AP42 Section: 12.1

Background Chapter 4

Reference: 3

Title: Source Test: Barmet Industries, Inc., Uhrichsville, Ohio. Contract No. 68-02-0240,

February, 1975.

Source Testing Report

Barmet Industries, Inc.
Uhrichsville, Ohio

Prepared for:

Air Surveillance Branch
Surveillance and Analysis Division
United States Environmental Protection Agency
Region V

James W. Davison
Air Sampling Supervisor

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Project Manager

February 1975

Contract No. 68-02-0240

Prepared by
Roy F. Weston, Inc.
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PREFACE

The Emission Source Sampling Program detailed in this report was conducted by Roy F. Weston, Inc. pursuant to a task order issued by Region V of the United States Environmental Protection Agency, conforming to the terms of EPA Contract No. 68-02-0240. Mr. James W. Davison, Air Sampling Supervisor, directed the Weston field team staffed by the following personnel:

Allan R. Daly	Robert A. Lyon
Barry L. Jackson	Jeffrey D. O'Neill

Approved for Roy F. Weston, Inc.

P. J. Marks

Peter J. Marks
Project Manager

18 February 1975
Date

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PROJECT PARTICIPANTS

The following members of the staff of Roy F. Weston, Inc. have participated in the planning and execution of this project and the preparation of this report.

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James W. Davison Air Sampling Supervisor	Pollution Control Concept Division
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SUMMARY

The Environmental Protection Agency, Region V[1], retained Roy F. Weston, Inc. to conduct particulate emission compliance and contaminant removal efficiency testing of furnaces at the Barmet Industries, Inc. plant in Uhrichsville, Ohio. The testing involved the two scrubbers and the one baghouse that controls the emissions from the dross aluminum recovery furnaces. The salt recovery washer/dryer outlet stack, an uncontrolled source of emissions, was also tested for compliance. Engineering observations of unit efficiency and plant operation were included in the study, along with conclusions and recommendations.

The sampling train employed for collection of the particulate and gaseous contaminants was the EPA Method 5 Train, modified to include an alundum thimble filter ahead of the primary filter, plus wet impingement utilizing impingers containing distilled water followed by impingers containing 5-percent N_aOH as approved by the Ohio EPA and EPA Region V.

Particulate mass rate results of the 10 test runs, as defined by EPA Method 5 Procedures, are summarized as follows:

Test Run	Location	Pounds/Hour Inlet	Pounds/Hour Outlet	Percent Removal	Allowable Particulate Emissions lbs/hr
1	Scrubber No. 2	58.52	56.47	3.5	9.10
2	Scrubber No. 2	90.38	97.86	- -	9.53
3	Scrubber No. 1	76.75	36.17	52.9	6.96
4	Scrubber No. 1	71.72	44.95	37.3	6.57
5	Baghouse	42.29	4.84	88.6	7.30
6	Baghouse	41.59	4.63	88.9	7.20
7	Baghouse	45.48	3.26	92.8	7.70
8	Dryer	- -	15.09	- -	2.11
9	Dryer	- -	10.03	- -	2.07
10	Dryer	- -	8.99	- -	2.42

[1] The Field Support Section, Air Surveillance Branch, Surveillance and Analysis Division

The baghouse outlet stack emissions complied with the State of Ohio Air Pollution Regulations concerning particulate emissions. Both scrubber units and the uncontrolled dryer outlet failed to meet these requirements. Visible emission regulations were satisfied by the baghouse outlet and dryer outlet; however, both scrubbers had brief periods of non-compliance.

Source Testing Report

Barmet Industries, Inc.
Uhrichsville, Ohio

INTRODUCTION

Barmet Industries, Inc., of Akron, Ohio, owns and operates aluminum recovery facilities at the Barmet Plant Number Two in Uhrichsville, Ohio. Aluminum dross from a variety of sources is processed at this plant in several rotary furnaces to provide aluminum metal for resale.

The emission control system serving the furnaces includes two scrubber units and a baghouse, thus providing a total of three stacks exhausting to the atmosphere. The dryer outlet stack of the salt washing operation is an uncontrolled emission source.

The Air Surveillance Branch of the United States Environmental Protection Agency Region V directed Roy F. Weston, Inc. to provide technical assistance in obtaining and analyzing pertinent information concerning air pollution emissions from the Barmet plant.

The specific objectives of the program of assistance to the Region V office included:

1. The determination of the composition and quantity of emissions from each of the four stacks at the Barmet plant.
2. Appropriate sampling to establish if the stack emissions to the atmosphere are in compliance with the Ohio Environmental Protection Agency particulate emission regulations.
3. An investigation of the plant process equipment and emission control devices to provide an assessment of the existing performance, and recommendations for emission control upgrading required to comply with the State of Ohio regulations.

4. Observation and review of plant operating practices, with recommendations for possible improvement.

5. Documentation of all technical determinations and observations, and presentation of technical data and expert testimony at enforcement conferences and subsequent legal procedures. Preparation of enforcement action documentation if a violation of the Ohio Environmental Protection Agency regulations exists.

The test program was staffed and supervised by Roy F. Weston, Inc. personnel and was conducted according to guidelines provided by the Ohio EPA and EPA Region V.

The Weston Test Team was on-site during the period of October 21 to 31, 1974 to perform the emissions sampling and to gather the pertinent operations data and observations.

A performance evaluation of each of the two scrubbers and the baghouse required simultaneous sampling of the gas stream before and after each unit while normal operating conditions were maintained. The Ohio EPA established that each test run include an entire batch cycle operation of the furnace of interest.

The gas stream contaminants sampled and analyzed included particulate matter, hydrogen chloride, chlorides, fluorides, cyanides, aluminum, lead, cadmium, and strontium. All samples were analyzed in the Weston Laboratories, West Chester, Pennsylvania.

The observations of visible emissions were performed according to EPA Method 9 by a certified observer.

This report presents the results of the test program and includes a discussion of the observations of the plant operations, along with conclusions and recommendations.

Barmet Industries, Inc., located in Uhrichsville, Ohio, processes aluminum slag or dross to recover the remaining aluminum. Direct fired rotary kilns are used to melt and recover the aluminum. Salt (sodium chloride) is added to the kiln to protect the molten aluminum surface from oxidation and to act as a fluxing agent. Exhaust gases are vented through wet scrubbers. A hood system collects fugitive emissions, which are vented through a baghouse.

Barmet's source of aluminum slag could be any of the primary or secondary aluminum smelters. The composition of the slag is thus highly variable, depending on the refining process used, the type of flux used, and the quality of the aluminum being processed. On the average, slag contains about 30-percent aluminum. Barmet is able to recover about 90-percent of the metal. Although the production rate from this batch process varies from day to day, the average aluminum production is approximately 26 tons per day.

The aluminum slag is shipped to Barmet by rail or truck. The slag ranges in size from large clinkers (about 1-inch diameter) to extremely fine powder. There is generally some scrap material and dirt in the slag. This material has a dirty gray appearance and is stored in open piles throughout the yard until it is charged to the kilns. Barmet attempts to segregate the aluminum slag by source as much as possible.

The aluminum slag is recovered in two 10-foot diameter by 10-foot long rotary kilns. Additionally, there are three 8-foot diameter by 8-foot long rotary kilns in place, with room for a fourth. The smaller kilns are generally used only to recover aluminum from the dryer operation. All raw slag processing occurs in the larger units. According to plant personnel, the two larger kilns and only one of the smaller kilns are operated at any time. The uninsulated kilns are direct fired; natural gas is the only fuel used. The burners are located outside of the kilns, with the flame directed into the charger openings so as to impinge on the side wall of the kilns.

Heat transfer to the molten bed is predominantly radiant, although additional heat is transferred by convection from the hot, rotating kiln walls. Although combustion is complete, heat losses are large due to the high volume of excess air drawn through the kiln. The plant operates 24 hours per day, seven days a week, on a three-shift per day basis.

The slag is charged to the hot, rotating kilns by means of a front-end loader with a specially-equipped bucket scoop. The curved scoop fits into the opening at the end of the kiln. The typical slag charge is 8,500 pounds, but there is no attempt to accurately control process weight. After the slag has melted down, some additional slag is often added. After the slag has been charged, about 5,000 pounds of salt (sodium chloride) are added to the furnace. The purpose of the salt is to blanket the molten aluminum surface and thereby prevent oxidation of the metal. The salt is also fused at operating temperatures. During raw material charging and for about ten minutes thereafter, large quantities of high opacity fumes escape from the furnace and hood area.

Typical melt time in the large kilns is about four hours. Melt time in the smaller kilns, processing aluminum from the dryer, is about two hours. Although there is no instrumentation available, the temperature of the molten aluminum and salt was reported to be in the range of 1,300° to 1,600°F. However, higher temperatures can be expected at various points in the furnace, particularly on the flame wall and lip points on which the flame directly impinges. Exhaust gases escape through the rear opening in the kiln to a stack, which ultimately carries the gases to the wet washers.

At the end of the melt time, the kilns are stopped. A tap hole in the base is opened and the heavier aluminum is tapped into ingots of about 1,000 pounds each. The molten salt and slag impurities are then tapped and the kiln is ready for another charge.

The salt and slag impurities are further processed in a separate area of the plant to recover additional aluminum. Large quantities of this salt/slag mixture have been stockpiled throughout the plant.

The solidified salt/slag is coarsely broken by a wrecking ball. The material is charged to a continuous, co-current rotary hydro-extractor. The salt and other soluble materials (magnesium chloride) are dissolved and washed away. The washer is equipped with lifting flights, thus considerable agitation occurs. Fines generated by this agitation are also removed with the water. Separation of the washwater and fines from the larger pieces of aluminum is carried out in a vibrating screen, using a four-mesh screen. The oversized material, primarily chunks of aluminum, are dried in a counter-current, gas-fired rotary dryer. Fuel input is two to three million Btu per hour. Water vapor and combustion products are vented through a stack on the feed end of the dryer.

The impure aluminum recovered in this operation is remelted and further processed in the small rotary kiln described above. The suspended solids in the wastewater are thickened and removed; the water is then discharged to a settling pond.

Figure 1 illustrates the aluminum recovery process, along with the fume collection system.

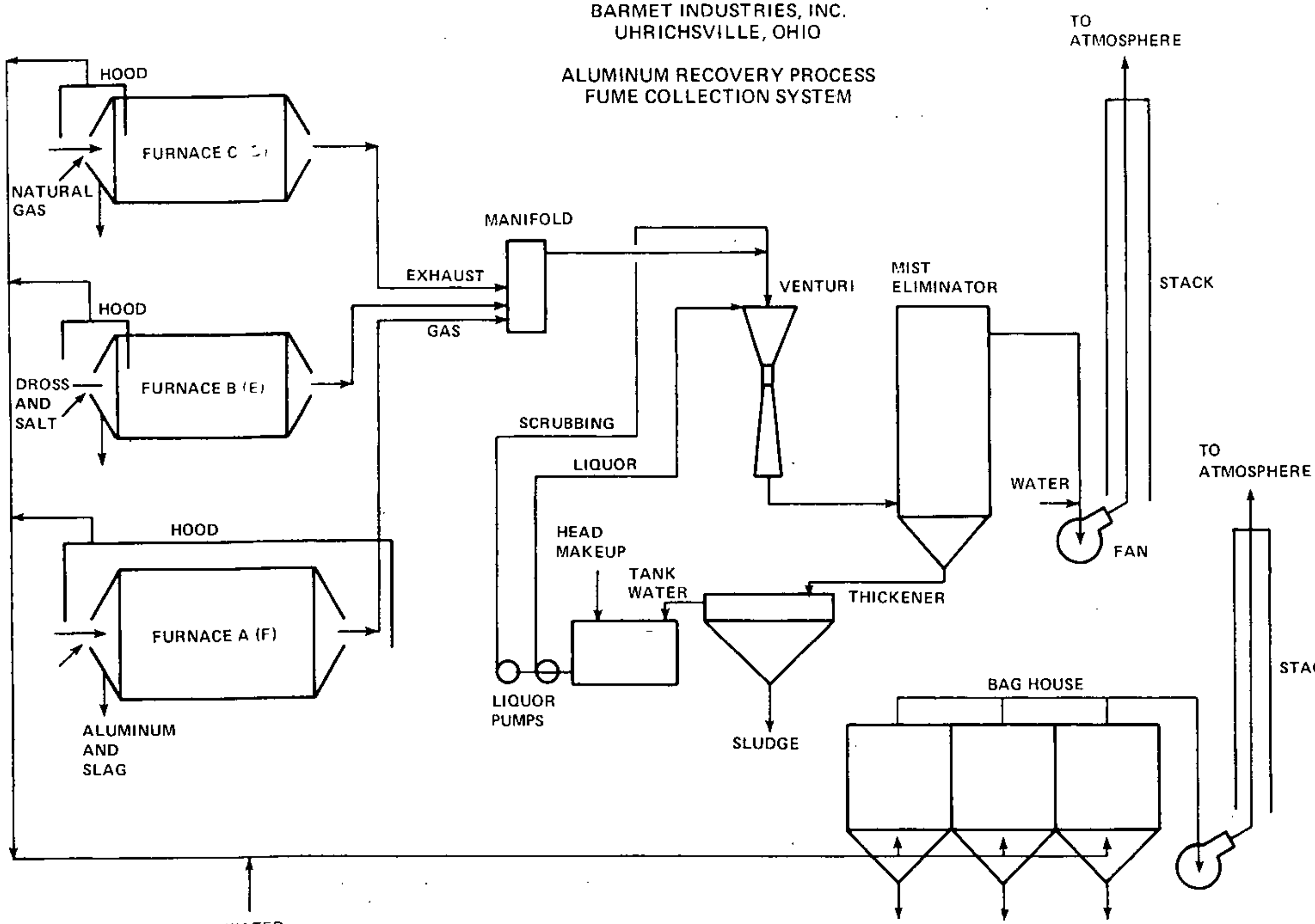

FIGURE 1

ROY F. WESTON, INC.
WESTON
ENVIRONMENTAL CONSULTANTS-DESIGNERS

W.O. 30056

Three systems are used at Barmet to control emissions to the atmosphere from slag processing equipment. Two virtually identical systems collect and clean most of the combustion gases from the kilns. The third system includes hoods over the front end of the kilns; these hoods are then vented through a baghouse.

Scrubber No. 1

Scrubber and vent system No. 1 (Figure 2) collects the combustion products from Kilns D, E, and F. Only Kiln F was in operation during the test period, although the flues from the other two kilns were at least partially open. The kiln is vented through a large vertical flue. The back end of the kiln is tapered to fit inside a circular opening cut into the flue. There is also an opening at the base of the flue to admit additional air. Furnace F is equipped with a full hood. The exhaust gas flue also has an opening inside the top of the hood to remove additional gas.

The three flues combine at a vertical manifold, which also serves as a release vent in the event of an explosive reaction in the kiln. The exhaust gases then enter a Research-Cottrell flooded disc venturi scrubber.

This scrubber has a movable orifice plate which can be adjusted to maintain required pressure drop at various air flow rates or to obtain various pressure drops at the same gas flow rate. To change the area, a disc located in a conical section of the scrubber is raised or lowered, thus changing the clearance between the perimeter of the disc and the converging walls of the scrubber. The variable throat area has a 20:1 ratio. The narrow opening and the convergent and divergent sections above and below the disc create the venturi effect.

The scrubbing liquid is introduced to the system at the top center of the disc and flows across the disc and through the annular opening, where it contacts the gas. Water flowing across the disc loosens the formation of deposits from the dirty gas and provides uniform distribution of the scrubbing liquid. In this system, additional water is also introduced in the approach duct to quench the hot gases and to provide additional scrubbing liquid.

All of the scrubbing liquid leaves the unit entrained in the clean gas stream. An adjacent, cyclonic mist eliminator is used to separate the mist from the clean gas. An induced draft fan discharges the cleaned gases through a steel stack. A garden hose injects additional fresh water into the gas stream just before the fan.

The separated mist drains from the mist eliminator into a 500-gallon conical thickener. The clarified liquid overflows into a small head tank, which supplies two 250-gallon-per-minute (rated) centrifugal pumps, which return the liquid to the disc and approach spray of the scrubber. A simple float switch continuously adds makeup water to the head tank as required. Lime is manually added to the settling tank to maintain an alkaline scrubbing liquid. A separate lime slurry tank is currently being rehabilitated. This mechanically-agitated system will provide a more uniform lime slurry to the settling tanks.

Periodically, sludge is drained from the bottom of the settling tank. The sludge is either discharged on the ground or is pumped to a small pond on Barmet's property.

Scrubber No. 2

The second scrubbing system (Figure 3) collects gases from furnaces A, B, and C. (Only A and B units were in place during the tests. The flue from furnace C was blanked at the manifold.) System No. 2 is virtually identical to System No. 1 described above, with the exception of the specific type of venturi scrubber used. The venturi on System No. 1 was a standard convergent type with a wetted wall approach. The unit appeared to be a Mikro-Airetron venturi scrubber, although all nameplates and other markings had been lost and there are many such scrubbers available. The No. 2 scrubber is also adjustable for various flow rates or pressure drops by moving a block along the length of the venturi throat. Additional water was also added to the ductwork approach of this scrubber.

Baghouse

The third system provides ventilation of the hot gases and contaminants from the front (charging and drawing) end of the kilns. This system is illustrated in Figure 4.

Kilns A and E are equipped with hoods enclosing the entire unit. The hood is approximately 12 by 20 feet. The vent connection to the baghouse is at the top front of the hood. Exhausted air is vented to a manifold running across the roof of the building. Additional air is also exhausted to the wet washers (through a slit in the opening in the flue), inside the hood. These hoods are equipped with doors which cover the front openings. The door is opened pneumatically to permit raw material charges.

Kilns B, C[1], D and E are equipped with hoods covering only the charging end of the unit. Open area is about 10 feet by 4 feet. The rear of the hood extends near the body of the kiln. The hood has a front opening to

[1] Space for Furnace C is available; however, the unit is not in place.

permit raw material charging. These smaller hoods are not equipped with doors. The vent connection at the top of the hood extends to the manifold on the roof.

The hood exhaust gas is directed to a baghouse. At one time an ambient air bleed system was used to cool the gas. This significantly reduced hood exhaust volume, but has been replaced with an evaporative cooling system manufactured by Sonic Corporation. This system employs sonic atomization to spray zero to six gallons per minute of water into the hot gas stream. The spray rate is automatically controlled in temperature measurement, typically about two gallons per minute.

The exhaust gas then enters a Dracco Mark II baghouse. The unit was purchased used, and most information has been obtained from Fuller Company. The baghouse is fully insulated with urethane foam; it is a shaker type, divided into three independent sections. Each section contains 288 bags (864 total). Bags are approximately five-inch diameter by 11 feet, 7 inches long, with a net area of 13.9 square feet per bag. The gross area of the baghouse is 12,000 square feet; bag construction is woven polyester.

The baghouse structure is typical of shaker types, i.e., the inlet duct branches enter the three modules through the hoppers. Filtration is from the inside to the outside of the bag. The filter gases leave the top of the baghouse in individual ducts which combine to a single duct running to the fan. The three outlet ducts have been equipped with mechanized butterfly valves to isolate the modules for cleaning. However, the valve drive, and possibly even the valve itself, has been removed. The combined duct runs to an induced draft fan, which discharges to the atmosphere through a steel stack.

Washer/Dryer Process

There is no air pollution control equipment used at the dryer or related operations. The washer/dryer operation is illustrated in Figure 5.

BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO

EMISSIONS CONTROL SYSTEM
SCRUBBER NUMBER 1

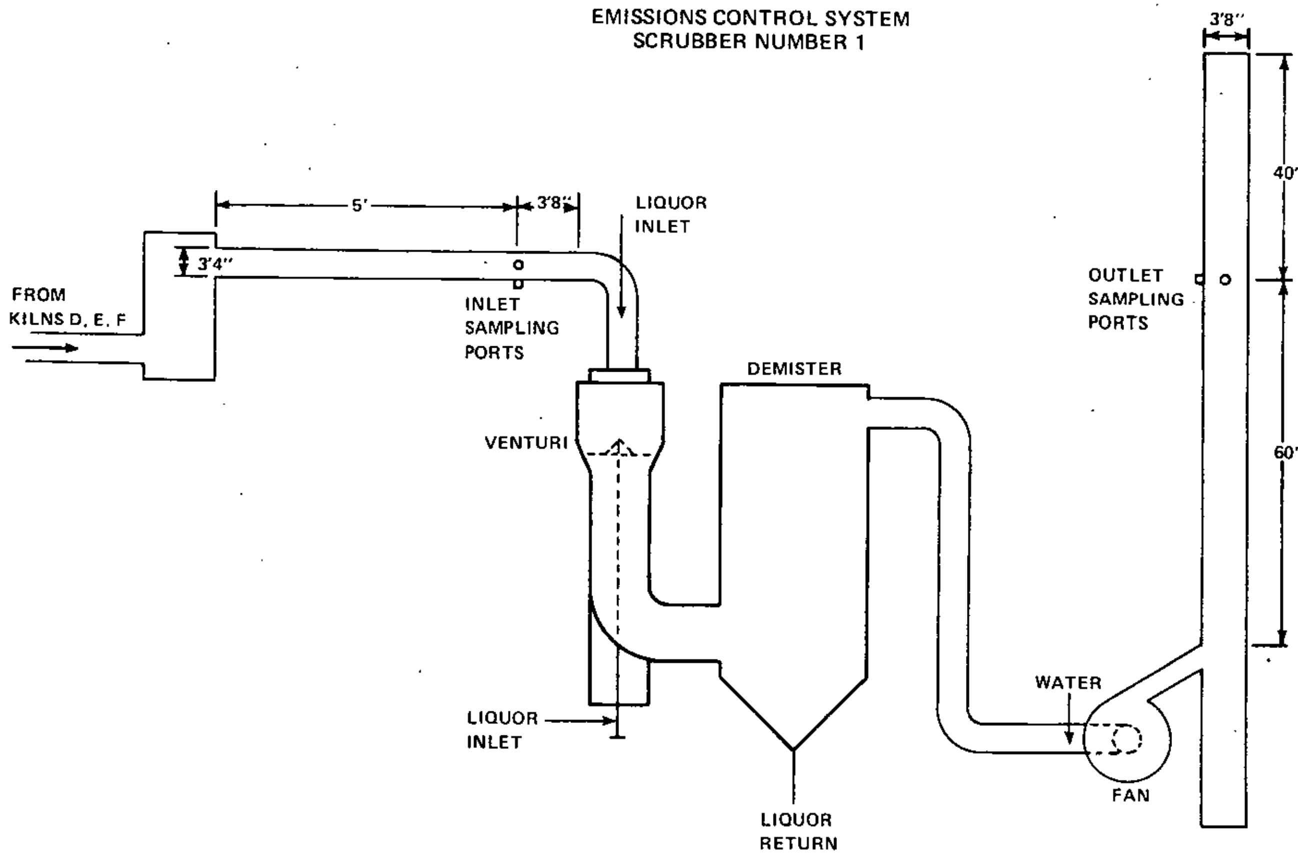

FIGURE 2

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BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO

EMISSIONS CONTROL SYSTEM
SCRUBBER NUMBER 2

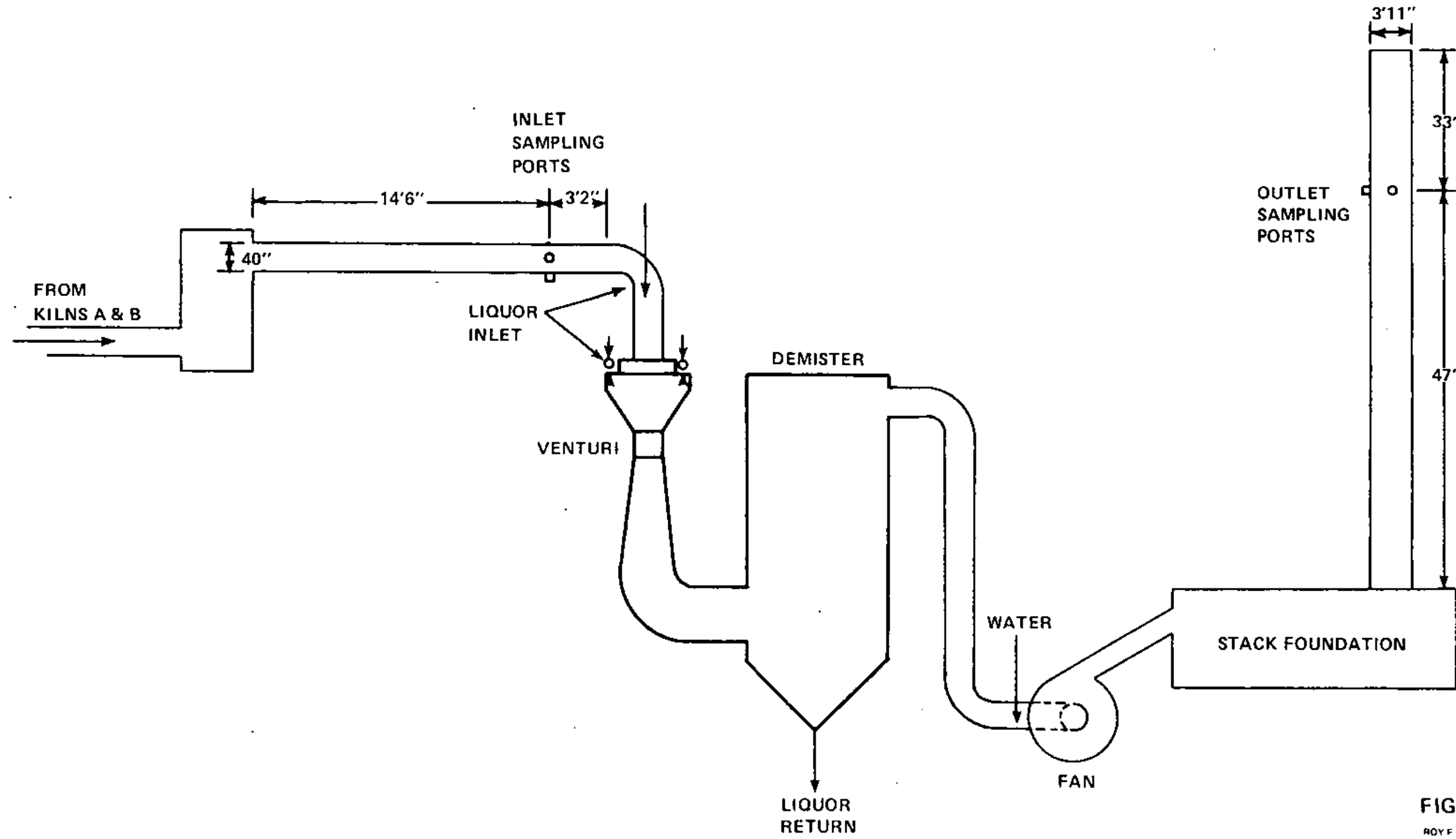

FIGURE 3

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BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO

EMISSIONS CONTROL SYSTEM
BAGHOUSE

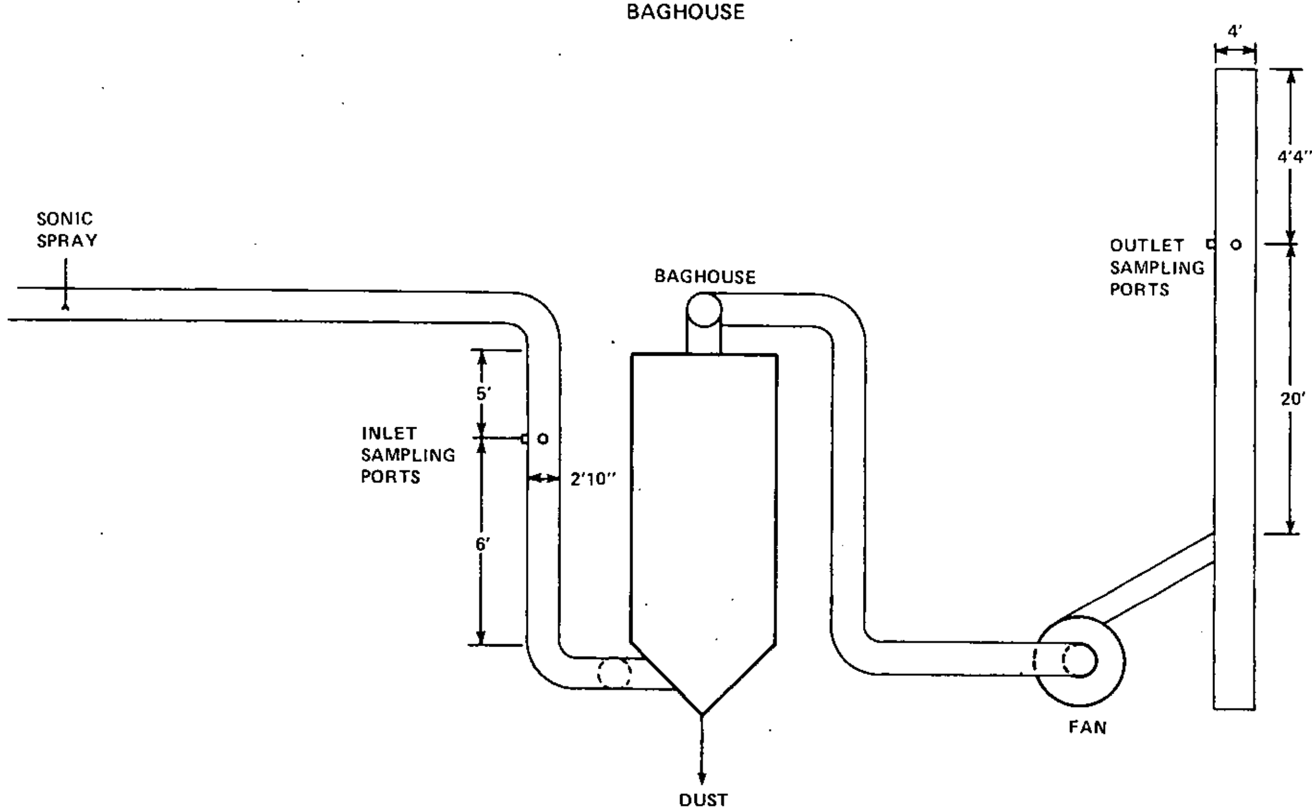

FIGURE 4

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BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO

WASHER/DRYER OPERATIONS

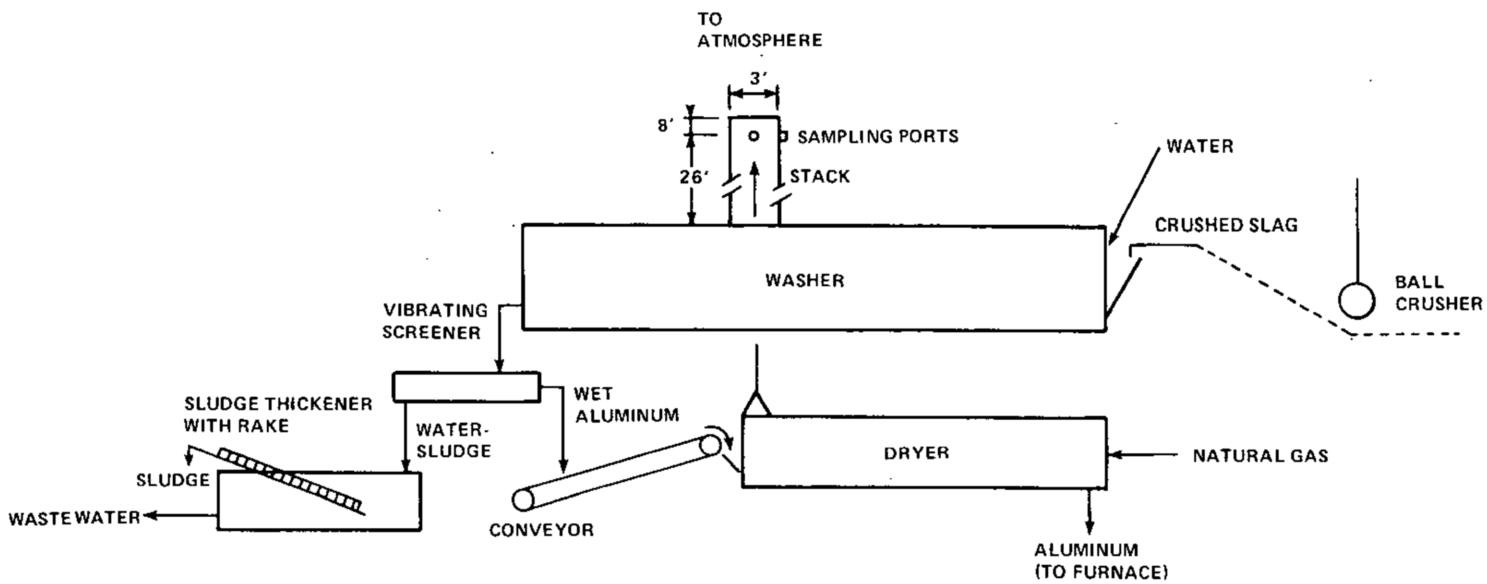

FIGURE 5

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Particulates

The sampling train designed for the collection of particulate matter complied with the EPA Region V task requirement that the sampling be accomplished according to EPA and ASME PTC-27[1]; the train also satisfied the Ohio EPA requisite for compliance with EPA Methods[2] 1, 2, and 5.

