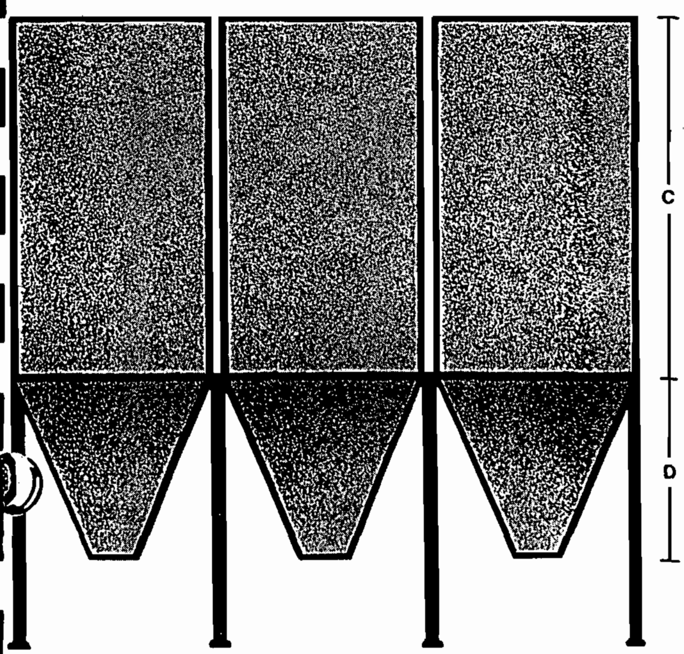
We use a standardized modular design that is economical to build and operate. Each module is a separate compartment within the fabric filter system. Rather than redesigning the entire system for each application, we simply include as many of these standard modules as an application requires.

Table B—DEPARTURE™ Standard Module Sizes

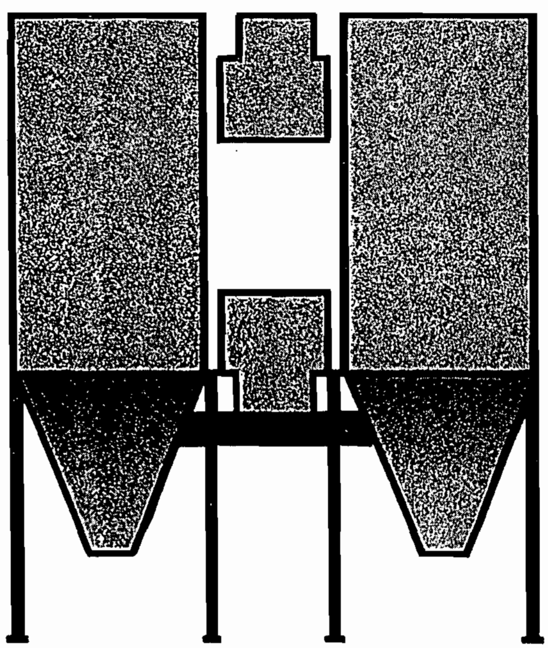
Module Size	Approximate Dimensions (ft)			
	A	B	C	D
36	5.5	5.5		5
54	5.5	8		6
72	5.5	10	Bag length plus 2 feet	7.5
108	8	10		8.5
144	10	10		9.5
180	10	12		10.5

Top View





Side View

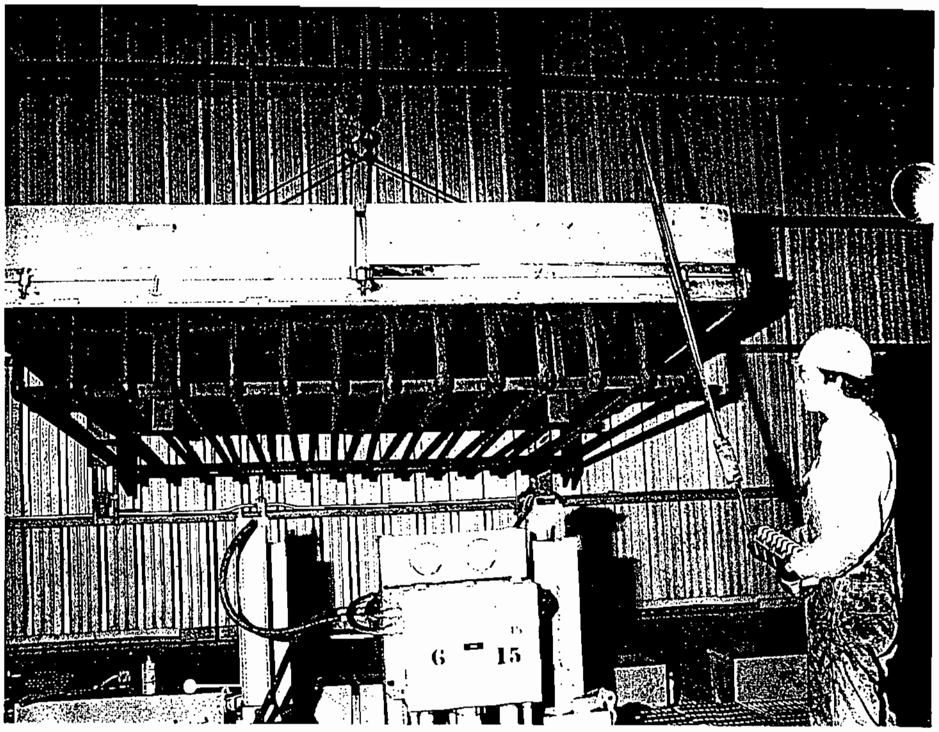


End View

Easy Maintenance

Bag inspection and replacement are the most critical and time-consuming operations performed on a fabric filter. To inspect and service the bags properly, maintenance personnel must have satisfactory working conditions.

United McGill fabric filter systems are designed so that maintenance work can be done from an outside environment that is safe and free from particulate and gas. Your maintenance personnel have easy access to the bags from a roomy platform the size of the entire system rather than from a confining walk-in plenum. For large systems, a 2-ton crane is provided to remove the top door of each module. Pulse piping and valves are removed with this door, allowing immediate access to the bags. Piping and valves can be electrically isolated and disconnected easily.



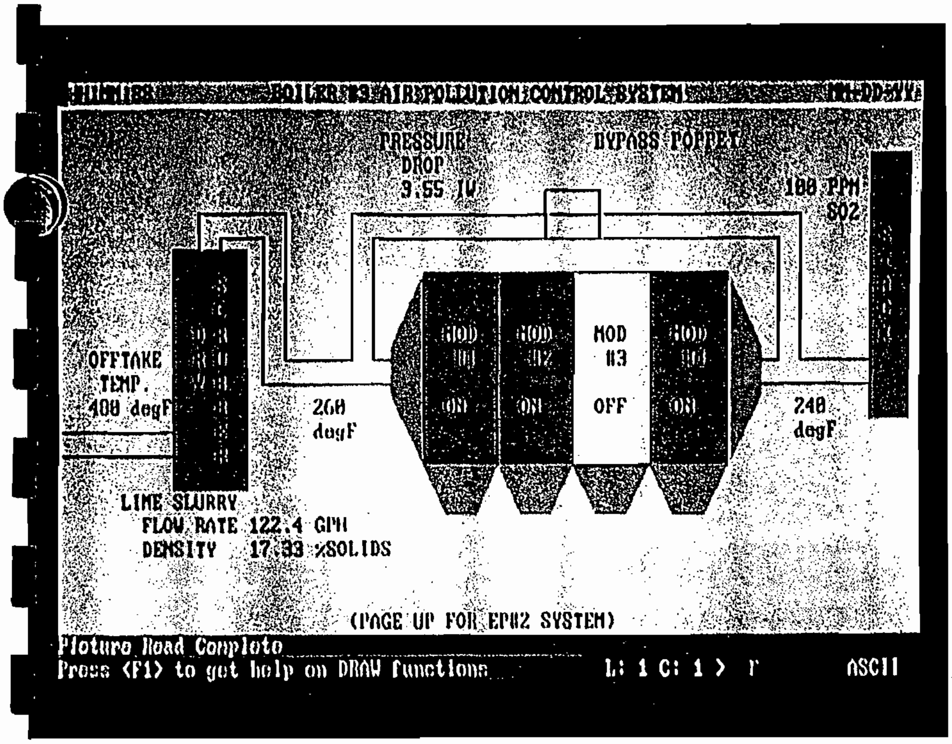
34. An overhead crane removes top door with attached pulse piping and valves to provide easy access to a module's bags.

35

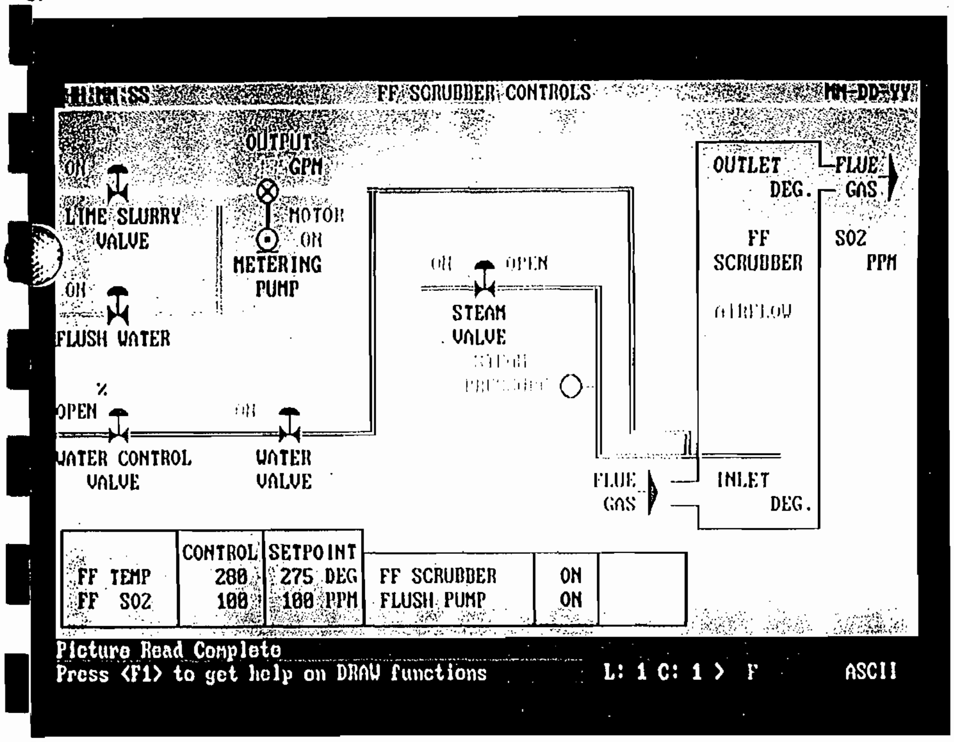
35. Once the door is removed, a module's entire tubesheet is immediately available for bag inspection or maintenance.

36

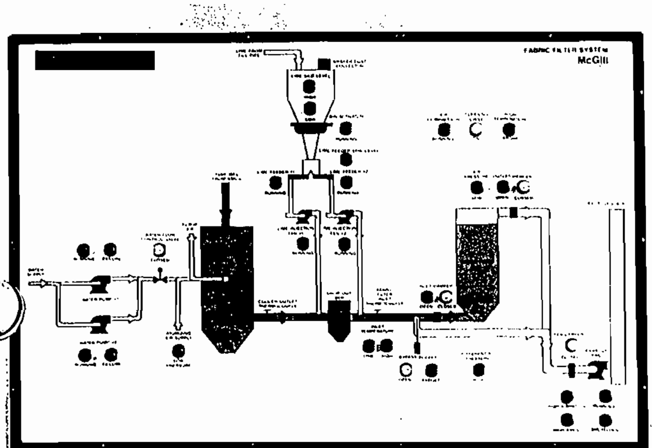
36. Bags are changed from a safe, ambient environment.



37



38

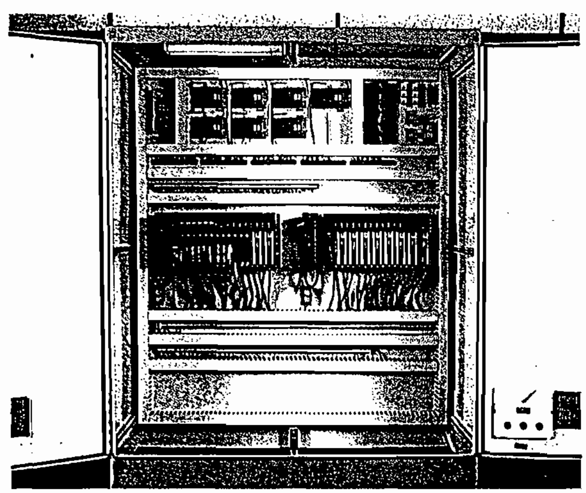


39

Control Systems

To make our fabric filters easy to operate and maintain, we supply a control system that meets your needs and budget. One option is running the fabric filter system with a programmable logic controller (PLC). Another is combining a PLC with a personal computer (PC). The PLC is the brains of the control system, making decisions about the day-to-day operations of your equipment. Both options put control of all functions at your fingertips, while providing visual displays so you can monitor operations.

We can custom design a control system for your application, even to the extent of having it interact with your boiler controls. The unit is preprogrammed to control pulse duration, pulse sequencing, cleaning cycle time, settling time, module isolation valves, and alarm functions. Alarms alert the operator if problems with temperature, pressure, or particulate levels occur within the system. Controls can be set up near the fabric filter or in a remote location, depending on the requirements of your facility.



40

37. Optional PC-based control system simplifies control of the fabric filter and all auxiliary equipment.

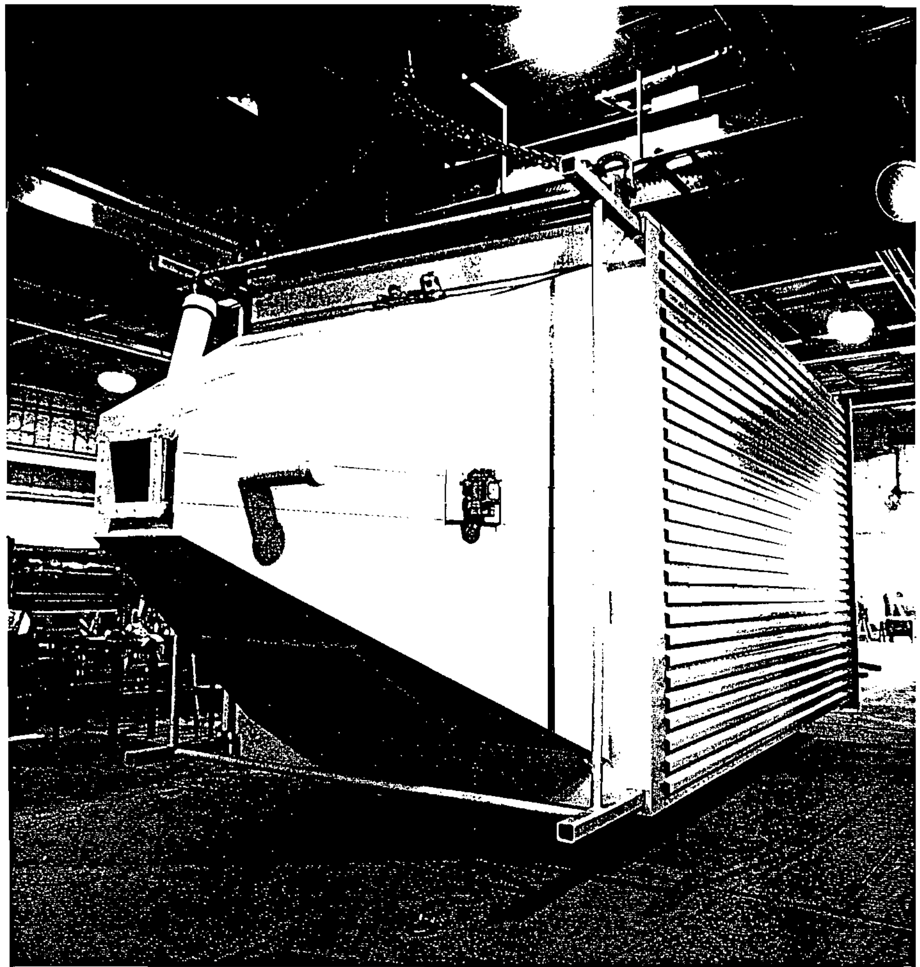
38. PC-based system provides detailed graphics to help keep track of operations within all subsystems.

39. Standard hard graphics display panel for monitoring system operations.

40. Standard control panel works with either hard graphics display or PC to control a fabric filter system.

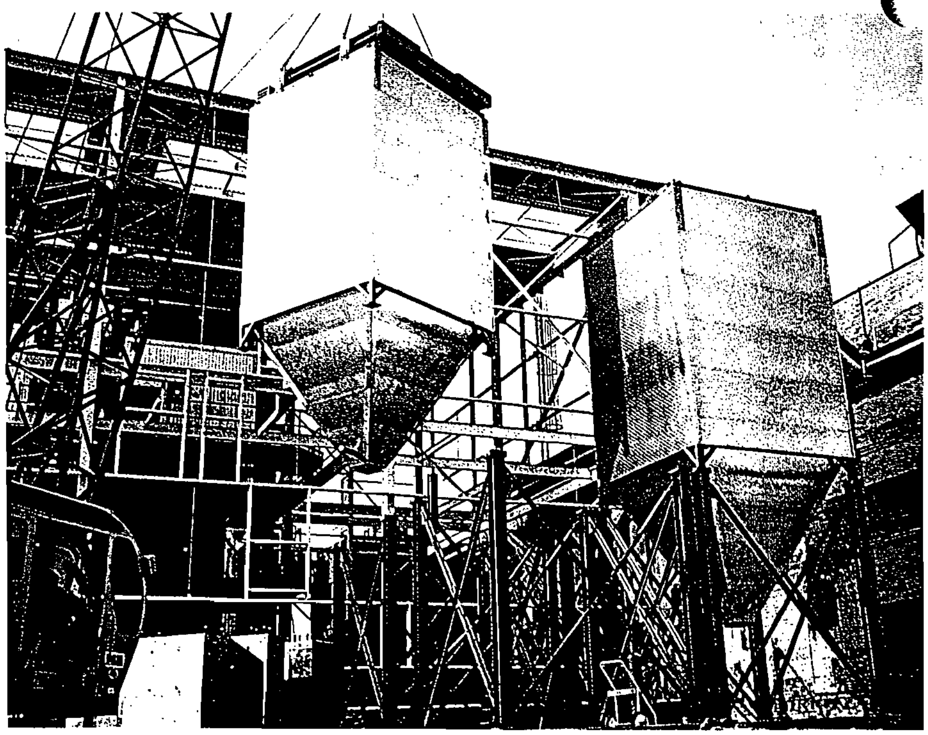
Overall Capabilities

United McGill provides complete turnkey service. We can handle engineering, manufacturing, and installation for your fabric filter system. By coordinating work at all stages of the project, we give you a complete, integrated system that costs less and is ready on schedule. Our field engineers, superintendents, and technicians manage the erection and start-up of all equipment. They can remain on site after the system has been installed to instruct your personnel in starting, testing, operating, shutting down, and maintaining the equipment. We work with you to monitor the performance of the system, making adjustments and providing service. Our goal is to supply you with a reliable and economical fabric filter that will enable you to meet your air pollution control requirements.



41

41. Our fabric filter systems are composed of individual modules insulated and assembled in the factory.



42

42. With the foundation work completed and structural support steel erected, each module is lifted into place on this four-module system.

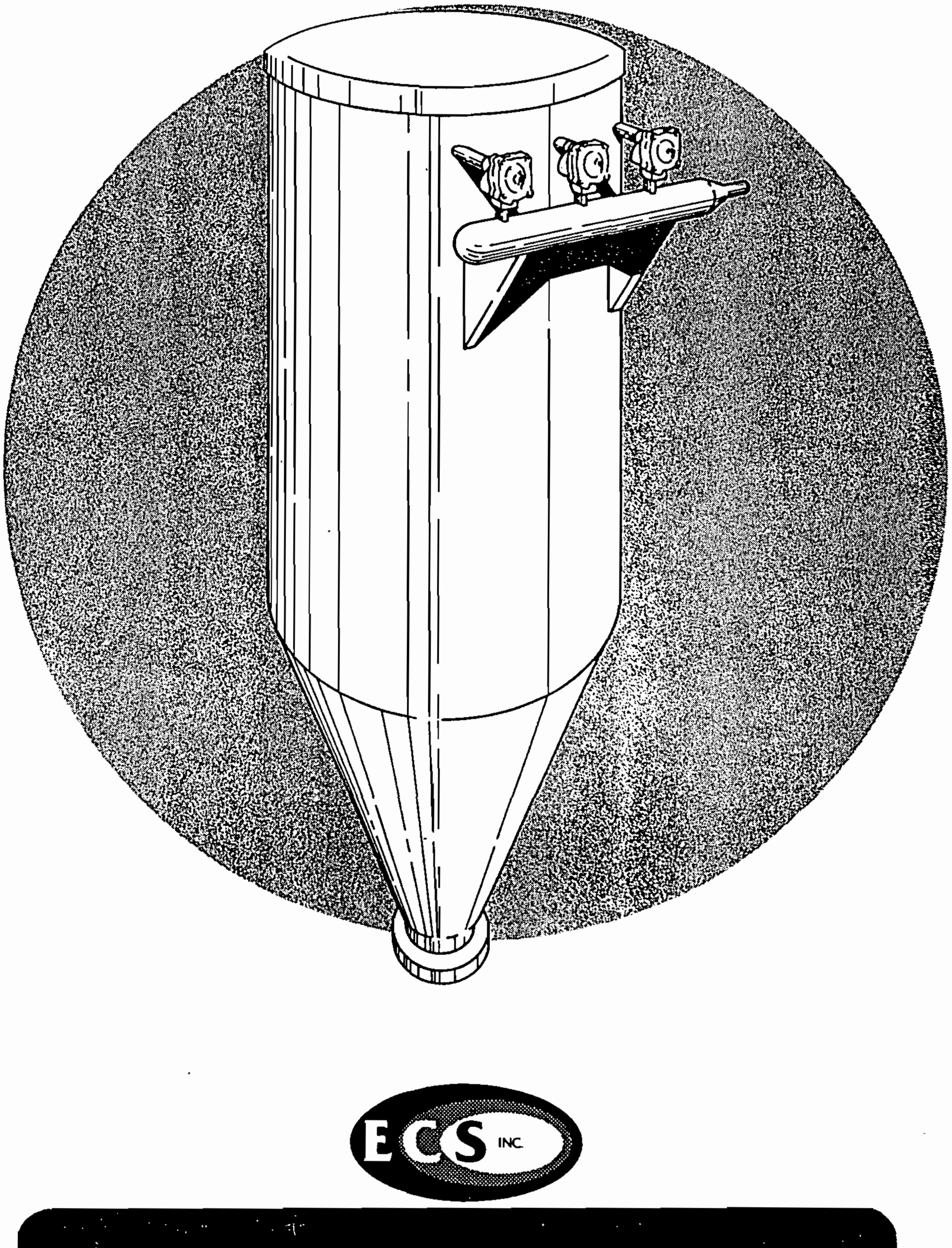
United McGill Corporation
1779 Refugee Road
P.O. Box 820
Columbus, Ohio 43216
614/443-0192
Fax: 614/445-8759

Form No.: FFBM Rev.1 5/91

Litho in USA

TYPICAL BIN VENT
FILTERING SYSTEMS

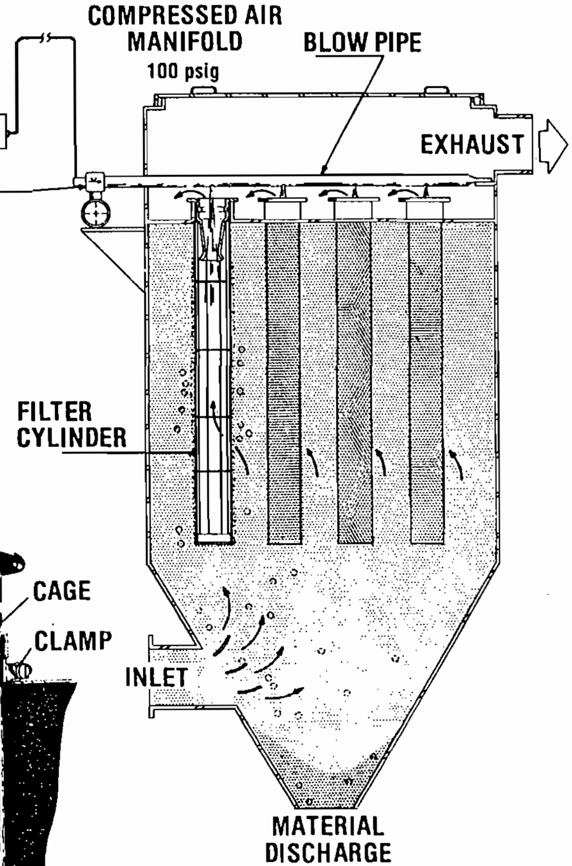
REVERSE PULSE BIN VENTS AND FILTER RECEIVERS

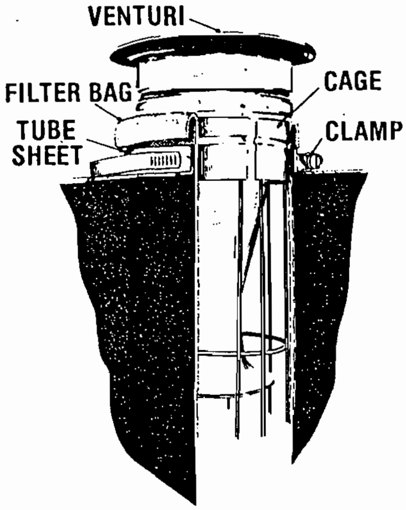


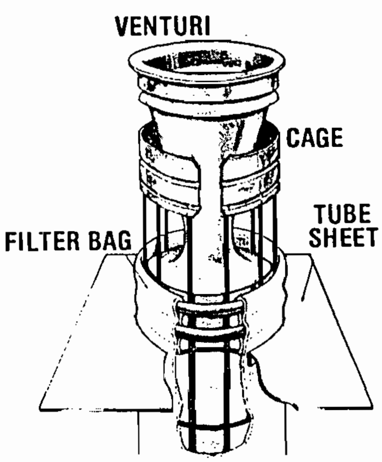
ECS INC.

Eastern Control Systems, Inc.
Fabric Filter Dust Collector
Bin Vents and Filter Receivers

The Eastern Control Systems' fabric filter collector is a reverse pulse air unit which gives the combined advantages of high capacity, high dust collection efficiency, and low maintenance. In addition to having fully automated cleaning, the collector has no internal moving parts and requires a minimum amount of floor space.







These three drawings depict the working details of a typical Eastern Control Systems, Inc., fabric filter dust collector. The complete unit is shown in the larger drawing at upper right. The upper of the two smaller drawings is a standard bag/cage assembly with double seal between bag and tube sheet. The lower of the smaller drawings shows the optional bag/cage assembly with snap band bag installation for rapid bag change.

OPERATION

- Dust laden air enters housing.
- Air passes through heavy felt bags and is exhausted.
- Dust is collected on the outside surface of the bag with 99.99%+ recovery.
- As dust accumulates on the bag surface, it is periodically removed by a pulse of high pressure air.
- Cleaning frequency and duration are adjustable and controlled by a transistorized solid state timer.
- Dust falls to the bottom of the hopper and is removed through an air lock.

DESIGN FEATURES

✓ *Completely Pre-Assembled*

Continuous welded construction eliminates caulked joints and leaks.

Minimum site preparation. (Unit can be set on a level pad).

No field assembly. (Assembly is completed at fabrication shop.) Optional side-mounted exhaust fan available.

✓ *Simplified Operation*

No internal moving parts — no compartmenting valves or mechanical shakers.

Fully automated reverse pulse cleaning — no need to shut down during operation for cleaning.

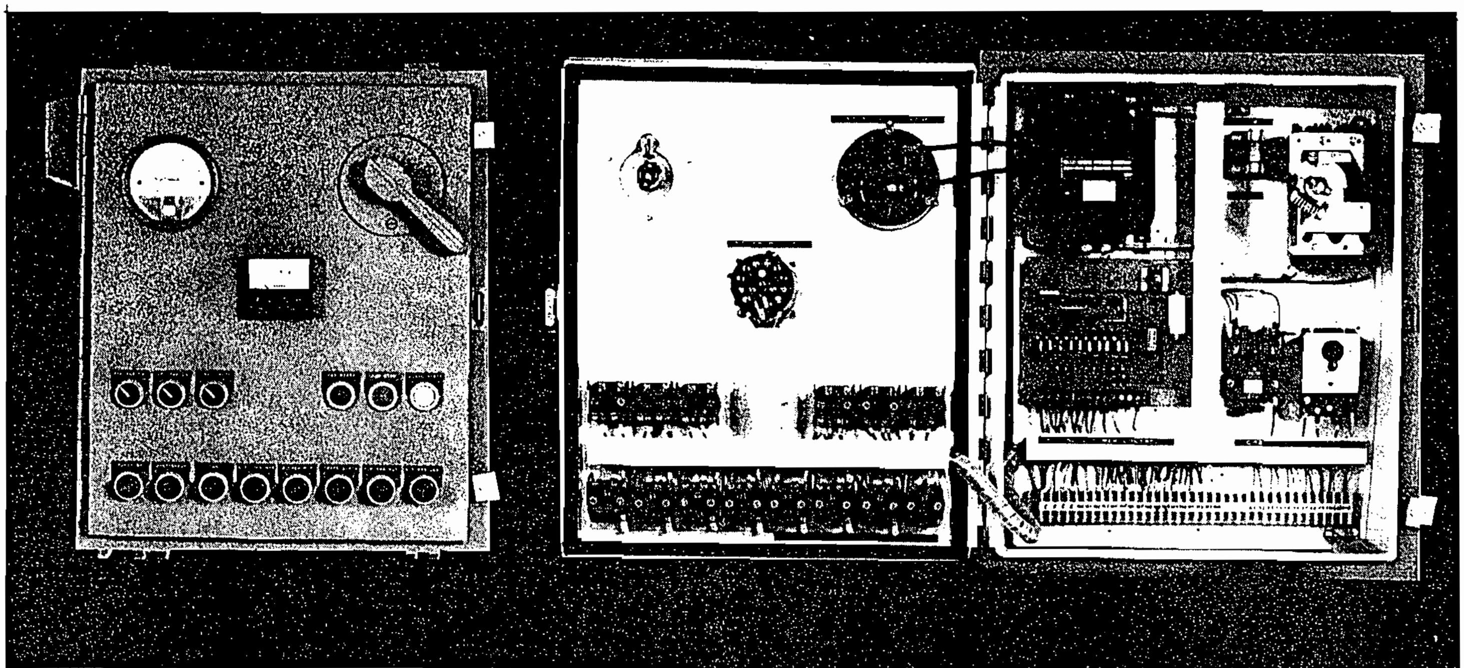
All controls are prewired in a single panel at the operator's fingertips, including:

Start-stop controls for all electrical components (blower, compressor, screw conveyor, etc.).

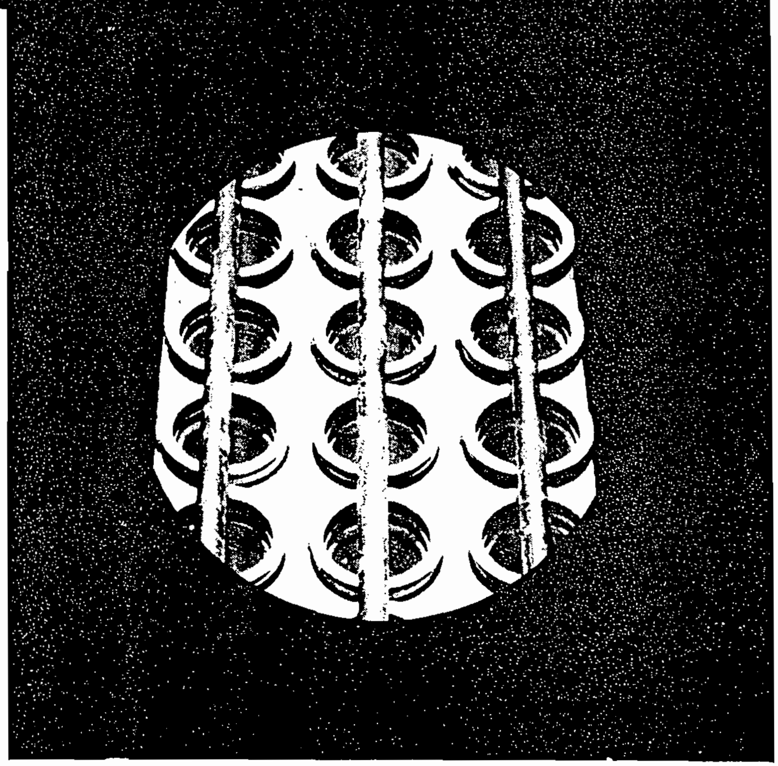
Transistorized solid state timer to control frequency and duration of cleaning.

Magnehelic gauge to monitor differential pressure across the filter bags.

Optional start-stop controls for all electrical components (blower, compressor, screw conveyor, etc.).



The top two photographs illustrate how the prewired control panel puts all controls at the operator's fingertips. The photograph at right shows how top access to filter bags simplifies installation and service.



Optional temperature indicator and controls for high temperature application to prevent damaging bags due to high temperature conditions.

Optional starters for fan, airlock, etc.

✓ *Optimum Cleaning System*

Rapid actuation of pilot-operated diaphragm valve virtually eliminates compressed air waste and maximizes peak pressure.

Theoretically-designed venturi and sparger orifice optimize cleaning versus compressed air usage.

Lower compressed air requirements than for most competitive products.

✓ *Double Seal on Filter Bag*

Stainless steel band seals bag to drawn tube sheet cup.

Venturi/cage combination presses bag to tube sheet cup inner surface.

Double positive seal eliminates leaks at bag/tube sheet interface.

SIMPLIFIED MAINTENANCE

✓ *No Internal Moving Parts*

No compartmenting valves or dampers.

No mechanical shakers.

✓ *All Electricals Totally Enclosed*

All controls are in control panel in control house.

All solenoid valves are in watertight enclosures accessible from top of collector.

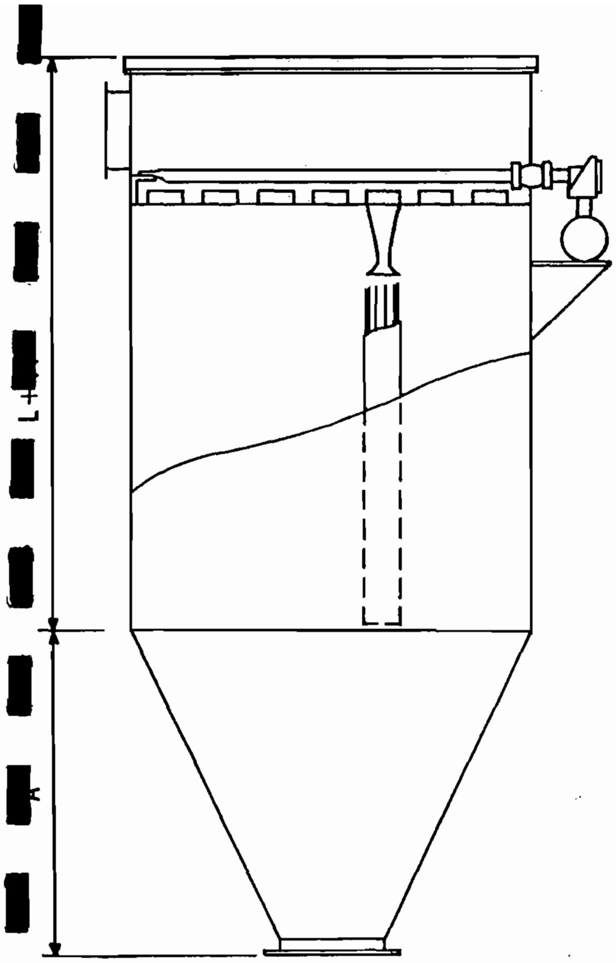
✓ *Top Bag Removal*

Eliminates need to enter dust side of baghouse to service bags.

Rapid servicing by one person with three hand tools — channel locks, 9/16" wrench, and 5/16" socket.

Breakdown cages available to minimize headroom requirements.