The train consisted of a stainless steel nozzle connected directly to a stainless steel holder containing a medium porosity alundum thimble. This primary filter assembly was immediately backed-up by a Gelman Filter Holder supporting a 47-mm Gelman Glass Fiber Filter, Type A. An inconel probe (48 inches long) followed the filter holder and was connected to the first of six Greenburg-Smith Impingers by means of a short length of teflon tubing.

Impinger Number One was a modified[3] Greenburg-Smith Impinger connected by a glass joint to a standard type Greenburg-Smith Impinger.

Each of the first two impingers contained exactly 100 milliliters of distilled water. The next two impingers were also a modified and standard type, and each contained exactly 100 milliliters of 5.0 percent sodium hydroxide solution. A dry modified impinger was next, followed by the final modified impinger charged with 200 grams of dry pre-weighed silica gel. The first two impingers remained at ambient temperature; all other impingers were maintained in a crushed ice bath. A Research Appliance control console provided a leakless vacuum pump, a calibrated dry gas meter, a calibrated orifice, and appropriate inclined manometers. The sampling train is illustrated in Figure 6.

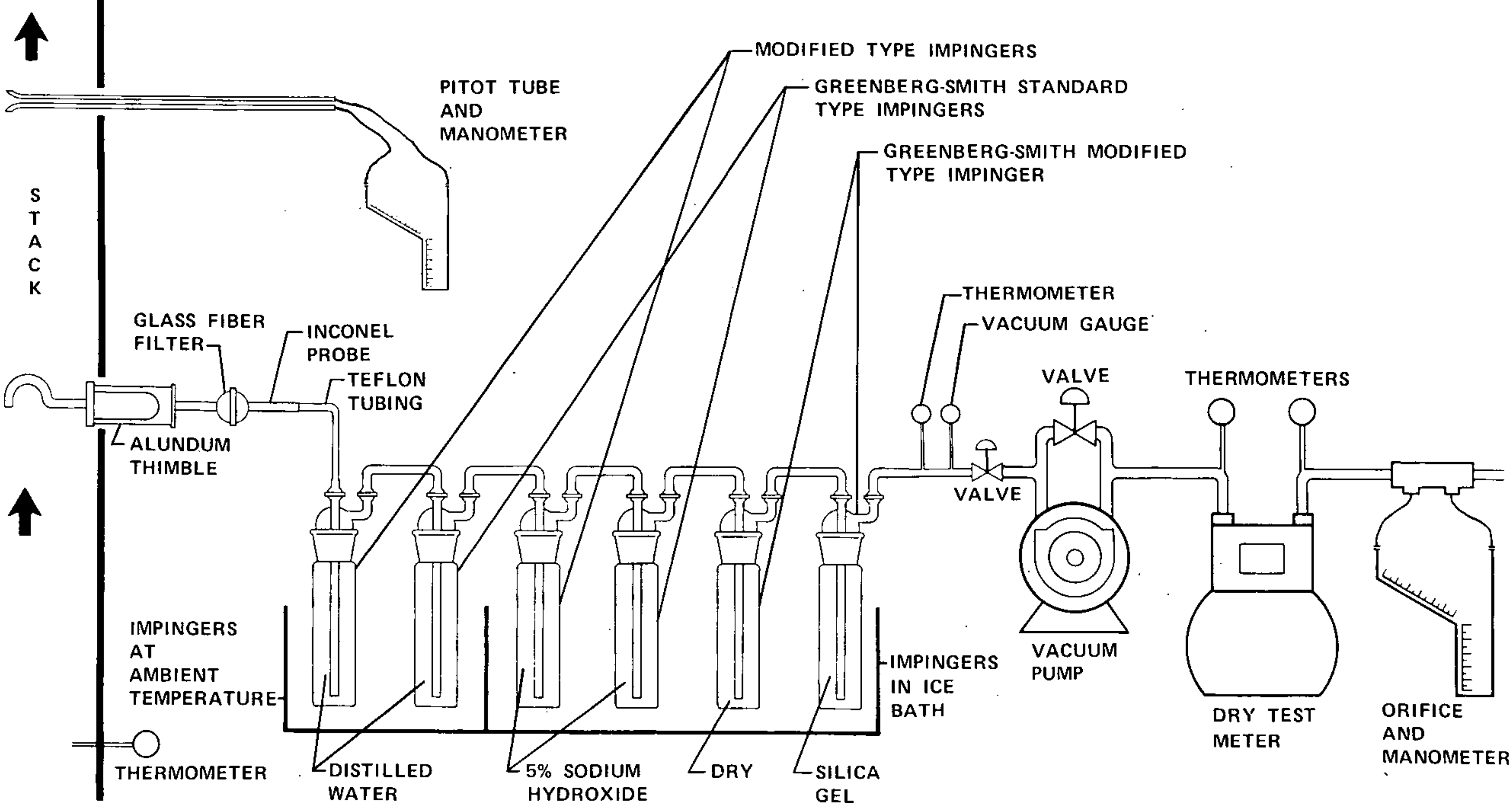
The particulate captured by the thimble and in the sampling nozzle satisfies the ASME PTC-27 method requirement for the particulate catch. The addition of the particulate found on the glass fiber filter to the initial catch represents the EPA Method 5 particulate sample. The particulate found in the distilled water sample from the first two impingers was combined with the preceding particulate values, resulting in the total particulate collected by the train. The amounts found by each portion of the train are calculated separately for purposes of this report.

[1] "Determining Dust Concentration in a Gas Stream", American Society of Mechanical Engineers, Power Test Code PTC-27, 1957.

[2] "Standards of Performance For New Stationary Sources", Federal Register, Volume 36, No. 247, December 23, 1971.

[3] The modification consisted of substituting a one-half inch tube opening at the bottom of the impinger insert tube instead of the usual orifice and plate of the standard type.

BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO
FIGURE 6
ASME PTC-27/EPA 5
MODIFIED SAMPLING TRAIN



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Chlorides, Fluorides, and Metals

Simultaneous sampling for chlorides, fluorides, cyanides, aluminum, lead, cadmium and strontium was accomplished with the modified particulate sampling train. The sample recovery procedures allowed analyses of individual samples for definition of particulate chlorides, particulate fluorides, and metals for both the ASME PTC-27 and EPA 5 Methods. (ASME PTC-27 results are provided in a separate report.)

Analysis for hydrochloric acid was performed on the contents of impingers one and two, and all impingers captured chlorides, fluorides, cyanides, and metals.

Gas stream velocities were measured by means of a calibrated "S" type pitot tube and inclined manometer. Temperatures were obtained by utilizing calibrated thermometers. Gas composition was determined by means of standard orsat analysis.

Scrubber Number One

Sample Port Location

The selection of the scrubber inlet sampling port location was dictated by the ductwork configuration which did not permit compliance with EPA Method 1 "Distance from flow disturbance" criteria. Two 3-inch I.D. ports were cut into the 40-inch diameter metal duct at right angles to each other in the only straight run of duct before the scrubber. The nearest upstream flow disturbance was 44 inches and a downstream bend was located at 60 inches. This sampling location required the maximum number of sampling points (48). (See Figure 2.)

The existing sampling ports in the scrubber No. 1 outlet stack met the "eight diameters from a flow disturbance" rule and permitted a six-point traverse through each of two sampling ports positioned at right angles to each other at a point in the metal stack 40 feet from the nearest upstream disturbance and 60 feet from any downstream disturbance. The exact distances of the sample points along the inlet and outlet traverse axis can be found in Figure 7.

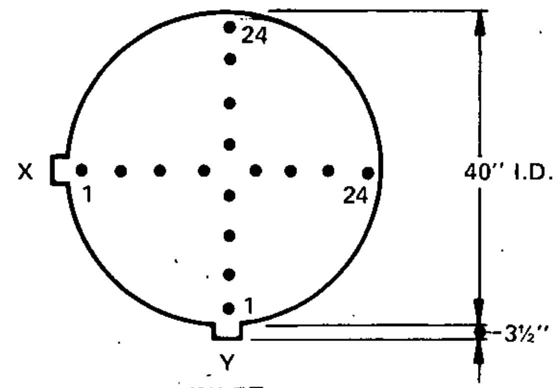
Preliminary Tests

The cross-sectional area of the inlet duct was divided into 12 concentric areas to provide 24 sample points on each axis for a total of 48 points. The preliminary velocity traverse was accomplished by measuring the gas velocity pressure differentials utilizing a calibrated "S" type pitot tube and inclined manometer. The pitot tube was positioned in the duct at each of the 48 traverse points for 30 seconds to obtain a constant reading on the manometer. A static pressure was measured to calculate the absolute pressure in the duct. The gas stream temperature was confirmed by a metal dial thermometer compared against a calibrated glass thermometer.

The outlet stack was divided into three concentric areas to permit six traverse points on each axis for a total of 12 sampling points. The gas velocity was observed in a similar manner as were the inlet measurements. Stack gas moisture content was measured by wet and dry bulb thermometers and was determined from standard psychrometric tables.

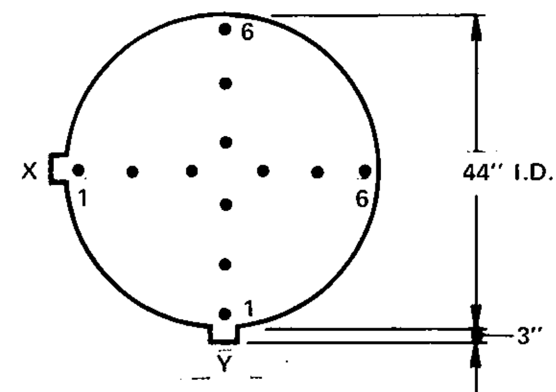
A summary of the results of these tests can be found in Table 1. Detailed test data is presented in Table A-1 of Appendix A.

BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO
FIGURE 7
SCRUBBER NUMBER ONE
SAMPLING POINTS LOCATION



INLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)	TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4 1/2	13	27 1/2
2	4 3/4	14	30 1/2
3	5 1/4	15	32 1/2
4	6 1/2	16	34 1/4
5	7 3/4	17	35 3/4
6	8 3/4	18	37
7	10	19	38 1/4
8	11 1/4	20	39 1/4
9	12 3/4	21	40 1/4
10	14 1/4	22	41 1/4
11	16 1/2	23	42 1/4
12	19 1/2	24	42 1/2



OUTLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	5
2	9 1/2
3	16
4	34
5	40 1/2
6	45

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Table 1

Barmet Industries, Inc.
Uhrichsville, Ohio

Preliminary Velocity Traverse

Scrubber Number One

	Inlet	Outlet
Date	10/24/74	10/24/74
Time	1600	1630
Gas Velocity FPM	2,650.	1,360.
Gas Volume SCFM	13,490.	11,420.
Gas Volume ACFM	23,120.	14,400.
Temperature, ^{o}F.	425.	125.
Gas Moisture, %	3.0	13.0

Formal Tests

The start of each of the two test runs was scheduled to coincide with the initial charging of furnace F. This large (10-ft diameter) rotary furnace was the only furnace in operation of the three units serviced by scrubber No. 1; however, this was considered normal operating conditions. The time period estimated for a complete batch cycle (heat) for the furnace (from initial charging to tapping of metal) was from three to four hours. A five-minute sampling period at each of the 48 sampling points was chosen to allow sampling throughout the heat. Frequent thimble and filter changes and sampling port change-overs permitted only 170 minutes of sampling for the first test run out of the 230 minutes available, and 150 minutes of sampling during the 205 minute heat for the second test run. In both instances, the sampling continued throughout the entire heat with brief stoppages for thimble and filter replacement. Both tests were stopped immediately after the metal was tapped.

During sampling, gas stream velocities were measured by insertion of a calibrated "S" type pitot tube into the duct adjacent to the sampling nozzle. The velocity was observed immediately after positioning the nozzle at each sampling point, and the sampling rate was adjusted to maintain isokinetic sampling conditions. A metal dial thermometer continuously measured the temperature of the gas stream. Temperature measurements were observed at the outlet of the impingers and at the inlet and outlet of the dry test meter. Test data were recorded for each sampling point. The composition of the gas stream was monitored during each test by means of orsat analysis.

The materials charged to the process furnace during each heat were monitored and recorded. A typical charge of dross was weighed at 1,100 pounds. A similar charge of salt weighed 1,000 pounds. A notation was made each time either a load of dross or salt was charged; thus, the total process charge during the heat was recorded. A Statement of Process Rate was completed for each test run and is available in Appendix G, Process Operations Log.

An evaluation of the visible emissions from the scrubber outlet stack was performed for a 30-minute period in the second test run. The observations were conducted by a recently certified observer during a period of furnace charging, which represented a worst condition. Table A-9 presents detailed visible emissions data for scrubber No. 1.

Scrubber Number Two

Sample Port Location

Two 3-inch I.D. sampling ports were required for sampling the 40-inch diameter inlet metal duct to scrubber No. 2. The ports were positioned in the most convenient location for sampling in a straight run of duct, with a distance of 4.4 stack diameters downstream before flow disturbance and approximately one stack diameter from an upstream bend in the duct. Thirty-two sampling points were selected according to EPA Method 1 procedures. (See Figure 3.)

Two existing sampling ports in the outlet stack from scrubber No. 2 were satisfactory for EPA Method 1 traverse requirements. The ports were cut into the metal stack at right angles to each other at a point 33 feet from the nearest downstream flow disturbance and 47 feet from the stack outlet. This location permitted a six-point traverse through each of the two ports. The distances for the sample points on the inlet and outlet traverse are illustrated in Figure 8.

Preliminary Tests

The cross-sectional area of the inlet duct was divided into 8 concentric areas to provide 16 sample points on each axis for a total of 32 points.

The preliminary velocity traverse was performed with a calibrated "S" type pitot tube and inclined manometer by measuring the pressure differential at each of the 32 points. Temperature of the gas stream was measured with a metal dial thermometer.

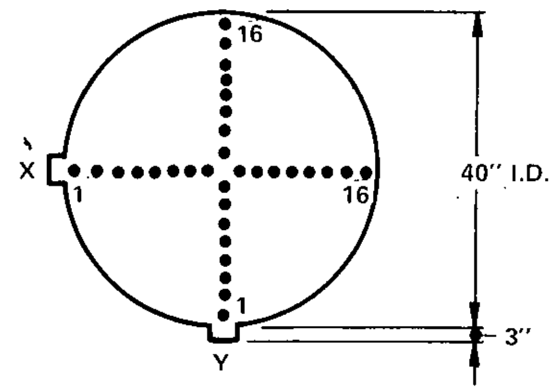
The scrubber outlet stack was divided into three concentric areas to provide six traverse points on each axis for a total of 12 points. The gas velocity and flow was determined by pitot tube and manometer in a similar manner as the inlet duct measurements. Stack gas stream moisture was measured by wet and dry bulb thermometers.

Table 2 outlines the results of the preliminary tests at scrubber No. 2. Details of the tests can be found in Table A-2.

Formal Tests

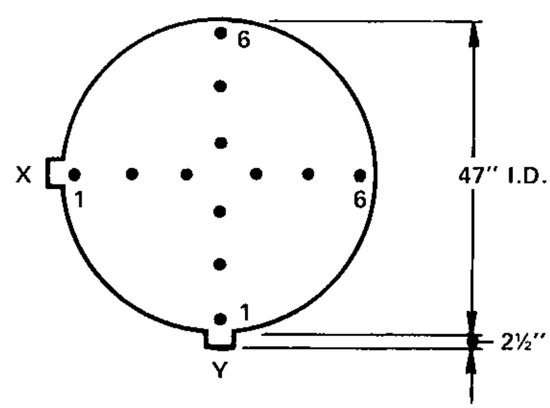
The No. 2 scrubber serves furnaces A, B, and C. Two furnaces were in operation during the two test periods. Furnace A is a ten-feet diameter rotary furnace and produces approximately twice as much metal per heat as furnace B (8 feet diameter). Furnace A batch heats were therefore used to determine the test timing. Each simultaneous test of the scrubber inlet and outlet included a complete heat of Furnace A and usually two heats of Furnace B during the same period.

BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO
FIGURE 8
SCRUBBER NUMBER ONE
SAMPLING POINTS LOCATION



INLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)	TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4	9	28
2	5	10	31 3/4
3	6 1/2	11	34 1/4
4	8	12	36 1/4
5	9 3/4	13	38
6	11 3/4	14	39 1/2
7	14 1/4	15	41
8	18	16	42



OUTLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4 5/8
2	9 3/8
3	16 3/8
4	35 5/8
5	42 5/8
6	47 3/8

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Table 2

Barmet Industries, Inc.
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Preliminary Velocity Traverse

Scrubber Number Two

	Inlet	Outlet
Date	10/21/74	10/21/74
Time	1530	1600
Gas Velocity FPM	3,050.	1,860.
Gas Volume SCFM	16,050.	18,970.
Gas Volume ACFM	26,630.	22,430.
Temperature, ^{o}F.	405.	115.
Gas Moisture, %	3.1	9.9

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Seven and one-half minutes of sampling at each of the inlet sampling points and ten minutes at each outlet point provided 180 minutes sampling time of the 230-minute heat during test run number one, and 150 minutes sampling for test two of the available 190 minutes of the heat cycle. Several thimble and filter changes consumed the time differential. In both tests, sampling was performed throughout the entire heat time period.

The sampling techniques were similar as those described for sampling of scrubber No. 1. Temperatures were measured and recorded, and gas composition was analyzed by orsat methods.

The loads of dross and salt charges to both furnaces A and B were monitored and recorded throughout both tests. Statements of Process Rate can be found in Appendix G.

Visible emissions from the scrubber outlet stack were observed for a 30-minute period during run number two. The visible emissions were observed at a distance in the plume where it was estimated that the water vapor was dissipated and only particulate matter was responsible for the opacity. The observations were performed during furnace charging. Visible emissions data is presented in Table A-10.

Baghouse

Sample Port Location

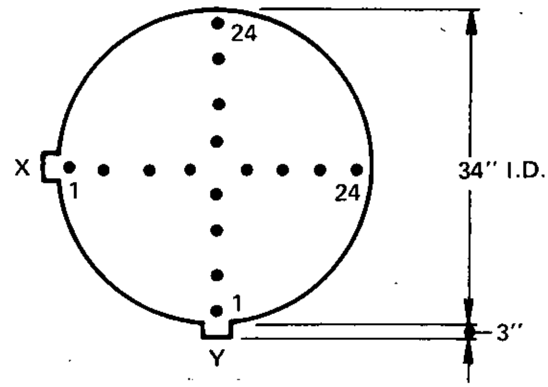
The 34" I.D. inlet duct to the baghouse was provided with existing 3-inch I.D. sampling ports located six feet before a split into two ducts entering the baghouse compartments; and five feet from a downstream flow disturbance caused by a bend in the line. This location dictated that the maximum number of points be assigned for inlet sampling. Twenty-four points on each traverse provided the required total of 48 sampling points.

The two ports located in the baghouse fiberglass outlet stack were positioned only 1.1 stack diameters from the stack outlet and 5 diameters from the stack outlet and 5 diameters from the entry of the breeching from the fan. Thirty-six traverse points were needed for proper sampling according to Method One. Figure 4 illustrates the inlet and outlet sampling port locations. The traverse point distances can be found in Figure 9.

Preliminary Tests

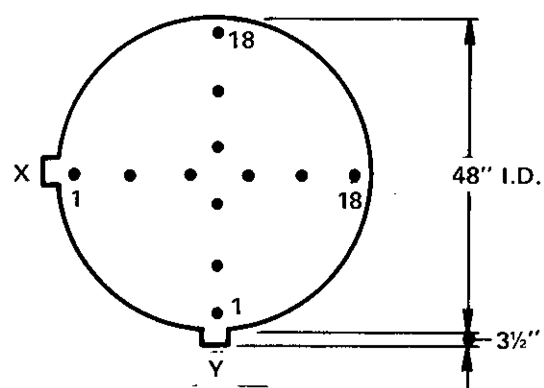
The inlet preliminary velocity traverse were performed by pitot tube and manometer by measuring the pressure differential in two points in each of 12 concentric areas across the cross-sectional area of the inlet duct for a total of 48 measurements.

BARMET INDUSTRIES, INC.
UHRICHSVILLE, OHIO
FIGURE 9
BAGHOUSE
SAMPLING POINTS LOCATION



INLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)	TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4	13	23 1/2
2	4 1/4	14	26
3	4 3/4	15	28 3/4
4	5 3/4	16	29
5	6 1/2	17	30 1/2
6	7 1/2	18	31 1/2
7	8 1/2	19	32 1/2
8	9 3/4	20	33 1/2
9	10 3/4	21	34 1/4
10	12 1/4	22	35
11	14	23	35 3/4
12	16 1/2	24	36



OUTLET

TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)	TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4 1/2	10	33 1/4
2	5 1/2	11	37 1/4
3	7	12	40 1/4
4	8 3/4	13	42 1/2
5	10 1/2	14	44 1/2
6	12 1/2	15	46 1/4
7	14 3/4	16	48
8	17 3/4	17	49 1/2
9	21 3/4	18	50 1/2

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Duct static pressure was obtained and the inlet gas stream temperature was measured.

Thirty-six traverse points in the outlet stack were measured for gas velocity utilizing similar techniques. Gas stream moisture was calculated at 5.0 percent from measurements of water introduced for gas cooling and ambient humidity. Temperatures were obtained and recorded. The summary of the preliminary tests is presented in Table 3. Test details are found in Table A-3 of Appendix A.

Formal Tests

Prior to the start of each of the three test runs, the baghouse was shut down and cleaned to establish similar conditions for each test.

The inlet to the baghouse collects emissions from all furnaces. Three units (A, B, F) were in operation during the testing period. The initial charging to metal tap of furnace A was considered to be a batch cycle which covered a time period including all charges to the other two furnaces. Each simultaneous test of the scrubber inlet and outlet included a complete heat of furnace A and F and usually two heats of furnace B.

The baghouse inlet was sampled for 5 minutes at each sample point, and the outlet was sampled for 6 minutes per point, for a total test time of 190 minutes of the batch cycle time of 205 minutes for the first test run (Run No. 5).

The second test (Run No. 6) provided sampling for 220 minutes of the available 230 minutes because no thimble or filter changes were necessary. Test Run No. 7 allowed 190 minutes of sampling out of 200 minutes total batch time.

The sampling techniques were identical to the procedures previously described. The gas composition was analyzed by Orsat analyzer.

The loads of aluminum dross and salt charges to furnaces A, B, and F were considered for evaluation of the baghouse performance. The charges were monitored to each furnace and recorded. Statements of process rate for each test are presented in Appendix G.

Visible-emission observations were made during two periods of baghouse operation. A routine 30-minute observation of the stack outlet where the baghouse was monitored at normal operation was performed during the first test period. A second observation was conducted during the cleaning cycle. The baghouse is shut down during the seven to ten minute shaking and cleaning procedure, and zero emissions were noted at that time; however, a brief period of emissions were noted at start-up. Visible emission test details for the baghouse can be found in Table A-11 of Appendix A.

Table 3

Barmet Industries, Inc.
Uhrichsville, Ohio

Preliminary Velocity Traverse

Baghouse

	Inlet	Outlet
Date	10/27/74	10/27/74
Time	1600	1630
Gas Velocity FPM	2,510.	1,720.
Gas Volume SCFM	11,010.	16,060.
Gas Volume ACFM	15,830.	21,630.
Temperature, ^{o}F.	265.	220.
Gas Moisture, %	5.0	5.0

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Dryer Outlet

Sample Port Location

The sample ports were cut into the outlet stack of the dryer unit at a stack height that permitted a minimum number of sampling points. The nearest upstream disturbance of 26 feet and downstream disturbance of 8 feet permits a minimum of 12 sampling ports as outlined in EPA Method 1. Two three-inch I.D. Ports were positioned at right angles to each other in the 36 inch diameter metal stack. (See Figure 5.)

Preliminary Tests

The cross-sectional area of the outlet stack was divided into three concentric areas to provide six sample points on each axis for a total of 12 points. (See Figure 10 for sampling point distances.) A preliminary velocity traverse was performed according to standard procedures. Stack gas temperature and moisture content were measured and recorded. The summary of preliminary test results can be found in Table 4.

Formal Tests

Three one-hour test runs were performed in a single day during periods of normal washer/dryer operation.

Five-minute sampling at each of the 12 sampling points provided 60-minute test runs. The sampling rates were maintained at isokinetic sampling rates according to EPA Procedures.

The process charging rate was determined by weighing the amount of aluminum recovered during each one-hour test. This approximates the quantity of wet metal delivered to the dryer from the salt washing operation. Statements of Process Rate were prepared for each test and are found in Appendix G.

The stack emissions plume was negligible because of very low stack gas flow. A 30-minute period of visible-emission observation was attempted for opacity evaluation of the light wispy plume. Visible emissions data can be found in Table A-12.

Detailed test data for the test runs performed on the two scrubber units, the baghouse, and the dryer outlet can be found in Tables A-5 through A-8 of Appendix A. Field data sheets are provided in Appendix B. A test log outlining test dates and times is presented as Appendix E.

BARMET INDUSTRIES, INC.
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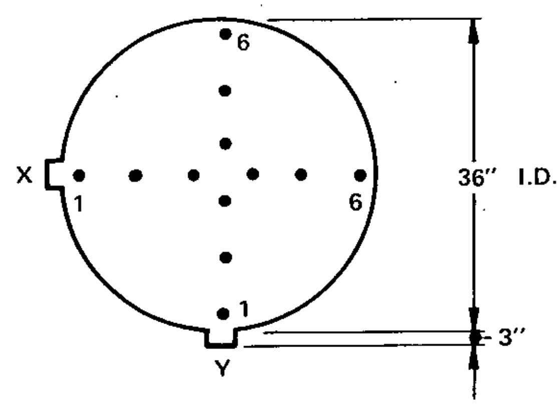
FIGURE 10

DRYER OUTLET STACK
SAMPLING POINTS LOCATION



TRAVERSE POINT NUMBER	DISTANCE FROM OUTSIDE PORT (INCHES)
1	4 1/2
2	8 1/4
3	13 1/2
4	28 1/4
5	33 3/4
6	37 1/2

Table 4

Barmet Industries, Inc.
Uhrichsville, Ohio

Preliminary Velocity Traverse

Dryer Outlet

Date	10/30/74
Time	1530
Gas Velocity FPM	640.
Gas Volume SCFM	3,570.
Gas Volume ACFM	4,550.
Temperature, °F.	180.
Gas Moisture, %	6.0

(5)

Sample Recovery

A consistent procedure was employed for sample recovery. Two persons were assigned the task of cleaning an entire sampling train, sample recovery, and charging the train for the next test run. Both of the two man sample recovery teams had the responsibility for the same test train (inlet or outlet) for all test runs. The sample recovery proceeded in the following manner:

1. The total liquid in impingers one and two was measured and placed in a polyethylene container (Sample 1).

2. The impingers, connectors, teflon tubing, inconel probe, and back-half of the filter holder were washed with distilled water into Sample 1.

3. 100 milliliters of Sample 1 were placed in a separate polyethylene container and preserved by the addition of 10N sodium hydroxide to pH 11.0 for cyanide analysis (Sample 1-A).

4. The total liquid (sodium hydroxide solution) in impingers three and four was measured and placed in a polyethylene container. The impingers and glass connectors were washed with distilled water into the container (Sample 2).

5. The glass fiber filter was removed from the holder and replaced in the original container (petri dish), along with any loose particulate and filter fragments (Sample 3).

6. The back-half of the thimble holder preceding the filter was washed with distilled water into a polyethylene container (Sample 4).

7. The alundum thimble was removed from the holder and placed in the original container (Sample 5).

8. The nozzle was brushed and washed with distilled water into a polyethylene container (Sample 6).

9. The silica gel was removed from the last impinger and immediately weighed to the nearest 0.1 gram.

Particulate Analysis

A 100-ml portion of the impinger sample (Sample 1), the filter holder wash sample (Sample 4), and the nozzle wash sample (Sample 6) were each evaporated to dryness in tared beakers by means of a steam bath. A sample of the distilled water was carried through the evaporation procedure as a blank. The glass fiber filter (Sample 3) and alundum thimble (Sample 5) were desiccated for 24 hours and weighed to a constant weight.

The weight of the material collected in the alundum thimble plus the nozzle wash residue weight represents the particulate catch according to Method ASME-PTC 27. The addition to the previous value of the weight of the particulate captured on the filter, plus the thimble holder wash residue weight, provides the particulate matter weight collected according to EPA Method 5 procedures. The total particulate catch for the sampling train includes the residue weight of the impingers sample (Sample 1). All final weights are adjusted by the corresponding values of the appropriate blanks. Laboratory analytical reports are located in Appendix D.

The particulate matter collected in the alundum thimble was extracted with several portions of hot distilled water and was combined with the reconstituted nozzle wash sample residue. The analyses performed on this combined sample represent the contaminants present in the particulate phase for the ASME-PTC 27 method catch.

The accumulation of particulate on the glass fiber filter was extracted in a similar manner and combined with the filter holder wash residue sample. The addition of the analytical values for the particulate contaminants found in this sample to the previous results provides the analyses for each contaminant according to EPA Method 5 procedures. The analyses performed on these samples include chlorides, fluorides, aluminum, cadmium, lead, and strontium.

A portion of the impinger sample (Sample 1) was analyzed for hydrogen chloride concentration. The preserved portion of the impingers sample (Sample 1-A) was combined with an aliquot of Sample 2 (the impingers sodium hydroxide solution) and analyzed for cyanides. The reconstituted residue from Sample 1 was combined with the remainder of Sample 2 for the following analyses: chlorides, fluorides, aluminum, lead, cadmium, and strontium. These contaminant quantities found in the impinger section of the sampling train provide the gaseous-phase measurements and when combined with the particulate phase concentrations represent the total concentration of each contaminant collected during the test run.

Hydrogen Chlorides

The analytical procedures used to measure the emissions of hydrogen chlorides have been published by Los Angeles County, California in the Source Testing Manual. The procedure involves titration with sodium hydroxide.

The emission rate of hydrogen chlorides is determined from an analysis of the distilled water in the first two impingers (Sample 1). A sample of this water is titrated with standard 0.1 N sodium hydroxide solution to the methyl red endpoint. The quantity of standard base used is recorded and expressed as milliequivalents. The concentration and emission rate of hydrogen chlorides (as HCl) in the sample gas are calculated with the expressions:

$$C_{HCl} = 838 \frac{f_1 m_3}{V_T}$$

and

$$M_{HCl} = 5.76 \times 10^{-6} \; C_{HCl} \; Q$$

where:

C_{HCl} = hydrogen chloride concentration, parts per million by volume.

m_3 = milliequivalents of standard sodium hydroxide used for titration of an aliquot of Sample 1.

M_{HCl} = emission rate of hydrochloric acid, pounds per hour.

f_1 = aliquot factor: ratio of total impinger solution volume to aliquot volume taken for analysis.

V_T = volume of stack gas sampled, standard cubic feet.

Q = stack gas flow rate, standard cubic feet per minute.

Chlorides

The chloride analyses have been performed by the Mercuric Nitrate Method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The procedure involves titrating chloride ions with mercuric nitrate because of the formation of soluble, slightly dissociated mercuric chloride. In the pH range 2.3 to 2.8, diphenylcarbazone indicates the endpoint of this titration by formation of a purple complex with the excess mercuric ions.