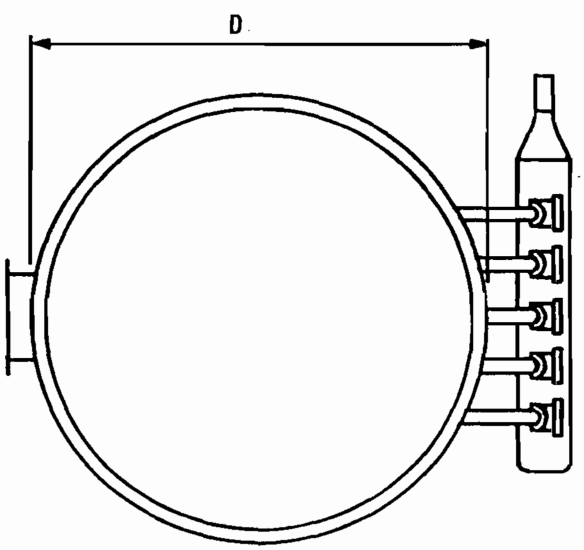
✓ *All Parts (Electrical and Mechanical) Can Be Serviced Rapidly.*

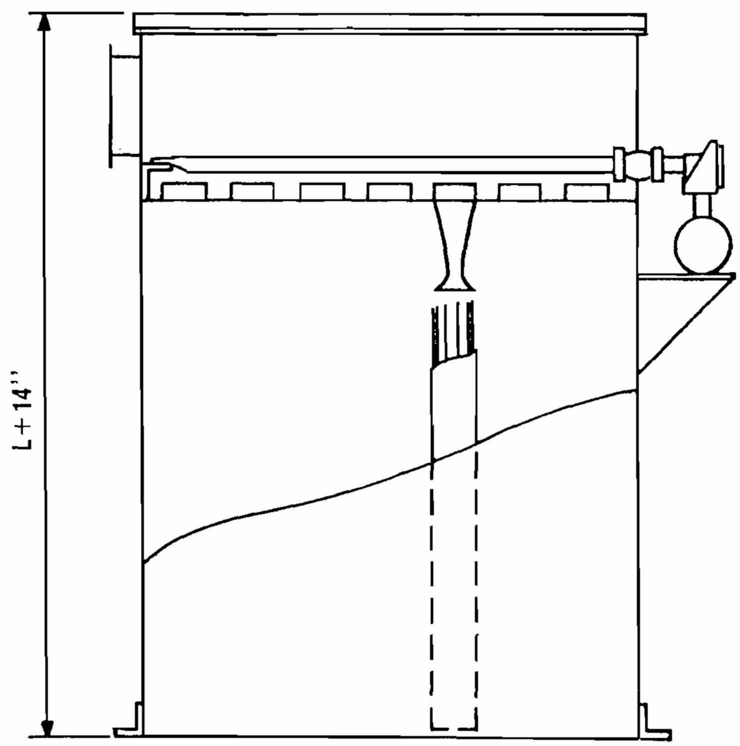


BIN VENTS

- ✓ *Inlet sized for 3000 to 3600 fpm (50 to 60 fps).*
- ✓ *Outlet sized for 3000 to 4000 fpm.*
- ✓ *Units available designed for either 100 or 220 inches w. g. internal pressure (to be specified by customer). Higher ratings are available upon request (special design).*
- ✓ *OSHA handrails and ladders available upon request.*
- ✓ *Overall height with hopper = bag length + A + 57 inches. Overall height without hopper = bag length +15 inches.*
- ✓ *Clearance beneath hopper outlet 42 inches standard. (Legs not shown but included in pricing.)*

MODEL	Approximate Dimensions		Bag Length (Ft.) vs. Area (Sq. Ft.)					
	D	A	5′	6′	7′	8′	9′	10′
10R	30	24	68	81	94	108	122	135
18R	38	30	122	146	171	194	219	243
24R	45	36	162	194	181	259	292	324
30R	50	38	202	243	284	324	364	405
36R	56	44	243	292	340	389	437	486
44R	62	49	300	360	420	480	540	600
52R	66	52	351	421	491	562	632	702
60R	70	56	405	486	567	648	729	810
80R	81	60	540	648	756	864	972	1080

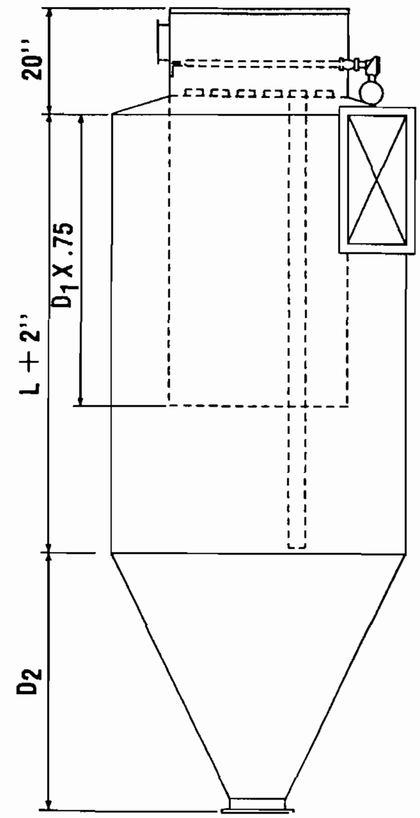




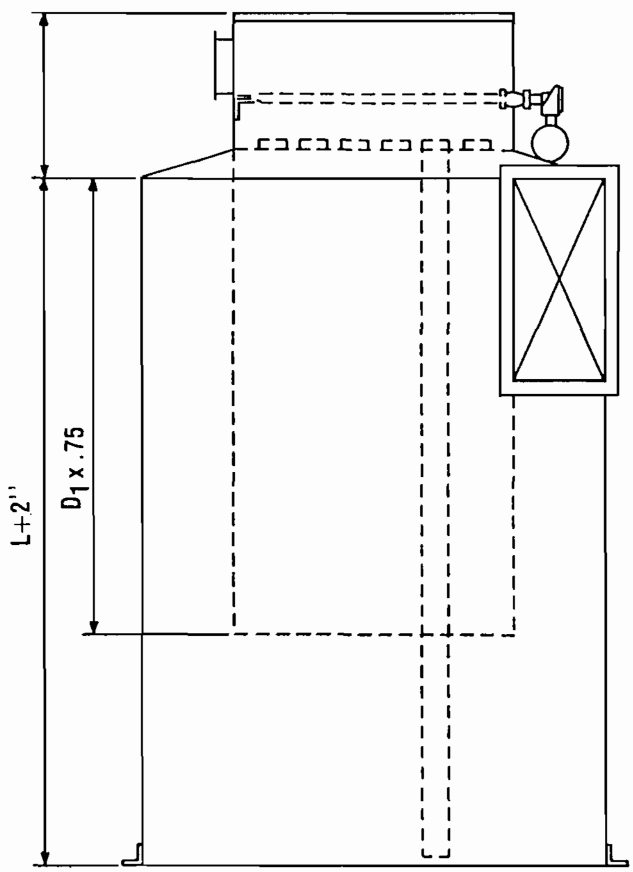
Filter Receivers / Bin Vents

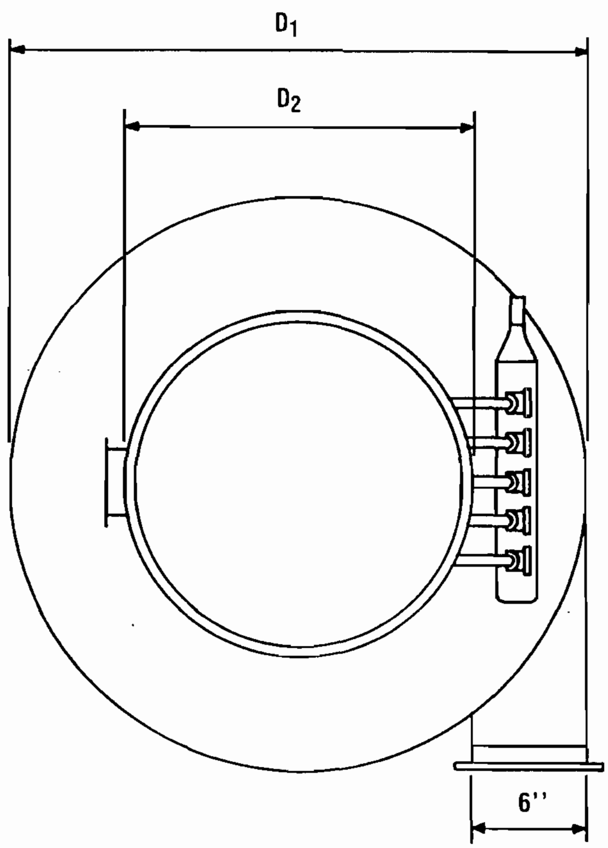
WITH CYCLONIC INLET (PREFERRED FOR HEAVY DUST LOADINGS)

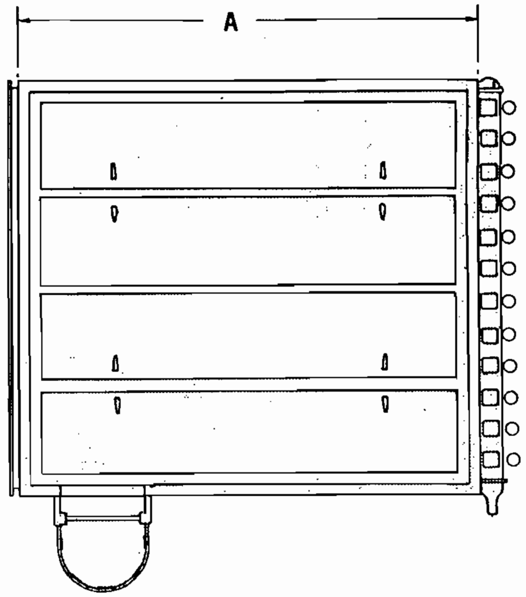
- ✓ *Inlet sized for 3000 to 3600 fpm (50 to 60 fps).*
- ✓ *Outlet sized for 3000 to 4000 fpm.*
- ✓ *Units available designed for either 100 or 220 inches w. g. internal pressure (to be specified by customer). Higher ratings are available upon request (special design).*
- ✓ *OSHA handrails and ladders available upon request.*
- ✓ *Overall height with hopper = bag length + D2 + 64 inches. Overall height without hopper = bag length + 21 inches.*
- ✓ *Clearance beneath hopper outlet 42 inches standard. (Legs not shown but included in pricing.)*

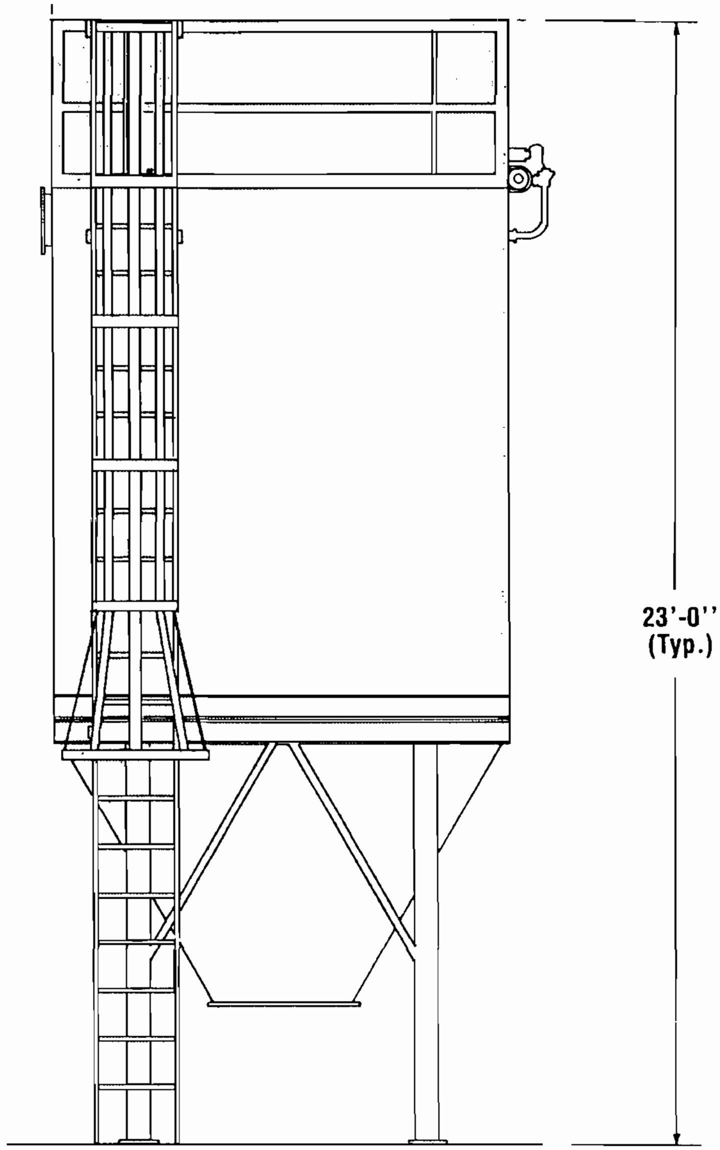


MODEL	Approximate Dimensions		Bag Length (Ft.) vs. Area (Sq. Ft.)					
	D_1	D_2	5′	6′	7′	8′	9′	10′
10RC	42	30	68	81	94	108	122	135
18RC	50	38	122	146	171	194	219	243
24RC	59	45	162	194	181	259	292	324
30RC	64	50	202	243	284	324	364	405
36RC	70	56	243	292	340	389	437	486
44RC	78	62	300	360	420	480	540	600
52RC	82	66	351	421	491	562	632	702
60RC	86	70	405	486	567	648	729	810
80RC	97	81	540	648	756	864	972	1080









Pre-Assembled Dust Collectors

Eastern Control Systems offers completely pre-assembled collectors with from 16 to 180 bags (up to 2,430 square feet of filter area.

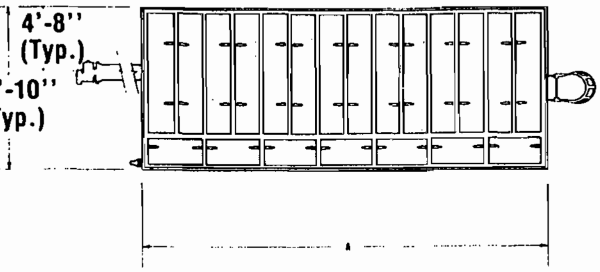
STANDARD FEATURES

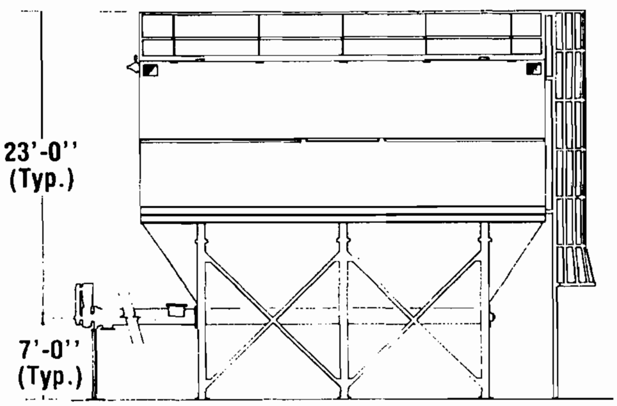
- Collector completely pre-assembled.
- All welded construction.
- Top bag removal. (Collapsing cages available when head room is limited.
- Bag length up to 10 feet. (Other bag lengths available on special request.
- Transistorized solid state timer.
- OSHA approved ladder and handrails when required .
- Prewired control panel.

ECS REVERSE PULSE COLLECTOR SPECIFICATIONS

Model *		16C-10	25C-10	36C-10	49C-10	64C-10	81C-10	100C-10	108C-10	135C-10	144C-10	180C-10
Filter Length (ft.)		10	10	10	10	10	10	10	10	10	10	10
Number of Filter Units		16	25	36	49	64	81	100	108	135	144	180
Cloth Area (sq. ft.)		216	338	486	662	864	1094	1350	1458	1822	1944	2430
Compressed Air Requirements CFM @ 70-90 psig	(max.)	6	7	9	10	12	13	14	14	15	19	23
	(avg.)	4	4	5	6	6	7	8	8	8	9	12
Approx. Wt. (lbs.)		2200	2500	2800	3200	3600	4100	4700	5000	5500	6000	10000
Dimension A (ins.)		34	40	47	54	65	72	78	86½	113	86½	113
Dimension B (ins.)		34	40	47	54	65	72	78	75	80	100	104

* These models are also available in 6 and 8 foot lengths. These collectors are also available in cylindrical configuration, and can be supplied in ratings up to 220" W. G.





also available

Large Capacity Dust Collectors

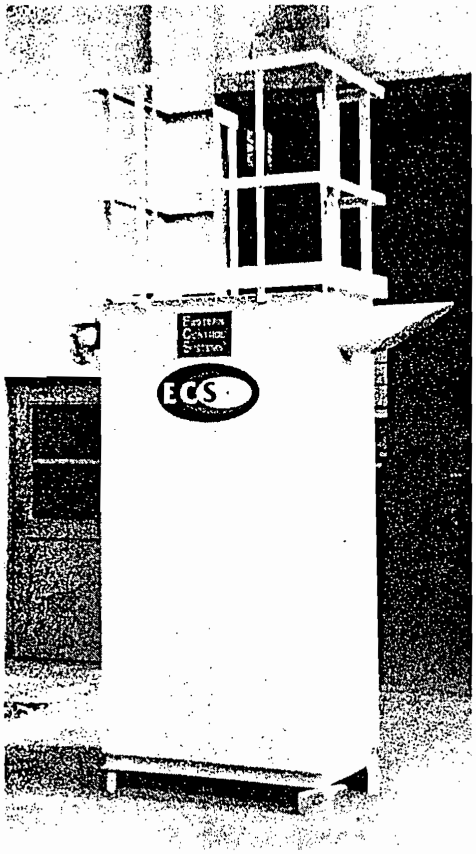
The pre-assembled dust collector is designed for minimum installation time and costs.

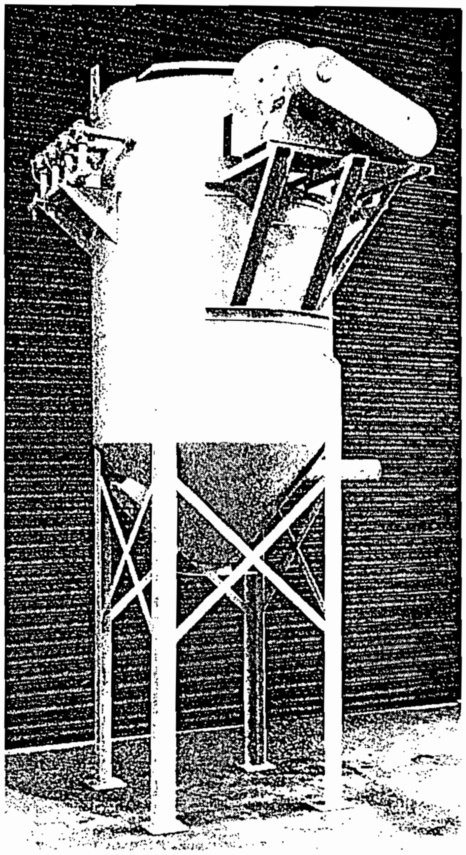
- Pre-fitted legs sit directly on a level concrete pad. No need for expensive piers or leveling bolts.
- Hopper (with screw conveyor installed) sits directly on legs.
- Housing (clean air plenum with bags installed) sits on hopper to insure rapid matching of bolt holes.
- Handrails pre-installed – complete installation by raising and connecting corners.
- Encased ladder pre-fitted for rapid installation.
- Insulated collectors when required.
- Top entry optional.

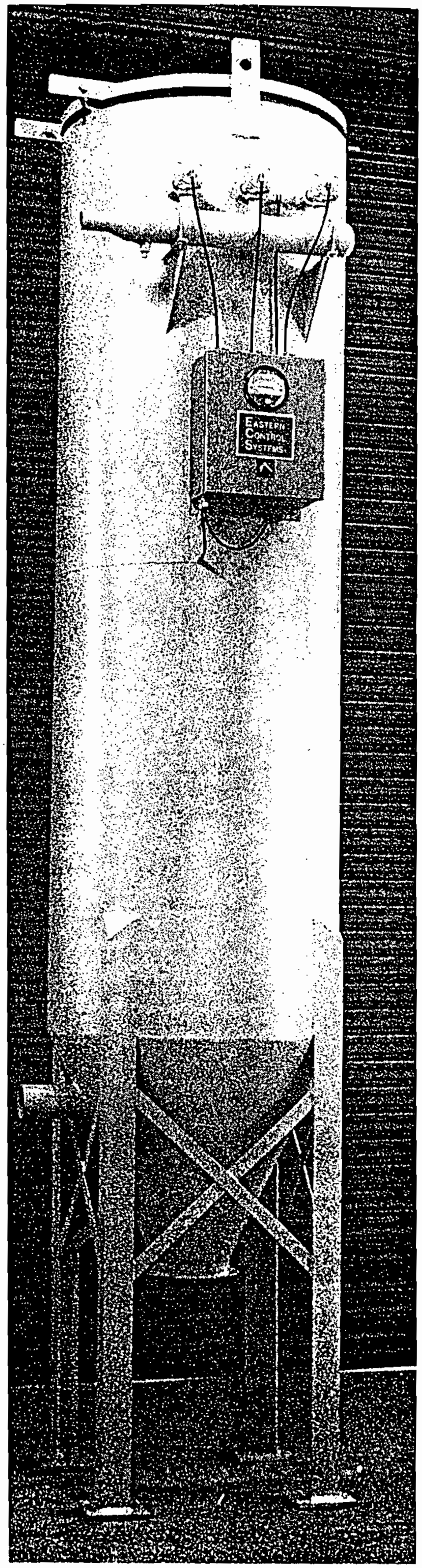
ECS REVERSE PULSE COLLECTOR SPECIFICATIONS

Model		225	270	315	360	405	450	495	540
Filter Length (ft.)		10	10	10	10	10	10	10	10
Number of Filter Units		225	270	315	360	405	450	495	540
Cloth Area (sq. ft.)		3038	3645	4253	4860	5468	6075	6683	7290
Compressed Air Requirements CFM @ 70-90 psig	(max.)	29	34	39	44	50	55	60	66
	(avg.)	14	16	19	22	25	27	28	28
Number of Headers		15	18	21	24	27	30	33	36
Approx. Wt. (lbs.)		12000	14000	16000	18000	20500	23000	25000	27000
Number of Legs		4	4	4	4	4	6	6	6
Length (A)		10'8"	12'8"	14'8"	16'8"	18'8"	20'8"	22'8"	24'8"

Model		585	630	675	720	765	810	855	900
Filter Length (ft.)		10	10	10	10	10	10	10	10
Number of Filter Units		585	630	675	720	765	810	855	900
Cloth Area (sq. ft.)		7898	8505	9113	9720	10328	10935	11543	12150
Compressed Air Requirements CFM @ 70-90 psig	(max.)	72	77	83	88	94	99	105	110
	(avg.)	33	38	41	44	47	49	52	54
Number of Headers		39	42	45	48	51	54	57	60
Approx. Wt. (lbs.)		29000	31000	33500	36000	38000	40000	42500	45000
Number of Legs		6	6	8	8	8	8	8	10
Length (A)		26'8"	28'8"	30'8"	32'8"	34'8"	36'8"	38'8"	40'8"







At upper left is a bin vent filter for a cement storage silo at a Virginia batch mixing plant. In the center photo is a filter receiver for a pilot scale spray dryer for a metal oxide purification plant in New England. A similar unit went to a pilot scale spray dryer at an Illinois pharmaceutical plant. At right is a filter receiver for the pneumatic conveying system at a major food processing plant in Wisconsin.

Applications

Typical Applications for Eastern Control Systems Bin Vents and Filter Receivers Include:

- Pneumatic Conveying Systems
- Vents for Non-Pneumatic Conveying Systems
- Vents for Storage Vessels for Powdered Materials
- Specialty Process Applications, i. e., Dry Process Venting, Pilot Plants, etc.

Equipment Designed by Eastern Control Systems Engineers Includes:

- Fabric Filter Collectors
- High Energy Venturi Systems
- Dry Cyclones
- Die Lubricant Reclamation Systems
- Advanced Design Fly-Ash Collectors

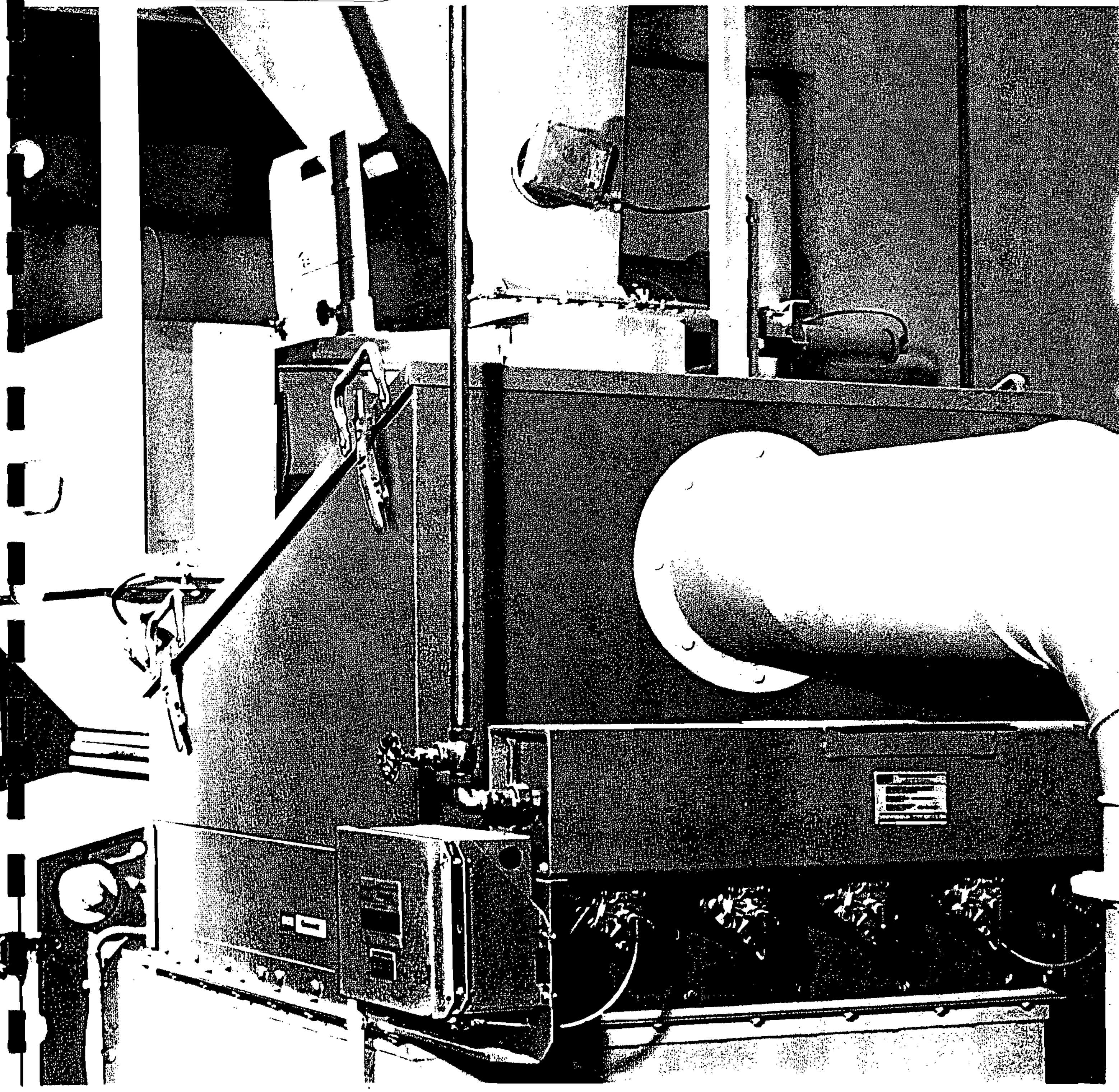
Eastern Control Systems Offers Complete Turn-Key Engineering Services, Including Foundation & Structural Design, Ductwork, Auxiliary Equipment, Etc.

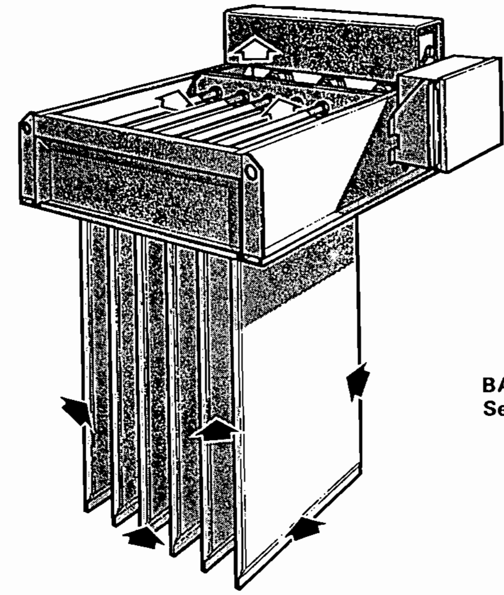
DCE VOKES

Dalamatic®

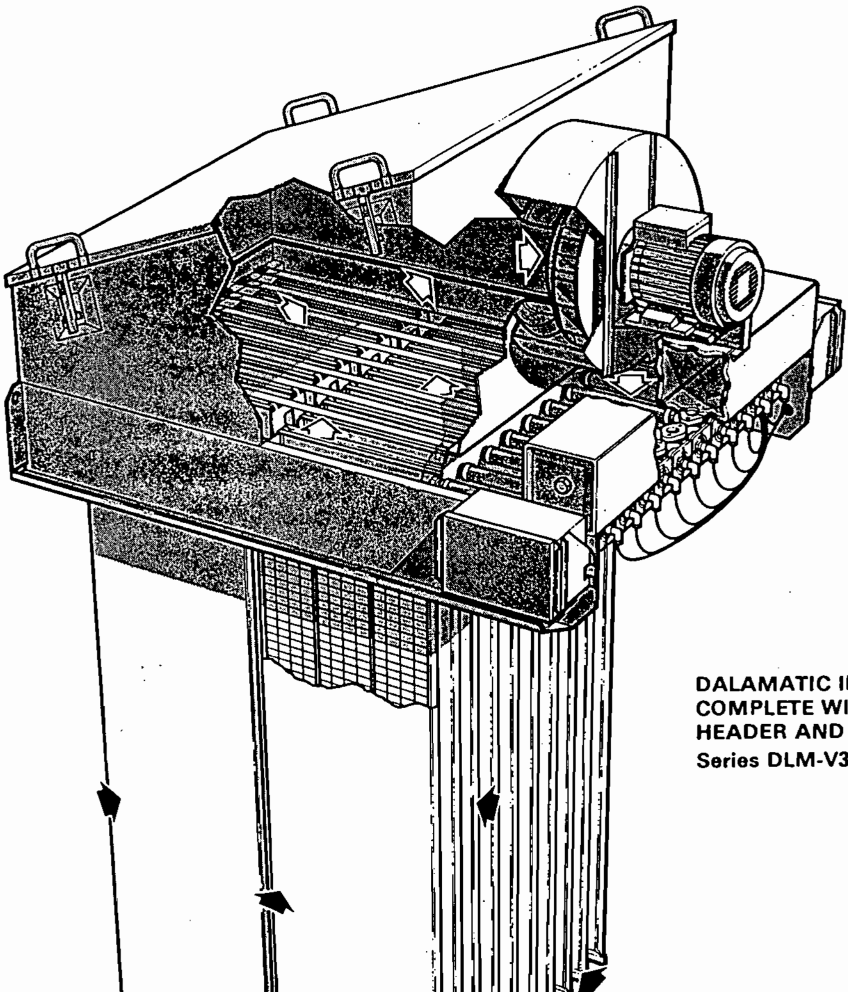
DCE VOKES
JOE GRIEC Ed Fortener
DISTRICT ENGINEER
709 Marquette Drive Louisville KENTUCKY 40222
☎ (502) 267-0707

insertable dust filters
series DLM-V





BASIC DALAMATIC INSERTABLE FILTER
Series DLM-V4/7 Type B



DALAMATIC INSERTABLE FILTER COMPLETE WITH WEATHERPROOF HEADER AND FAN
Series DLM-V30/15 Type F

FRONT COVER ILLUSTRATION
Dalamatic DLM-V20/10H insertable dust filter serving feed mill.

DCE VOKES DALAMATIC INSERTABLE FILTERS

The Dalamatic Insertable Filter — the first of its type — was originally designed to deal with the heavy dust burdens and high filtration velocities encountered in the pneumatic conveying of particulate products. Simply inserted into a silo, it provided continuous filtration of the conveying and displaced air and maintained a high collection efficiency at constant resistance to air flow. The range has been continually developed and now consists of 80 different filters with a wide variety of applications in the handling, processing and storage of bulk materials and powders.

Based on the compact Dalamatic reverse jet filter, the flat pad shaped filter elements are cleaned in turn by short bursts of compressed air, automatically and continuously using an electronic controller of total solid state design. No moving mechanical components are involved and inspection and routine maintenance are from the clean side of the filter. One man can change any size of filter element. Only top quality felt media — vital to proper filter performance — is used. Advanced automated production methods ensure accurate easy to assemble components and inherently strong high quality products.

CONTENTS

APPLICATIONS

In pneumatic conveying systems, Dalamatic Insertables can be inserted in the top of silos and storage vessels to separate the product from conveying and displaced air and so prevent product loss and dust nuisance. The collected dust returns directly to the bulk content of the silo. DLM-V Type B and W are normally applied in blowing systems, Type F and H are used where a suction fan is needed to relieve pressure from the system.

In mechanical conveying systems the dust cloud at loading, discharge and transfer points can be controlled by a DLM-V Type F in an enclosure. The collected dust is returned directly to the product beneath. This saves space, makes ducting and other ancillary equipment unnecessary and avoids the problem of collected dust disposal.

Dalamatic Insertable Filters can also be integrated within process machinery requiring dust control such as fluid bed reactors, mixers, blenders, mills and crushers, or be used to ventilate powder spray booths, automatic bag slitting machines and a wide variety of similar equipment.

Important Safety Note — Whenever the dust involved represents an explosion risk, the silo, or process equipment concerned should be provided with adequate explosion relief.

TYPES OF FILTER

There are four types of Dalamatic insertable Filters:

Type B Basic filter for pressure systems sited inside.

Type H Filter with exit Header for connection to a fan or discharge ducting. The filter is weather-proof and suitable for inside and outside applications.

Type W Filter with a Weather cowl for pressure systems where the filter is located outside or exposed to adverse conditions.

Type F Weather-proof filter fitted with an integral Fan for applications normally operating below atmospheric pressure.

(Mounting positions — All Dalamatic Insertable filters can be mounted either vertically or horizontally whichever is the best position for the particular application (see figs. 1 & 2 for examples).

FILTER CONSTRUCTION

Each type is available in 14 different filtration areas depending on the air volume capacity required. They are based on two sizes of seal frame, containing either six or ten filter elements in one of three lengths: 0·7m, 1·0m or the 1·5m. These are assembled into three module sizes which can be used singly or joined together in twos or threes in the configurations shown in the table opposite.

Each filter module consists of an outer frame surrounding a seal frame through which a number of flat pad shaped filter elements are inserted.

Each filter element consists of a felted fabric pad supported on a rigid mesh frame or 'insert', which has an integral header and sealing flange welded to its mouth. A continuous sealing ring of the same felted fabric is stitched round the open end of the pad. When the filter is assembled clamps compress the sealing ring between the flange and the seal frame slot to give an exceptionally tight and effective seal. The clamps also ensure that the pads are properly aligned.

A jet tube is located along the mouth of each insert header and is connected via a diaphragm valve to a compressed air distribution manifold fitted to the outer frame. This valve is linked to a solenoid-operated pilot valve which is governed by an electronic timer. The controller assembly, consisting of pilot valves and timer, is housed in a weather-proof steel box usually mounted on the outer frame.

In applications involving an explosion risk a pneumatically operated controller which has no electrical components can be used to control filter cleaning.