Fluorides

The fluoride analyses have been performed using a specific ion electrode as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The electrode is designed to be used with a standard calomel reference electrode and a pH meter having an expanded millivolt scale. Fluoride concentrations are determined by correlating a millivolt reading and a calibration curve developed through the use of known samples.

Cyanide

The cyanide analyses have been performed using a distillation and colorimetric method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The procedure involves distillation of the sample in the presence of sulfuric acid which readily converts simple cyanides into HCN. The conversion is hastened in the presence of magnesium and mercuric salts, which aid in reducing the ferrocyanides and ferricyanides.

Following distillation, the cyanide is converted to cyanogen chloride, CNCl, by reaction with chloramine-T. After the reaction is complete, the CNCl forms a blue dye on the addition of a pyridine-pyrazolone reagent. The intensity of the color is then measured on a spectrophotometer, and the concentration is determined from a standard curve.

Aluminum

The aluminum analyses have been performed by the Atomic Absorption Method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The process involves atomizing a sample at high temperature flame into a monochromator, and onto a detector that measures the amount of light absorbed. Because each metallic element has its own characteristic absorption wavelength, a source lamp composed of that element is employed, making the method relatively free of spectral or radiation interferences. The amount absorbed in the flame is proportional to the concentration of the element in the sample.

Lead

The lead analyses have been performed by the Atomic Absorption Method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The analytical procedure is identical to that used for the aluminum determination.

Cadmium

The cadmium analyses have been performed by the Atomic Absorption Method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The analytical procedure is identical to the procedure used for the aluminum determination.

Strontium

The strontium analyses have been performed by the Atomic Absorption method as described in Standard Methods for the Examination of Water and Wastewater, 13th Edition. The analytical procedure is identical to the procedure used for the aluminum determination.

Scrubber Number One

The summary of test results providing the particulates measured in the inlet and outlet gas streams of scrubber number one can be found in Table 5. The test results are reported for three points in the sampling train. The initial values indicate the particulate catch up to and including the filter (Test Method EPA 5). The next data provides the total particulate catch including the impinger portion. Particulate concentrations are expressed in grains per dry standard cubic foot (gr/dscf) and grains per actual cubic foot (gr/acf). The particulate emission rates are presented in pounds per hour (lbs/hr) and pounds per ton (lbs/ton) of charge.

.6043-.3463/.6043 = 43%
74.24-40.56/74.24 = 45%
35.13-19.34/35.13 = 45%

Averaging the results of the two test runs indicates an average concentration of particulate matter in the inlet gas stream of 0.6043 gr/dscf as measured by the EPA 5 catch. The outlet gas stream particulate emission average was 0.3463 gr/dscf. The inlet gas stream average mass emission rates were measured at 74.24 lbs/hr and 35.13 lbs/ton. Corresponding to EPA 5 procedures, the outlet average mass emission rates were 40.56 lbs/hr and 19.34 lbs/ton. Table 6 provides the summary of test results for both particulate and gaseous contaminants. Each fraction is itemized separately. Total contaminant concentrations are the sum of the particulate and the gaseous fractions. All results are expressed in micrograms per cubic meter. Visible emission results for the scrubber number one outlet stack can be found in Table A-9, Appendix A.

P.W. = 1.8 T/HR.

Scrubber Number Two

P.W. = 3.6 T/HR.
NO CONTROL

Table 7 summarizes the test results of the particulate sampling of the inlet and outlet gas streams of scrubber number two. The average particulate concentration for the two test runs (based on the EPA 5 catch) was 0.5273 grains per dry standard cubic foot at the inlet and 0.5066 gr/dscf in the outlet gas stream. The average mass emission rate was measured at 74.45 lbs/hr inlet and 77.17 lbs/hr at the outlet. Average EPA 5 pounds per ton of charge at the inlet was 20.63 and at the outlet 21.41. Table 8 summarizes particulate and gaseous contaminants measured at the inlet and the outlet of scrubber number two. Table A-10, Appendix A, contains the visible emission results at scrubber number two outlet stack.

Baghouse

93%

Particulate results for the three baghouse test runs are presented in Table 9. Average EPA 5 particulate concentration in the entering gas stream was measured at 0.4218 gr/dscf. Outlet average particulate concentration was 0.0294 gr/dscf. Average mass emission rates were 43.12 lbs/hr inlet and 4.24 lbs/hr measured at the outlet. 8.35 pounds per

43.12 - 4.24/43.12

Table 5

Barmet Industries, Inc.
Uhrichsville, Ohio

Scrubber Number One - Particulate Emissions

Summary of Test Results

Test Run Number	3		4	
Location	Inlet	Outlet	Inlet	Outlet
Date	10/26/74		10/27/74	
Gas Flow				
Standard Cubic Feet/Minute, Dry	13910	12940	14780	14320
Actual Cubic Feet/Minute, Wet	23630	15800	22840	16670
Particulates (EPA 5)				
Grains/SCF, Dry	0.6423	0.3262	0.5662	0.3663
Grains/ACF, Stack Conditions	0.3779	0.2672	0.3663	0.3147
Pounds/Hour	76.75	36.17	71.72	44.95
Pounds/Ton Charge	34.74	16.41	35.51	22.26
Particulates (Total Catch)[3]				
Grains/SCF, Dry	0.8184	0.3487	0.6250	0.3710
Grains/ACF, Stack Conditions	0.4814	0.2856	0.4043	0.3188
Pounds/Hour	97.56	38.67	79.16	45.54
Pounds/Ton Charge	44.27	17.54	39.20	22.55

1 Grains per dry standard cubic foot, standard conditions of 70° F. and 29.92 in. Hg.
2 Grains per actual cubic foot, stack conditions.
3 Includes impinger catch.

Table 6

Barmet Industries, Inc.
Uhrichsville, Ohio

Scrubber Number One
Particulate and Gaseous Contaminants

Summary of Test Results

Test Run Number	3		4	
Location	Inlet	Outlet	Inlet	Outlet
Date	10/26/74		10/27/74	
Particulate Contaminants (EPA 5) ug/m^3				
Chlorides	283,760.	10,100.	402,020.	17,370.
Fluorides	470.	30.	180.	ND
Aluminum	6,190.	3,110.	2,210.	460.
Lead	1,110.	ND	1,260.	ND
Cadmium	ND	ND	ND	5.4
Strontium	ND	ND	ND	ND
Gaseous Contaminants (Impinger Catch) ug/m^3				
Hydrogen Chloride	22,055.	1,075.	12,430.	ND
Chlorides	132,480.	9,420.	44,050.	18,510.
Fluorides	215.	80.	290.	160.
Cyanides	ND	ND	ND	ND
Aluminum	145.	335.	110.	82.
Lead	38.	19.9	22.	22.
Cadmium	6.4	5.0	7.2	ND
Strontium	ND	ND	ND	ND
Total Contaminants[1], ug/m^3				
Hydrogen Chloride	22,055.	1,075.	12,430.	ND
Chlorides	416,240.	19,520.	446,070.	35,880.
Fluorides	685.	110.	470.	160.
Cyanides	ND	ND	ND	ND
Aluminum	6,335.	3,445.	2,320.	542.
Lead	1,148.	19.9	1,282.	22.
Cadmium	6.4	5.0	7.2	5.4
Strontium	ND	ND	ND	ND

[1] Sum of particulate and gaseous contaminants.

ND = Not Detected; Less than sensitivity of analytical method.

Table 7

Barmet Industries, Inc.
Uhrichsville, Ohio

Scrubber Number Two - Particulate Emissions

Summary of Test Results

Test Run Number	1		2	
Location	Inlet	Outlet	Inlet	Outlet
Date	10/23/74		10/24/74	
Gas Flow				
Standard Cubic Feet/Minute, Dry	14580	17070	17990	18210
Actual Cubic Feet/Minute, Wet	25120	21720	30220	22840
Particulates (EPA 5)				
Grains/SCF, Dry	0.4683	0.3860	0.5862	0.6271
Grains/ACF, Stack Conditions	0.2716	0.3033	0.3489	0.4998
Pounds/Hour	58.52	56.47	90.38	97.86
Pounds/Ton Charge	15.58	15.03	25.67	27.79
Particulates (Total Catch)[3]				
Grains/SCF, Dry	0.5323	0.3959	0.6962	0.6364
Grains/ACF, Stack Conditions	0.3087	0.3111	0.4144	0.5072
Pounds/Hour	66.51	57.92	107.34	99.32
Pounds/Ton Charge	17.71	15.42	30.49	28.21

1 Grains per dry standard cubic foot, standard conditions of 70°F. and 29.92 in. Hg.

2 Grains per actual cubic foot, stack conditions.

3 Includes impinger catch.

Table 8

Barmet Industries, Inc.
Uhrichsville, Ohio

Scrubber Number Two
Particulate and Gaseous Contaminants

Summary of Test Results

Test Run Number	1		2	
Location	Inlet	Outlet	Inlet	Outlet
Date	10/23/74		10/24/74	
Particulate Contaminants (EPA 5), ug/m³				
Chlorides	207,825.	22,120.	239,320.	64,500.
Fluorides	595.	ND	1,080.	ND
Aluminum	6,910.	860.	6,255.	860.
Lead	14,200.	ND	990.	135.
Cadmium	5.5	ND	5.8	8.0
Strontium	ND	ND	ND	ND
Gaseous Contaminants (Impinger Catch) ug/m³				
Hydrogen Chloride	8,775.	ND	13,350.	ND
Chlorides	116,890.	6,465.	88,720.	3,440.
Fluorides	1,375.	150.	1,575.	ND
Cyanides	ND	ND	ND	ND
Aluminum	220.	120.	230.	ND
Lead	22.	22.	35.	24.
Cadmium	8.9	11.9	8.1	8.0
Strontium	ND	ND	ND	ND
Total Contaminants[1], ug/m³				
Hydrogen Chloride	8,775.	ND	13,350.	ND
Chlorides	324,715.	28,585.	328,040.	67,940.
Fluorides	1,970.	150.	2,655.	ND
Cyanides	ND	ND	ND	ND
Aluminum	7,130.	980.	6,485.	860.
Lead	14,222.	22.	1,025.	159.
Cadmium	14.4	11.9	13.9	16.
Strontium	ND	ND	ND	ND

[1] Sum of particulate and gaseous contaminants.
ND - Not Detected; Less than sensitivity of analytical method.

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Table 9

Barmet Industries, Inc.
Uhrichsville, Ohio

Baghouse - Particulate Emissions

Summary of Test Results

Test Run Number	5		6		7	
Location	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Date	10/28/74		10/29/74		10/30/74	
Gas Flow						
Standard Cubic Feet/Minute, Dry	12620	17340	11630	16490	11610	16590
Actual Cubic Feet/Minute, Wet	17390	23440	15880	21450	15850	21480
Particulates (EPA 5)						
Grains/SCF, Dry	0.3910	0.0326	0.4172	0.0327	0.4571	0.0229
Grains/ACF, Stack Conditions	0.2836	0.0241	0.3055	0.0251	0.3346	0.0177
Pounds/Hour	42.29	4.84	41.59	4.63	45.48	3.26
Pounds/Ton Charge	9.81	1.12	7.34	0.82	7.90	0.57
Particulates (Total Catch)[3]						
Grains/SCF, Dry	0.4525	0.0659	0.4878	0.0841	0.5643	0.0510
Grains/ACF, Stack Conditions	0.3282	0.0488	0.3572	0.0646	0.4130	0.0394
Pounds/Hour	48.94	9.80	48.62	11.89	56.14	7.25
Pounds/Ton Charge	11.36	2.27	8.58	2.10	9.75	1.26

[1] Grains per dry standard cubic foot, standard conditions of 70°F. and 29.92 in. Hg.

[2] Grains per actual cubic foot, stack conditions.

[3] Includes impinger catch.

$$\frac{8.35 - .84}{8.35} = 90\%$$

ton of charge was the average mass rate of particulate matter in the inlet gas stream and 0.84 lbs/ton was found in the exit gas stream. Average particulate removal rate was 90.2 percent. EPA 5 (particulate contaminants) and impinger catch (gaseous contaminants) fractions are listed separately in Table 10. The sum of these two fractions gives the total contaminants found in the inlet and outlet gas streams. Visible emission results for the baghouse exhaust stream are presented in Table A-11, Appendix A.

Dryer Outlet

Three particulate runs were made at the dryer outlet. Results of these tests are summarized in Tables 11 and 12. Average EPA 5 particulate emission concentration was measured at 0.4917 gr/dscf. The total catch was quantified at 0.4931 gr/dscf average. Average pounds per hour particulate emission rates are 11.37 for EPA 5 catch and 11.40 for the total catch. Average pounds per ton charge are 29.38 for EPA 5 catch and 29.46 for total catch. Particulate, gaseous and total contaminants are shown in Table 12 for each test. Visible emission results are presented in Table A-12, Appendix A.

$$P.W. = \frac{LB/HR}{LB/T} = \frac{11.37}{29.38} = .387 \frac{T}{HR} ?$$

Table 10

Barmet Industries, Inc.
Uhrichsville, Ohio

Baghouse - Particulate and Gaseous Contaminants

Summary of Test Results

Test Run Number	5		6		7	
Location	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Date	10/28/74		10/29/74		10/30/74	
Particulate Contaminants (EPA5), ug/m^3						
Chlorides	128,740.	13,760.	273,160.	18,315.	202,910.	11,410.
Fluorides	170.	135.	735.	165.	450.	76.
Aluminum	625.	595.	1,610.	465.	1,640.	1,720.
Lead	1,180.	16.	940.	7.2	460.	12.
Cadmium	ND	ND	ND	ND	ND	ND
Strontium	ND	ND	ND	ND	ND	ND
Gaseous Contaminants (Impinger Catch), ug/m^3						
Hydrogen Chloride	7,800.	4,645.	7,720.	5,210.	7,325.	9,800.
Chlorides	22,450.	10,810.	26,760.	20,800.	29,780.	10,625.
Fluorides	70.	24.	80.	70.	40.	48.
Cyanides	ND	ND	ND	ND	ND	ND
Aluminum	35.	60.	135.	125.	35.	65.
Lead	10.	16.	13.	11.	155.	12.
Cadmium	ND	4.0	ND	ND	ND	ND
Strontium	ND	ND	ND	ND	ND	ND
Total Contaminants[1], ug/m^3						
Hydrogen Chloride	7,800.	4,645.	7,720.	5,210.	7,325.	9,800.
Chlorides	140,080.	24,570	299,920.	39,115.	232,690.	22,035.
Fluorides	240.	159.	815.	235.	490.	124.
Cyanides	ND	ND	ND	ND	ND	ND
Aluminum	660.	655.	1,745.	590.	1,675.	1,785.
Lead	1,190.	32.	953.	18.2	615.	24.
Cadmium	ND	4.0	ND	ND	ND	ND
Strontium	ND	ND	ND	ND	ND	ND

[1] Sum of particulate and gaseous contaminants.

ND - Not Detected; Less than sensitivity of analytical method.

Table 11

Barmet Industries, Inc.
Uhrichsville, Ohio

Dryer Outlet - Particulate Emissions

Summary of Test Results

Test Run Number	8	9	10
Location	Outlet	Outlet	Outlet
Date	10/31/74	10/31/74	10/31/74
Gas Flow			
Standard Cubic Feet/Minute, Dry	2760	2640	2660
Actual Cubic Feet/Minute, Wet	2990	2820	2840
Particulates (EPA 5)			
Grains/SCF, Dry	0.6378	0.4431	0.3942
Grains/ACF, Stack Conditions	0.5880	0.4159	0.3689
Pounds/Hour	15.09	10.03	8.99
Pounds/Ton Charge	40.55	27.85	19.75
Particulates (Total Catch)[3]			
Grains/SCF, Dry	0.6384	0.4439	0.3970
Grains/ACF, Stack Conditions	0.5885	0.4166	0.3714
Pounds/Hour	15.10	10.04	9.05
Pounds/Ton Charge	40.59	27.90	19.89

1 Grains per dry standard cubic foot, standard conditions of 70°F. and 29.92 in. Hg.

2 Grains per actual cubic foot, stack conditions.

3 Includes impinger catch.

Table 12

Barmet Industries, Inc.
Uhrichsville, Ohio

Dryer Outlet - Particulate and Gaseous Contaminants

Summary of Test Results

Test Run Number	8	9	10
Location	Outlet	Outlet	Outlet
Date	10/31/74	10/31/74	10/31/74
Particulate Contaminants (EPA 5), ug/m^3			
Chlorides	130,500.	114,040.	75,465.
Fluorides	235.	545.	ND
Aluminum	67,660.	32,655.	27,250.
Lead	2,770	105.	1,970.
Cadmium	18.	77.	ND
Strontium	ND	ND	ND
Gaseous Contaminants (Impinger Catch), ug/m^3			
Hydrogen Chloride	ND	ND	ND
Chlorides	11,500.	3,560.	7,595.
Fluorides	120.	ND	500.
Cyanides	ND	ND	ND
Aluminum	78.	81.	81.
Lead	44.	35.	35.
Cadmium	ND	ND	ND
Strontium	ND	ND	ND
Total Contaminants,[1] ug/m^3			
Hydrogen Chloride	ND	ND	ND
Chlorides	142,000.	117,600.	83,060.
Fluorides	355.	545.	500.
Cyanides	ND	ND	ND
Aluminum	67,738.	32,736.	27,331.
Lead	2,814.	140.	2,005.
Cadmium	18.	77.	ND
Strontium	ND	ND	ND

[1] Sum of Particulate and Gaseous Contaminants

ND - Not Detected; Less than sensitivity of analytical method.

The State of Ohio Air Pollution Control Board Regulations concerning particulate matter emissions from industrial processes (EP-11-11) provide two alternates for the purposes of determining the maximum allowable mass rate of particulate matter in pounds per hour (former regulations AP-3-11 and AP-3-12). The regulations dictate that in all cases the more stringent of the two requirements shall apply where both are termed applicable.

Figure II of regulation EP-11-11 is a plot of three curves relating the uncontrolled mass rate of emissions to the maximum allowable mass rate of emissions of particulate matter in pounds per hour. Curve P-2 of Figure II is appropriate for areas of the State designated as priority II areas. Barmet Industries, Inc. (Uhrichsville, Tuscarauas County, Ohio) is classified by the regulations as a priority II area and, therefore, subject to the limits defined by curve P-2.

The alternate means of determining compliance is provided by Table I of Section AP-3-12. This table indicates allowable particulate emission rates based on process weight rates.

Visible emissions compliance is defined under the Ohio regulations (AP-3-07). The degree of emission opacity and visible emission time periods are presented as part of these rules.

Scrubber Number One

AVG: 74.25
10.73

The particulate matter loading in the inlet gas stream to scrubber number one was measured at 76.8 pounds per hour during Test No. 3 and at 71.7 lbs/hr for Test No. 4. These values are calculated from the particulate catch as defined by EPA Method 5 test procedures. According to curve P-2, Figure II, the allowable mass rate of emissions during test three was 11.9 lbs/hr. Based on process weight rates, Table I permits only 7.0 lbs/hr. The actual test measurement of the particulate matter in the scrubber stack emissions indicated 38.7 lbs/hr; therefore, the mass emission rate was considerably higher than the rate allowed by the more stringent of the two criteria of the regulations. The Test No. 4 measurement of outlet emissions of 45.0 lbs/hr of particulate matter was also well above the limits set by the regulations.

The average particulate removal efficiency of scrubber number one was determined by the two tests to be 45.1 percent.

Visible emission data suggests that scrubber number one was in noncompliance for 3.5 minutes during the 30-minute observation period. State and Federal regulations concerning visible emissions prohibits stack emission opacities of 20 percent or greater for more than three minutes in any 60-minute period.

Scrubber Number Two

The maximum allowable mass rate of emissions permitted by Figure II (based on the uncontrolled mass rate of particulate measured at the number two scrubber inlet) was found to be 9.1 lbs/hr for Test No. 1 and 13.0 lbs/hr for Test No. 2. The allowable emission rate obtained from Table No. 1 was 10.0 lbs/hr for Test No. 1 and 9.5 lbs/hr for Test No. 2. Therefore, the most stringent emission rate for Test No. 1 was 9.1 lbs/hr, and 9.5 lbs/hr for Test No. 2. Test No. 1 indicated that scrubber number two exceeded the particulate emission regulation by more than six times the limit (56.5 lbs/hr); during Test No. 2, it was in violation to an even greater degree (97.9 lbs/hr). Essentially, no removal efficiency existed for scrubber number two during the two test periods.

The visible emissions were in noncompliance 3.75 minutes of the 30-minute observation period.

Baghouse

The uncontrolled mass emission rates for the baghouse (inlet measurement), based on the particulate each defined by EPA test Method Five, was 42.3 lbs/hr for Test No. 5, 41.6 lbs/hr for Test No. 6, and 45.5 lbs/hr for Test No. 7. Applying these values to curve P-2 of Figure II of the regulations, the maximum allowable mass emission rate are found to be 7.3 lbs/hr, 7.2 lbs/hr and 7.7 lbs/hr, respectively. Utilizing the corresponding process weight rates, the following maximum allowable mass emission rates were obtained from Table 1: 10.9 lbs/hr for Test No. 5, 13.1 lbs/hr for Test No. 6, and 13.3 lbs/hr for Test No. 7. In all three test the baghouse outlet particulate emissions complied with the regulations (4.8 lbs/hr, 4.6 lbs/hr, 3.3 lbs/hr).

The baghouse particulate removal efficiencies are calculated at 88.6 percent, 88.9 percent and 92.8 percent. At no time were the baghouse outlet emissions in violation of the State of Ohio or Federal visible emissions regulations during the periods of observation.

Dryer Outlet

Table 1 of the Ohio regulations was used to determine the allowable mass emission rate of particulate from the dryer outlet stack. The process weight rate for Test No. 8 was 0.372 tons/hr, yielding an allowable particulate emission rate of 2.1 lbs/hr. Test No. 9 provided a process weight rate of 0.360 tons/hr which permits an emission rate of 2.1 lbs/hr, and 2.4 lbs/hr for Test No. 10 based on a charge rate of 0.455 tons/hr. The dryer outlet stack particulate emissions exceeded the limits in each test (15.1 lbs/hr, 10.0 lbs/hr, 9.0 lbs/hr).

Visible emissions were in compliance with the regulations during the observation periods.

In general, operating practices at Barmet are less than ideal. There are no technically-trained people at the operating level and the plant is operated with virtually no process control equipment. While this "seat of the pants" type of operation produces the desired result--high production at low cost--many of the auxiliaries including pollution control equipment do not receive proper attention. The following are specific areas in pollution control which appear to merit increased attention.

Scrubbers

Venturi Scrubbers

Data indicates that while the Venturi scrubbers are effective in controlling gaseous contaminants, particulate emission control is poor. The range of efficiencies was 0 to 50 percent. During the stack test, both scrubbers operated at a pressure drop of 38 inches. Particulate emissions in the form of fumes generally contain sizable portions of sub-micron particle size material.

One study of an aluminum smelting operation using salt-cryolite flux indicated that all particulates were less than 2 microns and most were less than 0.1 micron in particle size (by electron microscope). This fume was primarily sodium chloride, as is the case at Barmet. A pressure drop of 38 inches in a Venturi scrubber would not be expected to control this small particle size particulate material, as is confirmed by the data.

Liquid/Gas Ratio

A liquid-to-gas ratio of these systems was in the 13 to 15 gallon per 1,000 cu ft range. This would appear to be adequate for typical Venturi scrubbers.

pH Control

While high pH does not appear to be a critical factor in the operation of these wet scrubbers, their control of pH appeared adequate. pH of the absorbent would only be a critical factor if large quantities of chlorine were used. This is the case with many secondary aluminum processors, but no chlorine fluxing or demagging is practiced at Barmet.

The acidic gases detected during the test would be adequately scrubbed (greater than 90 percent) by water. Nevertheless, personnel at the plant regularly checked scrubber pH and added lime accordingly. Only once during the testing did we observe acidic conditions in the thickener. This condition was corrected shortly thereafter by plant personnel.

Blowdown

Blowdown from the thickeners does not appear to be adequate. Sludge was removed manually every two to three days. On one such occasion, sludge solids had accumulated to the point where the valve at the base of the thickener was blocked. While high levels of suspended solids in the liquid does not materially affect scrubber efficiency, it will contribute to particulate discharge by any carryover from the demister. High suspended solids also increase equipment wear and increase the potential for clogging.

Increased frequency of manual blowdown seems in order. A continuous blowdown of the sludge thickener would be ideal. Disposal of the wastewater from the wet washers does not appear at all satisfactory from a water pollution standpoint; however; however, detailed evaluation of this aspect is beyond the scope of this report.

Partial Shutdown

Only three of the six available kilns operate at any time. Units not in use should be disconnected from the scrubber duct work. Personnel at the plant claimed that this has been done, but there was still a draft being drawn through those units not in use. From a power consumption and scrubber efficiency standpoint, it would be better to reduce the exhaust volume by completely blanking those units not in use and by adjusting the Venturi to maintain the desired pressure drop.

Even those units which were in operation allowed infiltration of considerable tramp air through openings in the duct work. If this excess air were to be eliminated, the scrubbers could be operated at a higher pressure drop and greater particulate scrubbing efficiency, with no increase in power consumption.

General Maintenance

In general, equipment maintenance was adequate; despite this effort, however, equipment was in poor condition, due primarily to the extremely corrosive environment.

Baghouse/Hooding System

Ventilation

By far the largest short-coming of the baghouse system was insufficient air volume to properly ventilate the hooded area over the front portion of the kiln. Considerable air must be withdrawn from the hood to simply overcome the buoyant forces of hot air before ventilation of the area can actually occur. While it is certain that the hood system and baghouse reduce some of the fugitive emissions, it cannot be considered highly effective.

Visual emissions are apparent around the hood area at all times during production. These emissions are particularly heavy for a period of about 10 minutes following a charge of either salt or dross to the kiln. Possible reasons for insufficient exhaust volume are:

1. Poor Design - Part of the problem may be a simple design error in sizing the hood and the exhaust fan.

2. Air/Cloth Ratio and Pressure Drop - Based on inlet air volume, the air to cloth ratio is 1.36:1. This is relatively low, even for a shaker type baghouse. At the same time, the pressure drop ACROSS ~~crossed~~ the filter cloth was 5 inches -- high for this low air to cloth ratio. Pressure drop across the baghouse dropped to only 4.5 inches after a clean cycle, and returned to 5.0 inches within 30 minutes. It is likely that there is considerable buildup on the bag filter surface, thus resulting in high pressure drops, excessive resistance, and reduced air flow.

3. Leaks - There is significant air leakage into the collection system. There is a discrepancy of about 35 percent between inlet and outlet air volumes at the baghouse. Careful examination of the baghouse structure and duct work connecting the baghouse to the fan indicated a considerable number of leaks, sufficient to account for this discrepency. All of these leaks were on the "clean" side of the filter and thus significantly reduced the air volume drawn through the hood and the baghouse.

   There was also a sizable number of leaks in the duct work connecting the hood to the baghouse. These were evident when the baghouse was shut down for cleaning. Such leaks would also reduce the effectiveness of the hood system.

4. Hoods Not in Use - Two of the three hoods were not in use. There was still considerable air being drawn through these hoods for no useful purpose, although operating personnel had indicated these hoods were blocked. Hoods not in use should be blanked at the manifold to avoid excessive infiltration.

5. Poor Distribution - The manifold serving all hoods runs across the roof of the building. All ducts from the hood connect directly to the manifold. There is no provision for maintaining uniform distribution from each hood. Therefore, hoods at furnaces A and B got fair to good ventilation, while the hood over furnace F is virtually stagnant.

Cleaning

With shaker type baghouses, it is necessary to shut down a module for cleaning. At Barmet, the fan is shut off and the entire baghouse is cleaned at one time. Butterfly valves originally installed to permit partial (1/3) shutdown have been removed. During the 10-minute cleaning cycle, there is no ventilation from the hoods. There are significant visible emissions from the hood area and from leaks in the duct work during this period.

We were advised by operating personnel that the baghouse was cleaned twice per 8-hour shift. Early in the testing program, however, we observed that the baghouse was cleaned only once in the morning (we were generally in the plant for 12 hours). Bags should definitely be cleaned more frequently to reduce pressure drop to a minimum. A modular shut-down arrangement would permit automatic shut-down and cleaning by using a preset timer.

During a bag cleaning operation, the hoppers at the base of the baghouse were open and the dust allowed to fall to the ground. Fortunately, much of the dust had agglomerated; however, there was still significant re-entrainment of dust fines into the atmosphere, as a fugitive dust. There appeared to be no adequate disposal method for the collected dust. The piles of dust remained until washed away by rain or entrained by the wind. Our analysis indicates that the dust collected was primarily salt (sodium chloride). Rain would leach much of this solid and could create a significant groundwater problem. Since the dust is primarily salt and has been agglomerated to some extent, it would seem possible to reuse the collected salt in the kiln. If it cannot be reused, the dust should be collected in a manner which will prohibit re-entrainment to the atmosphere, and then disposed of properly.

ASSESSMENT OF EMISSION CONTROL IMPROVEMENT REQUIRED

We have been asked to comment on modifications necessary to meet the Ohio air pollution regulations. The three areas currently in violation are: process emissions from the kiln, fugitive emissions from the hood, and fugitive emissions from raw material stock piles and handling.

Process Emissions

It is obvious from the data collected that the particulate emissions from the Venturi scrubbers are in violations of Section 3-12 of the regulations.

As discussed earlier, the scrubbers are operating at 38 inch w.g. pressure drop. With significant portions of sub-micron fume, a considerably higher pressure drop would be necessary to improve efficiency. Pressure drops of 50 to 60 inches would likely be necessary to obtain satisfactory scrubber performance, if then. This pressure drop would require a significant increase in energy input, and the existing blowers and possibly duct work would not be adequate. A prequench of hot gases well before the scrubber will result in condensation around the small particule size fume. with improved scrubber efficiency. The advantage to continue use of wet scrubbing would be control of gaseous pollutants. At the 38-inch pressure drop, acidic gases, the primary gaseous pollutant, was effectively controlled.

A second alternative is the use of dry collection (i.e., baghouses) to control the particulate emissions from the kiln. Such system is currently being installed at Barmet. The system is to consist of six Torit modular baghouses with a combined filter area of 8, 148 square feet. These are continuous, post cleaning types, using felted polyester bags. The six units currently in place will service one 10-~~inch~~ Foot diameter kiln (furnace C). A sonically-atomized water spray will be used to cool the gases to less than 250°. Estimating the gas volume at that temperature to be about 20,000, the air/cloth ratio will be on the order of 2.5:1. This is a conservative figure for pulse jet cleaning baghouses. Based on test results obtained at the existing baghouse, we are of the opinion that this new system will result in a significant reduction in particulate emission from the process. There are those who would define dry filter collection as "state of the art" in fume control. If the new system does not meet the Ohio regulations, it is highly unlikely that any alternate would.

The dry system is not without its shortcomings.

1. Gaseous Pollutants - The baghouse will not control gases, such as the acidic gases found during stack testing. However, the Ohio regulations do not specifically restrict emissions of this material from industrial sources. Its presence, however, should not be ignored.

2. Corrosion - The combination of salt, acidic gases, and water from the gas cooling system will result in an extremely corrosive atmosphere in the baghouse. This will be a significant problem during periods of shut-down when condensation and other forms of moisture are likely to accumulate in the baghouse structure. Extensive corrosion of the baghouse structure was evident in the existing Dracco unit, and was probably the cause of the many air leaks. It would be advisable to thoroughly line the interior of the baghouse to resist such corrosion. Insulation should also be installed.

3. High Temperature - Gases drawn directly from the kiln will be considerably higher in temperature than those drawn from the hood. While the sonic water spray appeared reliable, the planned polyester bags would not withstand the 500°F temperatures directly from the kiln, should the spray system fail. It would seem advisable to use bag materials which will resist these high temperatures. Either Nomex or Fiberglas should do. Use of the spray system with this type of bag material would be optional.

The optimum system would be a combination of both wet and dry collection. A low pressure drop scrubber such as a simple packed column could be used to control acidic gases and reduce gas temperatures to less than 200°F. It is likely that water, rather than a lime slurry, would be adequate to control the acidic gases providing there is sufficient blowdown; however, wastewater must be neutralized before disposal. This wet scrubber would also signficantly reduce the corrosiveness of the gases by removing the acidic gases and much of the sodium chloride. The system would have to be constructed of corrosion-resistant materials, most likely Fiberglas reinforced plastic. After the wet scrubbers, the gases would be reheated to reduce their percent saturation and then cleaned in the baghouse. While fuel requirements to reheat this gas volume would add significantly to the cost, there is an alternative at Barmet. Gases drawn from the hood system could be combined with direct process ventilation at this point to produce a moderate temperature, dry gas stream to be cleaned in the dry section of the system.

Electrostatic precipitators have often been used to collect metallurgical fume. This type equipment has turned in a notably poor performance in aluminum processing plants, due primarily to the corrosive nature of the exhaust gases. Electrostatic precipitators should not be considered at Barmet.

Fugitive Emissions from the Hood System

Fugitive emissions from the hood do not meet the opacity regulations. It is quite possible that the combined fugitive emission from the hooding system and materials handling exceed the direct process emissions at this plant. Fortunately, the solution to emission control at the hood is simple, i.e., increased, effective ventilation rate. As indicated above, leaks in the system significantly reduce the effectiveness of the existing system. Even if operated without leaks, it is possible that the existing ventilation system is inadequate. We understand that all new hoods installed (furnace C) will be the complete coverage type, as now exists on furnaces A and B. While this hood construction provides more complete collection of contaminants escaping from the kiln, it also significantly increases the volume of air which must be drawn from the hood. With a significantly larger body of hot material within the hood, the amount of buoyant air which must be removed is significantly increased. As each new furnace is equipped with totally enclosed hoods, the effectiveness of the system will be further decreased. While the smaller front-end hoods may not provide 100 percent fume capture, they require a smaller ventilation volume.

It is quite likely that additional baghouse capacity will have to accompany any increase in ventilation volume. It is unlikely that a shaker type baghouse will be effective at air to cloth ratios much higher than 2:1. Other modifications to improve the operation of this system would include valves at each hood to close off those units not in use; an improved manifold system should also be included to provide more uniform distribution to each of the units in use. The use of high temperature bag materials and the elimination of the cooling water would also be preferable. It is quite likely that at least part of the buildup on the bags reported above is the result of condensation of water from the spray system during shutdown.

Fugitive Emissions from Materials Handling

Fugitive emissions from the unloading, handling, and stacking of dross presents a potential problem. These fugitive emissions are normally dust and volatile materials present in the aluminum dross. Dust emissions are readily generated during handling of the dross. These fugitive emissions released at ground level may have a significant impact on the area surrounding the plant. As noted earlier, it is possible that these fugitive emissions, especially dust, are as significant as impact as those emissions from the stack. When stack emissions have been adequately controlled, the impact of these fugitive emissions will be more apparent.

It is probable that fugitive emissions controls will have to be eventually implemented. The obvious control procedure--cannot be readily adapted to Barmet operations due to the explosions that occur in the kiln when wet dross is charged. Thus, enclosure of the operations area and emission collection and control may be necessary. Possible control of fugitive emissions is an area for future consideration after implementation of control procedures for the primary problem of kiln operation.

Abstract

Roy F. Weston, Inc., was retained by EPA Region V to conduct unit efficiency and compliance tests on the two scrubbers and one baghouse controlling the emission of the dross aluminum recovery furnaces at Barmet Industries, Inc., Uhrichsville, Ohio. The dryer outlet, an uncontrolled emission, was also tested. Engineering observations, conclusions, and recommendations were included in the program. Only the baghouse complied with Ohio EPA source emission regulations.

Keywords

Aluminum, baghouses, cadmium, chlorides, cyanide, drying, efficiency, emission testing, fluorides, hydrogen chlorides, maintenance, Ohio, particulates, pH, recovery furnaces, sampling, scrubbers, ventilation, Venturi Scrubbers.

APPENDIX A

April 12, 1979

Stack Test Observation - Barmet Industries
ROCK PORT, INDIANA

John Connell, Technical Advisor
Special Projects Section

David Schulz, Air Enforcement Branch

Thru: Lucien Torrez, Chief
Special Projects Section

The required stack test was performed on April 5-6, 1979 by Robert Jacko of Purdue University. Andy Sunderland from the State of Indiana was also present each day. The northwest outlet vent of baghouse #5 for plant #2 was tested on the first day and the second outlet vent from the north on the east side of baghouse #1 for Plant #1 was tested on the second day. Each test consisted of three runs; each run was conducted for an entire heat from charge to top. The inlet to both baghouses were tested during the first run for an entire heat. Furnace 'S' was exhausted through baghouse #5 during the first Test and furnace 'A' was exhausted through baghouse #1 during the second test. The test should accurately represent the emissions at the time of the tests.

The roof monitor was observed during the charging of furnace' 'S' for the third run on baghouse #5. During most of the operation there were no visible emissions; there were a few puffs of approximately 5% opacity. I observed the collection hood during the charging of furnace 'A' for run #2 on baghouse #1. The overall hood efficiency was estimated to be 98% but there were occurrences when I estimated the efficiency to be 80%. When questioned about the improvement made to the collection hoods, Mr. Grunigan stated that new fiberglass curtains, 65" wide, were placed on furnaces C,D,S,T,W and additioanl 40% of curtain was added to furnace A. These changes appeared to greatly reduce the emissions from around the front of the furances.

[illegible]t appeared that the visible emissions from th[illegible]monitor and [illegible]he doors of both plants onnboth days appeared [illegible] greatly [illegible]educed from my previous visit at the beginni[illegible]rch. Also, [illegible]he entire area appeared to be much cleaner. [illegible]re two [illegible]ources of emission at the plant. New bags were [illegible]tly put [illegible]nto baghouse #7 on plant #[illegible], which caused emissions of about [illegible]0% opacity. Also there were emissions from the salt piles east of the plants when the wind picked up. Mr Grunigan stated that he anticipates that the piles will be worked down during the summer because of an increase in capacity of the Kentucky plant.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

(3) Grory
(4) File

DATE: April 12, 1979

SUBJECT: Stack Test Observation - Barmet Industries

FROM: John Connell, Technical Advisor JC
Special Projects Section

TO: David Schulz, Air Enforcement Branch

Thru: Lucien Torrez, Chief
Special Projects Section

The required stack test was performed on April 5-6, 1979 by Robert Jacko of Purdue University. Andy Sunderland from the State of Indiana was also present each day. The northwest outlet vent of baghouse #5 for plant #2 was tested on the first day and the second outlet vent from the north on the east side of baghouse #1 for Plant #1 was tested on the second day. Each test consisted of three runs; each run was conducted for an entire heat from charge to tap. The inlet to both baghouses were tested during the first run for an entire heat. Furnace 'S' was exhausted through baghouse #5 during the first Test and furnace 'A' was exhausted through baghouse #1 during the second test. The tests should accurately represent the emissions at the time of the tests.

The roof monitor was observed during the charging of furnace 'S' for the third run on baghouse #5. During most of the operation there were no visible emissions; there were a few puffs of approximately 5% opacity. I observed the collection hood during the charging of furnace 'A' for run #2 on baghouse #1. The overall hood efficiency was estimated to be 98% but there were occurrences when I estimated the efficiency to be 90%. When questioned about the improvement made to the collection hoods, Mr. Grunigan stated that new fiberglass curtains, 65" wide, were placed on furnaces C,D,S,T,V and additioanl 40" of curtain was added to furnace A. These changes appeared to greatly reduce the emissions from around the front of the furances.

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It appeared that the visible emissions from the roof monitor and the doors of both plants on both days appeared to be greatly reduced from my previous visit at the beginning of March. Also, the entire area appeared to be much cleaner. There were two sources of emission at the plant. New bags were recently put into baghouse #7 on plant #2, which caused emissions of about 10% opacity. Also there were emissions from the salt piles east of the plants when the wind picked up. Mr Grunigan stated that he anticipates that the piles will be worked down during the summer because of an increase in capacity of the Kentucky plant.

APPENDIX A

SUMMARY OF TEST RESULTS

Table A-1

Preliminary Velocity Traverse
Scrubber Number One

	Inlet	Outlet
Date	10/24/74	10/24/74
Barometric Pressure, in Hg	30.10	30.10
Moisture, % by volume	3.0	13.0
Molecular Weight, Dry Stack Gas	29.0	29.0
Mole Fraction, Dry Stack Gas	0.97	0.87
Molecular Weight, Wet Stack Gas	28.7	27.6
Stack Area, in.^{2}	1256	1520
Static Pressure, in Hg	-0.04	+0.01
Stack Pressure Absolute, in Hg	30.06	30.09

Traverse	Velocity Head in H_2O (Avg.)	Stack Temp. ^oF.	Average $\sqrt{\text{Velocity x Temp. } ^oR.}$	Stack Gas Velocity FPM[1]	Stack Gas Volume SCFM
Inlet	0.37	425.	17.90	2650.	13490.
Outlet	0.15	125.	9.04	1360.	11420.

[1] Stack Conditions

Table A-2

Preliminary Velocity Traverse
Scrubber Number Two

	Inlet	Outlet
Date	10/21/74	10/21/74
Barometric Pressure, in Hg	30.45	30.45
Moisture, % of Volume	3.1	10.0
Molecular Weight, Dry Stack Gas	29.0	29.0
Mole Fraction Dry Gas	0.968	0.901
Molecular Weight, Wet Stack Gas	28.64	27.91
Stack Area, $in.^2$	1256.6	1735
Static Pressure, in Hg	-0.04	+0.01
Stack Pressure Absolute, in Hg	30.41	30.46

Traverse	Velocity Head in H_2O (Avg.)	Stack Temp. °F.	Average $\sqrt{\text{Velocity} \times \text{Temp. }^{\circ}\text{R.}}$	Stack Gas Velocity FPM[1]	Stack Gas Volume SCFM
Inlet	0.49	405	20.71	3050.	16050.
Outlet	0.27	115	12.46	1860.	18970.

[1] Stack Conditions

Table A-3

Preliminary Velocity Traverse
Baghouse

	Inlet	Outlet
Date	10/27/74	10/27/74
Barometric Pressure, in Hg	30.05	30.05
Moisture, % by Volume	5.0	5.0
Molecular Weight, Dry Stack Gas	29.0	29.0
Mole Fraction Dry Gas	0.95	0.95
Molecular Weight, Wet Stack Gas	28.45	28.45
Stack Area, $in.^2$	908	1809
Static Pressure, in Hg	-0.09	+0.02
Stack Pressure Absolute, in Hg	29.96	30.07

Traverse	Velocity Head in H_2O (Avg.)	Stack Temp. °F.	Average $\sqrt{\text{Velocity} \times \text{Temp. °R.}}$	Stack Gas Velocity[1] FPM	Stack Gas Volume SCFM
Inlet	0.40	265	17.03	2510.	11020.
Outlet	0.20	220	11.68	1720.	16060.

1 Stack Conditions.

Table A-4

Preliminary Velocity Traverse
Dryer Outlet

Date	10/30/74
Barometric Pressure, in Hg	30.15
Moisture, % by Volume	6.0
Molecular Weight, Dry Stack Gas	29.0
Mole Fraction Dry Gas	.94
Molecular Weight, Wet Stack Gas	28.34
Stack Area, $in.^2$	1017
Stack Pressure, in Hg	0.00
Stack Pressure Absolute, in Hg	30.15

Velocity Head in H_2O (Avg.)	Stack Temp $^{\circ}F$.	Average $\sqrt{\text{Velocity x Temp. } ^{\circ}R.}$	Stack Gas Velocity FPM[1]	Stack Gas Volume SCFM
0.03	180.	4.38	640.	3570

[1] Stack Conditions.

Table A-5

Particulate Emissions Data
Scrubber Number One

		Inlet		Outlet	
Run No.		3	4	3	4
Date		10/26/74	10/27/74	10/26/74	10/27/74
Time - 24 Hour Clock		1000-1345	1025-1355	1000-1345	1025-1355
D_n	Sampling Nozzle Diameter, in.	0.188	0.188	0.25	0.25
T_t	Net Time of Test, min.	170.	150.	170.	150.
P_b	Barometric Pressure, in Hg Absolute	30.15	30.05	30.15	30.05
P_m	Average Orifice Pressure Drop, in. H_2O	0.31	0.32	0.61	0.68
V_m	Volume of Dry Gas Sampled, cu.ft. at Meter Conditions	54.47	49.72	70.40	66.55
T_m	Average Gas Meter Temperature, °F.	65.78	79.02	70.76	86.03
$V_{m_{std}}$	Volume of Dry Gas Sampled, cu. ft. at Standard Conditions*	55.33	49.10	70.89	64.93
V_w	Total H_2O Collected, ml, impingers and silica gel	30.	30.	202.	120.

* 70° F., 29.92 in H_2O, dry basis

		Inlet		Outlet	
		3	4	3	4
Vwgas	Volume of Water Vapor Collected, scf	1.42	1.42	9.58	5.67
% M	Percent Moisture in the Stack Gas by Volume	2.54	2.81	11.90	8.05
% CO_2		1.0	1.0	0.8	0.8
% O_2		18.4	18.4	18.2	18.2
% CO		0.2	0.2	0.2	0.2
% N_2		80.4	80.4	80.8	80.8
MW_d	Molecular Weight of Dry Stack Gas	28.88	28.88	28.84	28.84
MW	Molecular Weight of Wet Stack Gas	28.61	28.57	27.55	27.97
C_p	Pitot Tube Coefficient	0.85	0.85	0.85	0.85
ΔP	Average Velocity Head of Stack Gas, in.H_2O	0.378	0.383	0.175	0.195
T_s	Average Stack Temperature, ^oF.	423.4	338.5	114.7	110.
N_p	Net Sampling Points	48.	48.	12.	12.
P_{st}	Static Pressure of Stack, in. Hg	-0.04	-0.04	+0.02	+0.02
P_s	Stack Pressure, in.Hg Absolute	30.11	30.01	30.17	30.07
V_s	Stack Velocity at Stack Conditions, fpm	2710.	2620.	1500.	1580.

		Inlet		Outlet	
		3	4	3	4
A_s	Stack Area, sq. in.	1257.	1257.	1521.	1521.
Q_s	Dry Stack Gas Volume at Standard Conditions, SCFM	13910.	14780.	12940.	14320.
Q_a	Stack Gas Volume at Stack Conditions, ACFM	23630.	22840.	15800.	16670.
% I	Percent Isokinetic	105.6	99.95	99.5	93.3
M_e	Particulate, mg, EPA-5	2307.7	1805.3	1501.4	1544.3
M_t	Particulate, mg, Total	2940.3	1992.6	1605.3	1564.4
I_c	% Impinger Catch	21.5	9.4	6.5	1.3
C_{es}	Particulate, gr/scf, EPA-5	0.6423	0.5662	0.3620	0.3663
C_{ts}	Particulate, gr/scf, Total	0.8184	0.6250	0.3487	0.3710
C_{ea}	Particulate, gr/acf, EPA-5	0.3779	0.3663	0.2672	0.3147
C_{ta}	Particulate, gr/acf, Total	0.4814	0.4043	0.2856	0.3188
PMR_e	Particulate, lb/hr, EPA-5	76.75	71.72	36.17	44.95

		Inlet		Outlet	
		3	4	3	4
PMR_t	Particulate, lb/hr, Total	97.56	38.67	79.16	45.54
M_{ec}	Particulate, lb/ton Charge EPA-5	34.74	16.41	35.51	22.26
M_{tc}	Particulate, lb/ton Charge Total	44.27	17.54	39.20	22.55
M_c	Charge Mass, lbs.	16900	13800	16900	13800
M_m	Metal Production, lbs.	3550	6820	3550	6820
	Dross Source Furnace F	Davenport	Howmet	Davenport	Howmet
	Heat Number	F187	F193	F187	F193

Table A-6

Particulate Emissions Data
Scrubber Number Two

Test Location		Inlet		Outlet	
Run No.		1	2	1	2
Date		10/23/74	10/24/74	10/23/74	10/24/74
Time - 24 Hour Clock		1015-1420	1044-1355	1015-1420	1105-1355
D_n	Sampling Nozzle Diameter, in.	0.188	0.188	0.188	0.188
T_t	Net Time of Test, min.	180	150	180	150
P_b	Barometric Pressure, in. Hg absolute	30.34	30.10	30.34	30.10
P_m	Average Orifice Pressure, in. H_2O	0.41	0.54	0.28	0.29
V_m	Volume of Dry Gas Sampled, cu. ft. at Metric Conditions	63.60	61.97	46.84	44.10
T_m	Average Gas Meter Temperature, $^\circ$ F.	79.1	82.4	69.4	74.0
V_{mstd}	Volume of Dry Gas Sampled, cu. ft. at Standard Conditions*	63.45	60.95	47.58	44.03
V_w	Total H_2O Collected, ml, Impingers and Silica Gel	40	38	180	137

* 70° F., 29.92 in. Hg, Dry Basis

		Inlet		Outlet	
		1	2	1	2
$V_{w_{gas}}$	Volume of Water Vapor Collected, scf	1.90	1.80	8.53	6.49
%M	Percent Moisture in the Stack Gas by Volume	2.9	2.9	15.2	12.85
M_d	Mole Fraction of Dry Gas	.971	.971	.848	.872
% CO_2		1.4	1.2	1.2	1.0
% O_2		17.8	18.0	18.6	18.0
% CO		0.4	0.4	0.4	0.4
% N_2		80.4	80.4	79.8	80.6
MW_d	Molecular Weight of Dry Stack Gas	28.94	28.91	28.93	28.88
MW	Molecular Weight of Wet Stack Gas	28.61	28.60	27.29	27.48
C_p	Pitot Tube Coefficient	0.85	0.85	0.85	0.85
ΔP	Average Velocity Head of Stack Gas, in. H_2O	0.43	0.27	0.25	0.63
T_s	Average Stack Temperature, $^{\circ}$ F.	438.3	406.5	120.3	123.3
N_p	Net Sampling Points	32.	32.	12.	12.
P_{st}	Static Pressure on Stack, in. Hg	-0.04	-0.12	+0.02	+0.02
P_s	Stack Pressure, in. Hg Absolute	30.30	29.98	30.36	30.12

		Inlet		Outlet	
		1	2	1	2
V_s	Stack Velocity at Stack Conditions, fpm	2880.	3464.	1800.	1900.
A_s	Stack Area, sq. in.	1257.	1257.	1734.	1734.
Q_s	Dry Stack Gas Volume at Standard Conditions, SCFM	14580.	17990.	17070.	18210.
Q_a	Stack Gas Volume at Stack Conditions, ACFM	25120.	30220.	21720.	22840.
% I	Percent Isokinetic	109.1	101.9	96.4	100.4
M_e	Particulate, mg, EPA-5	1929.5	2320.1	1192.6	1792.8
M_t	Particulate, mg, Total	2193.1	2755.5	1223.2	1819.5
I_c	% Impinger Catch	12.0	15.8	2.5	1.5
C_{es}	Particulate, gr/scf, EPA-5	0.4683	0.5862	0.3860	0.6271
C_{ts}	Particulate, gr/scf, Total	0.5323	0.6962	0.3959	0.6364
C_{ea}	Particulate, gr/acf, EPA-5	0.2716	0.3489	0.3033	0.4998
C_{ta}	Particulate, gr/acf, Total	0.3087	0.4144	0.3111	0.5072

		Inlet		Outlet	
		1	2	1	2
PMR_e	Particulate, lb/hr, EPA-5	58.52	90.38	56.47	97.86
PMR_t	Particulate, lb/hr, Total	66.51	107.34	57.92	99.32
M_{ec}	Particulate, lb/ton Charge, EPA-5	15.58	25.67	15.03	27.79
M_{tc}	Particulate, lb/ton Charge, Total	17.71	30.49	15.42	28.21
M_c	Charge Mass, lb.	28800	22300	28800	22300
M_m	Metal Production, lb.	7100	5160	7100	5160
	Dross Source				
	Furnace A	Conalco	Conalco	Conalco	Conalco
	Furnace D	Crusher	Crusher	Crusher	Crusher
	Heat Number	A 637 B 785	A 633 B 778	A 637 B 785	A 633 B 778

Table A-7

Particulate Emissions Data
Baghouse

Test Location		Inlet			Outlet		
Run No.		5	6	7	5	6	7
Date		10/28/74	10/29/74	10/30/74	10/28/74	10/29/74	10/30/74
Time - 24 Hour Clock		1012-1350	1000-1400	1030-1345	1012-1352	1000-1350	1030-1342
D_n	Sampling Nozzle Diameter, in.	0.188	0.188	0.188	0.25	0.25	0.25
T_t	Net Time of Test, min.	190	225	195	186	216	192
P_b	Barometric Pressure, in. Hg Absolute	30.05	30.10	30.15	30.05	30.10	30.15
P_m	Average Orifice Pressure, in. H_2O	0.47	.40	0.40	0.79	0.69	0.69
V_m	Volume of Dry Gas Sampled, cu. ft.	73.81	81.42	70.18	87.57	98.87	88.80
T_m	Average Gas Meter Temperature, ^{o} F.	87.9	89.3	80.1	73.1	80.5	78.1
V_{mstd}	Volume of Dry Gas Sampled, cu.ft., at standard conditions*	71.73	79.04	69.41	87.54	97.62	88.22
V_w	Total Water Collected, ml, Impingers and Silica Gel	59.	64.	59.	127.	76.	66.

* 70^{o} F., 29.92 in. Hg., Dry Basis

		Inlet			Outlet		
		5	6	7	5	6	7
V_{wgas}	Volume of Water Vapor Collected, SCF	2.80	3.03	2.80	6.02	3.60	3.13
% M	Percent Moisture in the Stack Gas by Volume	3.75	3.70	3.87	6.43	3.55	3.43
M_d	Mole Fraction of Dry Gas	0.96	0.96	0.96	0.94	0.96	0.97
% CO_2		0.2	0.2	0.2	0.2	0.2	0.2
% O_2		18.4	19.0	19.4	18.4	19.2	19.4
% CO		0.4	0.4	0.2	0.4	0.2	0.2
% N_2		81.0	80.4	80.2	81.0	80.4	80.2
MW_d	Molecular Weight of Dry Stack Gas	28.75	28.79	28.80	28.75	28.79	28.80
MW	Molecular Weight of Wet Stack Gas	28.35	28.41	28.38	28.06	28.41	28.43
C_p	Pitot Tube Coefficient	0.85	0.85	0.85	0.85	0.85	0.85
ΔP	Average Velocity Head of Stack Gas, in. H_2O	.493	0.414	0.412	0.237	0.203	0.203
T_s	Average Stack Temperature, ° F.	244.2	239.0	239.5	213.9	209.4	208.1
N_p	Net Sampling Points	48.	48.	48.	36.	36.	36.

		Inlet			Outlet		
		5	6	7	5	6	7
P_{st}	Static Pressure of Stack, in.Hg	-0.09	-0.09	-0.09	+0.02	+0.01	+0.01
P_s	Stack Pressure, in.Hg Absolute	29.96	30.01	30.01	30.07	30.11	30.16
V_s	Stack Velocity at Stack Conditions, fpm	2760.	2520.	2515.	1870.	1710.	1710.
A_s	Stack Areas, sq. in.	908.	908.	908.	1809.6	1809.6	1809.6
Q_s	Dry Stack Gas Volume at Standard Conditions, ACFM	12620.	11630.	11610.	17340.	16490.	16590.
Q_a	Stack Gas Volume at Stack Conditions, ACFM	17390.	15880.	15850.	23440.	21450.	21480.
% I	Percent Isokinetic	97.6	98.5	100.0	99.8	100.8	101.8
M_e	Particulate, mg, EPA-5	1821.4	2141.5	2060.4	185.2	207.5	131.4
M_t	Pariticulate, mg, Total	2107.8	2503.6	2543.2	374.8	533.2	292.2
I_c	% Impinger Catch	13.6	14.4	19.0	50.6	61.1	55.0
C_{es}	Particulate, gr/scf EPA-5	0.3910	0.4172	0.4571	0.0326	0.0327	0.0229

		Inlet			Outlet		
		5	6	7	5	6	7
C_{ts}	Particulate, gr/scf, Total	0.4525	0.4878	0.5643	0.0659	0.0841	0.0510
C_{ea}	Particulate, gr/acf, EPA-5	0.2836	0.3055	0.3346	0.0241	0.0251	0.0177
C_{ta}	Particulate, gr/acf, Total	0.3282	0.3572	0.4130	0.0488	0.0646	0.0394
PMR_e	Particulate, lb/hr, EPA-5	42.29	41.59	45.48	4.84	4.63	3.26
PMR_t	Particulate, lb/hr, Total	48.94	48.62	56.14	9.80	11.89	7.25
M_{ec}	Particulate, lb/ton Charge, EPA-5	9.81	7.34	7.90	1.12	0.82	0.57
M_{tc}	Particulate, lb/ton Charge, Total	11.36	8.58	9.75	2.27	2.10	1.26
M_c	Charge Mass, lb.	31600.	42500.	38400.	31600.	42500.	38400.
M_m	Metal Production, lb.	4770.	8320.	9580.	4770.	8320.	9580.

	Inlet			Outlet		
	5	6	7	5	6	7
Dross Source						
Furnace A	Conalco	Conalco	Conalco	Conalco	Conalco	Conalco
Furnace B	Crusher	Crusher	Tyroller Chunks	Crusher	Crusher	Tyroller Chunks
Furnace F	Howmet	Howmet	Howmet	Howmet	Howmet	Howmet
Heat Number	A 661	A 667	A 673	A 661	A 667	A 673
	B 821	B 829	B 839	B 821	B 829	B 839
	F 199	F 205	F 211	F 199	F 205	F 211

Table A-8

Particulate Emissions Data
Dryer

Test Location			Outlet	
Run No.		8	9	10
Date		10/31/74	10/31/74	10/31/74
Time		0930-1035	1105-1214	1320-1425
D_n	Sampling Nozzle Diameter, in.	0.50	0.50	0.50
T_t	Net Time of Test, min.	60.	60.	60.
P_b	Barometric Pressure, in.Hg Absolute	30.10	30.10	30.10
P_m	Average Orifice Pressure Drop, in H_2O	0.94	0.91	0.90
V_m	Volume of Dry Gas Sampled, cu. ft. at Meter	31.70	30.75	31.10
T_m	Average Gas Meter Temperature, ° F.	71.21	81.04	84.92
V_{mstd}	Volume of Dry Gas Sampled, Cu.Ft. at Standard Conditions*	31.87	30.35	30.45
V_w	Total Water Collected, ml, Impingers and Silica Gel	21.	23.	23.

* 70° F., 29.92 in Hg, Dry Basis

		Outlet		
		8	9	10
V_{wgas}	Volume of Water Vapor Collected, scf*	1.00	1.09	1.09
% M	Percent Moisture in the Stack Gas by Volume	3.04	3.47	3.46
Md	Mole Fraction of Dry Gas	0.97	0.97	0.97
% CO_2		0.0	0.0	0.0
% O_2		20.4	20.4	20.4
% CO		0.0	0.0	0.0
% N_2		79.6	79.6	79.6
MW_d	Molecular Weight of Dry Stack Gas	28.82	28.82	28.82
MW	Molecular Weight of Wet Stack Gas	28.49	28.44	28.45
C_p	Pitot Tube Coefficient	0.85	0.85	0.85
ΔP	Average Velocity Head of Stack Gas, in. H_2O	0.015	0.014	0.014
T_s	Average Stack Temperature, ^oF.	100.8	83.3	90.0

* 70^o F., 29.92 in Hg, Dry Basis

		Outlet		
		8	9	10
N_p	Net Sampling Points	12.	12.	12.
P_{st}	Static Pressure of Stack, in.Hg	+0.002	+0.001	+0.001
P_s	Stack Pressure, in.Hg Absolute	30.10	30.10	30.10
V_s	Stack Velocity at Stack Condition, fpm	420.	400.	400.
A_s	Stack Area, sq.in.	1017.9	1017.9	1017.9
Q_s	Dry Stack Gas Volume at Standard Conditions, SCFM	2760.	2640.	2660.
Q_a	Stack Gas Volume at Stack Conditions, ACFM	2990.	2820.	2840.
% I	Percent Isokinetic	99.6	98.9	98.7
M_e	Particulate, mg, EPA-5	1319.9	873.3	779.5
M_t	Particulate, mg, Total	1321.1	874.8	784.9
I_c	% Impinger Catch	.09	0.17	0.69
C_{es}	Particulate, gr/scf, EPA-5	0.6378	0.4431	0.3942
C_{ts}	Particulate, gr/scf, Total	0.6384	0.4439	0.3970

		Outlet		
		8	9	10
C_{ea}	Particulate, gr/acf, EPA-5	0.5880	0.4159	0.3689
C_{ta}	Particulate, gr/acf, Total	0.5885	0.4166	0.3714
PMR_e	Particulate, lb/hr, EPA-5	15.09	10.03	8.99
PMR_t	Particulate, lb/hr, Total	15.10	10.04	9.05
M_{ec}	Particulate, lb/ton Charge	40.55	27.85	19.75
M_{tc}	Particulate, lb/ton Charge	40.59	27.90	19.89
M_c	Charge Mass, lb.	744.	720.	910.

Table A-9

Visible Emissions Data
Scrubber Number One Outlet Stack

Test Number 3

Date 10/26/74

Company Barmet Industries, Inc.

Location Uhrichsville, Ohio

Type Facility Aluminum Recovery

Control Device Scrubber

Discharge Location

Point of Emissions Scrubber Outlet Stack
Height of Discharge Point 90 Feet

Observer Location

Distance to Discharge 100 Yards
Height of Observation Point Ground Level
Direction from Discharge South

Plume Description

Detached: Yes ____ No X
Color: Black ____ White X Other ____
Plume Dispersion Behavior:
Looping ____ Coning ____ Fanning X
Lofting ____ Fumigating ____ Other ____
Estimated Distance Plume Visible 100-200 Yds.

Interval of Observation (24-hour clock) 1100-1130
Minutes of Observation 30
Total Number of Readings 120
Minutes of Non-Compliance 3.5
Observers Davison
Observers Certification Date 9/4/74

Weather Data:

Sky Condition: Clear ____ Scattered X
Broken ____ Overcast ____
Color Blue
Wind Direction East
Wind Velocity (Miles/Hour) 5-10
Background Description Sky
Ambient Temperature (° F.) 60

Comments:

Table A-10

Visible Emissions Data
Scrubber Number Two Outlet Stack

Test Number 2

Date 10/24/74

Company Barmet Industries, Inc.

Location Uhrichsville, Ohio

Type Facility Aluminum Recovery

Control Devices Scrubber

Discharge Location

Point of Emissions Scrubber Outlet Stack
Height of Discharge Point 80 Feet

Observer Location

Distance to Discharge 300 Feet
Height of Observation Point Ground Level
Direction from Discharge South

Plume Description

Detached: Yes ____ No X
Color: Black ____ White X Other ____
Plume Dispersion Behavior:
Looping ____ Coning ____ Fanning X
Lofting ____ Fumigating ____ Other ____
Estimated Distance Plume Visible 100-200 Yds.

Interval of Observation (24-hour clock) 1030-1100
Minutes of Observation 30
Total Number of Readings 120
Minutes of Non-Compliance 3.75
Observers Davison
Observers Certification Date 9/4/74

Weather Data:

Sky Condition: Clear ____ Scattered X
Broken ____ Overcast ____
Color Blue
Wind Direction East
Wind Velocity (Miles/Hour) 5-10
Background Description Sky
Ambient Temperature (o F.) 65

Comments:

Table A-11

Visible Emissions Data
Baghouse Outlet Stack

Test Number 5

Date 10/28/74

Company Barmet Industries, Inc.

Location Uhrichsville, Ohio

Type Facility Aluminum Recovery

Control Device Baghouse

Discharge Location

Point of Emissions Baghouse Outlet Stack
Height of Discharge Point Ground Level

Observer Location

Distance to Discharge 100 Yards
Height of Observation Point Ground Level
Direction from Discharge Southwest

Plume Description

Detached: Yes ____ No ____
Color: Black ____ White ____ Other NA
Plume Dispersion Behavior:
Looping ____ Coning ____ Fanning ____
Lofting ____ Fumigating ____ Other NA
Estimated Distance Plume Visible NA

Interval of Observation (24 hour clock) 950-1000; 1130-1200
Minutes of Observation 40
Total Number of Readings 160
Minutes of Non-Compliance 0
Observers Davison
Observers Certification Date 9/4/74

Weather Data:

Sky Conditions: Clear ____ Scattered ____
Broken X Overcast ____
Color Blue
Wind Direction Northeast
Wind Velocity (Miles/Hour) 5-10
Background Description Trees and Shrubbery
Ambient Temperature (° F.) 60

Comments:

Table A-12

Visible Emissions Data
Dryer Outlet Stack

Test Number 9

Date 10/31/74

Company Barmet Industries, Inc.