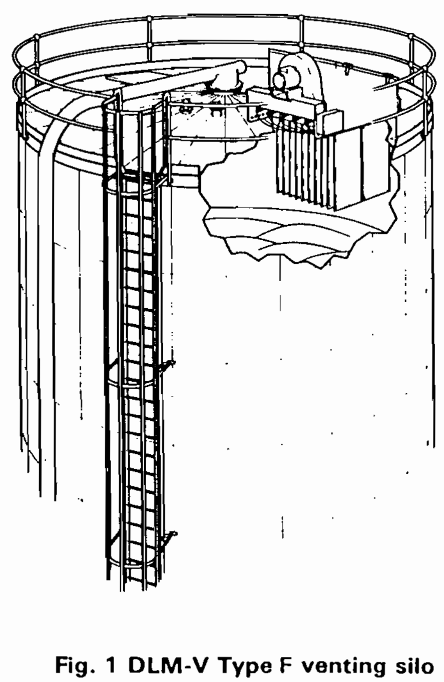


Fig. 1 DLM-V Type F venting silo fed by pneumatic conveying system

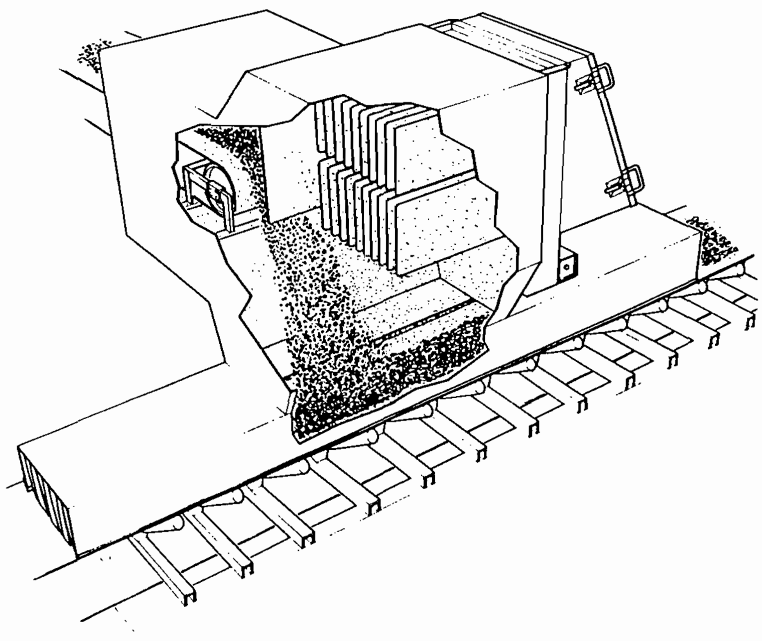
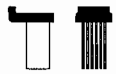
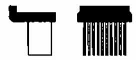
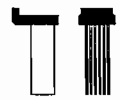
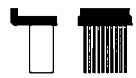
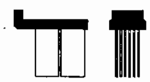
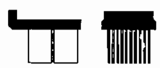
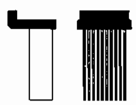
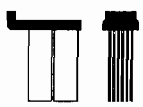
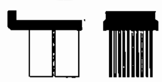
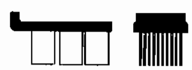
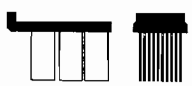
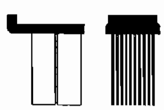
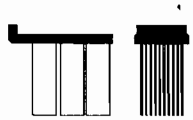


Fig. 2 DLM-V Type F mounted above belt transfer point

THE FULL RANGE OF SIZES

Filter Size Designation	Total Fabric Area	Filter Elements: Number	Filter Elements: Length	Filter Elements: Configuration	Approx. Air Volume* m³/hr	Approx. Air Volume* c.f.m.
DLM-V4/7	$4m^2$ ($43ft^2$)	6	0·7m		700	400
DLM-V6/10	$6m^2$ ($64ft^2$)	6	1·0m		1000	600
DLM-V7/7	$7m^2$ ($75ft^2$)	10	0·7m		1250	700
DLM-V8/7	$8m^2$ ($86ft^2$)	12	0·7m		1350	800
DLM-V9/15	$9m^2$ ($97ft^2$)	6	1·5m		1550	900
DLM-V10/10	$10m^2$ ($108ft^2$)	10	1·0m		1750	1000
DLM-V12/10	$12m^2$ ($129ft^2$)	12	1·0m		2000	1200
DLM-V14/7	$14m^2$ ($150ft^2$)	20	0·7m		2400	1400
DLM-V15/15	$15m^2$ ($161ft^2$)	10	1·5m		2550	1500
DLM-V18/15	$18m^2$ ($194ft^2$)	12	1·5m		3050	1800
DLM-V20/10	$20m^2$ ($215ft^2$)	20	1·0m		3500	2000
DLM-V21/7	$21m^2$ ($226ft^2$)	30	0·7m		3600	2100
DLM-V30/10	$30m^2$ ($323ft^2$)	30	1·0m		5100	3000
DLM-V30/15	$30m^2$ ($323ft^2$)	20	1·5m		5100	3000
DLM-V45/15	$45m^2$ ($484ft^2$)	30	1·5m		7650	4500

*NOTE: The air volumes shown above must be taken as a rough guide only. They can vary considerably according to the nature of the dust involved.

FILTER DESIGNATION

The designation of Dalamatic Insertable filters begins with the prefix DLM-V and is followed by size and type. Examples are:

DLM V4/7B — Dalamatic Insertable with filter area of $4m^2$ and 0·7m long pads. Basic type.

DLM V6/10H — Dalamatic Insertable with filter area of $6m^2$ and 1·0m long pads, fitted with exit header.

DLM V9/15W — Dalamatic Insertable with filter area of $9m^2$ and 1·5m long pads, fitted with weather cowl.

DLM V10/10F3 — Dalamatic Insertable with area of $10m^2$ and 1·0m long pads fitted with integral size 3 fan.

FILTER CLEANING

The electronic timer activates each pilot valve in sequence at predetermined intervals in a continuous cycle. The pilot valve in turn opens the diaphragm valve. A short burst of compressed air is released and injected by the jet tube through the insert header into the filter pad. (As shown in Fig. 3). This causes a momentary reversal of the air flow through the filter pad. The effect is a brief controlled inflation of the pad so that the accumulated dust or 'dust cake' is dislodged from its surface. Simultaneously the reversed air flow through the fabric itself assists dust removal. The collected dust falls directly into the silo below or into the process served.

FILTER FABRIC

The majority of applications are best served by the standard Polyester felt. Other felts include Dralon, epitropic polyester; nylon, oleophobic, Orlon, polypropylene and wool felts. Another – Nomex felt is suitable for use at temperatures up to 392°F.

All fabrics are manufactured to a strict specification and undergo stringent quality control testing. The quality of the fabric and the high standard of pad manufacture are vital to proper filter performance.

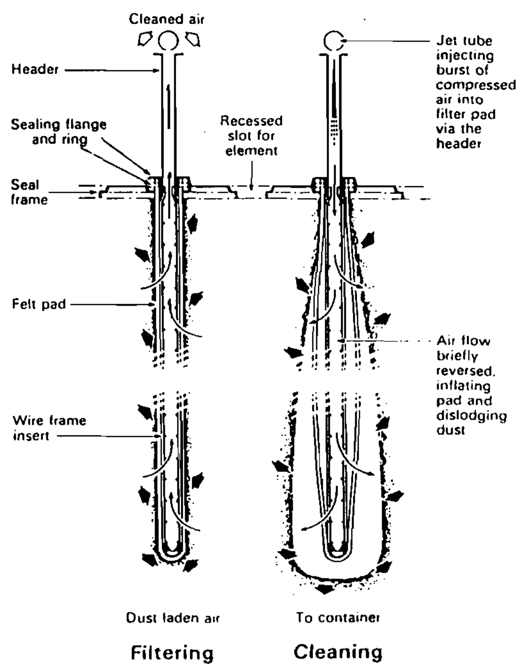


Fig. 3 Section through filter elements

SPECIFICATIONS

(a) Compressed Air Supply

A supply of clean and dry compressed air is required for efficient operation. Maximum pressure and volume required are given in the table below.

COMPRESSED AIR REQUIREMENTS

Filter Size	Maximum air pressure bar	psig	Air Volume required m^3/hr	cfm
			at 25 sec. interval	
DLM V4, 6, 9	4.5	65	3.9	2.3
DLM V7, 10, 15	4.5	65	4.7	2.8
DLM V8, 12, 18	6.2	90	7.1	4.2
DLM V14, 20 (5 valve)	6.2	90	8.5	5.0
			at 12 sec. interval	
DLM V20 (10 valve)	4.5	65	6.1	3.6
DLM V21, 30/10	5.2	75	7.8	4.6
DLM V30/15	4.5	65	8.6	5.1
DLM V45	5.2	75	11.2	6.6

(b) Electrical Supply

For controllers

3 or 5 valves – 2 wire AC – 110V or 240V (±10%) 50 or 60Hz. 10 valves – 2 wire AC – 110V to 530V (±10%) 50 or 60Hz.

For Type F fan motors

A 3 phase supply is required. There is a standard range of motors to suit most voltages.

(c) Controllers

A controller assembly is fitted to Dalamatic Insertable Filters – 3-valve to filter size V4, V6, V8, V9, V12 and V18; 5-valve to filter size V7, V10, V14 and V15; 5 or 10-valve to filter size V20; and 10-valve to filter size V21, V30 and V45.

The valves are controlled by a fully automatic solid state dual timer, which activates the solenoid valves in the required sequence and governs the time interval between the pulses of compressed air. The time interval is adjustable to match the severity of application and has a range of 5 to 35 seconds with a normal initial setting of 25 or 12 seconds depending on filter size.

In the case of the DLM-V Type F model the fan should only operate in conjunction with the controller, but whenever possible, the controller itself should be capable of independent operation so that the filter elements can be cleaned under static air conditions.

3 and 5 valve controller assemblies are housed in a single weather-proof steel box usually mounted on the outer frame of the filter. 10 valve assemblies have two boxes – one for the solenoid valves and the other for the timer.

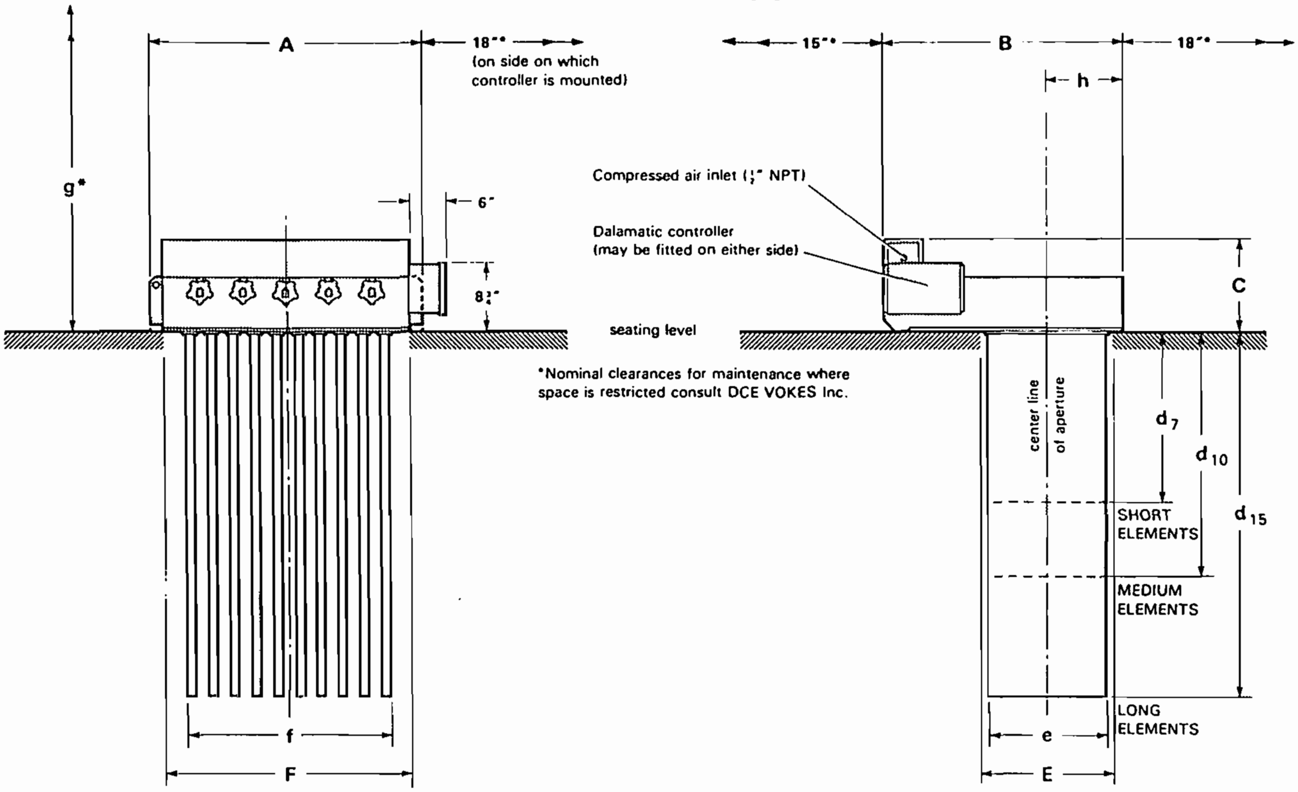
(d) VP and PT Controllers

To minimize compressed air consumption the cleaning system can be operated intermittently using a Dalamatic VP controller. This is activated by a pressure switch governed by the pressure differential across the filter.

A pneumatically operated controller (PT) which contains no electrical components is available for filters operating in hazardous areas.

Please see separate data sheets.

Series DLM-V type B



FRONT ELEVATION SIDE ELEVATION

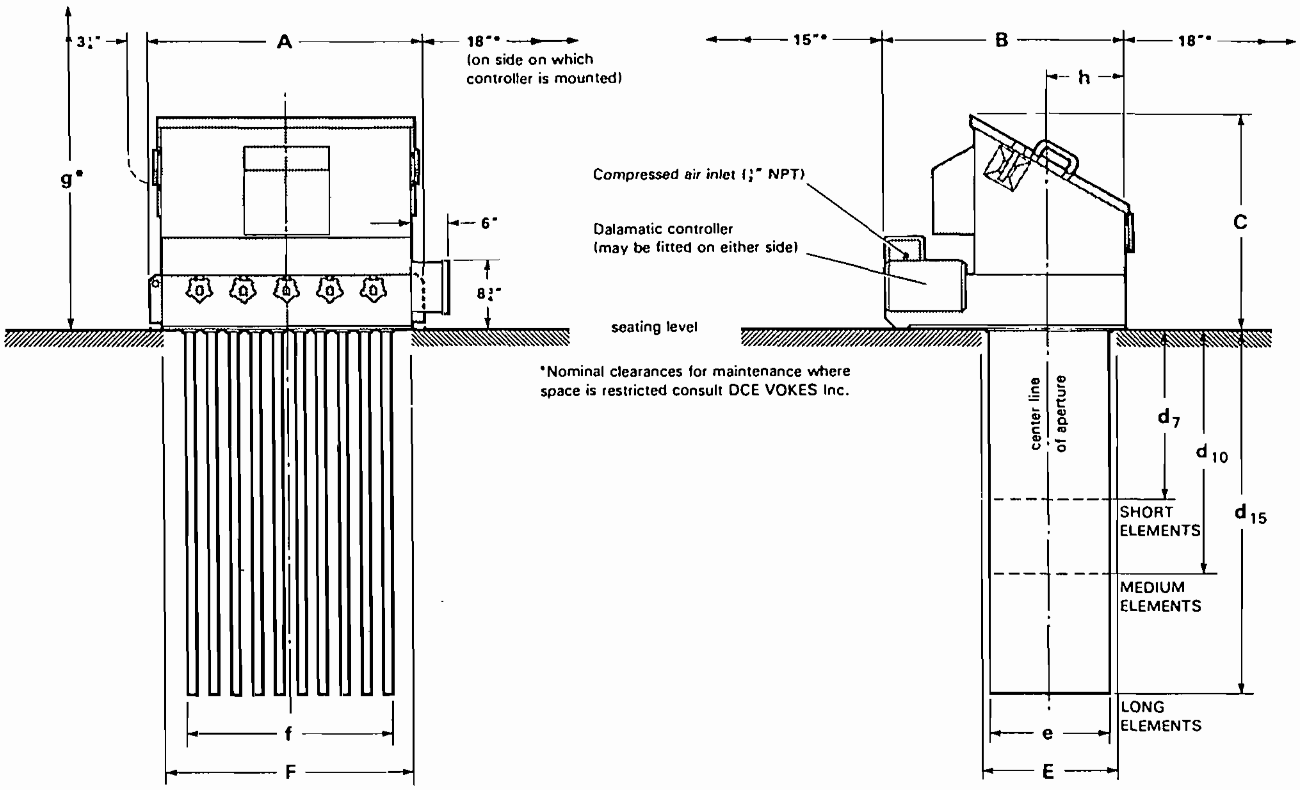
Size DLM-V15/15B illustrated, broken lines representing DLM-V7/7B & DLM-V10/10B

Note: Clearance of at least 6" to be left on all sides of the filter elements

MODEL	DIMENSIONS (Tolerance ±⅛" on main dimensions)												Approx. net weight
	A	B	C	d_7	d_{10}	d_{15}	E	e	F	f	g*	h	
DLM-V4/7B	2'3½"	3'2½"	14¾"	2'3½"	—	—	20½"	19"	23½"	18½"	2'10"	12¼"	220lb
DLM-V6/10B	2'3½"	3'2½"	14¾"	—	3'3½"	—	20½"	19"	23½"	18½"	4'0"	12¼"	240lb
DLM-V9/15B	2'3½"	3'2½"	14¾"	—	—	4'11"	20½"	19"	23½"	18½"	5'7"	12¼"	265lb
DLM-V7/7B	3'7½"	3'2½"	14¾"	2'3½"	—	—	20½"	19"	3'3¼"	2'8½"	2'10"	12¼"	330lb
DLM-V10/10B	3'7½"	3'2½"	14¾"	—	3'3½"	—	20½"	19"	3'3¼"	2'8½"	4'0"	12¼"	375lb
DLM-V15/15B	3'7½"	3'2½"	14¾"	—	—	4'11"	20½"	19"	3'3¼"	2'8½"	5'7"	12¼"	420lb
DLM-V8/7B	2'3½"	5'2½"	15¾"	2'3½"	—	—	3'5¼"	3'3½"	23½"	18½"	2'10"	22⅝"	350lb
DLM-V12/10B	2'3½"	5'2½"	15¾"	—	3'3½"	—	3'5¼"	3'3½"	23½"	18½"	4'0"	22⅝"	395lb
DLM-V18/15B	2'3½"	5'2½"	15¾"	—	—	4'11"	3'5¼"	3'3½"	23½"	18½"	5'7"	22⅝"	450lb
DLM-V14/7B	3'7½"	5'2½"	15¾"	2'3½"	—	—	3'5¼"	3'3½"	3'3¼"	2'8½"	2'10"	22⅝"	570lb
DLM-V20/10B	3'7½"	5'2½"	15¾"	—	3'3½"	—	3'5¼"	3'3½"	3'3¼"	2'8½"	4'0"	22⅝"	650lb
†DLM-V30/15B	3'7½"	5'2½"	15¾"	—	—	4'11"	3'5¼"	3'3½"	3'3¼"	2'8½"	5'7"	22⅝"	760lb
†DLM-V21/7B	3'7½"	7'2"	15¾"	2'3½"	—	—	5'5"	5'3¼"	3'3¼"	2'8½"	2'10"	2'10½"	780lb
†DLM-V30/10B	3'7½"	7'2"	15¾"	—	3'3½"	—	5'5"	5'3¼"	3'3¼"	2'8½"	4'0"	2'10½"	880lb
†DLM-V45/15B	3'7½"	7'2"	15¾"	—	—	4'11"	5'5"	5'3¼"	3'3¼"	2'8½"	5'7"	2'10½"	1010lb

†A separate solenoid terminal box is used on these units, and should be fitted to the side opposite the controller. Therefore a nominal clearance of 18" should be allowed for maintenance.