Location Uhrichsville, Ohio

Type Facility Aluminum Recovery

Control Device None

Discharge Location

Point of Emissions Dryer Outlet Stack
Height of Discharge Point 50 Feet

Observer Location

Distance to Discharge 100 Yards
Height of Observation Point Ground Level
Direction from Discharge East

Plume Description

Detached: Yes ____ No X
Color: Black ____ White X Other ____
Plume Dispersion Behavior:
Looping ____ Coning ____ Fanning ____
Lofting ____ Fumigating ____ Other NA
Estimated Distance Plume Visible 15 Feet

Interval of Observation (24-hour clock) 1120-1150
Minutes of Observation 30
Total Number of Readings 120
Minutes of Non-Compliance 0
Observers Davison
Observers Certification Date 9/4/74

Weather Data:

Sky Condition: Clear ____ Scattered ____
Broken X Overcast ____
Color ____
Wind Direction South
Wind Velocity (Miles/Hour) 5
Background Description ____
Ambient Temperature (° F.) 60

Comments:

APPENDIX B

APPENDIX B

FIELD DATA SHEETS

Box 1225
$\Delta H@ = 1.92$
PT. 2R

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT EPA BARMET
DATE 10-21-74
SAMPLING LOCATION SCRUBBER #2 INLET
INSIDE OF FAR WALL TO OUTSIDE OF PORT (DISTANCE A) 43"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT (DISTANCE B) 3"
STACK I.D., (DISTANCE A - DISTANCE B) 40"
NEAREST UPSTREAM DISTURBANCE 14'6"
NEAREST DOWNSTREAM DISTURBANCE 38"
CALCULATOR Davison
4.4 Diameters

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	1.6 %	40"	.64	3	4"
2	4.9		1.96		5
3	8.5		3.4		6 1/2
4	12.5		5.0		8
5	16.9		6.76		9 3/4
6	22.0		8.8		11 3/4
7	28.3		11.3		14 1/4
8	37.5		15.0		18
9	62.5		25.0		28
10	71.7		28.7		31 3/4
11	78.0		31.2		34 1/4
12	83.1		33.24		36 1/4
13	87.5		35.0		38
14	91.5		36.6		39 1/2
15	95.1		38.04		41
16	98.4		39.4		42

PRELIMINARY VELOCITY TRAVERSE

PLANT BARMET INDUSTRIES
DATE 10-21-74
LOCATION SCRUBBER #2 INLET
STACK I.D. 40"
BAROMETRIC PRESSURE, in. Hg 30.45
STACK GAUGE PRESSURE, in. H_2O -.56
OPERATORS JACKSON, O'NEILL

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	[illegible]	405
2	.25	
3	.27	
4	.30	
5	.27	
6	.41	
7	[illegible]	
8	.52	
9	[illegible]	
10	.61	
11	[illegible]	
12	.60	
13	.57	
14	[illegible]	
15	.56	
16	.53	
AVERAGE	.47	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.54	405
2	.52	
3	.49	
4	.48	
5	.49	
6	.50	
7	[illegible]	
8	[illegible]	
9	.55	
10	.56	
11	[illegible]	
12	[illegible]	
13	.57	
14	.57	
15	.58	
16	.58	
AVERAGE	.50	

.49 @ 405°F

FIELD MOISTURE DETERMINATION

Location SCRUBBER #2 INLET Comments:

Test MOISTURE

Date 10-21-74

Operator JACKSON

By Absorption:

Barometric Pressure 30.45

Clock Time	Meter (Ft^3)	Flow Meter Settling (CFH)	Meter Temperature, Tm
16 38 15 44	333.592 303.592		[illegible]
54 MIN	30.000		

Tube No.	Weight, grams		
	Final	Initial	Difference
S.G.	212	200	12
H_2O	107	100	7
			19

(W) = weight of moisture collected = 19 g

$$^o/_o \text{ Moisture by Volume} = \frac{100(.0473)(W)}{\left(\frac{Pb-Pm}{29.92}\right)\left(\frac{530}{T+460}\right) V_M + \left(.0473W\right)}$$

$^o/_o$ Moisture by Volume = 3.12

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. ________ ^oF $^o/_o$ Moisture From Psychometric Chart

Dry Bulb Temp. ________ ^oF ________

HS:ba(6/71)

NOMOGRAPH DATA

PLANT EPA - BARNET

DATE 10-21-74

SAMPLING LOCATION Scrubber #2 Inlet

CONTROL BOX NO. 122[illegible]

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.92
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	3.1
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.4[illegible]
STATIC PRESSURE IN STACK, in. Hg −.56 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.04 P_s	30.41
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.999
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	405
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.49
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.61
C FACTOR	1.1	
CALCULATED NOZZLE DIAMETER, in.	.28	
ACTUAL NOZZLE DIAMETER, in.	.188	3/16
REFERENCE Δp, in. H_2O	2.0	

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT EPA - BARMET
DATE 10-21-74
SAMPLING LOCATION SCRUBBER #2 OUTLET
INSIDE OF FAR WALL TO OUTSIDE OF PORT (DISTANCE A) 49 1/2"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT (DISTANCE B) 2 1/2"
STACK I.D. (DISTANCE A - DISTANCE B) 47"
NEAREST UPSTREAM DISTURBANCE 47'
NEAREST DOWNSTREAM DISTURBANCE 33'
CALCULATOR Dawson

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	4.4 %	47"	2.07	2 1/2	4 5/8
2	14.7		6.90		9 3/8
3	29.5		13.87		16 3/8
4	70.5		33.14		35 5/8
5	85.3		40.1		42 5/8
6	95.6		44.93		47 3/8

PRELIMINARY VELOCITY TRAVERSE

PLANT BARMET INDUSTRIES
DATE 10-21-74
LOCATION SCRUBBER #2 OUTLET
STACK I.D. 47"
BAROMETRIC PRESSURE, in. Hg 30.45
STACK GAUGE PRESSURE, in. H_2O -.25
OPERATORS JACKSON O'NEILL

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
X-1	.13	115
2	.20	
3	.26	
4	.31	
5	.38	
6	.38	
AVERAGE	.26	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.20	115°
2	.26	
3	.30	
4	.34	
5	.34	
6	.20	
AVERAGE	.29	

.27 @ 115

FIELD MOISTURE DETERMINATION

Location SCRUBBER #2 OUTLET Comments:

Test MOISTURE PRELIMINARY

Date 10-21-74

Operator JACKSON

By Absorption:

Barometric Pressure 30.45

Clock Time	Meter (Ft³)	Flow Meter Settling (CFH)	Meter Temperature, Tm
1643 1613	180.202 165.202		52-2 34.5
30min	15.000		

Tube No.	Weight, grams		
	Final	Initial	Difference
S.G.	207	200	7
H_2O	126	100	26
			33

(W) = weight of moisture collected = 33

$$\%\ \text{Moisture by Volume} = \frac{100(.0473)(W)^{33}}{\left(\frac{Pb-Pm}{29.92}\right)\left(\frac{530}{T+460}\right)V_M^{15} + \left(.0473W^{33}\right)}$$

$\%$ Moisture by Volume = 9.89 % 9.94

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. ________ °F   % Moisture From Psychometric Chart

Dry Bulb Temp. ________ °F   ____________

HS:ba(6/71)

NOMOGRAPH DATA

PLANT EPA - BARMET

DATE 10-21-74

SAMPLING LOCATION SCRUBBER #2 OUTLET

CONTROL BOX NO. 12-27

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.94
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	80
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	10.00
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.45
STATIC PRESSURE IN STACK, in. Hg +.25 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.02 P_s	30.47
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s / P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	115
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.27
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.38
C FACTOR		1.05
CALCULATED NOZZLE DIAMETER, in.		.28
ACTUAL NOZZLE DIAMETER, in.		.188
REFERENCE Δp, in. H_2O		1.5

FIELD DATA

PLANT EPA - BARNET
DATE 10-23-74
SAMPLING LOCATION INLET # 2 SCRUBBER
SAMPLE TYPE PARTICULATE
RUN NUMBER 1
OPERATOR JACKSON
AMBIENT TEMPERATURE 60°F
BAROMETRIC PRESSURE 30.34
STATIC PRESSURE, (P_s) -.55
FILTER NUMBER (s) 13-14-15-18-
[illegible]

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.188
ASSUMED MOISTURE, % 3.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.1
PITOT TUBE FACTOR .85
REFERENCE Δp 2.0
NOTE

READ AND RECORD ALL DATA EVERY 7.5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1015	941.705									
X-1	7.5	944.3	.40	.38	.38	445	51	51	8	-	40
2	15.0	945.7	.25	.24	.24	445	66	56	7	-	40
3	22.5	948.2	.39	.37	.37	445	70	64	7	-	40
4	30.0	951.3	.49	.46	.46	440	76	68	12	-	40
5	37.5	955.3	.63	.60	.60	450	76	70	16	-	40
6	45.0	957.1	.37	[illegible]	[illegible]	[illegible]	[illegible]	78	6	-	40
7	52.5	959.8	.40	.38	[illegible]	455	83	80	9	-	40
8	60.0	962.5	.42	.40	.40	455	88	81	7	-	40
9	67.5	964.3	.33	.30	[illegible]	455	88	80	10	-	40
10	75.0	965.[illegible]	.28	[illegible]	[illegible]	455	[illegible]	[illegible]	10	-	40
11	82.5	967.3	[illegible]	[illegible]	[illegible]	450	[illegible]	[illegible]	[illegible]		40
12	90.0	970.4	.48	.46	.46	450	[illegible]	80	[illegible]		40
13	97.5	973.1	[illegible]	.40	.46	450	[illegible]	80	[illegible]		40
14	105.0	976.7	[illegible]	.53	.53	450	[illegible]	[illegible]	[illegible]		40
15	112.5	[illegible]	[illegible]	.55	.55	[illegible]	[illegible]	76	10		40
16	120.0	983.4	.45	.43	.45	455	[illegible]	80	[illegible]		40
Y-1	127.5	986.2	.32	.30	.30	455	[illegible]	[illegible]	12		40
2	135.0	[illegible]	.40	[illegible]	[illegible]	455	[illegible]	[illegible]	[illegible]		[illegible]
3	142.5	[illegible]	.49	[illegible]	[illegible]	440	[illegible]	[illegible]	[illegible]		[illegible]
4	150.0	[illegible]	.51	.50	[illegible]	440		[illegible]	[illegible]		[illegible]
5	157.5	995.2	.53	[illegible]	[illegible]	[illegible]			[illegible]		[illegible]
6	165.0	998.3	.48	.46	[illegible]	[illegible]	[illegible]	82	[illegible]		40
7	172.5	1001.2	.45	.43	.43	[illegible]	[illegible]	[illegible]	13		40
8	180.0	1005.[illegible]		.46	[illegible]	225	[illegible]	[illegible]	[illegible]		40

END 1420

.43

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA - BARMET

DATE 10-23-74

SAMPLING TIME (24-hr CLOCK) 1130

SAMPLING LOCATION SCRUBBER #2 INLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) GRAB

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 60 °F

OPERATOR [illegible]

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	[illegible]	1.4						44/100	0.62
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.2	17.						32/100	5.70
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6	0.4						28/100	0.112
N_2 (NET IS 100 MINUS ACTUAL CO READING)		[illegible]						28/100	22.51
								TOTAL	28.93 28.94

FIELD DATA

PLANT E.P.A.-B[illegible]
DATE 10-23-[illegible]
SAMPLING LOCATION [illegible]
SAMPLE TYPE [illegible]
RUN NUMBER 4
OPERATOR JACKSON
AMBIENT TEMPERATURE [illegible]
BAROMETRIC PRESSURE 30.[illegible]
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) [illegible] B17, B10
[illegible]

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.168
ASSUMED MOISTURE, % 15.0
SAMPLE BOX NUMBER 5
METER BOX NUMBER 1227
METER $\Delta H_@$ 1.94
C FACTOR 0.9
PITOT TUBE FACTOR [illegible]
REFERENCE Δp 1.7
NOTE

READ AND RECORD ALL DATA EVERY 10 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	182.556									
X-1	10	184.6	.16	.18	.18	115	53	53	0	—	40
2	20	187.0	.23	.26	.26	[illegible]	56	54	3	—	40
3	30	189.6	.26	[illegible]	.27	[illegible]	55	58	3	—	40
4	40	192.7	.30	.33	.33	[illegible]	72	72	3	—	40
5	50	195.8	.30	[illegible]	[illegible]	[illegible]	72	72	3	—	40
6	60	195.3	.24	.27	.27	120	72	72			
Y-1	70	200.4	.17	.19	.19	125	68	70	4	—	40
2	80	202.6	.20	.23	.23	125	66	65	6	—	40
3	90	205.7	.30	.33	.33	125	70	65	6	—	40
4	100	205.9	.27	.29	.29	125	72	70	[illegible]	—	40
5	110	211.[illegible]	[illegible]	.31	.31	125	72	72	7	—	40
6	120	21[illegible]	.22	.25	.25	120	72	71	7	—	40
X-6	130	216.0	.23	.26	.26	120	70	70	7	—	40
5	140	21[illegible]	.27	.31	.31	120	[illegible]	72	16	—	40
4	150	221.4	.27	.31	[illegible]	120	[illegible]	[illegible]	15	—	40
3	160	224.5	[illegible]	[illegible]	[illegible]	125	[illegible]	72	10	—	40
2	170	22[illegible]	.23	.26	.26	125	73	70	12	—	40
1	180	22[illegible]	.28	.23	[illegible]	115	7[illegible]	68	10	—	40
			.25								

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA - Barmet

DATE 10-23-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Scrubber #2 Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 60 °F

OPERATOR Davison

COMMENTS:

GAS \ RUN	0930 1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STAOK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	1.2	1.2						44/100	0.53
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.8	18.6						32/100	5.95
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.2	0.4						28/100	0.11
N_2 (NET IS 100 MINUS ACTUAL CO READING)		79.8						28/100	22.34
								TOTAL	28.93

FIELD DATA

PLANT EPA - BARMET
DATE 10-24-74
SAMPLING LOCATION SCRUBBER #2
SAMPLE TYPE INLET
RUN NUMBER 2
OPERATOR JACKSON
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -1.6
FILTER NUMBER (s) 11-13-8
THIMBLES - 42-67-63

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.188
ASSUMED MOISTURE, % 3.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.1
PITOT TUBE FACTOR .85
REFERENCE Δp 2 2
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / [illegible]	[illegible]									
Y-1	5	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	5	—	40
2	10	12.6	.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	—	40
3	15	14.6	.57	.51	.51	410	[illegible]	65	8	—	40
4	20	16.5	.53	.45	.46	415	[illegible]	68	7	—	40
5	25	18.3	[illegible]	.45	.45	415	[illegible]	70	[illegible]	—	40
6	30	20.3	.59	.51	.51	415	83	72	10	—	40
7	35	22.4	[illegible]	[illegible]	[illegible]	415	84	75	10	—	40
8	40	24.6	.60	.57	[illegible]	[illegible]	85	76	12	—	40
9	45	26.8	.72	.62	.62	415	81	[illegible]	11	—	40
10	50	[illegible]	.72	.62	.62	[illegible]	[illegible]	[illegible]	14	—	40
11	55	31.1	[illegible]	[illegible]	[illegible]	[illegible]			14	—	40
12	60	33.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16	—	40
13	65	35.4	.6	.60	[illegible]	440	74	80	16	—	40
14	70	[illegible]	.65	.55	.55	445	[illegible]	[illegible]	[illegible]	—	40
15	75	39.7	.67	.57	.57	415	85	[illegible]	18	—	40
16	80	42.2	[illegible]	[illegible]	[illegible]	415	[illegible]	[illegible]	[illegible]	—	40
Y-1	85	43.9	.65	.55	[illegible]	445	88	81	19	—	40
2	90	45.1	.67	.57	[illegible]	445	[illegible]	82	22	—	40
3	95	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
4	100	50.8	[illegible]	[illegible]			[illegible]	[illegible]	15	—	40
5	105	52.7	.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14	—	40
6	110	54.5	.70	.60	.60	[illegible]	92	86	16	—	40
7	115	57.0	[illegible]	.64	.64	385	92	86	16	—	40

Run 2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-h CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Y-8	120	[illegible]	.66	.5	.5	[illegible]	[illegible]	[illegible]	[illegible]	–	70
9	[illegible]	61.0	.68	.58	.58	305	76	[illegible]	11	–	40
10	[illegible]	[illegible]	.66	.56	[illegible]	300	95	89	12	–	40
11	[illegible]	[illegible]	.60	.52	.52	300	92	88	12	–	40
12	[illegible]	67.3	.50	.43	.43	215	92	[illegible]	11	–	[illegible]
13	[illegible]	69.1	.45	.39	[illegible]	[illegible]	93	83	8	–	40
14	155	71.0	.47	.40	.40	[illegible]	[illegible]	[illegible]	8	–	40
15											
16											

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA - Bremer
DATE 10-24-74
SAMPLING TIME (24-hr CLOCK) 1130
SAMPLING LOCATION Scrubber #2 - Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 60°F
OPERATOR Dowling

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2	1.2	1.2					1.2	44/100	.53
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.2	18.0					18.0	32/100	5.76
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6	0.4					.4	28/100	.112
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.4					80.4	28/100	22.512
								TOTAL	28.91

FIELD DATA

PLANT: EPA Barmet
DATE: 10-24-74
SAMPLING LOCATION: Scrubber #2
SAMPLE TYPE: Outlet
RUN NUMBER: 2
OPERATOR: Jackson
AMBIENT TEMPERATURE: 65 °F
BAROMETRIC PRESSURE: 30.10
STATIC PRESSURE, (P_s): +.35
FILTER NUMBER (s): 12 —
Thimbles – 66

PROBE LENGTH AND TYPE: 4' Inconel
NOZZLE I.D.: 0.188
ASSUMED MOISTURE, %: 15.0
SAMPLE BOX NUMBER: 2
METER BOX NUMBER: 1205
METER $\Delta H_@$: 1.91
C FACTOR: 0.9
PITOT TUBE FACTOR: .85
REFERENCE Δp: 1.7
NOTE:

READ AND RECORD ALL DATA EVERY 10 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	1005	34.468									
X-1	10		36.4	.17	.19	.19	125	[illegible]	[illegible]	4	-	[illegible]
2	20		39.6	.24	.26	.26	125	70	[illegible]	4	—	40
3	30		42.5	.28	.30	.30	125	63	60	5	-	40
4	40		45.5	[illegible]	.30	.30	125	[illegible]	[illegible]	6	—	40
5	50		48.7	.30	.33	.33	[illegible]	75	69	7	—	40
6	60		51.5	[illegible]	.30	[illegible]	125	72	72	6	—	40
Y-1	70		54.6	.27	.29	.29	125	72	72	6	—	40
2	80		57.6	.30	.33	.33	125	79	75	[illegible]	—	40
3	90		60.9	.33	.37	.37	125	80	77	6	—	40
4	100		[illegible]	.30	.33	.33	125	[illegible]	[illegible]	6	—	40
5	110		66.8	.23	.25	.25	125	[illegible]	77	6	—	40
6	120		69.8	.26	.29	.27	125	[illegible]	78	6	—	40
Y-1	130		72.5	.23	.25	.25	125	[illegible]	[illegible]	6	—	40
2	140		75.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	—	40
3	150		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	—	40
4												
5												
6												

NOMOGRAPH DATA

PLANT EPA - BARNETT

DATE 10-23-74

SAMPLING LOCATION Scrubber #2 Outlet

CONTROL BOX NO. 1205

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.91
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	15.0
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.34
STATIC PRESSURE IN STACK, in. Hg +.25 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.02 P_s	30.36
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	120
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.26
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.30
C FACTOR		0.9
CALCULATED NOZZLE DIAMETER, in.		.30
ACTUAL NOZZLE DIAMETER, in.		.188
REFERENCE Δp, in. H_2O		1.70

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA Barnett

DATE 10-24-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Scrubber #2 Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE

OPERATOR Dowling

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	1.0	1.0					1.0	44/100	.44
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.0	18.0					18.0	32/100	5.76
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.4	0.4					.4	28/100	.112
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.6					80.6	28/100	22.568
								TOTAL	28.88

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT EPA Boemet
DATE 10-24-74
SAMPLING LOCATION Scrubber #1 Inlet
INSIDE OF FAR WALL TO OUTSIDE OF PORT. (DISTANCE A) 43½"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT. (DISTANCE B) 3½"
STACK I.D., (DISTANCE A - DISTANCE B) 40"
NEAREST UPSTREAM DISTURBANCE 5'
NEAREST DOWNSTREAM DISTURBANCE 3'8"
CALCULATOR Dan

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	1.1	40"	.44	3½	4½
2	3.2		1.28		4¾
3	5.5		2.2		5¾
4	7.9		3.16		6½
5	10.5		4.2		7¾
6	13.2		5.28		8¾
7	16.1		6.44		10
8	19.4		7.76		11¼
9	23.0		9.2		12¾
10	27.2		10.84		14¼
11	32.3		12.92		16½
12	39.8		15.92		19½
13	60.2		24.08		27½
14	67.7		27.08		30½
15	72.8		29.12		32½
16	77.0		30.80		34¼
17	80.1		32.24		35¾
18	83.9		33.56		37
19	86.8		34.72		38¼
20	89.5		35.80		39¼
21	92.1		36.84		40¼
22	94.5		37.80		41¼
23	96.8		38.72		42¼
24	98.9		39.56		42½

PRELIMINARY VELOCITY TRAVERSE

PLANT EPA BARMET
DATE 10-24-74
LOCATION SCRUBBER #1 INLET
STACK I.D. 40"
BAROMETRIC PRESSURE, in. Hg 30.10
STACK GAUGE PRESSURE, in. H_2O -.58
OPERATORS O'Neill

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
X-1	.17	425
2	.18	
3	.18	
4	.22	
5	.25	
6	.25	
7	.26	
8	.34	
9	.39	
10	.49	
11	.51	
12	.50	
13	.52	
14	.55	
15	.54	
16	.56	
AVERAGE	.37	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.30	425
2	.35	
3	.35	
4	.36	
5	.38	
6	.40	
7	.41	
8	.41	
9	.41	
10	.40	
11	.39	
12	.37	
13	.37	
14	.37	
15	.35	
16	.32	
AVERAGE	.37	

.37 @ 425

NOMOGRAPH DATA

PLANT EPA Bagines

DATE 10-24-74

SAMPLING LOCATION Scrubber #1 INLET

CONTROL BOX NO. 1225

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.92
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	3.0
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.10
STATIC PRESSURE IN STACK, in. Hg -.58 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.04 P_s	30.06
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.999
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	425
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.37
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.56
C FACTOR		1.1
CALCULATED NOZZLE DIAMETER, in.		.29
ACTUAL NOZZLE DIAMETER, in.		.188
REFERENCE Δp, in. H_2O		2.2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT EPA Bormet

DATE 10-24-74

SAMPLING LOCATION Scrubber #1 Outlet

INSIDE OF FAR WALL TO OUTSIDE OF PORT, (DISTANCE A) 47"

INSIDE OF NEAR WALL TO OUTSIDE OF PORT, (DISTANCE B) 3"

STACK I.D., (DISTANCE A - DISTANCE B) 44"

NEAREST UPSTREAM DISTURBANCE 60'

NEAREST DOWNS~~TREAM DI~~STURBANCE 40'

CALCULATOR Dowling

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
X-1	4.4	44"	1.94	3	5
2	14.7		6.47		9 1/2
3	29.5		12.98		16
4	70.5		31.02		34
5	85.3		37.53		40.5
6	95.6		42.06		45

PRELIMINARY VELOCITY TRAVERSE

PLANT EPA Barnet
DATE 10-24-74
LOCATION Scrubber #1 Outlet
STACK I.D. 44
BAROMETRIC PRESSURE, in. Hg 30.10
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Dowson

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
X-1	.07	125
2	.15	
3	.18	
4	.19	
5	.18	
6	.09	
AVERAGE	.14	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.07	125
2	.17	
3	.17	
4	.19	
5	.18	
6	.11	
AVERAGE	.15	

.15 @ 125

FIELD MOISTURE DETERMINATION

Location EPA BARMET Comments:

Test Scrubber #1 Outlet

Date 10-24-74

Operator Dorian

By Absorption:

Barometric Pressure

Clock Time	Meter (Ft^3)	Flow Meter Settling (CFH)	Meter Temperature, Tm

Tube No.	Weight, grams		
	Final	Initial	Difference

(W) = weight of moisture collected =

$$\%\ \text{Moisture by Volume} = \frac{100(.0473)(W)}{\left(\frac{Pb-Pm}{29.92}\right)\left(\frac{530}{T+460}\right)V_M + (.0473W)}$$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. 125 °F

Dry Bulb Temp. 125 °F

% Moisture From Psychometric Chart 13%

HS:ba(6/71)

NOMOGRAPH DATA

PLANT EPA BARNET

DATE 10-24-74

SAMPLING LOCATION Scrubber #1

CONTROL BOX NO. 1205

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.91
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	8[illegible]
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	13.0
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.10
STATIC PRESSURE IN STACK, in. Hg +.19 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	.01 P_s	30.09
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	125
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.15
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.19
C FACTOR		.94
CALCULATED NOZZLE DIAMETER, in.		.35
ACTUAL NOZZLE DIAMETER, in.		.25
REFERENCE Δp, in. H_2O		.54

FIELD DATA

PLANT EPA BARMET
DATE 10-26-74
SAMPLING LOCATION [illegible] #1
SAMPLE TYPE INLET
RUN NUMBER (3)
OPERATOR [illegible]
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE [illegible]
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) 2-3

[illegible] 44-65

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.188
ASSUMED MOISTURE, % 3.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER [illegible]
METER $\Delta H_{@}$ 1.9[illegible]
C FACTOR 1.1
PITOT TUBE FACTOR .85
REFERENCE Δp 2.2
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	1000	[illegible].562									
X-1	5		[illegible]	.26	.21	.21	400	42	42	2	—	40
2	10		92.4	.33	.28	.28	415	4[illegible]	43	4	—	40
3	15		93.8	.34	.28	.28	430	[illegible]	44	5	—	40
4	20		95.3	.36	.30	.30	435	53	46	6	—	40
5	25		96.8	.36	.30	.30	435	48	[illegible]	6	—	40
6	30		98.4	.39	.33	.33	435	58	50	6	—	40
7	35		100.1	.39	.33	.33	[illegible]	60	50	7	—	40
8	40		101.7	.41	.34	.34	435	62	52	7	—	40
9	45		103.1	.41	.34	.34	430	64	54	7	—	40
10	50		105.0	.40	.35	.35	430	64	54	8	—	40
11	55		106.7	.40	.34	.34	430	66	56	9	—	40
12	60		107.9	.39	.33	.33	435	68	58	9	—	40
13	65		109.9	.40	.34	.34	435	69	59	9	—	40
14	70		111.5	.35	.31	.31	420	70	58	9	—	40
15	75		[illegible]	.35	.31	.31	420	70	60	9	—	40
16	80		114.7	[illegible]	[illegible]	[illegible]	450	[illegible]	[illegible]	9	—	40
17	85		[illegible]	.40	.34	.34	[illegible]				—	[illegible]
18	90		[illegible]	[illegible]	.34	.34	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
19	95		[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	—	40
20	100		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
21	105		122.7		[illegible]							[illegible]
22	110		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	40
23	115		126.0	[illegible]	[illegible]				[illegible]	[illegible]	—	40
24	120		127.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40

[illegible] #1
INLET
RUN 3

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
	0		[illegible]									
Y-1	5		129.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1		[illegible]
2	10		130.7	[illegible]		[illegible]	[illegible]	8?	[illegible]	1.5	—	[illegible]
3	15		132.1	.39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
4	20		133.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	—	[illegible]
5	25		135.9	.40	.33	.33	400	70	72	3	—	40
6	30		137.8	.39	.32	.32	420	72	70	3	—	40
7	35		139.0	.39	.33	.33	340	72	71	3	—	40
8	40		140.7	.40	.33	.33	340	72	72	4	—	40
9	45		142.3	.40	.33	.33	350	75	72	4	—	40
10	50		144.031	.40	.33	.33	[illegible]	74	72	4	—	40
	(120)		END 1345									

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA - BACMET

DATE 10-26-74

SAMPLING TIME (24-hr CLOCK) 1100

SAMPLING LOCATION SCRUBBER #1 - INLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) GRAB

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 60°F

OPERATOR [illegible]

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	1.0	1.0					1.0	44/100	0.44
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.4	18.4					18.4	32/100	5.88
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6	0.2					0.2	28/100	0.055
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.4					80.4	28/100	22.51
								TOTAL	28.88

FIELD DATA

PLANT EPA Boo[illegible]
DATE 10-26-7[illegible]
SAMPLING LOCATION S[illegible] #1
SAMPLE TYPE C[illegible]
RUN NUMBER (3)
OPERATOR [illegible]
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 30.15
STATIC PRESSURE, (P_s) +.23
FILTER NUMBER (s) 4-1
Th[illegible] - 27 - 41

PROBE LENGTH AND TYPE 4' Incon[illegible]
NOZZLE I.D. [illegible]
ASSUMED MOISTURE, % 1[illegible]
SAMPLE BOX NUMBER 2
METER BOX NUMBER 120[illegible]
METER $\Delta H_@$ 1.[illegible]
C FACTOR .94
PITOT TUBE FACTOR .8[illegible]
REFERENCE Δp .[illegible]
NOTE

READ AND RECORD ALL DATA EVERY 10 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1000	[illegible]	[illegible]	.31	.31	110	[illegible]	[illegible]	3	—	40
X-1	10	101.9	.17	[illegible]	[illegible]	11[illegible]	[illegible]	[illegible]	[illegible]		40
2	20	106.3	.19	.67	[illegible]	115	[illegible]	[illegible]	7	—	40
3	30	110.8	.21	.73	[illegible]	115	71	54	7	—	40
4	40	114.0	.22	.76	.76	115	6[illegible]	58	7	—	40
5	50	117.0	.19	.69	.69	115	70	60	7	—	40
6	60										[illegible]
Y-1	70	119.3	.29	.67	.67	115	70	63	9	—	40
2	80	[illegible]	.21	[illegible]	[illegible]	[illegible]	71	65	12	—	40
3	90	133.2	.21	.73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		40
4	100	137.8	[illegible]	[illegible]	.76	115	[illegible]	[illegible]	[illegible]	—	40
5	110	141.0	.09	.31	.31	[illegible]	6[illegible]	[illegible]	[illegible]	—	40
6	120	144.1	.07	[illegible]	[illegible]	115	80	[illegible]	[illegible]	—	40
Y-1	130	147.3	.01	.31	.31	115	8[illegible]	[illegible]	6	—	40
2	140	[illegible]	.19	.67	[illegible]	[illegible]	8[illegible]	[illegible]	[illegible]	—	40
3	150	15[illegible]	.22	.73	[illegible]	115	[illegible]	76	12	—	40
4	160	[illegible]	.22	.1[illegible]	[illegible]	[illegible]	[illegible]		12	—	40
5	170	16[illegible]	.20	.1[illegible]	[illegible]	[illegible]	[illegible]		12	.	40
		[illegible]									

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA Barnett

DATE 10-26-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Scrubber #1

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 65

OPERATOR Doull

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2	0.8	0.8					0.8	44/100	0.35
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.0	18.2					18.2	32/100	5.82
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.2	.2					.2	28/100	.056
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.8					80.8	28/100	22.62
								TOTAL	28.84

FIELD DATA

PLANT EPA Barnet[illegible]
DATE 10-27-74
SAMPLING LOCATION Scrubber #1
SAMPLE TYPE Inlet
RUN NUMBER 4
OPERATOR [illegible]
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.53
FILTER NUMBER (s) 21-
Thimble - 38 -

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.185
ASSUMED MOISTURE, % 3.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.1
PITOT TUBE FACTOR .85
REFERENCE Δp 2.2
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 10[illegible]	144.415									
X-1	5	[illegible]	.3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		—	40
2	10	14[illegible].5	.39	.32	.32	[illegible]	[illegible]	[illegible]	4	—	40
3	15	149.2	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	4		40
4	20	150.9	.40	.33	.33	390	80	66	4	—	40
5	25	152.4	.40	.33	.33	395	84	70	4	—	40
6	30	154.1	.40	.33	.33	360	86	72	4	—	40
7	35	155.8	.4[illegible]	.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
8	40	[illegible]	.41	.33	[illegible]	[illegible]	86	[illegible]	[illegible]	—	40
9	45	159.2	.4[illegible]	.3[illegible]	.3[illegible]	34[illegible]	[illegible]	[illegible]	[illegible]	—	40
10	50	160.9	.40	.34	.33	34[illegible]	[illegible]	80	6	—	40
11	55	162.5	.39	.32	.3[illegible]	[illegible]	9[illegible]	[illegible]	7	-	40
12	60	164.1	.39	.32	[illegible]	[illegible]	[illegible]	8[illegible]	7	—	40
13	65	165.8	.39	.32	.32	3[illegible]	[illegible]	[illegible]	[illegible]	—	40
14	70	168.0	.38	.31	.31	385	[illegible]	83	7	—	40
15	75	169.4	.35	.30	.30	345	80	78	8	-	40
16	80	172.4	.36	.30	.30	345	80	80	5	—	40
17	85	174.1	.36	.30	.30	345	82	80	8	—	40
18	90	175.7	.38	.32	[illegible]	345	82	80	8	—	40
19	95	177.4	.39	.32	.32	350	84	80	8	—	40
20	100	178.8	.39	.32	.32	350	85	80	8	—	40
21	105	180.7	.3[illegible]	.30	.30	[illegible]	82	80	9	—	40
22	110	182.2	.32	.27	.27	310	84	80	8	—	40
23	115	183.7	.35	.29	.29	325	80	80	8	—	40
24	120	185.4	.36	.30	.30	325	78	76	8	—	40

Scrubber #1
INLET
RUN 4

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET $(T_{m_{in}})$, °F	DRY GAS METER TEMPERATURE OUTLET $(T_{m_{out}})$, °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
1	[illegible]	125	156.8	.36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9	–	40
2	[illegible]		188.6	.40	.34	[illegible]	[illegible]	[illegible]	26	9	–	48
3	[illegible]		190.2	.40	[illegible]	[illegible]	340	26	[illegible]	9	–	48
4	[illegible]		192.1	[illegible]	.33	[illegible]	[illegible]	[illegible]	[illegible]	10	–	40
5	[illegible]		193.17	.37	.31	.31	[illegible]	[illegible]	[illegible]	10	–	40
6	30		200	[illegible]	.31	.31	345	85	84	9	–	40
			194.136									

B-32

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA Barnett

DATE 10-26-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Scrubber #1 Inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 65°F

OPERATOR Davis

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2	1.2	1.2						44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)								32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

FIELD DATA

PLANT EPA Barnet[illegible]
DATE 10-27-74
SAMPLING LOCATION Scrubber #1
SAMPLE TYPE [illegible]
RUN NUMBER 4
OPERATOR [illegible]
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) +.03
FILTER NUMBER (s) 22 - 31-32 -
T Numbers - M-37 - 85 - 88 - 25

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.250
ASSUMED MOISTURE, % 13
SAMPLE BOX NUMBER 2
METER BOX NUMBER 1105
METER $\Delta H_@$ 1.91
C FACTOR .94
PITOT TUBE FACTOR .85
REFERENCE Δp .54
NOTE

READ AND RECORD ALL DATA EVERY 10 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	165.136									
X-1	10	[illegible]	.10	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	-	40
2	20	172.7	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	-	40
3	30	177.1	.22	.75	.75	110	82	66	7	-	40
4	40	182.1	.22	.75	.75	110	83	79	9	-	40
5	50	187.4	.17	.60	.60	110	84	[illegible]	11	-	40
6	60	191.3	.15	.53	.53	110	90	[illegible]	4	-	4
Y-1	70	195.8	.19	.66	.66	110	86	86	3	-	40
2	80	200.3	.23	[illegible]	.79	110	94	86	4	-	40
3	90	205.7	.23	[illegible]	.79	110	96	86	3	-	40
4	100	209.7	[illegible]	[illegible]	.75	110	98	84	3	-	40
5	110	214.2	.20	.70	.70	110	100	86	3	-	40
6	120	218.5	.19	.66	.66	110	102	87	4	-	40
Y-6	130	222.8	.19	.66	.66	110	102	88	4	-	40
5	140	227.2	.22	.75	.75	110	104	88	4	-	40
4	150	231.684	.22	.75	.75	110	104	88	4	-	40

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA Bar[illegible]

DATE 10-27-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Scrubber #1

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE [illegible]

OPERATOR Dav[illegible]

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2								44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)								32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT: Barnet
DATE: 10-27-74
SAMPLING LOCATION: Baghouse Inlet
INSIDE OF FAR WALL TO OUTSIDE OF PORT. (DISTANCE A): 37"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT. (DISTANCE B): 3"
STACK I.D.. (DISTANCE A - DISTANCE B): 34"
NEAREST UPSTREAM DISTURBANCE: 5
NEAREST DOWNSTREAM DISTURBANCE: 6
CALCULATOR: [illegible]

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	1.1	34"	.37	3"	4"
2	3.2		1.09		4 1/8
3	5.5		1.87		[illegible]
4	7.9		2.69		[illegible]
5	10.5		3.57		6 1/2
6	13.2		4.49		7 1/2
7	16.1		5.47		8 1/2
8	19.4		6.60		9 5/8
9	23.0		7.82		10 7/8
10	27.2		9.25		12 1/4
11	32.3		10.98		[illegible]
12	39.8		13.53		[illegible]
13	60.2		20.47		[illegible]
14	67.7		23.02		[illegible]
15	72.8		24.75		[illegible]
16	[illegible]		[illegible]		[illegible]
17	80.6		27.40		[illegible]
18	83.6		28.42		[illegible]
19	86.8		29.51		[illegible]
20	89.5		30.43		33 1/2
21	92.1		31.31		34 1/4
22	94.5		32.13		35
23	96.8		32.91		35 7/8
24	98.9		33.63		[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT: Bagget
DATE: 10-27-74
LOCATION: Baghouse Inlet
STACK I.D.: 34"
BAROMETRIC PRESSURE, in. Hg:
STACK GAUGE PRESSURE, in. H_2O:
OPERATORS: Jackson

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
X-1	.36	265
2	.38	
3	.41	
4	.43	
5	.44	
6	.44	
7	.43	
8	.42	
9	.41	
10	.41	
11	.40	
12	.39	
13	.38	
14	.38	
15	.37	
16	.38	
17	.40	
18	.42	
19	.43	
20	.43	
21	.41	
22	.40	
23	.40	
24	.39	
AVERAGE	.41	

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.29	265
2	.37	
3	.3[illegible]	
4	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
10	[illegible]	
11	.34	
12	.34	
13	.3[illegible]	
14	.3[illegible]	
[illegible]	.41	
[illegible]	.42	
	[illegible]	
18	.42	
19	.43	
[illegible]	.44	
21	.44	
22	.45	
23	.45	
24	.4[illegible]	
AVERAGE	.3[illegible]	

.4 @ 265

NOMOGRAPH DATA

PLANT Bacmet

DATE 10-27-74

SAMPLING LOCATION Bag [illegible] Inlet

CONTROL BOX NO. 125

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	[illegible]
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m\,avg.}$	[illegible]
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	5.0
BAROMETRIC PRESSURE AT METER, in Hg	P_m	[illegible]
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s\,avg.}$	265
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.40
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.46
C FACTOR		1.05
CALCULATED NOZZLE DIAMETER, in.		.27
ACTUAL NOZZLE DIAMETER, in.		0.127
REFERENCE Δp, in. H_2O		1.9

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Barnet
DATE 10-27-74
SAMPLING LOCATION Baghouse Outlet
INSIDE OF FAR WALL TO OUTSIDE OF PORT (DISTANCE A) 51 1/2"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT (DISTANCE B) 3 1/2"
STACK I.D. (DISTANCE A - DISTANCE B) 48"
NEAREST UPSTREAM DISTURBANCE 52", 1.1 D. Diameter!
NEAREST DOWNSTREAM DISTURBANCE 20
CALCULATOR Downing

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	1.4	48"	.67	3 1/2	4 1/8
2	4.4		2.11		[illegible]
3	7.5		3.6		7
4	10.9		5.23		8 3/4
5	14.6		7.01		10 1/2
6	18.8		9.02		12 1/2
7	23.6		11.33		14 7/8
8	29.6		14.21		17 3/4
9	38.2		18.34		21 7/8
10	61.8		29.66		33 1/4
11	70.4		33.79		37 1/4
12	76.4		36.67		40 1/4
13	81.2		38.98		42 1/2
14	85.4		40.99		44 1/2
15	89.1		42.77		46 1/4
16	92.5		44.40		48
17	95.6		45.89		49 1/2
18	98.6		47.33		50 1/2

PRELIMINARY VELOCITY TRAVERSE

PLANT Bormet
DATE 10-27-74
LOCATION Baghouse Outlet
STACK I.D. 48"
BAROMETRIC PRESSURE, in. Hg 30.05
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Jackson

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
X-1	.17	220
2	.18	
3	.18	
4	.17	
	.17	
[illegible]	.16	
7	.16	
8	[illegible]	
9	.17	
10	[illegible]	
11	[illegible]	
12	.24	
13	.27	
14	.28	
15	.30	
16	.30	
17	.30	
18	.30	
AVERAGE	.22	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Y-1	.29	220
2	.28	
3	.26	
4	[illegible]	
[illegible]	.26	
6	[illegible]	
7	[illegible]	
8	.24	
9	.23	
10	.20	
11	.12	
12	.10	
13	.08	
14	[illegible]	
[illegible]	.09	
16	.10	
17	.10	
18	.13	
AVERAGE	.18	

120 @ 220

NOMOGRAPH DATA

PLANT Boeme

DATE 10-27-74

SAMPLING LOCATION Primary Ovwer

CONTROL BOX NO. 1205

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE. in. H_2O	$\Delta H_@$	1.91
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m\,avg.}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	5.0
BAROMETRIC PRESSURE AT METER. in Hg	P_m	30.05
STATIC PRESSURE IN STACK. in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	
RATIO OF STATIC PRESSURE TO METER PRESSURE	$P_s\ P_m$	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	220
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.2
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.3
C FACTOR		1.05
CALCULATED NOZZLE DIAMETER, in.		.32
ACTUAL NOZZLE DIAMETER, in.		.25
REFERENCE Δp, in. H_2O		.56

FIELD DATA

PLANT Barnet
DATE 10-28-74
SAMPLING LOCATION [illegible]
SAMPLE TYPE INLET
RUN NUMBER 5
OPERATOR [illegible]
AMBIENT TEMPERATURE [illegible]
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE, (P_s) -1.2
FILTER NUMBER (s) 23-34-2
Thimble - 61-57-26

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.187
ASSUMED MOISTURE, % 5.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1221
METER $\Delta H_@$ 1.92
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp 1.9
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	[illegible]									
X-1	5		[illegible]	.74	[illegible]			[illegible]	[illegible]	[illegible]	—	40
2	10		[illegible]	1.1					[illegible]		[illegible]	40
3	15		207.[illegible]	1.2			[illegible]	[illegible]		[illegible]	[illegible]	40
4	20		204.8	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	40
5	25		207.0	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	—	40
6	30		208.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
7	35		210.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	—	40
8	40		212.7	.46	.44	.44	[illegible]	76	71	8	—	40
9	45		214.5	.46	.44	.44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
10	50		216.3	[illegible]	.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
11	55		[illegible]	[illegible]	.43	.43	[illegible]	[illegible]	[illegible]	12	—	40
12	60		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16	—	40
13	65		[illegible]	.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
14	70		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		40
15	75		[illegible]	.5	[illegible]		240	[illegible]	[illegible]	[illegible]	—	40
16	80		218.[illegible]	.5[illegible]	.48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
17	85		230.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	86	[illegible]	—	40
18	90		231.9	.43	.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
19	95		233.8	.47	.45	[illegible]	[illegible]	[illegible]	[illegible]	5	—	40
20	100		[illegible]	.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
21	105		[illegible]	.5[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
22	110		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	40
23	115		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			40
24	120		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40

B[illegible]
Run 5

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
	120	[illegible]	[illegible]									
Y-1	125		[illegible]	[illegible]		[illegible]	[illegible]			4		[illegible]
2	130		247.8	[illegible]	.40	.40	[illegible]	[illegible]	[illegible]	4	—	40
3	135		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	—	40
4	140		251.2	.38	[illegible]	.36	[illegible]	101	[illegible]	[illegible]	—	40
5	145		252.8	.39	[illegible]	[illegible]	230	[illegible]	[illegible]	3	—	40
6	150		254.[illegible]	.41	[illegible]	[illegible]	[illegible]	101	[illegible]	4	—	40
7	155		256.9	.38	.36	.36	230	[illegible]	[illegible]	4	—	40
8	160		258.0	.37	.35	.35	[illegible]	98	95	4	—	40
9	[illegible]		259.8	.41	.39	.39	240	[illegible]	95	4	—	40
10	[illegible]		261.6	.41	.39	.39	240	[illegible]	95	4	—	40
11	175		263.4	.41	.39	.39	24[illegible]	100	96	4	—	40
12	180		265.1	.42	[illegible]	.40	[illegible]	101	97	4	—	40
13	185		267.0	.42	.40	.40	240	[illegible]	[illegible]	4	—	40
14	190		268.710	.42	.40	.40	[illegible]	[illegible]	[illegible]	4	—	40
			[illegible] 1350									

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FIELD DATA

PLANT Barmet
DATE 10-28-74
SAMPLING LOCATION Baghouse
SAMPLE TYPE Outlet
RUN NUMBER 5
OPERATOR [illegible]
AMBIENT TEMPERATURE 60°F
BAROMETRIC PRESSURE 30.05
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) 33
[illegible] - 21

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.25
ASSUMED MOISTURE, % 5.0
SAMPLE BOX NUMBER 2
METER BOX NUMBER 1205
METER $\Delta H_@$ 1.91
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp .16
NOTE

READ AND RECORD ALL DATA EVERY 6 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1012	218.5[illegible]									
X-1	6	219.1	[illegible]			[illegible]			[illegible]	—	40
2	12	[illegible]	.30	[illegible]		[illegible]		[illegible]	[illegible]	—	40
3	18	226.[illegible]	.32		[illegible]	215	[illegible]	[illegible]	5	—	40
4	24	229.[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	—	40
5	30	232.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
6	36	235.3	[illegible]	[illegible]	.8	215	[illegible]	63	[illegible]	—	40
7	42	238.1	.23	[illegible]	.76	215	[illegible]	[illegible]	4		40
8	48	[illegible]	.22	[illegible]	[illegible]	[illegible]	[illegible]	64	3	—	40
9	54	243.7	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	—	40
10	60	[illegible]	.33	1.1	1.1	[illegible]	70	67	5	—	40
11	66	[illegible]	[illegible]	1.1	1.1	[illegible]		[illegible]	[illegible]	—	40
12	72	25[illegible].4	[illegible]	1.1	1.1	[illegible]	[illegible]	[illegible]	6	—	40
13	78	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	—	40
14	84	25[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	—	40
15	90	263.4	.34	1.1	1.1	215	75	74	7	—	40
16	96	266.6	[illegible]	[illegible]	[illegible]	[illegible]	75	75	[illegible]	—	40
17	102	[illegible]	.30	.97	.97	215	[illegible]	75	7	—	40
18	108	[illegible]	.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40

[redacted]
Run (5)

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	[illegible] / 1217	[illegible]									70
Y-1	114	[illegible]	.21								70
2	120	279.1	[illegible]	[illegible]	[illegible]	[illegible]				—	70
3	126	[illegible]	[illegible]		[illegible]					—	70
4	132	[illegible]	.22	[illegible]	[illegible]	210		[illegible]		—	70
5	138	[illegible]	[illegible]			210	75	[illegible]	5	—	70
6	144	289.7	.22	.77	[illegible]	210	77	80	5	—	70
7	150	[illegible]	[illegible]	.72	.72	215	77	80	5	—	70
8	156	295.2	.21	.66	.66	215	77	82		—	70
9	162	297.7	.18	.45	.45	215	77	88	3	—	70
10	168	300.[illegible]	.13	.48	.45	215	77	88	2	—	70
11	174	301.9	.10	.33	[illegible]	215	77	89	2	—	70
12	180	304.[illegible]	[illegible]	[illegible]	.44	209	77	89	2	—	70
13	186	306.125	[illegible]	.41	.41	205	77	89	[illegible]	—	
		END [illegible]									

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA Barnes

DATE 10-28-74

SAMPLING TIME (24-hr CLOCK) 1100

SAMPLING LOCATION Baghouse [illegible]

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 65

OPERATOR [illegible]

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2		0.2					.2	44/100	0.088
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.6	18.4					18.4	32/100	5.88
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.0	0.4					0.4	28/100	.11
N_2 (NET IS 100 MINUS ACTUAL CO READING)		81.0					81.0	28/100	22.68
								TOTAL	28.75

FIELD DATA

PLANT Barmet
DATE 10-29-74
SAMPLING LOCATION [illegible]
SAMPLE TYPE INLET
RUN NUMBER 6
OPERATOR Jackson
AMBIENT TEMPERATURE 65
BAROMETRIC PRESSURE 30.10
STATIC PRESSURE, (P_s) -1.2
FILTER NUMBER (s) 25
THIMBLE 78

PROBE LENGTH AND TYPE 4' INCONEL
NOZZLE I.D. 0.188
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp 1.9
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET $(T_{m\,in})$, °F	DRY GAS METER TEMPERATURE OUTLET $(T_{m\,out})$, °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	[illegible]				250	[illegible]	[illegible]	2	—	40
X-1	5		272.2	.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	40
2	10		274.6	.73	.73	.73	[illegible]	[illegible]		2	—	40
3	15		276.8	[illegible]	.63	.63	[illegible]	[illegible]	[illegible]	[illegible]	—	40
4	20		277.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			4	—	40
5	25		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	4	—	40
6	30		[illegible]	.40	[illegible]	[illegible]	[illegible]		[illegible]	4	—	40
7	35		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	4	—	40
8	40		286.7	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	4	—	40
9	45		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
10	50		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	—	40
11	55		292.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
12	60		[illegible]	.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
13	65		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
14	70		298.4	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	—	40
15	75		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
16	80		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		—	40
17	85		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
18	90		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	—	40
19	95		[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	—	[illegible]
20	100		[illegible]	[illegible]		[illegible]					—	[illegible]
21	105		[illegible]	[illegible]	[illegible]						—	[illegible]
22	110		[illegible]	[illegible]					[illegible]		—	40
23	115		[illegible]	[illegible]			[illegible]				—	40
24	120		[illegible]	[illegible]	[illegible]	[illegible]						

[redacted]OG[redacted]SE[redacted]N[redacted]
Run 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	120	[illegible]									
Y-1	125	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	–	40
2	130	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	–	40
3	135	[illegible]	.46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	–	40
4	140	[illegible]	.36	[illegible]	[illegible]	215	[illegible]	[illegible]	5	–	40
5	145	[illegible]	.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	–	40
6	150	[illegible]				[illegible]	[illegible]	98	5	–	40
7	155	323.2	.9	[illegible]	[illegible]	218	[illegible]	[illegible]	5	–	[illegible]
8	160	[illegible]	.47	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	–	40
9	165	331.1	.27	[illegible]	[illegible]	[illegible]		[illegible]	5	–	40
10	170	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	5	–	40
11	175	[illegible]	[illegible]	[illegible]	[illegible]	250	[illegible]	92	5	–	40
12	180	335.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	–	40
13	185	337.5	.31	.49	[illegible]	[illegible]	98	[illegible]	5	–	40
14	190	[illegible]	.38	.37	[illegible]	[illegible]	10[illegible]	[illegible]	6	–	40
15	195	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	101	96	6	–	40
16	200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	–	40
17	205	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99	96	8	–	40
18	210	346.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	96	9	–	40
19	215	347.1	.30	.37	.37	[illegible]	[illegible]		8	–	40
20	220	347.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	96	8	–	40
21	225	351.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8	–	40
22	230										
23	235	[illegible]									
24	240										

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bozmet

DATE 10-29-74

SAMPLING TIME (24-hr CLOCK) 1200

SAMPLING LOCATION Baghouse [illegible]

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) [illegible]

ANALYTICAL METHOD [illegible]

AMBIENT TEMPERATURE 60

OPERATOR [illegible]

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2	.2	.2					.2	44/100	0.088
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.2	19.0					19.0	32/100	6.08
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6	0.4					0.4	28/100	0.112
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.4					80.4	28/100	22.51
								TOTAL	28.79

FIELD DATA

PLANT Barnet
DATE 10-29-74
SAMPLING LOCATION [illegible]
SAMPLE TYPE Outlet
RUN NUMBER 6
OPERATOR [illegible]
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 30.10
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) 27
Thimble - 3

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.25
ASSUMED MOISTURE, % 5.0
SAMPLE BOX NUMBER 2
METER BOX NUMBER 1205
METER $\Delta H_@$ 1.91
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp .56
NOTE

READ AND RECORD ALL DATA EVERY 6 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	[illegible]									
Y-1	6		[illegible]	.34	1.14	1.14	[illegible]	[illegible]	[illegible]	2	—	70
2	12		313.1	[illegible]	1.1	[illegible]	210	[illegible]	[illegible]	2		70
3	18		[illegible]	.32	[illegible]	[illegible]	[illegible]		[illegible]	2	—	70
4	24		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	70
5	30		[illegible]	.31	1.04	1.04	[illegible]	[illegible]		2	—	70
6	36		326.[illegible]	.31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	70
7	42		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	70
8	48		332.6	[illegible]	.21	[illegible]	[illegible]	[illegible]	[illegible]	2		70
9	54		[illegible]	[illegible]	[illegible]					[illegible]		70
10	60		338.0	.13	.15	[illegible]	[illegible]	78	[illegible]	2	—	70
11	66		[illegible]	.10	[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	2	—	70
12	72		342.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	70
13	78		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	—	70
14	84		346.2	[illegible]	[illegible]		210	[illegible]	[illegible]	1		70
15	90		[illegible]	.11	[illegible]	[illegible]	210			2	—	70
16	96		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		70
17	102		352.[illegible]	.14	[illegible]	[illegible]	[illegible]	[illegible]		2	—	70
18	108		[illegible]	.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		70
X-1	114		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]			70
2	120		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1		70
3	126		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]		70
4	132		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	2		70
5	138		[illegible]	.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2		70

B[illegible] [illegible]
Run 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	[illegible] / 12:5[illegible]	367.5									
Y-6	144	[illegible]	.18	[illegible]	[illegible]	210	[illegible]	[illegible]	2	–	40
7	150	[illegible]	.20	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	–	40
8	156	375.7	.23	[illegible]	[illegible]	[illegible]	7[illegible]	[illegible]	2	–	40
9	162	[illegible]	.25	[illegible]	[illegible]	[illegible]	7[illegible]	[illegible]	3	–	40
10	168	[illegible]81.8	[illegible]	[illegible]	.82	208	77	8[illegible]	3	–	40
11	174	[illegible]	.25	[illegible]	[illegible]	[illegible]	77	8[illegible]	3	–	40
12	180	38[illegible]	.24	.8[illegible]	[illegible]	[illegible]	7[illegible]	[illegible]	3	–	40
13	186	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]10	[illegible]	[illegible]	3	–	40
14	[illegible]	[illegible]	.24	[illegible]	[illegible]	210	[illegible]	[illegible]0	3	–	40
15	[illegible]	[illegible]97.1	.21	[illegible]	[illegible]	21[illegible]	[illegible]	[illegible]	3	–	40
16	204	[illegible]	.21	[illegible]	[illegible]	21[illegible]	[illegible]	[illegible]	3	–	40
17	210	40[illegible]	.21	.70	.76	[illegible]	78	92	3	–	40
18	216	41[illegible]	.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	–	40
		[illegible] 143									

DRY MOLECULAR WEIGHT DETERMINATION

PLANT EPA [illegible]
DATE 10-29-74
SAMPLING TIME (24-hr CLOCK) [illegible]
SAMPLING LOCATION [illegible]
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) [illegible]
ANALYTICAL METHOD [illegible]
AMBIENT TEMPERATURE
OPERATOR [illegible]

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2	0.2	0.2					[illegible]	44/100	.088
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.4	19.2					19.2	32/100	6.14
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6	0.2					0.2	28/100	.056
N_2 (NET IS 100 MINUS ACTUAL CO READING)		80.4					[illegible]	28/100	22.51
								TOTAL	28.79

FIELD DATA

PLANT Barmet
DATE 10-30-74
SAMPLING LOCATION Baghouse
SAMPLE TYPE INLET
RUN NUMBER 7
OPERATOR Jackson
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -1.1
FILTER NUMBER (s) 24-
Traverse - 61

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.188
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp 1.9
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0 / 1050	351.550									
X-1	5	[illegible]	.55	.53	.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
2	10	355.5	.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
3	15	357.6	.57	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	40
4	20	359.8	.61	[illegible]	[illegible]	230	71		5	[illegible]	40
5	25	361.7	.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		40
6	30	363.7	.51	.5	.50	[illegible]	72	72	4		40
7	35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	[illegible]	4		40
8	40	[illegible]	[illegible]	.49	.49		[illegible]	[illegible]	4		40
9	45	369.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		40
10	50	371.6	[illegible]	.45	.45	[illegible]	[illegible]	[illegible]	4		40
11	55	373.6	[illegible]	.41	.41	240	[illegible]	[illegible]	[illegible]		40
12	60	375.[illegible]	.4	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		40
13	65	[illegible]	.45	[illegible]	[illegible]	225		[illegible]	[illegible]		40
14	70	379.3	.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	40
15	75	381.1	.40	[illegible]	[illegible]	[illegible]	[illegible]	81	5		40
16	80	383.0	.5	.43	.43	[illegible]	[illegible]	82	5	[illegible]	40
17	85	[illegible]	.45	.43	.43	[illegible]	82	82	5	[illegible]	40
18	90	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		40
19	95	[illegible]	[illegible]	[illegible]		225	[illegible]	[illegible]	[illegible]		40
20	100	[illegible]	.41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		40
21	105	[illegible]1.4	.4	.4	.4	[illegible]	[illegible]	[illegible]	[illegible]		40
22	110	[illegible]	.40	.4	.4	[illegible]	[illegible]	[illegible]	[illegible]		40
23	115	[illegible]	.42	.4	.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40
24	120	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5		40

[redacted] Run (1)

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Y-1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		
5	145	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	4		
6	150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81	[illegible]	4		[illegible]
9	165	411.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	82	83	4		[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4		[illegible]
16		[illegible]									
17											
18											
19											
20											
21											
22											
23											
24											

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Barmet

DATE 10-30-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Baghouse [illegible]

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD O[illegible]

AMBIENT TEMPERATURE

OPERATOR D[illegible]

COMMENTS:

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
CO_2		[illegible]						44/100	.088
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	9	[illegible]					[illegible]	32/100	6.208
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19							28/100	.056
N_2 (NET IS 100 MINUS ACTUAL CO READING)		[illegible]						28/100	[illegible].456
								TOTAL	25.80

FIELD DATA

PLANT Barnes [illegible]
DATE 10-30-74
SAMPLING LOCATION Baghouse
SAMPLE TYPE Outlet
RUN NUMBER (2)
OPERATOR [illegible]
AMBIENT TEMPERATURE 65°F
BAROMETRIC PRESSURE 30.15
STATIC PRESSURE, (P_s) + .15
FILTER NUMBER (s) 35
Thimble - 30

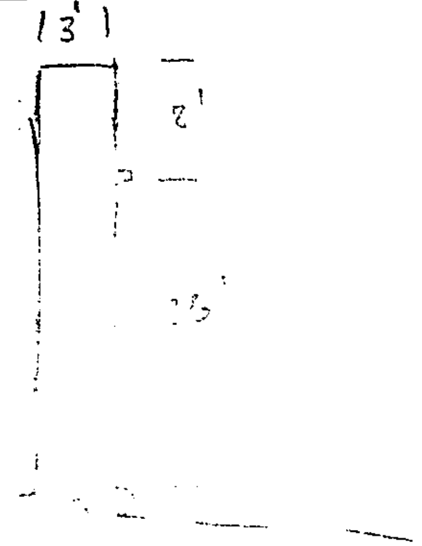
PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.25
ASSUMED MOISTURE, % 5.0
SAMPLE BOX NUMBER 2
METER BOX NUMBER 1205
METER $\Delta H_@$ 1.91
C FACTOR 1.0[illegible]
PITOT TUBE FACTOR .85
REFERENCE Δp .56
NOTE

READ AND RECORD ALL DATA EVERY 6 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]30	105.1[illegible]									
X-1	6		[illegible]	.21	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	—	40
2	12		[illegible]1.0	.26			[illegible]	[illegible]	[illegible]	[illegible]	—	40
3	18		113.0	.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	40
4	24		116.9	[illegible]	[illegible]	[illegible]	190	[illegible]	[illegible]	[illegible]	—	40
5	30		119.6	.17	[illegible]	[illegible]	210	[illegible]	[illegible]	2	—	40
6	36		[illegible]	.20	[illegible]	[illegible]	[illegible]	71	71	3	—	40
7	42		125.1	[illegible]	[illegible]	[illegible]	[illegible]	72	72	3	—	40
8	48		127.6	.1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
9	54		130.2	.16	.55	.55	[illegible]	[illegible]	[illegible]	[illegible]	—	40
10	60		133.0	[illegible]	[illegible]	[illegible]	215	76	77	4	—	40
11	66		[illegible]				[illegible]	[illegible]	[illegible]	6	—	40
12	72		139.5	.29	[illegible]	[illegible]	205	[illegible]	[illegible]	[illegible]	—	40
13	78		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	—	40
14	84		146.2	.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	—	40
15	90		149.5	.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	—	40
16	96		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
17	102		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	—	40
18	108		159.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40
Y-1	114		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	—	40
2	120		[illegible]	.17	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		40
3	126		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]		40
4	132		[illegible]			[illegible]			[illegible]	[illegible]	[illegible]	40
5	138		173.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	40

Run 6

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
	[illegible]	[illegible]									
Y-6	144	[illegible]	.17	[illegible]	[illegible]	15	[illegible]	[illegible]	3	—	40
7	150	[illegible]	.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	—	40
8	156	491.7	.21	[illegible]	[illegible]	[illegible]	[illegible]	84	3	[illegible]	40
9	162	[illegible]	.17	.65	.65	[illegible]	87	[illegible]	3	—	40
10	168		.11	[illegible]	[illegible]	[illegible]	83	[illegible]	[illegible]	--	40
11	174	[illegible]	[illegible]			[illegible]		[illegible]	[illegible]	--	40
12	180	490.4	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	40
13	186	[illegible]	[illegible]	.21	.31	[illegible]	82	[illegible]	[illegible]	[illegible]	40
14	192	494.295	[illegible]	.31	.31	216	82	85	[illegible]	[illegible]	40
15	198	[illegible]									
16	204										
17	210										
18	216										



TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Boemet
DATE 10-30-74
SAMPLING LOCATION [illegible] / [illegible] Over
INSIDE OF FAR WALL TO OUTSIDE OF PORT (DISTANCE A) 39"
INSIDE OF NEAR WALL TO OUTSIDE OF PORT (DISTANCE B) 3"
STACK I.D., (DISTANCE A - DISTANCE B) 36"
NEAREST UPSTREAM DISTURBANCE [illegible]
NEAREST DOWNSTREAM DISTURBANCE 8
CALCULATOR [illegible]

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF PORT (SUM OF COLUMNS 4 & 5)
1	4.4	36		3	[illegible]
2	14.7		[illegible]		[illegible]
3	[illegible]		16.62		[illegible]
4	[illegible]		[illegible]		[illegible]
5	[illegible]		[illegible]		[illegible]
6	[illegible]		[illegible]		[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE 10-30-74
LOCATION Washer / Dryer Outlet
STACK I.D. 36"
BAROMETRIC PRESSURE, in. Hg 30.15
STACK GAUGE PRESSURE, in. H_2O +.002
OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
	.01	180
	.02	
	.02	
	.02	
	.03	
	.02	
AVERAGE	.02	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
	.03	180
	.03	
	.04	
	.04	
	.04	
	.03	
AVERAGE	.035	