Series DLM-V type W



FRONT ELEVATION SIDE ELEVATION

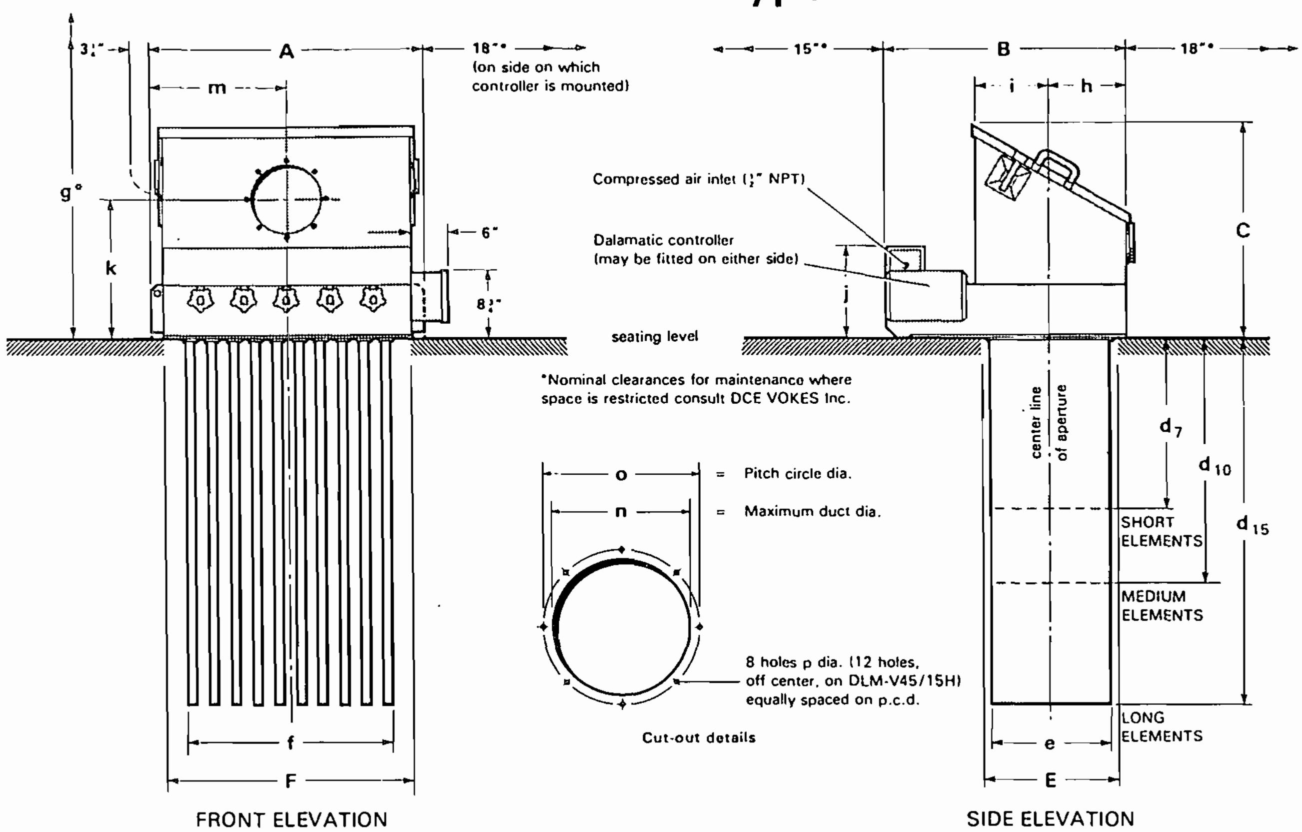
Size DLM-V15/15W illustrated, broken lines representing DLM-V7/7W & DLM-V10/10W

Note: Clearance of at least 6" to be left on all sides of the filter elements

MODEL	DIMENSIONS (Tolerance ±⅛" on main dimensions) A	B	C	d_7	d_{10}	d_{15}	E	e	F	f	g*	h	Approx. net weight
DLM-V4/7W	2'3½"	3'2½"	2'8¼"	2'3½"	–	–	20½"	19"	23½"	18½"	3'9½"	12¼"	300lb
DLM-V6/10W	2'3½"	3'2½"	2'8¼"	–	3'3½"	–	20½"	19"	23½"	18½"	4'9½"	12¼"	320lb
DLM-V9/15W	2'3½"	3'2½"	2'8¼"	–	–	4'11"	20½"	19"	23½"	18½"	6'5"	12¼"	340lb
DLM-V7/7W	3'7½"	3'2½"	2'10"	2'3½"	–	–	20½"	19"	3'3¼"	2'8½"	3'9½"	12¼"	440lb
DLM-V10/10W	3'7½"	3'2½"	2'10"	–	3'3½"	–	20½"	19"	3'3¼"	2'8½"	4'9½"	12¼"	485lb
DLM-V15/15W	3'7½"	3'2½"	2'10"	–	–	4'11"	20½"	19"	3'3¼"	2'8½"	6'5"	12¼"	530lb
DLM-V8/7W	2'3½"	5'2½"	2'10"	2'3½"	–	–	3'5¼"	3'3½"	23½"	18½"	3'9½"	22⅝"	475lb
DLM-V12/10W	2'3½"	5'2½"	2'10"	–	3'3½"	–	3'5¼"	3'3½"	23½"	18½"	4'9½"	22⅝"	520lb
DLM-V18/15W	2'3½"	5'2½"	2'10"	–	–	4'11"	3'5¼"	3'3½"	23½"	18½"	6'5"	22⅝"	570lb
DLM-V14/7W	3'7½"	5'2½"	2'11¾"	2'3½"	–	–	3'5¼"	3'3½"	3'3¼"	2'8½"	3'9½"	22⅝"	740lb
DLM-V20/10W	3'7½"	5'2½"	2'11¾"	–	3'3½"	–	3'5¼"	3'3½"	3'3¼"	2'8½"	4'9½"	22⅝"	815lb
†DLM-V30/15W	3'7½"	5'2½"	2'11¾"	–	–	4'11"	3'5¼"	3'3½"	3'3¼"	2'8½"	6'5"	22⅝"	925lb
†DLM-V21/7W	3'7½"	7'2"	3'6"	2'3½"	–	–	5'5"	5'3¼"	3'3¼"	2'8½"	3'9½"	2'10½"	1025lb
†DLM-V30/10W	3'7½"	7'2"	3'6"	–	3'3½"	–	5'5"	5'3¼"	3'3¼"	2'8½"	4'9½"	2'10½"	1125lb
†DLM-V45/15W	3'7½"	7'2"	3'6"	–	–	4'11"	5'5"	5'3¼"	3'3¼"	2'8½"	6'5"	2'10½"	1255lb

†A separate solenoid terminal box is used on these units, and should be fitted to the side opposite the controller. Therefore a nominal clearance of 18" should be allowed for maintenance.

Series DLM-V type H



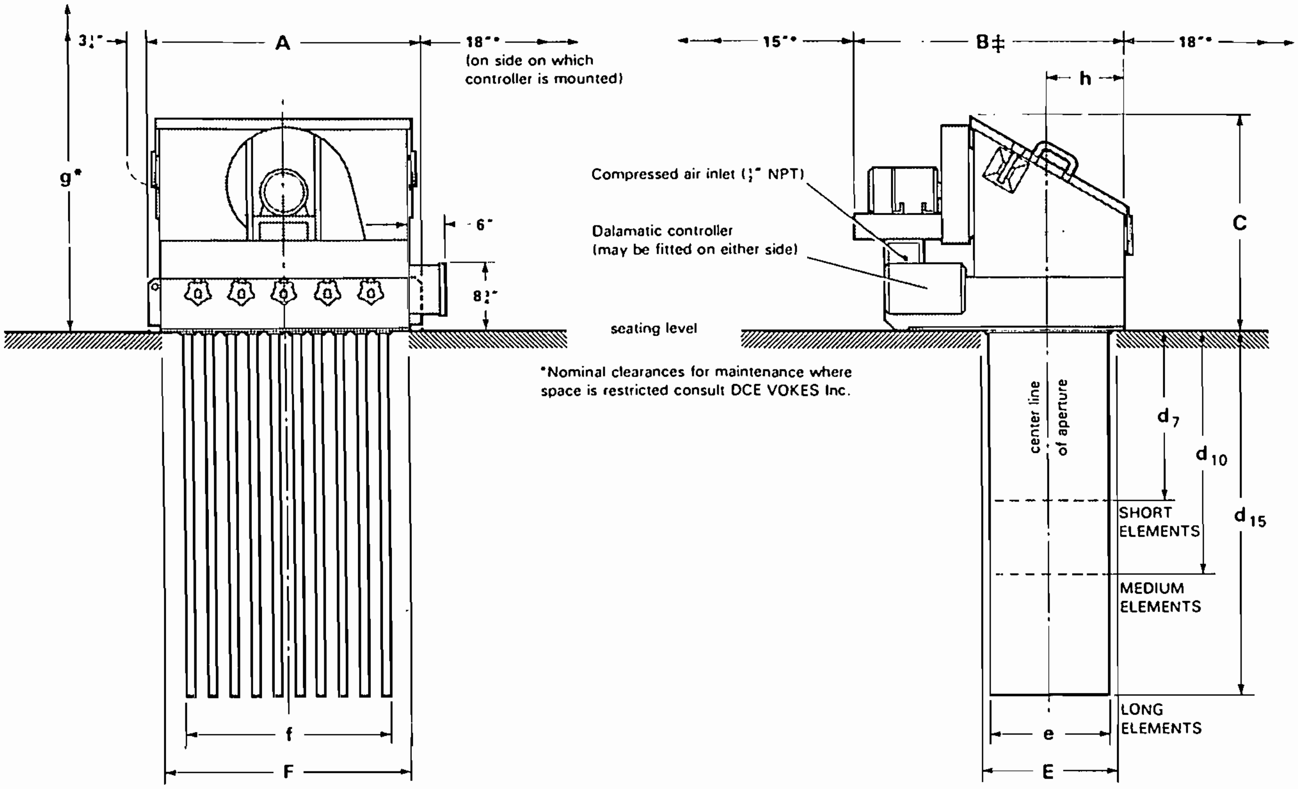
Size DLM-V15/15H illustrated, broken lines representing DLM-V7/7H & DLM-V10/10H

Note: Clearance of at least 6" to be left on all sides of the filter elements

MODEL	DIMENSIONS (Tolerance ±⅛" on main dimensions) A	B	C	d_7	d_{10}	d_{15}	E	e	F	f	g*	h	i	j	k	m	n	o	p	Approx. net weight
DLM-V4/7H	2'3½"	3'2½"	2'8¼"	2'3½"	—	—	20½"	19"	23½"	18½"	3'9½"	12¼"	11⅝"	14¾"	21¾"	13¾"	8⅝"	9⅝"	5/16"	290lb
DLM-V6/10H	2'3½"	3'2½"	2'8¼"	—	3'3½"	—	20½"	19"	23½"	18½"	4'9½"	12¼"	11⅝"	14¾"	21¾"	13¾"	8⅝"	9⅝"	5/16"	310lb
DLM-V9/15H	2'3½"	3'2½"	2'8¼"	—	—	4'11"	20½"	19"	23½"	18½"	6'5"	12¼"	11⅝"	14¾"	22⅝"	13¾"	11¼"	12¼"	⅜"	330lb
DLM-V7/7H	3'7½"	3'2½"	2'10"	2'3½"	—	—	20½"	19"	3'3¼"	2'8½"	3'9½"	12¼"	11⅝"	14¾"	22⅝"	21¾"	11¼"	12¼"	⅜"	430lb
DLM-V10/10H	3'7½"	3'2½"	2'10"	—	3'3½"	—	20½"	19"	3'3¼"	2'8½"	4'9½"	12¼"	11⅝"	14¾"	22⅝"	21¾"	11¼"	12¼"	⅜"	475lb
DLM-V15/15H	3'7½"	3'2½"	2'10"	—	—	4'11"	20½"	19"	3'3¼"	2'8½"	6'5"	12¼"	11⅝"	14¾"	22⅝"	21¾"	11¼"	12¼"	⅜"	530lb
DLM-V8/7H	2'3½"	5'2½"	2'10"	2'3½"	—	—	3'5¼"	3'3½"	23½"	18½"	3'9½"	22⅝"	21⅛"	15¾"	23⅝"	13¾"	11¼"	12¼"	⅜"	465lb
DLM-V12/10H	2'3½"	5'2½"	2'10"	—	3'3½"	—	3'5¼"	3'3½"	23½"	18½"	4'9½"	22⅝"	21⅛"	15¾"	24"	13¾"	11¼"	12¼"	⅜"	510lb
DLM-V18/15H	2'3½"	5'2½"	2'10"	—	—	4'11"	3'5¼"	3'3½"	23½"	18½"	6'5"	22⅝"	21⅛"	15¾"	24"	13¾"	11¼"	12¼"	⅜"	560lb
DLM-V14/7H	3'7½"	5'2½"	2'11¾"	2'3½"	—	—	3'5¼"	3'3½"	3'3¼"	2'8½"	3'9½"	22⅝"	21⅛"	15¾"	24"	21¾"	11¼"	12¼"	⅜"	730lb
DLM-V20/10H	3'7½"	5'2½"	2'11¾"	—	3'3½"	—	3'5¼"	3'3½"	3'3¼"	2'8½"	4'9½"	22⅝"	21⅛"	15¾"	24"	21¾"	11¼"	12¼"	⅜"	805lb
†DLM-V30/15H	3'7½"	5'2½"	2'11¾"	—	—	4'11"	3'5¼"	3'3½"	3'3¼"	2'8½"	6'5"	22⅝"	21⅛"	15¾"	2'0¾"	21¾"	12⅜"	13⅜"	⅜"	915lb
†DLM-V21/7H	3'7½"	7'2"	3'6"	2'3½"	—	—	5'5"	5'3½"	3'3¼"	2'8½"	3'9½"	2'10½"	2'9⅜"	15¾"	24"	21¾"	11¼"	12¼"	⅜"	1015lb
†DLM-V30/10H	3'7½"	7'2"	3'6"	—	3'3½"	—	5'5"	5'3½"	3'3¼"	2'8½"	4'9½"	2'10½"	2'9⅜"	15¾"	2'0¾"	21¾"	12⅜"	13⅜"	⅜"	1115lb
†DLM-V45/15H	3'7½"	7'2"	3'6"	—	—	4'11"	5'5"	5'3½"	3'3¼"	2'8½"	6'5"	2'10½"	2'9⅜"	15¾"	2'2⅜"	21¾"	19⅜"	21⅜"	½"	1245lb

†A separate solenoid terminal box is used on these units, and should be fitted to the side opposite the controller. Therefore a nominal clearance of 18" should be allowed for maintenance.

Series DLM-V type F



FRONT ELEVATION　　　　SIDE ELEVATION

Size DLM-V15/15F3 illustrated, broken lines representing DLM-V7/7F3 & DLM-V10/10F3

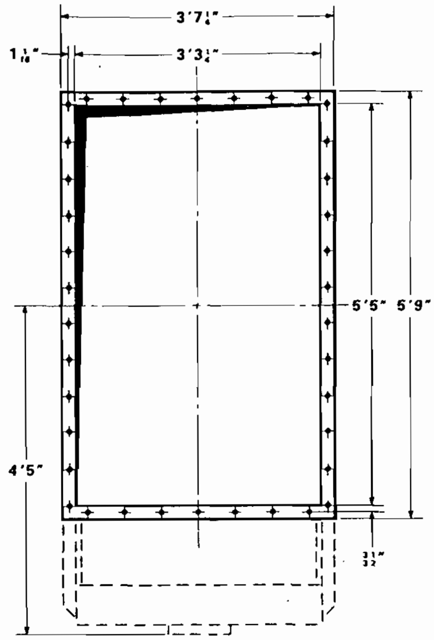
Note: Clearance of at least 6" to be left on all sides of the filter elements

‡This dimension is approximate and is dependent upon make of motor

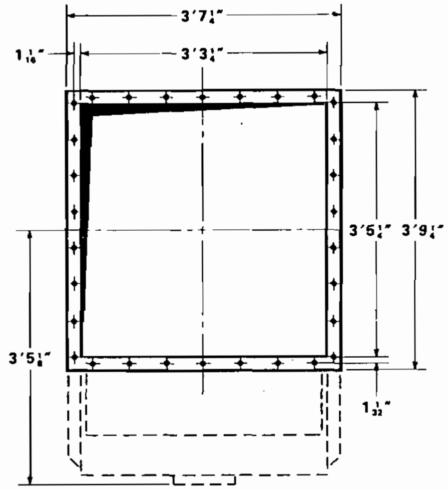
MODEL	DIMENSIONS (Tolerance ±⅛" on main dimensions) A	C	d_7	d_{10}	d_{15}	E	e	F	f	g*	h	B‡	Fan	Fan Motor h.p.	Approx. net weight
DLM-V4/7F	2'3½"	2'8¼"	2'3½"	—	—	20½"	19"	23½"	18½"	3'9½"	12¼"	3'7¼"	F1	1	350lb
DLM-V6/10F	2'3½"	2'8¼"	—	3'3½"	—	20½"	19"	23½"	18½"	4'9½"	12¼"	3'7¼"	F1	1	375lb
DLM-V9/15F	2'3½"	2'9¼"	—	—	4'11"	20½"	19"	23½"	18½"	6'5"	12¼"	3'7¼"	F1	1	395lb
												3'7¼"	F3	3	430lb
DLM-V7/7F	3'7½"	2'10"	2'3½"	—	—	20½"	19"	3'3¼"	2'8½"	3'9½"	12¼"	3'7¼"	F1	1	490lb
												3'7¼"	F3	3	530lb
DLM-V10/10F	3'7½"	2'10"	—	3'3½"	—	20½"	19"	3'3¼"	2'8½"	4'9½"	12¼"	3'7¼"	F1	1	540lb
												3'7¼"	F3	3	570lb
DLM-V15/15F	3'7½"	2'10"	—	—	4'11"	20½"	19"	3'3¼"	2'8½"	6'5"	12¼"	3'7¼"	F3	3	615lb
												3'7¼"	F5	4	630lb
DLM-V8/7F	2'3½"	2'10"	2'3½"	—	—	3'5¼"	3'3½"	23½"	18½"	3'9½"	22⅝"	5'3¾"	F1	1	530lb
												5'3¾"	F3	3	560lb
DLM-V12/10F	2'3½"	2'10"	—	3'3½"	—	3'5¼"	3'3½"	23½"	18½"	4'9½"	22⅝"	5'3¾"	F3	3	605lb
												5'3¾"	F5	4	620lb
DLM-V18/15F	2'3½"	3'0¾"	—	—	4'11"	3'5¼"	3'3½"	23½"	18½"	6'5"	22⅝"	5'3¾"	F3	3	660lb
												5'3¾"	F5	4	671lb
												5'4½"	F6	5½	840lb
DLM-V14/7F	3'7½"	2'11¾"	2'3½"	—	—	3'5¼"	3'3½"	3'3¼"	2'8½"	3'9½"	22⅝"	5'3¾"	F3	3	825lb
												5'3¾"	F5	4	840lb
DLM-V20/10F	3'7½"	3'0¾"	—	3'3½"	—	3'5¼"	3'3½"	3'3¼"	2'8½"	4'9½"	22⅝"	5'3¾"	F3	3	900lb
												5'3¾"	F5	4	915lb
												5'4½"	F6	5½	950lb
†DLM-V30/15F	3'7½"	3'1½"	—	—	4'11"	3'5¼"	3'3½"	3'3¼"	2'8½"	6'5"	22⅝"	5'3¾"	F5	4	1025lb
												5'4½"	F6	5½	1060lb
												5'8¾"	F10	7½	1110lb
†DLM-V21/7F	3'7½"	3'6"	2'3½"	—	—	5'5"	5'3¼"	3'3¼"	2'8½"	3'9½"	2'10½"	7'3½"	F3	3	1100lb
												7'3½"	F5	4	1110lb
												7'4"	F6	5½	1145lb
†DLM-V30/10F	3'7½"	3'6"	—	3'3½"	—	5'5"	5'3¼"	3'3¼"	2'8½"	4'9½"	2'10½"	7'3½"	F5	4	1210lb
												7'4"	F6	5½	1245lb
												7'7¾"	F10	7½	1300lb
†DLM-V45/15F	3'7½"	3'6"	—	—	4'11"	5'5"	5'3¼"	3'3¼"	2'8½"	6'5"	2'10½"	7'4"	F6	5½	1375lb
												7'7¾"	F10	7½	1430lb
												7'7¾"	F11	10	1475lb

†A separate solenoid terminal box is used on these units, and should be fitted to the side opposite the controller. Therefore a nominal clearance of 18" should be allowed for maintenance.