.028

B-59 .03 @ 180

FIELD MOISTURE DETERMINATION

Location Bormet
Comments:
Test Washer / Dryer Outlet
Date 10-30-74
Operator Down

By Absorption:

Barometric Pressure 30.15

Clock Time	Meter (Ft^3)	Flow Meter Settling (CFH)	Meter Temperature, Tm

Tube No.	Weight, grams		
	Final	Initial	Difference

(W) = weight of moisture collected = ____________

$$\%\ \text{Moisture by Volume} = \frac{100(.0473)(W)}{\left(\frac{Pb-Pm}{29.92}\right)\left(\frac{530}{T+460}\right)V_M + \left(.0473W\right)}$$

% Moisture by Volume = ____________

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. 95 °F
Dry Bulb Temp. 120 °F

% Moisture From Psychometric Chart 6.0

HS:ba(6/71)

NOMOGRAPH DATA

PLANT Barnet

DATE 10-30-74

SAMPLING LOCATION Washer / Dryer Outlet

CONTROL BOX NO. 1226

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.92
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	85
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	6.0
BAROMETRIC PRESSURE AT METER, in Hg	P_m	30.10
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	30.10
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	180
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.03
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.04
C FACTOR		1.05
CALCULATED NOZZLE DIAMETER, in.		.5
ACTUAL NOZZLE DIAMETER, in.		.5
REFERENCE Δp, in. H_2O		.034

Isokinetic Ratio Calculations

Sampling Location DRYER Run No. PRE

Time	Dry Gas Meter Ft^3	Pitot ΔP H_2O	Orifice ΔH H_2O	Dry Gas Temp. °F In	Dry Gas Temp. °F Out	Stack P In. Hg.	Stack Temp °F
0	VAC	VA	PAF	TAD	TAE	PHM	TDF

1. DAV - Nozzle Diameter - inches	
2. PAA - Barometric Pressure - inches Hg	30.15
3. TAW - Sampling Time - minutes	
4. VAC - VAC final - VAC initial = Sample Gas Volume - ft^3	
5. TAI - Average Dry Gas Temperature at Meter - °F $TAI = \frac{Avg.\ TAD + Avg.\ TAE}{2}$	
6. PAF - Average Orifice Pressure Drop - inches H_2O PAF = Avg. PAF	
7. VAB - Volume of Dry Gas at Standard Conditions - ft^3 $VAB = 17.7 \times VAC \times \frac{PAA + (PAF/13.6)}{TAI + 460}$	
8. VCE - Total Water Collected - ml	
9. VCF - Volume of Water Vapor at Standard Conditions $VCF = .0474 \times VCE$	
10. VCG - Moisture in Stack Gas - % $VCG = \frac{100 \times VCF}{VAB + VCF}$	6.0

11. MCH - Mole Fraction of Dry Gas

$$MCH = \frac{100 - VCG}{100}$$ .94

12. MBJ - Average Molecular Weight of Dry Gas

$$MBJ = (\%CO_2 \times .44) + (\%O_2 \times .32) + (\%N_2 \times .28)$$

13. MCA - Molecular Weight of Stack Gas

$$MCA = MBJ \times MCH + \left[18 \times (1 - MCH)\right]$$

14. SDD - Stack Area - square inches D=36 r=18 1017

18 × 18 × π =

15. PDI - Stack Pressure - inches Hg

$$PDI = PAA \pm Avg.\ PHM$$ 30.15

16. TDF - Average Stack Temperature - ^oF

$$TDF = Average\ TDF$$ 180

17. SDE - Average - Velocity Head (ΔP) x Stack Temperature

(Calculated each line)

.03 180

$$SDE = Avg. \sqrt{VA \times (TDF + 460)}$$ 4.38

18. VDH - Gas Velocity at Stack Conditions - FPM

4.38

$$VDH = 4350 \times SDE \times \left[\frac{1}{PDI \times MCA}\right]^{1/2}$$ 644

30.15 29

19. VDB - Gas Flow at Standard Conditions - SCFM

644 1017 .94 30.15

$$VDB = 0.123 \frac{VDH \times SDD \times MCH \times PDI}{TDF + 460}$$ 3567 4548 ACFM

180

640

20. IAX - Isokinetic Sampling, %

$$IAX = \frac{1032 \times (TDF + 460) \times VAB}{VDH \times TAW \times PDI \times MCH \times (DAV)^2}$$

FIELD DATA

PLANT Barmet
DATE 10-31-74
SAMPLING LOCATION Dryer [illegible]
SAMPLE TYPE
RUN NUMBER 8
OPERATOR Jackson
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) [illegible]
Thimble - [illegible]

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.5
ASSUMED MOISTURE, % 6.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.05
PITOT TUBE FACTOR .8[illegible]
REFERENCE Δp .0[illegible]
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
	0	[illegible]	[illegible]									
X-1	5		[illegible]	[illegible]		[illegible]	[illegible]					[illegible]
2	10		[illegible]	[illegible]			[illegible]		[illegible]			[illegible]
3	15		[illegible]	[illegible]			[illegible]			[illegible]	[illegible]	[illegible]
4	20		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]		[illegible]
5	25		[illegible]			[illegible]					[illegible]	[illegible]
6	30			[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	[illegible]
Y-1	35			[illegible]						[illegible]		[illegible]
2	40		[illegible]			[illegible]				[illegible]		[illegible]
3	45		[illegible]			[illegible]	[illegible]			[illegible]	[illegible]	[illegible]
4	50		[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	55		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	60		[illegible]			[illegible]		[illegible]				[illegible]
	[illegible]											

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Bormet

DATE 10-31-74

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION [illegible]

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Grab

ANALYTICAL METHOD [illegible]

AMBIENT TEMPERATURE

OPERATOR [illegible]

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2			[illegible]					44/100	[illegible]
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	[illegible]	4	[illegible]	[illegible]			[illegible]	32/100	6.53
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	[illegible]	.0	[illegible]				[illegible]	28/100	0.00
N_2 (NET IS 100 MINUS ACTUAL CO READING)							[illegible]	28/100	22.29 22.33
								TOTAL	25.52

B-65

FIELD DATA

PLANT Bormes
DATE 10-31-74
SAMPLING LOCATION Dryer Ou[illegible]
SAMPLE TYPE
RUN NUMBER 9
OPERATOR [illegible]
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.015
FILTER NUMBER (s) X-23

Thimble - m-9

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. 0.5
ASSUMED MOISTURE, % 6.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER 1225
METER $\Delta H_@$ 1.92
C FACTOR 1.05
PITOT TUBE FACTOR .85
REFERENCE Δp .029
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	[illegible]									
Y-1	5		455.3	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	—	90
2	10		[illegible]	.011	.72	.72		[illegible]	[illegible]	[illegible]	—	90
3	15		457.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	90
4	20		[illegible]	.013	.87	[illegible]	[illegible]	[illegible]	76	[illegible]	—	90
5	25		464.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	—	90
6	30		[illegible]	.015	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	-	90
X-1	35		[illegible]	[illegible]	[illegible]				[illegible]	3	—	90
2	40		[illegible]	.012	[illegible]	[illegible]	[illegible]		[illegible]	3	—	90
3	45		[illegible]	.012	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	—	90
4	50		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	5	—	90
5	55		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	90
6	60		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	90
	END 1214											

FIELD DATA

PLANT Barmes
DATE 10-31-74
SAMPLING LOCATION [illegible]
SAMPLE TYPE
RUN NUMBER 1 (10)
OPERATOR [illegible]
AMBIENT TEMPERATURE [illegible]
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s)
[illegible]

PROBE LENGTH AND TYPE 4' Inconel
NOZZLE I.D. [illegible]
ASSUMED MOISTURE, % 6.0
SAMPLE BOX NUMBER 1
METER BOX NUMBER [illegible]
METER $\Delta H_@$ 1.92
C FACTOR [illegible]
PITOT TUBE FACTOR [illegible]
REFERENCE Δp .029
NOTE

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	[illegible]	[illegible]									
X-1	5		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		7	–	40
2	10		496.1	.017		[illegible]	[illegible]		[illegible]			40
3	15		[illegible]	.022	1.15	1.1	[illegible]	[illegible]	[illegible]	/	–	40
4	20		496.1	.015				[illegible]	[illegible]	6	[illegible]	40
5	25		[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	–	40
6	30		[illegible].5	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	5	–	40
Y-1	35		502.8					[illegible]	[illegible]	[illegible]	–	[illegible]
2	40		50[illegible]	.015		[illegible]	[illegible]		[illegible]	[illegible]	–	40
3	45		508.[illegible]	.015	[illegible]	[illegible]	[illegible]			[illegible]	–	40
4	50		511.5	.0[illegible]	[illegible]	1.[illegible]	[illegible]			7		40
5	55		513.[illegible]	.009	.5[illegible]	.53	70	[illegible]		5		40
6	60		51[illegible]	[illegible]								40
	[illegible] 1425											

SMOKE EVALUATION FORM
U.S. E.P.A.-REGION V

Date 10-26-74

Observer Dowison

Name Boemer

Address Orrville Ohio

Scrubber #1 Run (3)

Observation Point [illegible] of Stack 100 Yards

Stack Distance From ____ Height 90

Wind - Speed 5-10 Direction East

Sky Condition: [illegible]

Color of Emission: Light Gray

Fuel Gas

Observation began 1120 Ended 1150

	0	15	30	45		0	15	30	45
0	15	[illegible]	[illegible]	[illegible]	30				
1	15	[illegible]	[illegible]	15	31				
2	10	10	10	[illegible]	32				
3	[illegible]	10	10	10	33				
4	10	[illegible]	[illegible]	[illegible]	34				
5	[illegible]	[illegible]	[illegible]	20	35				
6	10	[illegible]	[illegible]	[illegible]	36				
7	15	[illegible]	[illegible]	[illegible]	37				
8	20	[illegible]	[illegible]	[illegible]	38				
9	15	10	10	10	39				
10	[illegible]	[illegible]	10	10	40				
11	10	10	[illegible]	[illegible]	41				
12	[illegible]	[illegible]	[illegible]	[illegible]	42				
13	10	[illegible]	10		43				
14	[illegible]	[illegible]	[illegible]	[illegible]	44				
15	[illegible]	[illegible]	[illegible]	15	45				
16	[illegible]	[illegible]	[illegible]	[illegible]	46				
17	15	[illegible]	10	10	47				
18	10	[illegible]	[illegible]	[illegible]	48				
19	[illegible]	[illegible]	[illegible]	10	49				
20	10	[illegible]		20	50				
21	[illegible]	[illegible]	[illegible]		51				
22	15	[illegible]	15	15	52				
23	[illegible]	[illegible]	[illegible]	[illegible]	53				
24	[illegible]	20	[illegible]	[illegible]	54				
25	20	[illegible]	[illegible]	[illegible]	55				
26	[illegible]	15	[illegible]	15	56				
27	15	[illegible]	10	10	57				
28	15	[illegible]	[illegible]	[illegible]	58				
29	[illegible]	[illegible]	[illegible]	[illegible]	59				

Comments V[illegible] [illegible] were [illegible] at a point in the plume where it was free of condensed water vapor.

Observer's Signature [illegible]

Remarks: 14 - 15 SEC. PERIOD'S PER .5 HOUR = 3.5 MIN PER .5 HR IN VIOLATION.
3.5 x 2 = 7 MIN/HR 20% OPACITY OR GREATER.

SMOKE EVALUATION FORM
U.S. E.P.A.-REGION V

Date 10-24-74

Observer Dawson

Name Baemer

Address Urichsville, Ohio

Scrubber #2 Run 2

Observation Point South of Stack 100 Yards

Stack Distance From ____ Height 80'

Wind - Speed 5-10 Direction East

Sky Condition: Scattered

Color of Emission: Light Gray

Fuel Gas

Observation began 1030 Ended 1100

Comments Visible emissions were observed at a point in the plume where it was free of condensed water vapor. Plume was spread rather widely at this point.

Observer's Signature [signature]

Remarks: 15 opacities of 20% or more per 1/2 hour. = 30/hr = 7.5 min/hr. in violation.

	0	15	30	45		0	15	30	45
0	10	10	10	10	30				
1	10	15	15	15	31				
2	15	15	15	15	32				
3	15	15	15	15	33				
4	10	10	10	10	34				
5	10	10	5	5	35				
6	5	5	5	5	36				
7	5	5	5	5	37				
8	5	5	5	5	38				
9	10	10	5	5	39				
10	5	5	10	10	40				
11	10	10	15	15	41				
12	15	15	20	20	42				
13	20	15	15	15	43				
14	20	20	20	20	44				
15	15	15	15	15	45				
16	15	10	10	10	46				
17	10	10	10	10	47				
18	15	15	15	15	48				
19	20	20	20	20	49				
20	20	20	20	20	50				
21	15	15	15	15	51				
22	15	15	10	10	52				
23	10	10	10	10	53				
24	5	5	5	15	54				
25	5	5	5	5	55				
26	10	10	10	10	56				
27	10	10	10	10	57				
28	10	10	10	10	58				
29	10	10	10	10	59				

SMOKE EVALUATION FORM
U.S. E.P.A.-REGION V

Date 10-28-74 Name Boomer

Observer Daniel Address Uricsville Ohio

Baghouse Outlet Stack - Normal Operation

Observation Point South West 100 Yards

Stack Distance From ______ Height 50'

Wind - Speed 5-10 Direction NE

Sky Condition: Broken

Color of Emission: —

Fuel Gas

Observation began 11:30 Ended 1200

Comments Background [illegible] Trees and Shrubbery

Observer's Signature [signature]

Remarks: 0 TIME IN VIOLATION

	0	15	30	45		0	15	30	45
0	0	0	0	0	30				
1	5	5	0	0	31				
2	5	5	5	5	32				
3	5	5	5	5	33				
4	5	5	5	5	34				
5	5	5	5	0	35				
6	0	0	5	0	36				
7	5	5	5	5	37				
8	5	5	5	5	38				
9	5	5	5	5	39				
10	0	0	0	5	40				
11	5	5	0	5	41				
12	0	0	5	0	42				
13	5	5	5	5	43				
14	5	5	5	5	44				
15	0	0	0	0	45				
16	0	0	5	5	46				
17	5	5	5	5	47				
18	5	5	5	5	48				
19	5	5	5	5	49				
20	0	5	0	5	50				
21	5	5	5	5	51				
22	5	5	5	5	52				
23	5	5	5	5	53				
24	5	5	5	5	54				
25	5	0	0	0	55				
26	0	0	5	5	56				
27	5	5	5	5	57				
28	5	5	5	5	58				
29	5	5	0	5	59				

SMOKE EVALUATION FORM
U.S. E.P.A.-REGION V

Date 10-28-74
Observer Dawson
Name Borden
Address Urichsville, Ohio

Baghouse Outlet Stack — During Shakeout

Observation Point South West
100 Yards
Stack Distance From ____ Height 50'
Wind - Speed 5-10 Direction NE
Sky Condition: Broken
Color of Emission: —
Fuel Gas
Observation began 0950 Ended 1000

Comments Baghouse Shakeout and Cleaning operation required seven (7) minutes. No emissions during shakeout period because blower was off — however at start-up a brief period of emissions of 10-15% was observed

Observer's Signature [illegible]

Remarks:

	0	15	30	45		0	15	30	45
0	0	0	0	0	30				
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	10	^	^	37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				

SMOKE EVALUATION FORM
U.S. E.P.A.-REGION V

Date 10-31-74
Observer Davis

Name Borman
Address Ohio

Observation Point [illegible]
110 Yards

Stack Distance From ____ Height 50'

Wind - Speed ____ Direction ____

Sky Condition: [illegible]

Color of Emission: [illegible]

Fuel ____

Observation began ____ Ended ____

Comments Light [illegible]
plume

Observer's Signature

Remarks:

	0	15	30	45		0	15	30	45
0					30				
1					31				
2					32				
3					33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				

A P P E N D I X   C

Appendix C

Standard Test Procedures

STANDARD TEST PROCEDURES

1. EPA Test Method 1[1] - Sample and Velocity Traverses for Stationary Sources.

2. EPA Test Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate

3. EPA Test Method 3 - Gas Analysis for Carbon Dioxide, Excess Air, and Dry Molecular Weight.

4. EPA Test Method 5 - Determination of Particulate Emissions from Stationary Sources.

5. EPA Test Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources.

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1. Federal Register, Vol. 36, No. 247, December 23, 1971.

APPENDIX D

APPENDIX D

LABORATORY REPORTS

ANALYTICAL DATA

PLANT EPA Bonnet

DATE 10-23-74

SAMPLING LOCATION Scrubber #2

SAMPLE TYPE Inlet

RUN NUMBER

SAMPLE BOX NUMBER 1

CLEAN-UP MAN

COMMENTS:
PH Scrubber Water - 9.0
120°F

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE. PR~~OBE. CYCL~~ONE (BYPASS). FLASK. FRONT HALF OF FIL~~TER HOLDER~~.

	Thimble	Filter
FILTER NUMBER	M-34	B-19
	M-49	B-14
	M-50	B-15
	Holder	Wash
	M-52	B-18
	M-59	

CONTAINER 101		98.6 mg
THIMBLE CONTAINER 102		1717.1 mg
PTC-27	SUBTOTAL	1815.7 MG
Filter 103		71.0 mg
104		42.8 mg
FRONT HALF SUBTOTAL		1929.5 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS. CONNECTORS, AND BA~~CK HALF OF FILTER HOLDER~~

~~ACETONE WASH~~ OF IMPINGERS. CO~~NNECTORS~~. NaOH ~~AND BACK HALF OF FILTER HOLDER~~

Cyanide 105-A

CONTAINER 105	263.6 mg
~~ETHER~~-CHLOROFORM-EXTRACTION	mg
CONTAINER 106	mg
BACK HALF SUBTOTAL	263.6 mg
TOTAL WEIGHT	2193.1 mg

MOISTURE

212
213
425

IMPINGERS
FINAL VOLUME 425 ml
INITIAL VOLUME 400 ml
NET VOLUME 25 ml

SILICA GEL
FINAL WEIGHT 215 g ______ g
INITIAL WEIGHT 200 g ______ g
NET WEIGHT 15 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 40 g

D-1

ANALYTICAL DATA

PLANT EPA Bacmet

DATE 11-23-74

SAMPLING LOCATION Scrubber #2

SAMPLE TYPE Outlet

RUN NUMBER 1

SAMPLE BOX NUMBER 2

CLEAN-UP MAN Jackson

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS)~~, ~~FLASK~~, FRONT HALF OF FILTER HOLDER

CONTAINER 107 — 112.5 mg

FILTER NUMBER

[illegible]	[illegible]
[illegible]	6-10
	P-17
	6-20

CONTAINER [illegible] — 1030.4 mg

[illegible] — 1142.? — 36.2

110 — 13.5

FRONT HALF SUBTOTAL 1192.6 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK ~~HALF OF FILTER HOLDER~~

CONTAINER 111 — [illegible] mg

~~ETHER~~-CHLOROFORM EXTRACTION ______ mg

ACETONE WASH OF IMPINGERS, ~~CONNECTORS~~, ~~AND BACK HALF OF FILTER HOLDER~~

CONTAINER 112 ______ mg

BACK HALF SUBTOTAL 30.6 mg

TOTAL WEIGHT 1223.2 mg

MOISTURE

IMPINGERS

FINAL VOLUME 560 ml

INITIAL VOLUME 400 ml

NET VOLUME 160 ml

375
210
585

SILICA GEL

FINAL WEIGHT 220 g ______ g

INITIAL WEIGHT 200 g ______ g

NET WEIGHT 20 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 180 g

ANALYTICAL DATA

PLANT EPA Barmet

DATE 10-24-74

SAMPLING LOCATION Scrubber #2

SAMPLE TYPE INLET

RUN NUMBER (2)

SAMPLE BOX NUMBER 1

CLEAN-UP MAN O'Neil

COMMENTS:

PH Scrubber Water – 6.2

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS),~~ ~~FLASK,~~ FRONT HALF OF FILTER HOLDER — CONTAINER 113 — 90.2 mg

	Thimble	Filter
FILTER NUMBER	42	11
	67	13

Thimble CONTAINER 114 — 2118.3 mg

PTC 27 [illegible] — 2248.5 mg

Filter 11 — 89.3 mg

Holder [illegible] 116 — 27.3 mg

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

Combined – 117 A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 117 — 435.4 mg

~~ETHER~~-CHLOROFORM EXTRACTION — mg

~~ACETONE~~ WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER [illegible] — CONTAINER 118 — mg

BACK HALF SUBTOTAL 435.4 mg

TOTAL WEIGHT	2755.5 mg

MOISTURE

203
218
421

IMPINGERS

FINAL VOLUME 421 ml

INITIAL VOLUME 200 ml

NET VOLUME [illegible] ml

SILICA GEL

FINAL WEIGHT 217 g ____ g

INITIAL WEIGHT 200 g ____ g

NET WEIGHT 17 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE 39 g

ANALYTICAL DATA

PLANT EPA Boemft

DATE 10-24-74

SAMPLING LOCATION Scrubber #2

SAMPLE TYPE Outlet

RUN NUMBER 2

SAMPLE BOX NUMBER 2

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, P~~ROBE, CYCLONE (BYPASS)~~, ~~FLASK,~~ ~~FRONT HALF OF FILTER HOLDER~~ — CONTAINER 119 — 12.0 mg

FILTER NUMBER: Thimble 66; Filter 12

Thimble CONTAINER 120 — 1777.0 mg

Subtotal — [illegible]

Filter 121 — [illegible]

Holder Wash 122 — 10.1

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

[illegible] — 23-A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~ [illegible] — CONTAINER 123 — [illegible] mg

ETHER-CHLOROFORM EXTRACTION — mg

~~ACETONE WASH OF IMPINGERS, CONNECTORS~~, AND BACK HALF OF FILTER HOLDER NaOH — CONTAINER 124 — mg

BACK HALF SUBTOTAL 26.7 mg

TOTAL WEIGHT 1819.5 mg

MOISTURE

304
17
521

IMPINGERS

FINAL VOLUME 521 ml

INITIAL VOLUME 400 ml

NET VOLUME 121 ml

SILICA GEL

FINAL WEIGHT 216 g ____ g

INITIAL WEIGHT 200 g ____ g

NET WEIGHT 16 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE [illegible] g

ANALYTICAL DATA

PLANT: EPA Barnet

DATE: 10-26-74

SAMPLING LOCATION: Scrubber #1

SAMPLE TYPE: INLET

RUN NUMBER: 3

SAMPLE BOX NUMBER: 1

CLEAN-UP MAN: Doley

COMMENTS:

PH [illegible] Water — 8 [illegible]

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE~~ (BYPASS), ~~FLASK,~~ FRONT HALF OF FILTER HOLDER

CONTAINER 125 — 106.2 mg

FILTER NUMBER	Thimble	Filters
	44	2
	65	3

Thimble CONTAINER 126 — 1934.1 mg

PTC 27 Subtotal — 2102. [illegible] mg

Filter 127 — 53.1 mg

Holder [illegible] 125 — 115.3 [illegible]

FRONT HALF SUBTOTAL 2357.7 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK ~~HALF OF FILTER~~ HOLDER

(Cyclone) — 127-A

CONTAINER 123 — [illegible] mg

ETHER-CHLOROFORM EXTRACTION ______ mg

ACETONE ~~WASH OF IMPINGERS, CONNECTORS,~~ ~~AND BACK~~ HALF OF FILTER HOLDER — None

CONTAINER 124 ______ mg

BACK HALF SUBTOTAL 632.6 mg

TOTAL WEIGHT 2990.3 mg

MOISTURE

206
212
418

IMPINGERS

FINAL VOLUME 417 ml

INITIAL VOLUME 400 ml

NET VOLUME 17 ml

SILICA GEL

FINAL WEIGHT 212 g ______ g

INITIAL WEIGHT 200 g ______ g

NET WEIGHT 12 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 30 g

ANALYTICAL DATA

PLANT EPA [illegible]

DATE 10-26-74

SAMPLING LOCATION [illegible] #1

SAMPLE TYPE [illegible]

RUN NUMBER (2)

SAMPLE BOX NUMBER 2

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETO~~NE WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS), FLASK,~~ FRONT HALF OF FILTER HOLDER

FILTER NUMBER	THIMBLE	FILTER
	27	4
	41	1

CONTAINER 121 — 20.2 mg

CONTAINER — 1457.3 mg

PHC-27 [illegible] 1477.5 mg ✓

[illegible] 15.6 mg

[illegible] 3.3 mg

FRONT HALF SUBTOTAL 1573.4 mg ✓

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~ [illegible]

CONTAINER [illegible] — 103.9 mg

~~ETHER-CHL~~OROFORM EXTRACTION — mg

~~ACETONE~~ WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER [illegible]

CONTAINER [illegible] — mg

BACK HALF SUBTOTAL 103.9 mg

TOTAL WEIGHT 1605.3 mg ✓

MOISTURE

IMPINGERS

FINAL VOLUME	531	ml
INITIAL VOLUME	400	ml
NET VOLUME	131	ml

SILICA GEL

FINAL WEIGHT	271	g		g
INITIAL WEIGHT	200	g		g
NET WEIGHT	71	g		g

SUBTOTAL ______ g

TOTAL MOISTURE 202 g

D-6

ANALYTICAL DATA

PLANT EPA BARNET

DATE 10-27-74

SAMPLING LOCATION Scrubber #1

SAMPLE TYPE Inlet

RUN NUMBER (4)

SAMPLE BOX NUMBER 1

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), ~~FLASK, FRONT HALF OF FILTER HOLDER~~ — CONTAINER 137 — 61.8 mg

FILTER NUMBER: Thimble 38, Filter 21 — CONTAINER 12? — 1544.3 mg

PTC-2? SUBTOTAL — [illegible]

[illegible] — 877 [illegible]

[illegible] — 111.5

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

Ordinary - 141-A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK ~~HALF OF FILTER HOLDER~~ [illegible] — CONTAINER [illegible] — 187.3 mg

ETHER-CHLOROFORM EXTRACTION ______ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER. [illegible] — CONTAINER 142 ______ mg

BACK HALF SUBTOTAL 187.3 mg

TOTAL WEIGHT	1992.6 mg

MOISTURE

IMPINGERS

FINAL VOLUME 418 ml

203 INITIAL VOLUME 400 ml

215 NET VOLUME 18 ml

418

SILICA GEL

FINAL WEIGHT 212 g ______ g

INITIAL WEIGHT 200 g ______ g

NET WEIGHT 12 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 30 g

ANALYTICAL DATA

PLANT EPA [illegible]

DATE 10-27-74

SAMPLING LOCATION Scrubber #1

SAMPLE TYPE [illegible]

RUN NUMBER 4

SAMPLE BOX NUMBER [illegible]

CLEAN-UP MAN

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, ~~PROBE, CYCLONE~~ (BYPASS), ~~FLASK, FRONT HALF OF~~ FILTER HOLDER — CONTAINER [illegible] — 11.5 mg

FILTER NUMBER

37	22
85	31
88	32
25	29

CONTAINER [illegible] — 1479.9 mg

[illegible] SUBTOTAL — 1521.4 mg

Filter 145 — 20.0 mg

146 — 2.9 mg

FRONT HALF SUBTOTAL 1544.3 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HAL~~F OF FILTER~~ HOLDER [illegible] — CONTAINER [illegible] — 20.1 mg

ETHER-CHLOROFORM EXTRACTION — mg

ACETONE ~~WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER~~ NaOH — CONTAINER 27-A — mg

BACK HALF SUBTOTAL 20.1 mg

TOTAL WEIGHT 1564.4 mg

MOISTURE

IMPINGERS

FINAL VOLUME 503 ml

INITIAL VOLUME 400 ml

NET VOLUME [illegible] ml

SILICA GEL

FINAL WEIGHT 217 g ____ g

INITIAL WEIGHT 200 g ____ g

NET WEIGHT 17 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE 120 g

ANALYTICAL DATA

PLANT EPA [illegible]

DATE 10-2[illegible]-74

SAMPLING LOCATION [illegible]

SAMPLE TYPE Inlet

RUN NUMBER 5

SAMPLE BOX NUMBER 1

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE. ~~PROBE.~~ ~~CYCLONE~~ (BYPASS). ~~FLASK.~~ FRONT HALF OF FILTER HOLDER

CONTAINER [illegible] ______ [illegible] mg

FILTER NUMBER	61	23
	57	34
	[illegible]	[illegible]

CONTAINER 149 ______ [illegible] mg

PTC-27 [illegible] ______ 14[illegible] mg

Filter 150 ______ 2[illegible]39 mg

[illegible] [illegible] ______ [illegible] mg

FRONT HALF SUBTOTAL ______ [illegible] mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS. CONNECTORS. AND ~~BACK HALF OF FILTER HOLDER~~ [illegible]

Cyclone [illegible]

CONTAINER [illegible] ______ 286.4 mg

E~~THER~~-~~CHLORO~~FORM ~~EXTRACTION~~ ______ mg

~~ACETONE~~ WASH OF ~~IMPINGERS, CONNECTORS,~~ AND BACK HALF OF FILTER HOLDER [illegible]

CONTAINER 1[illegible]3 ______ ~~mg~~

BACK HALF SUBTOTAL ______ [illegible] mg

TOTAL WEIGHT	2107.8 mg

MOISTURE

IMPINGERS

FINAL VOLUME 442 ml

INITIAL VOLUME 400 ml

NET VOLUME 42 ml

SILICA GEL

FINAL WEIGHT 217 g ______ g

INITIAL WEIGHT 200 g ______ g

NET WEIGHT 17 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 59 g

ANALYTICAL DATA

PLANT EPA [illegible]

DATE 10-29-74

SAMPLING LOCATION [illegible]

SAMPLE TYPE [illegible]

RUN NUMBER 5

SAMPLE BOX NUMBER 2

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), ~~FLASK,~~ FRONT HALF OF FILTER HOLDER

CONTAINER 154 ..... [illegible] mg

FILTER NUMBER [illegible]

CONTAINER [illegible] ..... [illegible] mg

[illegible] 156 ..... [illegible]

[illegible] 157 ..... 3.8

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND ~~BACK HALF OF FILTER~~ HOLDER

CONTAINER [illegible] ..... [illegible] mg

~~ETHER CHLOROFORM EXTRACTION~~ ..... mg

~~ACETONE WASH OF~~ IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER NaOH

CONTAINER 159 ..... mg

BACK HALF SUBTOTAL [illegible] mg

TOTAL WEIGHT [illegible] mg

MOISTURE

IMPINGERS

FINAL VOLUME	501	ml
INITIAL VOLUME	400	ml
NET VOLUME	101	ml

242
259
501

SILICA GEL

FINAL WEIGHT	226	g		g
INITIAL WEIGHT	200	g		g
NET WEIGHT	26	g		g

SUBTOTAL ______ g

TOTAL MOISTURE 127 g

ANALYTICAL DATA

PLANT EPA BACMET

DATE 10-29-74

SAMPLING LOCATION B[illegible]

SAMPLE TYPE INLET

RUN NUMBER 6

SAMPLE BOX NUMBER 1

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE~~ (BYPASS), FLASK, ~~FRONT HALF OF FILTER HOLDER~~

	THIMBLE	FILTER
FILTER NUMBER	72	25

CONTAINER	160	14.5 mg
THIMBLE CONTAINER / PTC-27	161	1662.9 mg / 1312.4 mg
FILTER	162	216.9 mg
HOLDER WASH	163	32.2 mg
FRONT HALF SUBTOTAL		2141.5 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~

~~ACETONE~~ WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~

CONTAINER	164	362.1 mg
~~ETHER CHLO~~ROFORM EXTRACTION		mg
CONTAINER	165	mg
BACK HALF SUBTOTAL		362.1 mg
TOTAL WEIGHT		2503.6 mg