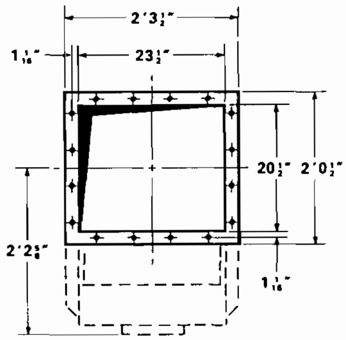
Flanges and Fans



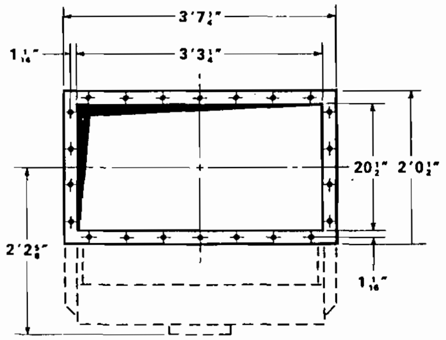
DLM-V21/7, V30/10 & V45/15



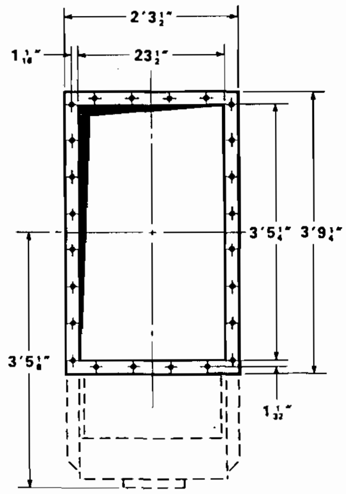
DLM-V14/7, V20/10 & V30/15



DLM-V4/7, V6/10 & V9/15



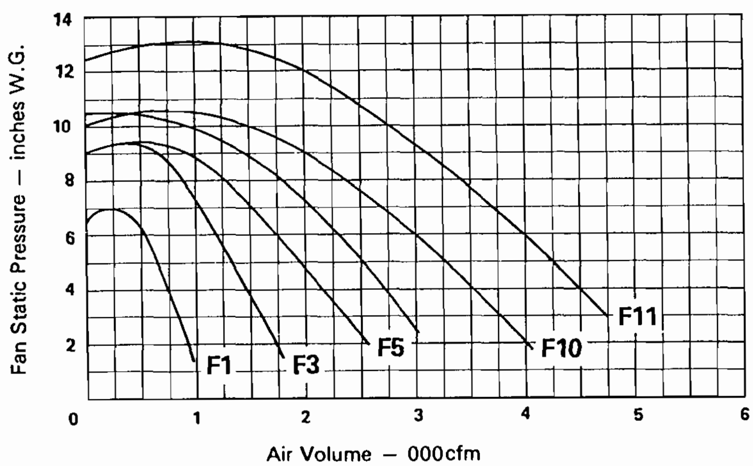
DLM-V7/7, V10/10 & V15/15



DLM-V8/7, V12/10 & V18/15

Aperture and mounting details

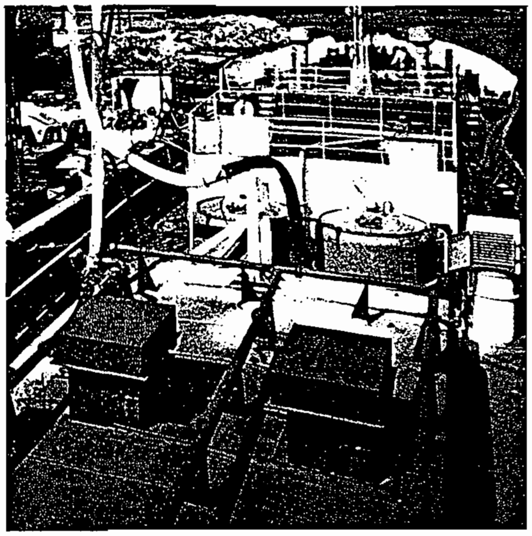
All bolt holes are 11mm dia. (7/16") for 10mm (3/8") bolts with hole centers at 150mm (5 29/32") pitch, and are symmetrical about center lines as shown



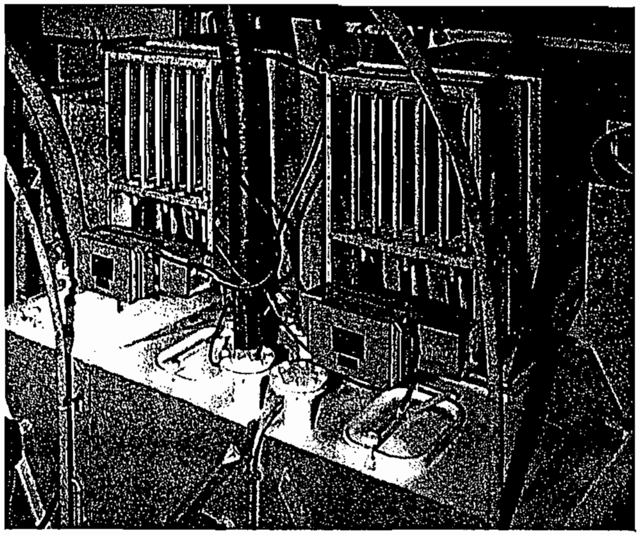
Fan Performance Curves

OPERATING DESIGN LIMITS		
Temperature range −15°F to +140°F	**Pressure limits:**	Type F as fan performance curves to nil Type B + or − 16" WG Type H − 16" to + 2" WG

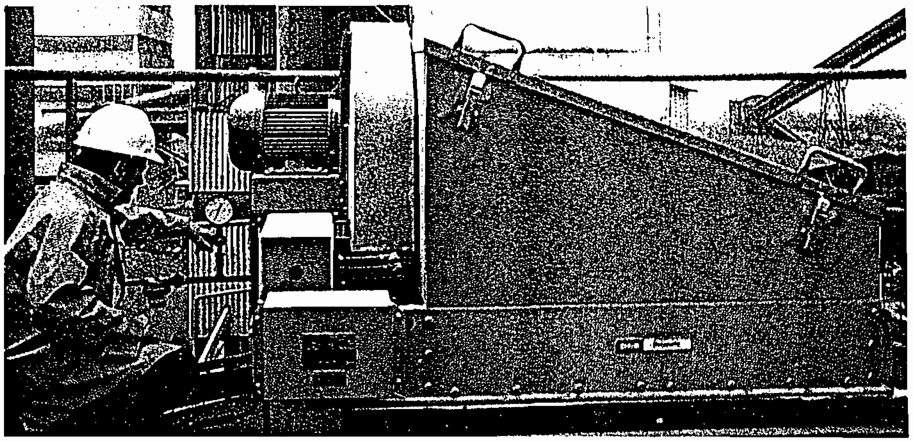
1



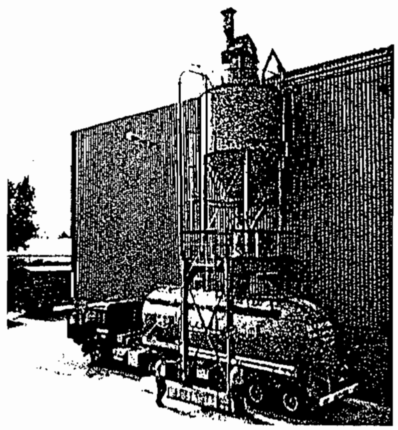
2



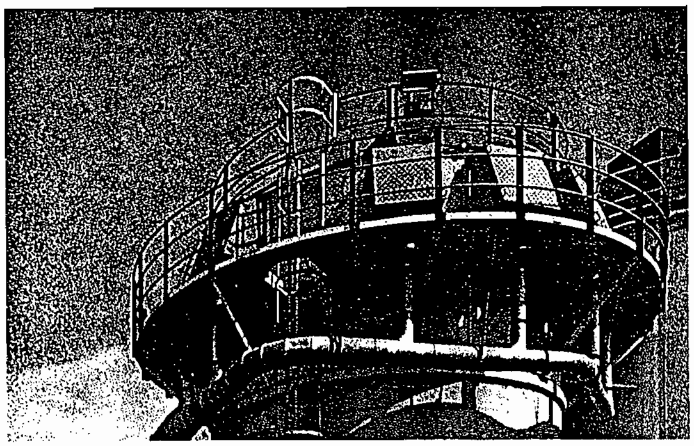
3



4



5



1 Bulk cargo handling of potato starch served by two Dalamatic DLM-V14/7B dust filters.

2 Two Dalamatic DLM-V6/10B's installed in a plastic bottle factory.

3 Dalamatic DLM-V20/10F insertable ventilating aluminium powder storage silo.

4 Tanker discharging metallic powder into silo served by a Dalamatic DLM-V20/10F insertable filter.

5 Horizontally mounted Dalamatic insertables in a silo collecting asbestos dust.

see us for dust

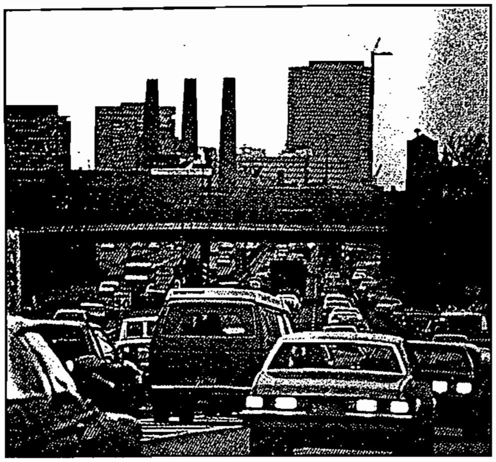
DCE VOKES

DCE VOKES Inc.
11301 Electron Drive
Jeffersontown
KENTUCKY 40299

CONTINUOUS EMISSION MONITORING SYSTEM

(SOURCE ANALYZER ONLY)

Product Line Catalog



Source

Ambient

Toxic

Thermo Environmental Instruments Inc.

Thermo Environmental Instruments Inc.

8 West Forge Parkway
Franklin, MA 02038

(617) 520-0430
Telex: 200205 THEMO UR

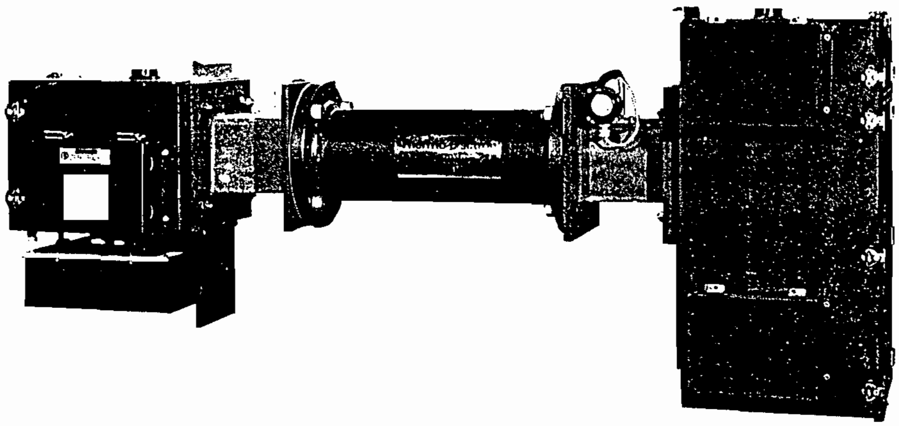
A subsidiary of
Thermo Instrument
Systems Inc.

Printed USA©

6/87-10M

IN-SITU SYSTEM

Model D12000 In-Situ Stack Multigas Analyzer System



The D12000 is a multigas analyzer which may be mounted on the stack wall, a duct, or other large conduits carrying gases which are products of a variety of processes.

Standard Applications Include:

Fossil fuel fired stream generators
Electric utility steam generators
Incinerators
Cement plants
Nitric acid plants
Petroleum refineries
Pulp and paper mills
Smelters
Iron and steel plants

Combustion Control (Excess Air) For:

Utility Boilers
Industrial Boilers
Recovery Boilers
Kilns

Process Analysis and Control For:

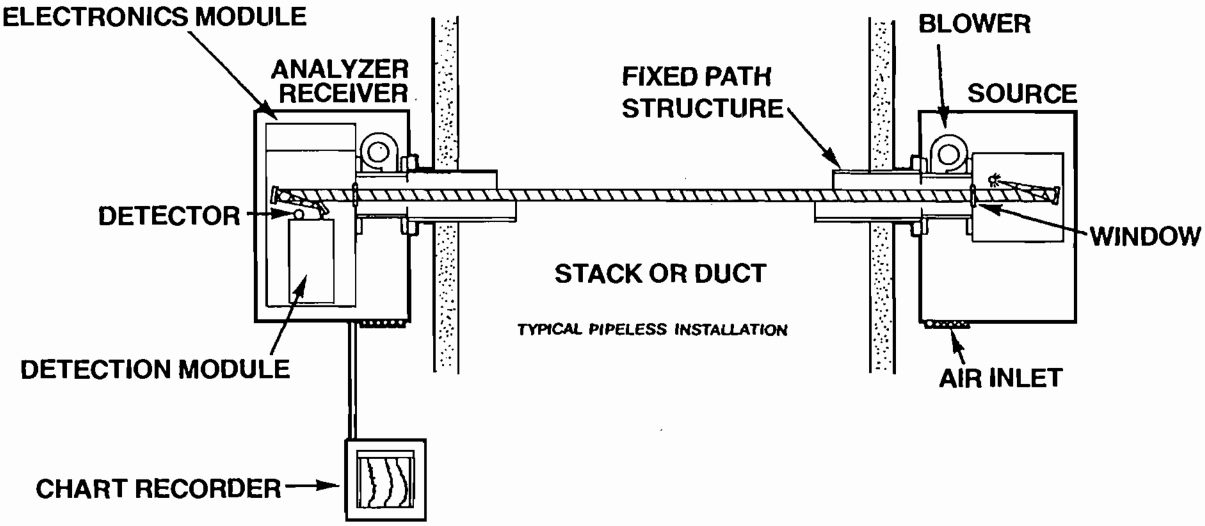
Flue gas desulfurization
Precipitator operation
Dryers

Analyzer Systems are Available For The Following Components:

Carbon monoxide (infrared absorption)
Carbon dioxide (infrared absorption)
Nitric oxide (ultraviolet absorption)
Sulfur dioxide, (ultraviolet absorption)
Opacity (visible light scattering)

BEST AVAILABLE COPY

The Model D12000



FLUE GAS ANALYZER SYSTEM

SOURCE

The Model D12000 Consists Of:

Source assembly — includes infrared and ultraviolet light sources, blower assembly, opacity Retro Reflector (the opactiy measurement is double pass), and source electronics.

Analyzer/receiver assembly — includes detectors for all gases, opacity, blower assembly and signal electronics.

The D12000 is a cross-stack averaging device, eliminating effects of stack gas stratification which may be present in the sample stream. Polychromatic beams of light pass from the source assembly on one side of the stack (or duct), through the stack gas, to the detector assembly on the other side of the stack.

Standard Full Scale Ranges Available Are:

	Minimum	Maximum	Accuracy
CO	10,000 ppm-ft	100,000 ppm-ft	+/−5%
CO_2	100%-ft	250%-ft	+/−2%
NO	1,000 ppm-ft	50,000 ppm-ft	+/−2%
SO_2	1,000 ppm-ft	50,000 ppm-ft	+/−2%
Opacity	0-100%		

Actual full scale range depends on the path length, for example:

For a path length of 10 feet, CO full scale ranges are minimum 0-1,000 ppm, maximum 0-10,000 ppm

EXHIBIT II

REPLACEMENT PAGES FOR ATTACHMENT A IN THE ORIGINAL PERMIT APPLICATION

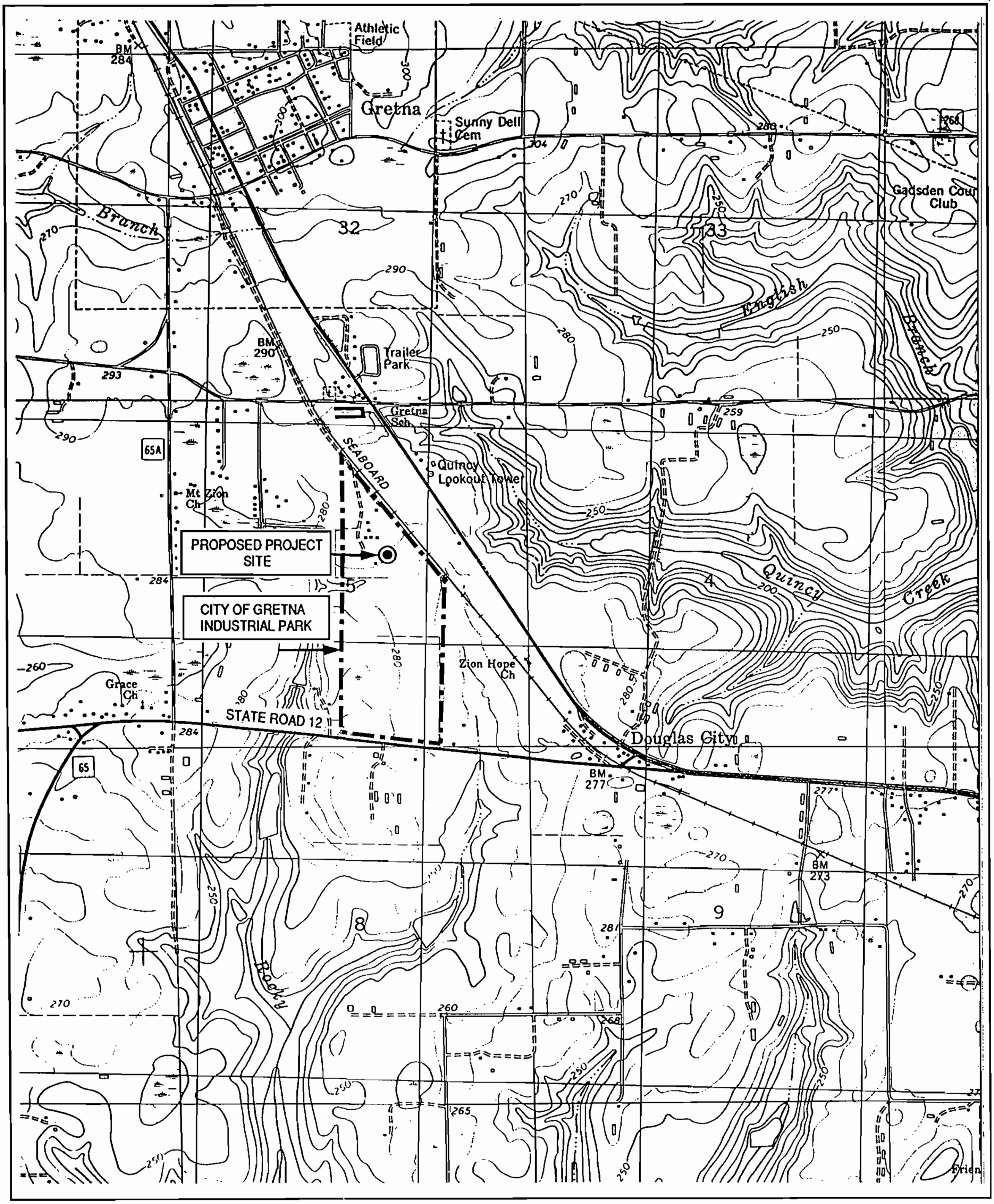
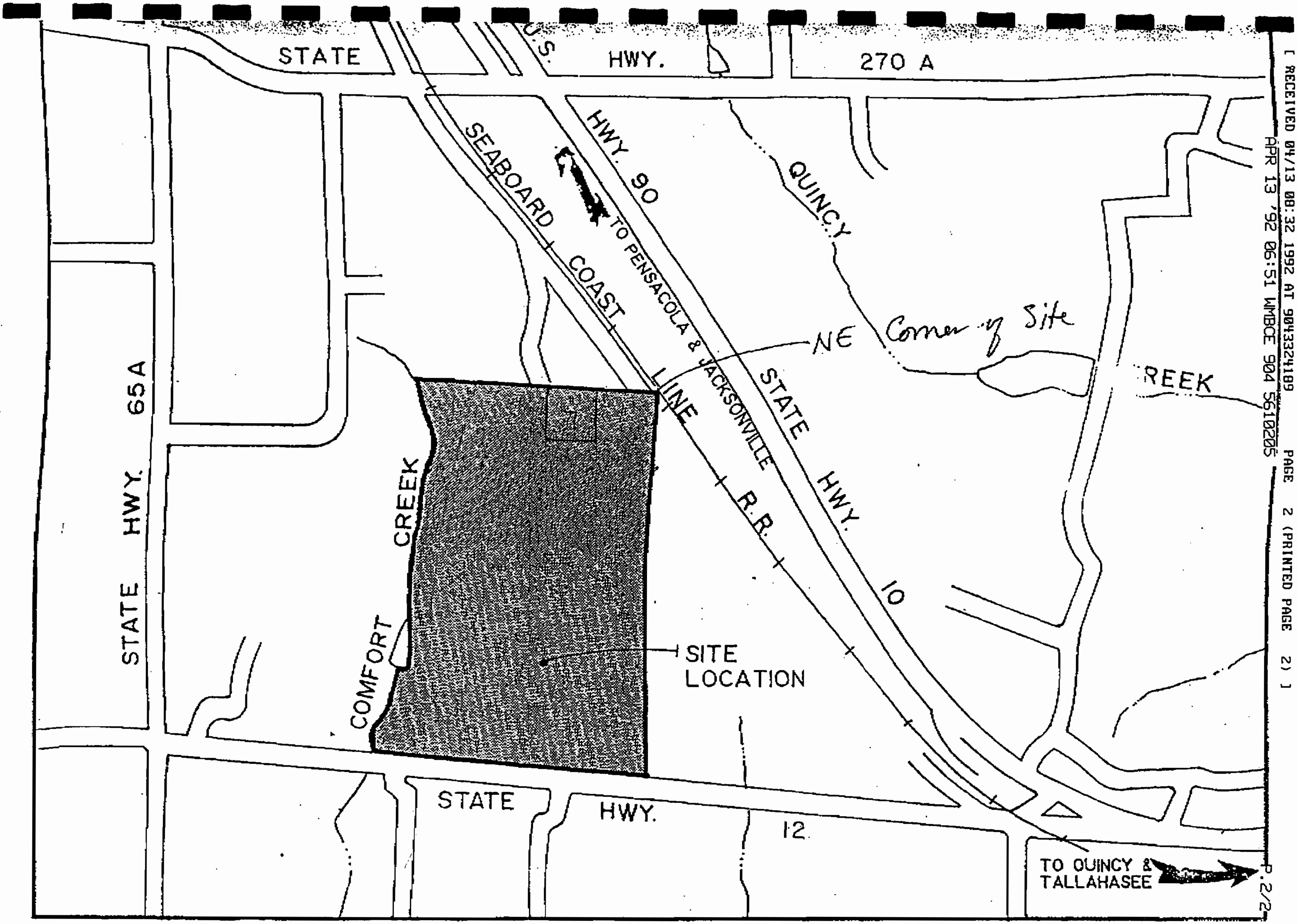


Figure 2-1 SITE LOCATION OF THE PROPOSED RESOURCE RECOVERY FACILITY CITY OF GRETNA, FLORIDA

[RECEIVED 04/13 08:32 1992 AT 9043324189 PAGE 2 (PRINTED PAGE 2)]
APR 13 '92 06:51 WMBCE 904 5610205 P.2/2



LOCATION MAP

Table 2–4. Estimated Maximum Regulated Pollutant Emissions for the Proposed Combustor (Revised).

Regulated Pollutant	Basis for Predicting Controlled Emissions	Ref.	Controlled Emission Factors (lb/ton)	Activity Factor	Estimated Emissions (lb/hr)	Annual Emissions (TPY)
Particulate (TSP)	Fabric Filter (0.02 gr/dscf)	1	0.58	10.20 ton/hr of 80/20 Fuel	5.93	25.97
Particulate (PM10)	Fabric Filter (0.02 gr/dscf)	1	0.58	10.20 ton/hr of 80/20 Fuel	5.93	25.97
Sulfur Dioxide	Spray Dryer & Fabric Filter					
1–Hour Maximum		2	3.05	9.83 ton/hr of 75/25 Fuel	30.0	–
Annual		3	1.53	9.83 ton/hr of 75/25 Fuel	15.0	65.70
Nitrogen Oxides	SNCR Technology					
1–Hour Maximum		2	4.44	10.20 ton/hr of 80/20 Fuel	45.28	–
Annual		4	2.22	10.20 ton/hr of 80/20 Fuel	22.64	99.16
Carbon Monoxide	Good Combustion					
1–Hour/Annual		4	2.20	10.20 ton/hr of 80/20 Fuel	22.40	98.11
Volatile Org. Compds.	Good Combustion					
1–Hour/Annual		4	0.87	10.20 ton/hr of 80/20 Fuel	8.88	38.89
Hydrogen Chloride	Spray Dryer & Fabric Filter					
1–Hour/Annual		5	1.98	10.20 ton/hr of 80/20 Fuel	20.16	88.30

Notes: Maximum heat input is 128.9 MMBtu/hr and 1.129x1E12 Btu/yr. Fuel heating values are: 5,500 Btu/lb for RDF–3 and 15,500 Btu/lb for TDF.
All revised emission calculations are shown in Attachment B (except VOC and HCL which are shown in Appendix A of the original permit application).

References:

1. Based on designed outlet particulate loading of the fabric filter system yielding 0.02 gr/dscf.
2. 1–hour maximum value was based on doubling the average concentration from the estimated maximum annual emissions.
3. Based on sulfur contents of RDF and TDF reported in fuel analysis and SD/FF emission control efficiency of 88% for SO2.
4. Uncontrolled emissions were estimated from stack gas concentrations measured from a prototype Auger combustor unit (1979). the controlled emissions were based on SNCR control technology with 60% removal efficiency.
5. Based on chlorine contents of RDF and TDF as reported in fuel analysis and SD/FF emission control efficiency of 80% for HCl gas.

Table 2−5. Estimated Maximum Emissions of HAPs for the Proposed Combustor (Revised).

	Uncontrolled Referenced Concentrations								SD/FF Controlled Emission Factors			Emission		
	Refuse Derived Fuel				Tire Derived Fuel				(a) RDF	(b) RDF	(c) TDF	Factors for Mixed Fuel	Hourly Emissions	Annual Emissions
Pollutants	(ug/dscm)	Basis	Ref.	(lb/hr)	(percent)	Basis	Ref.	(lb/hr)	(lb/ton)	(lb/ton)	(lb/ton)	(lb/ton)**	(lb/hr)	(TPY)
Other Regulated Pollutants														
Beryllium	–	–	–	–	-	–	–	–	-	1.89E−06	–	1.70E−06	0.000017	0.000076
Fluorides	–	–	–	–	0.0010%	by weight	4	0.021	-	0.036	1.00E−03	0.0325	0.33	1.5
Lead	31,000	@ 7% O2	1	4.018	0.0065%	by weight	4	0.135	0.0172	-	6.50E−03	0.0161	0.164	0.72
Mercury	–	–	2	0.0036 *	-	–	–	–	3.85E−04	-	–	3.47E−04	0.0035	0.015
Sulfuric Acid Mist	–	–	–	–	-	–	–	–	-	0.0826	–	0.0743	0.76	3.3
Air Toxic Pollutants														
Arsenic	615	@ 7% O2	1	0.080	-	–	–	–	3.40E−04	9.32E−05	–	3.06E−04	0.0031	0.014
Cadmium	1,050	@ 7% O2	1	0.136	0.0006%	by weight	4	0.012	7.26E−04	1.65E−04	6.00E−04	7.14E−04	0.0073	0.032
Calcium	–	–	–	–	0.378%	by weight	4	7.862	-	-	0.378	0.0378	0.39	1.7
Chromium, hexavalent	436	@ 7% O2	3	0.057	0.0097%	by weight	5	0.081	6.03E−05	-	0.00078	0.00013	0.0013	0.0059
Iron	–	–	–	–	0.321%	by weight	4	6.677	-	-	0.321	0.0321	0.33	1.4
Nickel	443	@ 7% O2	1	0.057	-	–	–	–	3.06E−04	5.90E−05	–	2.76E−04	0.0028	0.012
Zinc	–	–	–	–	1.52%	by weight	4	31.62	-	-	1.52	0.152	1.55	6.8
Dioxins/Furans														
Total	0.03	@ 7% O2	6	3.56E−06	-	–	–	–	-	-	–	-	3.56E−06	1.56E−05
Toxicity Equiv.	0.00098	@ 7% O2	6	1.16E−07	-	–	–	–	-	-	–	-	1.16E−07	5.07E−07

Notes:

(a) Calculated from uncontrolled referenced concentration, based on maximum RDF charging rate of 9.37 TPH and 95% removal efficiency for SD/FF.

(b) Permit limits for a RDF−fired boiler with similar SD/FF emission controls, from Energy Resources of Henrico, Virginia (1989).

(c) Calculated from uncontrolled referenced concentration, based on maximum TDF charging rate of 1.04 TPH and 95% removal efficiency for SD/FF.

* Reported here as controlled emission rate.

** Calculated as follows: 90% of the higher value of (a) and (b) combined with 10% of (c).

References:

1. Municipal Waste Combustors− Background Information for Proposed Standards on Post−Combustion Technology Performance (EPA−450/3−89−27c, 1989). Each uncontrolled concentration (ug/dscm) reported is the maximum of three different RDF sites. Uncontrolled emission rates (lb/hr) were based on 34,500 dscfm or 976.9 dscm.
2. Based on average of two test values (3.50 E−5 lb of Hg/MMBtu) from Palm Beach County RDF facility controlled with SD/ESP (tested in October, 1989).
3. See reference 1−− Uncontrolled concentration (ug/dscm) reported is the maximum of three modular units (i.e., similar combustion principal as the Auger combustor). Reported controlling efficiency for chromium by a SD/FF system is 99% or greater.
4. Characteristics of Tire−Derived Fuel, Bulletin 20.20.1C, 1986, Waste Recovery, Inc., Portland, Oregon. Elemental analysis for metals is given in weight percent. Uncontrolled emission rates (lb/hr) were based on maximum TDF requirement of 1.04 TPH (calculated from 25% of combustor heat input contributed by TDF).
5. See reference 4−− Assumed that 40 percent of chromium is hexavalent.
6. NSPS standard for MSW organics, 40 CFR 60 Subpart Ea.

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default wind speed profile coefficients for rural or urban option,
5. Default vertical potential temperature gradients,
6. Calm wind processing, and
7. Reducing calculated SO_2 concentrations in urban areas by using a decay half-life of 4 hours (i.e., reduce the SO_2 concentration emitted by 50 percent for every 4 hours of plume travel time).

In this screening analysis, the EPA regulatory options were used to address maximum impacts. Based on a review of the land use around the facility, the rural mode was selected because of the lack of residential, industrial, and commercial developments within 3 km of the plant site.

5.2 METEOROLOGICAL DATA

Meteorological data used in the ISCST2 modeling consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the National Weather Service (NWS) stations located at the Tallahassee Municipal Airport and Waycross, Georgia, respectively. The 5-year period of meteorological data was from 1982 through 1986. The NWS station in Tallahassee, located approximately 35 km to the southeast of the site, was selected for use in the study because it is the closest primary weather station to the project site. The meteological data collected at this NWS station is considered to be representative of the area under evaluation.

The surface observations included wind direction, wind speed, temperature, cloud cover, and cloud ceiling height. The wind speed, cloud cover, and cloud ceiling values were used in the ISCST2 meteorological preprocessor program to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at morning and afternoon, mixing heights were calculated from the radiosonde data at Waycross using the Holzworth approach (Holzworth, 1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by EPA (Holzworth, 1972). The hourly surface data and mixing heights were used to develop a sequential series of hourly meteorological data (i.e., wind direction, wind speed, temperature, stability, and mixing heights). Because the

Table 5-5. Summary of Maximum Regulated Pollutant Concentrations Due to the Proposed Project for Comparison to AAQS

Pollutant	Averaging Period	Total Concentration ($\mu g/m^3$)[a]	Total ($\mu g/m^3$) Due To		State of Florida AAQS ($\mu g/m^3$)
			Modeled Sources	Background	
Sulfur Dioxide	3-hour	328	177	151	1,300
	24-hour	153	73.1	80	260
	Annual	8	2.71	5	60
Particulate Matter (PM10)	24-hour	51	16.4	35	150
	Annual	26	1.21	25	50
Nitrogen Dioxide	Annual	10	3.33	7	100
Carbon Monoxide	1-hour	7,068	168	6,900	40,000
	8-hour	4,665	65.1	4,600	10,000
Lead	Quarter (24-hour)	0.2	0.19	0	1.5

[a] Highest, second-highest concentrations reported for all short-term averaging periods.

Table 5-7. Summary of Maximum Concentrations Due to the Proposed Facility for Air Toxic Modeling Analysis (Revised)

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)[a]	Florida No Threat Level ($\mu g/m^3$)
Arsenic	8-hour	0.0061	2
	24-hour	0.0025	0.48
	Annual	0.00018	0.00023
Beryllium	8-hour	0.00003	0.02
	24-hour	0.00001	0.0048
	Annual	0.000001	0.00042
Cadmium	8-hour	0.017	0.5
	24-hour	0.0070	0.12
	Annual	0.00051	0.00056
Calcium[b]	8-hour	0.76	20
	24-hour	0.31	4.8
	Annual	0.023	NE
Chromium VI	8-hour	0.0026	5
	24-hour	0.0011	0.12
	Annual	0.000079	0.000083
Dioxins/Furans (TEQ)	8-hour	—	NE
	24-hour	—	NE
	Annual	6.80×10^{-9}	2.2×10^{-8}
Flouride	8-hour	0.67	25
	24-hour	0.28	6
	Annual	0.020	NE
Hydrogen Chloride	8-hour	39.7	70
	24-hour	16.3	16.8
	Annual	1.18	7
Iron[c]	8-hour	0.63	50
	24-hour	0.26	12
	Annual	0.019	NE
Lead	8-hour	0.48	1.5
	24-hour	0.20	0.36
	Annual	0.014	0.09
Mercury	8-hour	0.0067	0.5
	24-hour	0.0028	0.12
	Annual	0.00020	0.3
Nickel	8-hour	0.0067	10
	24-hour	0.0028	2.4
	Annual	0.00020	0.0042
Sulfuric Acid Mist[d]	8-hour	1.48	10
	24-hour	0.61	2.38
	Annual	0.044	NE
Zinc[e]	8-hour	3.05	50
	24-hour	1.25	12
	Annual	0.091	NE

Note: NE = none established.
$\mu g/m$ = micrograms per cubic meter.
TEQ = toxicity equivalence.

[a] Highest refined concentrations reported for all averaging periods.
[b] As calcium oxide.
[c] As iron oxide.
[d] Not in current FDER NTL list. NTL in table is based on dividing the time-weighted average by 100 and 420 for the 8-hour and 24-hour NTL, respectively.
[e] As zinc oxide.