MOISTURE

214
234
448

IMPINGERS

FINAL VOLUME	448	ml
INITIAL VOLUME	400	ml
NET VOLUME	48	ml

SILICA GEL

FINAL WEIGHT	216 g	g
INITIAL WEIGHT	200 g	g
NET WEIGHT	16 g	g

SUBTOTAL ______ g

TOTAL MOISTURE 64 g

ANALYTICAL DATA

PLANT EPA Baomet

DATE 10-29-74

SAMPLING LOCATION B[illegible]

SAMPLE TYPE O[illegible]

RUN NUMBER (6)

SAMPLE BOX NUMBER 2

CLEAN-UP MAN [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, ~~FRONT HALF OF FILTER HOLDER~~

CONTAINER 166 — 16.0 mg

FILTER NUMBER 3 — 27

CONTAINER 167 — [illegible] mg

[illegible] — [illegible]

Filter 168 — 2.6

Holder 169 — 8.9

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~

[illegible] 170 · A

CONTAINER 170 — 7 mg

ETHER-CHLOROFORM EXTRACTION — mg

~~ACETONE WASH OF~~ IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~

CONTAINER 171 — mg

BACK HALF SUBTOTAL [illegible] mg

TOTAL WEIGHT	[illegible] mg

MOISTURE

IMPINGERS

236	FINAL VOLUME	459 ml
218	INITIAL VOLUME	400 ml
454	NET VOLUME	59 ml

SILICA GEL

FINAL WEIGHT	222 g	g
INITIAL WEIGHT	200 g	g
NET WEIGHT	22 g	g

SUBTOTAL g

TOTAL MOISTURE 74 g

ANALYTICAL DATA

PLANT Barnes

DATE 10-30-74

SAMPLING LOCATION Baghouse

SAMPLE TYPE INLET

RUN NUMBER 7

SAMPLE BOX NUMBER

CLEAN-UP MAN Jordan / Lyons

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS), FLASK,~~ FRONT HALF OF FILTER HOLDER

FILTER NUMBER	61	72	CONTAINER 172	[illegible] mg
			CONTAINER 173	1531.1 mg
			PTC-27 SUBTOTAL	1697.7
			FILTERS 174	245.8
			Holder's wash 17	116.9

FRONT HALF SUBTOTAL 2060.4 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND ~~BACK HALF OF FILTER~~ HOLDER

~~ACETONE WASH OF IMPINGERS, CONNECTORS,~~ ~~AND BACK HALF OF FILTER HOLDER~~ None

Cyanide 176.8

CONTAINER ______ 482.8 mg

ETHER-CHLOROFORM EXTRACTION ______ mg

CONTAINER ______ mg

BACK HALF SUBTOTAL 482.8 mg

TOTAL WEIGHT 2543.2 mg

MOISTURE

IMPINGERS

FINAL VOLUME 441 ml

INITIAL VOLUME 400 ml

NET VOLUME 41 ml

212
229
441

SILICA GEL

FINAL WEIGHT 218 g ______ g

INITIAL WEIGHT 200 g ______ g

NET WEIGHT 18 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 59 g

ANALYTICAL DATA

PLANT Pormo? [illegible]
DATE 10-30-74
SAMPLING LOCATION B[illegible]
SAMPLE TYPE O[illegible]
RUN NUMBER (7)
SAMPLE BOX NUMBER 2
CLEAN-UP MAN Doug / O'[illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

AC~~ETONE~~ WASH OF NOZZLE, PROBE~~, CYCLONE (BYPASS)~~, FLASK, FRONT HALF OF FILTER HOLDER

CONTAINER 172 [illegible] mg

FILTER NUMBER [illegible] 32

CONTAINER 173 [illegible] mg

FTC-2? [illegible] [illegible] mg

FILTER 174 1.6 mg

Holder Wash 175 [illegible] mg

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

Bypass — 176-A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK ~~HALF OF FILTER~~ HOLDER Probe

CONTAINER 176 [illegible] mg

ETHER-CHLOROFORM EXTRACTION ____ mg

AC~~ETONE~~ WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER

CONTAINER 177 ____ mg

BACK HALF SUBTOTAL .5 mg

TOTAL WEIGHT	792.9 mg

MOISTURE

IMPINGERS
FINAL VOLUME 441 ml
INITIAL VOLUME 400 ml
NET VOLUME 41 ml

SILICA GEL
FINAL WEIGHT 225 g ____ g
INITIAL WEIGHT 200 g ____ g
NET WEIGHT 25 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE 66 g

23
18
41

ANALYTICAL DATA

PLANT Barmet
DATE 10-31-74
SAMPLING LOCATION Dow [illegible]
SAMPLE TYPE PARTICULATE
RUN NUMBER 8
SAMPLE BOX NUMBER 1
CLEAN-UP MAN Dom [illegible]

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS),~~ ~~FLASK,~~ ~~FRONT~~ HALF OF FILTER HOLDER — CONTAINER 178 — [illegible] mg

FILTER NUMBER — Thimble M-31 — Filter 128

Thimble CONTAINER 179 — 1[illegible].5 mg

[illegible] 1283.7

Filter 180 — 13.1 mg

Holder [illegible] — 22.1 mg

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

[illegible] 1024

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~ Probe — CONTAINER 182 — 1.2 mg

ETHER-CHLOROFORM EXTRACTION — mg

~~ACETONE WASH OF IMPINGERS,~~ CONNECTORS, AND BACK HALF OF FILTER HOLDER NaOH — CONTAINER 183 — mg

BACK HALF SUBTOTAL 1.2 mg

TOTAL WEIGHT 1321.1 mg

MOISTURE

202
210
412

IMPINGERS
FINAL VOLUME 412 ml
INITIAL VOLUME 400 ml
NET VOLUME 12 ml

SILICA GEL
FINAL WEIGHT 209 g ____ g
INITIAL WEIGHT 200 g ____ g
NET WEIGHT 9 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE 21 g

ANALYTICAL DATA

PLANT Boomer
DATE 10-31-74
SAMPLING LOCATION Dryer Outlet
SAMPLE TYPE Particulate
RUN NUMBER 9
SAMPLE BOX NUMBER 2
CLEAN-UP MAN Dowson

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, ~~PROBE, CYCLONE (BYPASS)~~, FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 184 — [illegible] mg

FILTER NUMBER [illegible] [illegible]

Thimble CONTAINER 18[illegible] — [illegible].4 mg

Filter [illegible] — 10.4 mg

[illegible] 177

FRONT HALF SUBTOTAL [illegible] mg

BACK HALF

[illegible] - 188-A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, ~~CONNECTORS, AND BACK HALF OF FILTER HOLDER~~ Probe — CONTAINER [illegible] — mg

ETHER-CHLOROFORM EXTRACTION — mg

~~ACETONE WASH OF IMPINGERS,~~ CONNECTORS, AND BACK HALF OF FILTER HOLDER None — CONTAINER 189 — mg

BACK HALF SUBTOTAL 1.5 mg

TOTAL WEIGHT	874.9 mg

MOISTURE

205
210
415

IMPINGERS
- FINAL VOLUME 415 ml
- INITIAL VOLUME 400 ml
- NET VOLUME 15 ml

SILICA GEL
- FINAL WEIGHT 208 g ______ g
- INITIAL WEIGHT 200 g ______ g
- NET WEIGHT 8 g ______ g

SUBTOTAL ______ g

TOTAL MOISTURE 23 g

ANALYTICAL DATA

PLANT Boomer

DATE 10-31-74

SAMPLING LOCATION Dryer Outlet

SAMPLE TYPE Particulate

RUN NUMBER 10

SAMPLE BOX NUMBER 3

CLEAN-UP MAN Dowling

COMMENTS:

FRONT HALF

LABORATORY RESULTS

~~ACETONE~~ WASH OF NOZZLE, PROBE, ~~CYCLONE (BYPASS)~~, FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 190 — 212.6 mg

FILTER NUMBER Thimble M-2 — Filter B-28 — Thimble CONTAINER 191 — 533.7 mg

Filter Container — 146.3 mg

Flask 192 — 11.3 mg

Holder Wash 193 — 22.9 mg

FRONT HALF SUBTOTAL 779.5 mg

BACK HALF

Cyclone - 194-A

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF FILTER HOLDER~~ Probe — CONTAINER 194 — 5.4 mg

~~ETHER-CHLOROFORM EXTRACTION~~ — mg

ACETONE ~~WASH OF IMPINGERS, CONNECTORS,~~ AND BACK ~~HALF OF FILTER HOLDER~~ None — CONTAINER 195 — mg

BACK HALF SUBTOTAL 5.4 mg

TOTAL WEIGHT 784.9 mg

MOISTURE

IMPINGERS

H2O 180 FINAL VOLUME 415 ml

NaOH 235 INITIAL VOLUME 400 ml

415 NET VOLUME 15 ml

SILICA GEL

FINAL WEIGHT 208 g ____ g

INITIAL WEIGHT 200 g ____ g

NET WEIGHT 8 g ____ g

SUBTOTAL ____ g

TOTAL MOISTURE 23 g

APPENDIX E

APPENDIX E

TEST LOG

Table E-1

Barmet Industries, Inc.
Uhrichsville, Ohio

Test Log
Scrubber Number One

Date:	10-26-74		10-27-74	
Test No.:	3		4	
	Inlet	Outlet	Inlet	Outlet
Test Time (24-hour clock)	1000-1345	1000-1345	1025-1355	1025-1355
Test Duration, min.	170	170	150	150
Test Intervals, min.				
Port X	120	60	120	60
Port Y	50	110	30	90
Alundum Thimbles	2	2	1	4
Glass Fiber Filters	2	2	1	3

Table E-1

Barmet Industries, Inc.
Uhrichsville, Ohio

Test Log
Scrubber Number Two

Date:	10-23-74		10-24-74	
Test No.:	1		2	
	Inlet	Outlet	Inlet	Outlet
Test Time (24-hour clock)	1015-1420	1015-1420	1044-1355	1105-1355
Test Duration, min.	180	180	150	150
Test Intervals, min.				
Port X	120	60	80	60
Port Y	60	120	70	90
Alundum Thimbles	5	2	3	1
Glass Fiber Filters	4	3	3	1

Table E-1

Barmet Industries, Inc.
Uhrichsville, Ohio

Test Log
Baghouse

Date:	10-28-74		10-29-74		10-30-74	
Test No:	5		6		7	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Test Time (24-hour clock)	1012-1350	1012-1350	1000-1400	1000-1350	1030-1345	1030-1342
Test Duration, min.	190	186	225	216	195	192
Test Intervals, min.						
Port X	120	108	120	108	120	108
Port Y	70	78	105	108	75	84
Alundum Thimbles	3	1	1	1	1	1
Glass Fiber Filters	3	1	1	1	1	1

Table E-1

Barmet Industries, Inc.
Uhrichsville, Ohio

Test Log
Dryer

Date:	10-31-74	10-31-74	10-31-74
Test No.:	8	9	10
	Outlet	Outlet	Outlet
Test Time (24-hour clock)	0930-1035	1105-1214	1320-1425
Test Duration, min.	60	60	60
Time Intervals, min.,			
Port X	30	30	30
Port Y	30	30	30
Alundum Thimbles	1	1	1
Glass Fiber Filters	1	1	1

APPENDIX F

APPENDIX F

Sample Handling Log

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
I-Inlet	101-106	Sampling Train Set-Up	10/22	1500	Daly
		Console Operator	10/23	1015	Jackson
		Probe Handler	10/23	1015	Daly
		Sample Clean Up	10/23	1430	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
I-Outlet	107-112	Sampling Train Set-Up	10/22	1500	Lyon
		Console Operator	10/23	1015	Jackson
		Probe Handler	10/23	1015	Lyon
		Sample Clean Up	10/23	1430	Jackson
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
2-Inlet	113-118	Sampling Train Set-Up	10/23	1500	Daly
		Console Operator	10/24	1100	Jackson
		Probe Handler	10/24	1100	Daly
		Sample Clean-Up	10/24	1300	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
2-Outlet	119-124	Sampling Train Set-Up	10/23	1500	Lyon
		Console Operator	10/24	1100	Jackson
		Probe Handler	10/24	1100	Lyon
		Sample Clean-Up	10/24	1300	Lyon
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Acitvity	Date	Time	Personnel
3-Inlet	125-130	Sampling Train Set-Up	10/25	1500	Lyon
		Console Operator	10/26	1000	Jackson
		Probe Handler	10/26	1000	Lyon
		Sample Clean Up	10/26	1400	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
3-Outlet	131-136	Sampling Train Set-Up	10/25	1500	Daly
		Console Operator	10/26	1000	Jackson
		Probe Handler	10/26	1000	Daly
		Sample Clean-up	10/26	1400	Daly
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Acitivity	Date	Time	Personnel
4-Inlet	137-142	Sampling Train Set-Up	10/26	1500	Lyon
		Console Operator	10/27	1030	Jackson
		Probe Handler	10/27	1030	Lyon
		Sample Clean-up	10/27	1400	Lyon
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
4-Outlet	143-148A	Sampling Train Set-Up	10/26	1500	Daly
		Console Operator	10/27	1030	Jackson
		Probe Handler	10/27	1030	Daly
		Sample Clean-up	10/27	1400	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
5-Inlet	148B-153	Sampling Train Set-Up	10/27	1500	Lyon
		Console Operator	10/28	1000	Jackson
		Probe Handler	10/28	1000	Lyon
		Sample Clean-Up	10/28	1400	Lyon
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
5-Outlet	154-159	Sampling Train Set-Up	10/27	1500	O'Neill
		Console Operator	10/28	1000	Jackson
		Probe Handler	10/28	1000	O'Neill
		Sample Clean-Up	10/28	1400	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
6-Inlet	160-165	Sampling Train Set-Up	10/28	1500	Lyon
		Console Operator	10/29	1000	Jackson
		Probe Handler	10/29	1000	Lyon
		Sample Clean-Up	10/29	1400	Lyon
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
6-Outlet	166-171	Sampling Train Set-Up	10/28	1500	O'Neill
		Console Operator	10/29	1000	Jackson
		Probe Handler	10/29	1000	O'Neill
		Sample Clean-Up	10/29	1400	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Acitivity	Date	Time	Personnel
7-Inlet	I-172-I-177	Sampling Train Set-Up	10/29	1500	Lyon
		Console Operator	10/30	1030	Jackson
		Probe Handler	10/30	1030	Lyon
		Sample Clean-Up	10/30	1400	Lyon
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
7-Outlet	0-172-0177	Sampling Train Set-Up	10/29	1500	O'Neill
		Console Operator	10/30	1030	Jackson
		Probe Handler	10/30	1030	O'Neill
		Sample Clean-Up	10/30	1400	O'Neill
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
8-Outlet	178-183	Sampling Train Set-Up	10/31	0900	O'Neill
		Console Operator	10/31	0930	Jackson
		Probe Handler	10/31	0930	O'Neill
		Sample Clean-Up	10/31	1035	Davison
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari
9-Outlet	184-189	Sampling Train Set-Up	10/31	1000	O'Neill
		Console Operator	10/31	1100	Jackson
		Probe Handler	10/31	1100	O'Neill
		Sample Clean-up	10/31	1200	Davison
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

Table F-1

Sample Handling Log

Run No.	Sample No.	Activity	Date	Time	Personnel
10-Outlet	190-195	Sampling Train Set-Up	10/31	1300	O'Neill
		Console Operator	10/31	1330	Jackson
		Probe Handler	10/31	1330	O'Neill
		Sample Clean-Up	10/31	1430	Davison
		Transport	11/1	0900	O'Neill
		Analyses	11/4	0900	O'Neill
					Masson
					Seace
					Kothari

APPENDIX G

APPENDIX G

PROCESS OPERATION LOG

STATEMENTS OF PROCESS RATE

Table G-1

Process Operation Log

Scrubber Number One

Date	10/26/74	10/27/74
Test Number	3	4
Pressure Drop in H_2O	38	38
Scrubber Water pH	8.0	7.0
Scrubber Water Flow, gpm	250	250

Scrubber Number Two

Date	10/23/74	10/24/74
Test Number	1	2
Pressure Drop in H_2O	38	38
Scrubber Water pH	9.0	6.5
Scrubber Water Flow, gpm	300	300

Table G-1

Process Operation Log

Baghouse

Date	10/28/74	10/29/74	10/30/74
Test Number	5	6	7
Pressure Drop in H_2O	5.0	5.0	5.0
Temperature inlet °F	244.0	239.0	238.0
Cooling Water Flow, gpm	2-6	2-6	2-6

WEIGHT / SCOOP — DROSS ...
SALT - 1000 lbs

STATEMENT OF PROCESS RATE

TEST NUMBER 1 DATE 11-23-74

FIRM NAME BAEMET INDUSTRIES PLANT #2

ADDRESS URICHVILLE OHIO

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1020 IDLE TIME DURING CYCLE, MINUTES —

END OF OPERATION, TIME 1410

ELAPSED TIME, MINUTES 230 NET TIME OF CYCLE, MINUTES 230

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ______ Attach analysis Maximum Design BTU input ______

% Excess Air ______ Actual BTU input for Test ______

Gas Flow ______ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ______

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ______ Weight per charge ______

Number of charges ______ Type Waste ______

III. OTHER SOURCE OPERATIONS: TOTAL CHARGE TO FURNACE: A AND B

Material ALUMINUM DROSS Weight 19800 POUNDS

Material SODIUM CHLORIDE Weight 9000 POUNDS

Material ______ Weight 28800 LB/230 min.

Material ______ Weight ≃ 7513 LB/HR.

Material ______ Weight = 3.76 T/HR.

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

STATEMENT OF PROCESS RATE

TEST NUMBER (2) DATE 11-29-74

FIRM NAME Bremer Industries Plant #2

ADDRESS Urichsville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1050

IDLE TIME DURING CYCLE, MINUTES —

END OF OPERATION, TIME 1400

ELAPSED TIME, MINUTES 190

NET TIME OF CYCLE, MINUTES 190

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ________ Attach analysis

Maximum Design BTU input ________

% Excess Air ________

Actual BTU input for Test ________

Gas Flow ________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ________

Weight per charge ________

Number of charges ________

Type Waste ________

III. OTHER SOURCE OPERATIONS: Total Charge to Furnace: A and B

Material Alumium Dross Weight 19300 Pounds

Material Sodium Chloride Weight 8000 Pounds

Material ________ Weight 22300 LB/190 MIN.

Material ________ Weight ≅ 7042 LB/HR.

Material ________ Weight = 3.52 T/HR.

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-4

STATEMENT OF PROCESS RATE

TEST NUMBER 3 RUN 3 DATE 10-26-74

FIRM NAME BOEMET PLANT #2

ADDRESS URICHVILLE OHIO

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1000

IDLE TIME DURING CYCLE, MINUTES —

END OF OPERATION, TIME 1350

ELAPSED TIME, MINUTES 230

NET TIME OF CYCLE, MINUTES 230

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____________ Attach analysis

Maximum Design BTU input ______

% Excess Air ____________

Actual BTU input for Test ______

Gas Flow ____________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ____________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ____________

Weight per charge ____________

Number of charges ____________

Type Waste ____________

III. OTHER SOURCE OPERATIONS: TOTAL CHARGE TO FURNACE F

Material ALUMINUM DROSS Weight 9900 Pounds

Material SODIUM CHLORIDE Weight 7000 Pounds

Material ____________ Weight 16900

Material ____________ Weight ≅ 4409 LB/HR = 2.2 T/HR

Material ____________ Weight ____________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-5

STATEMENT OF PROCESS RATE

TEST NUMBER (4) DATE 10-27-74

FIRM NAME Barmet Plant #2

ADDRESS Urichsville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1030

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1355

ELAPSED TIME, MINUTES 205

NET TIME OF CYCLE, MINUTES 205

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____________ Attach analysis

Maximum Design BTU input ______

% Excess Air ____________

Actual BTU input for Test ______

Gas Flow ____________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ____________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ____________

Weight per charge ____________

Number of charges ____________

Type Waste ____________

III. OTHER SOURCE OPERATIONS: Total Charge to Furnace F

Material ALUMINUM DROSS Weight 8800 POUNDS

Material SODIUM CHLORIDE Weight 5000 POUNDS

Material ____________ Weight 13800

Material ____________ Weight ≅ 4039 LB/HR

Material ____________ Weight ≅ 2 T/HR

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [illegible signature]

TITLE Supervisor

STATEMENT OF PROCESS RATE

TEST NUMBER 5 DATE 10-28-74

FIRM NAME Bagnet Industries Plant #2

ADDRESS Urichsville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1015

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1355

ELAPSED TIME, MINUTES 220

NET TIME OF CYCLE, MINUTES 220

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ________ Attach analysis

Maximum Design BTU input ________

% Excess Air ________

Actual BTU input for Test ________

Gas Flow ________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ________ Weight per charge ________

Number of charges ________ Type Waste ________

III. OTHER SOURCE OPERATIONS: Total Charge to Furnaces A-B-F

Material Aluminum Dross Weight 17600 Pounds

Material Sodium Chloride Weight 14000 Pounds

Material ________ Weight 31600

Material ________ Weight ≅ 8618 LB/HR = 4.3 T/HR

Material ________ Weight ________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

STATEMENT OF PROCESS RATE

TEST NUMBER 6 DATE 10-29-74

FIRM NAME Barmet Industries Plant #2

ADDRESS Uhrichsville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1015

END OF OPERATION, TIME 1400

ELAPSED TIME, MINUTES 225

IDLE TIME DURING CYCLE, MINUTES 0

NET TIME OF CYCLE, MINUTES 225

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____________ Attach analysis

Maximum Design BTU input ________

% Excess Air ____________

Actual BTU input for Test ________

Gas Flow ____________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ____________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ____________ Weight per charge ____________

Number of charges ____________ Type Waste ____________

III. OTHER SOURCE OPERATIONS: Total Charge to Furnace A-B-F

Material Aluminum Dross Weight 18700 Pounds

Material Sodium Chloride Weight 10000 Pounds

Material ____________ Weight ____________

Material ____________ Weight ____________

Material ____________ Weight ____________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-8

STATEMENT OF PROCESS RATE

TEST NUMBER 7 DATE 10-30-74

FIRM NAME Borne Industries Plant #2

ADDRESS Orrville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1030

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1350

ELAPSED TIME, MINUTES 200

NET TIME OF CYCLE, MINUTES 200

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ________ Attach analysis

Maximum Design BTU input ________

% Excess Air ________

Actual BTU input for Test ________

Gas Flow ________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ________ Weight per charge ________

Number of charges ________ Type Waste ________

III. OTHER SOURCE OPERATIONS: Total Charge to Furnaces A-B-F

Material Aluminum Dross Weight 72,100 Pounds

Material Sodium Chloride Weight 12000 Pounds

Material ________ Weight ________

Material ________ Weight ________

Material ________ Weight ________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

STATEMENT OF PROCESS RATE

TEST NUMBER 8 DATE 10-31-74

FIRM NAME Brems Industries Plant #2

ADDRESS Orrville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 0930

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1030

ELAPSED TIME, MINUTES 60

NET TIME OF CYCLE, MINUTES 60

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____________ Attach analysis

Maximum Design BTU input ______

% Excess Air ____________

Actual BTU input for Test ______

Gas Flow ____________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ____________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ____________

Weight per charge ____________

Number of charges ____________

Type Waste ____________

III. OTHER SOURCE OPERATIONS: Total 1 Hour Charge to Dryer

Material ALUMINUM METAL Weight 744 Pounds

Material ____________ Weight ____________

Material ____________ Weight ____________

Material ____________ Weight ____________

Material ____________ Weight ____________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-10

STATEMENT OF PROCESS RATE

TEST NUMBER 9 DATE 10-31-74

FIRM NAME Bormet Industries Plant #2

ADDRESS Ve[illegible] Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1105

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1205

ELAPSED TIME, MINUTES 60

NET TIME OF CYCLE, MINUTES 60

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____________ Attach analysis

Maximum Design BTU input ______

% Excess Air ______________

Actual BTU input for Test______

Gas Flow ______________ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.)__________

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ________

Weight per charge ________

Number of charges ________

Type Waste ________

III. OTHER SOURCE OPERATIONS: Total 1 Hour Charge to Dryer

Material Aluminum Metal Weight 720 Pounds

Material ________ Weight ________

Material ________ Weight ________

Material ________ Weight ________

Material ________ Weight ________

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-11

STATEMENT OF PROCESS RATE

TEST NUMBER 10 DATE 10-31-74

FIRM NAME Barmet Industries Plant #

ADDRESS Uricksville Ohio

DATA ON OPERATING CYCLE TIME

START OF OPERATION, TIME 1320

IDLE TIME DURING CYCLE, MINUTES 0

END OF OPERATION, TIME 1420

ELAPSED TIME, MINUTES 60

NET TIME OF CYCLE, MINUTES 0

DATA ON MATERIAL CHARGED TO PROCESS DURING OPERATING CYCLE:

I. FOR FUEL BURNING OPERATION ONLY:

Weight ____ Attach analysis

Maximum Design BTU input ____

% Excess Air ____

Actual BTU input for Test ____

Gas Flow ____ ACFM

Total BTU input for all Fuel burning equipment on a plant or premises which are united physically or operationally (based on permit submissions.) ____

Note: Include stream flow chart with proper identification of scale, etc.

II. FOR INCINERATOR ONLY:

Total weight charged during test ____

Weight per charge ____

Number of charges ____

Type Waste ____

III. OTHER SOURCE OPERATIONS: Total 1 Hour Charge to Dryer

Material Aluminum Metal Weight 910 Pounds

Material ____ Weight ____

Material ____ Weight ____

Material ____ Weight ____

Material ____ Weight ____

Note: Include any pertinent charts or other operational data.

I certify that the above statement is true to the best of my knowledge and belief:

SIGNATURE [signature]

TITLE Supervisor

G-12

APPENDIX H

APPENDIX H

EQUIPMENT CALIBRATION

Table H-1

Barmet Industries, Inc.
Uhrichsville, Ohio

Equipment Calibration

Control Console Calibration

Unit No.	Calibration	γ	ΔH @	Calibrated By
1205	9/24/74	1.01	1.91	Jackson/O'Neill
1225	10/2/74	1.0	1.92	Jackson/O'Neill
1227	10/4/74	1.0	1.94	Jackson/O'Neill

Pitot Tube Calibration - (S"Type)

Unit No.	Calibration Date	C_s Right	C_s Left	Calibrated By
2	9/24/74	0.850	0.850	Carey
6	9/24/74	0.850	0.850	Carey

Thermometer Calibration

Unit No.	Calibration Date	Temperature Range	Calibrated
A	10/15/74	$100^{\circ}F$ - $500^{\circ}F$	Carey
B	10/15/74	$100^{\circ}F$ - $500^{\circ}F$ [1.]	Carey

1. Calibrated against certified thermometer in temperature range of interest.

γ = Ratio of accuracy of wet test meter to dry test meter - Tolerance = ± 0.01

ΔH @ = Orifice pressure differential that gives 0.75 CFM of air at $70^{\circ}F$ and 29.92 inches Hg. in H_2O - Tolerance = ± 0.15

C_s = "S" Pitot Tube coefficient

APPENDIX I

APPENDIX I

RELATED REPORTS

PRESURVEY REPORT

Survey Date 7-30-75

Survey by Dawson

Report Due 8-2-75

Carry:

- Orsat
- Tape Measure
- Pitot & Draft gage
- Thermometer
- Tape Recorder
- Camera
- Calculator
- Reference Reports
- Government Regulations

Glenn Magree

BASIC INFORMATION

Name of Company Barmet Industries Inc

Address Uhrichsville City State Ohio 44683

Plant Contact Al Haripabadi Title Plant Engineer Phone 614/922-4126

Send Report to Ed Zylstra Title Phone

Address City State

Invoice to

Other Personnel,

(get Business cards)

This is New or existing plant. Type of plant

Geographic location Altitude

Test areas indoor or outdoor ✓ location.

Plant Requirements: Certificate of Insurance Yes ✓ No. Safety

1. Meetings. Hats ✓. Safety Glasses ✓

Safety shoes. Clothing. Special rules.

2. Operating Hours 24 hr. to /day. Days per week 7

3. Provide Storage space. Safe ✓. Cleanliness

Locked ✓. Size space. Work areas ✓

4. Provide map of city or area. Map of plant area

5. Parking facility in plant ✓. Near test sites. Number

of vehicles 2. Passes required for men. For vehicles

6. Waiver. Allow Photographs Yes ✓ No If approved. ✓

Plant Supplies: Facilities__________. Contact__________

1. Liaison__________

   Helpers__________

2. Water available   Distilled   and Deionized   Compressed air

   Acetone______ Amount______ Misc.______

   Nearby Motels [illegible] INN Phone______

   10 [illegible]

   Restaurants__________

   Scaffolding and Platforms - Company will build   Yes   No.

   Company will provide   Yes   No.

   If not, who provides__________

   From where__________

   Under direction of__________

   At cost of__________

   Shipping methods: Via city of [illegible]

   Airline______ Pickup by______

   Truck______ (CEW)

   To__________

COMMENTS:__________

TESTING REQUIREMENTS

Test Methods __________

Number of Tests Required __________

Test for __________

At Locations 3 or 4 [illegible]

Designation Code for Locations __________

Special Scheduling - Dates [illegible]

- Exempt Periods __________

Vehicles Required: Rent ______ Where ______ Phone ______

Rent ______ Where ______ Phone ______

Ports & Holes: Existing Yes ✓ [illegible] No. Co. will provide Yes ✓ No

Size 3" ID and No. ____ required. Drawings for Plant ✓

Need Measurements ______ Duct & Stack sizes by blueprint ______

Our measurement ______ Covers pre-loosened by ______

Power: Volts 110 Hz 60 Amps [illegible]

Type Plug 3 Prong Location of Fuse Box ______

Separate circuits ______ No. of outlets ______

Estimate of RFW Labor Required 4

Estimate of Time Required __________

Estimate of Equipment Required __________

Type Filters Required ______ Size ______

Analyses Required __________

PROCESS INFORMATION

Block Diagram of Processes. Identify flows, locations, stack designations -

1. Origin of Gas & Dust Rotary Furnace
2. Chemical reactions Dross + NaCl Heat
3. Product rate 10 - 20 [illegible] / day Aluminum
4. Feed materials Dross — NaCl
5. Conditions 3 [illegible]
6. Batch cycles

   8' - 3/Day

   10' - 2/Day

SAMPLE LOCATION SKETCHES

Include: Designation, Size, Height, Distance to internal obstruction, Dimensions to external obstructions, ambient conditions, duct layout, ports, front-side-top or isometric views.

Stack section______x_______ or dia ________Insulation______Wall thickness____________________

Materials of Construction______________________________________

Size & Location of Ports______________________________________

FLOW CONDITIONS

Locations____

Ambient conditions: Temp__________ Protection_______________ Odors______

Toxic gas____________or dust________________Cleanliness_____________

Dangers (no rail, slope, hot pipes, high voltage, etc.______________

____

Gases Dry Wet ✓ Dirty ____________________________________

Gas conditions: Control Panel?	Max	Min	Typical
lbs/hr			
°F or °C			
ACFM			
SCFM			
Static Pressure H_2O_____ or _______			
Wet bulb			
% Moisture			
Condensation problems?			
Flow Velocity ______________			
Chemical Composition			
Collection Efficiency			

EQUIPMENT PERFORMANCE SHEET

Date____________________

Type of Equipment (precipitator, packed tower, scrubber, etc.)

____

Manufacturer's Model No. or rating____________________

Manufacturer____________________________________

Description (Cement plant, etc.)______________________

Date installed__________________________________

Date tested_____________________________________

Process Application (type of gas, particulate, fly ash, etc.)

____

____

Gas Composition____________inlet;______________outlet

Gas Volume (ACFM)____________inlet;______________outlet

Gas Temp (^{o}F)____________inlet;______150______outlet

Concentration: inlet__________ Efficiency__________

outlet__________

Size Distribution:________________________________

Equipment description (no. of fields, collectors, type of packing, etc.)____________________________

Pressure drop____________________________________

Combination of Water Sprays & Air Tempering; Attach Data for Each Step (on Reverse)

Composition of Refuse

Normal ______

Seasonal Variations ______

Special Industrial Wastes ______

Scrubber Afterburner Electrostatic Precipitator

Scrubbing Water

Source - Lake Municipal River Sea Well

Availability - Unlimited

Seasonal Limits, if Any (on Reverse)

Maximum GPM ______

Cost per Million Gallons ______

Acid or Alkaline ______

Pressure ______

Chemical Problems -- Hardness ______

-- Corrosive ______

Cleanliness -- Parts per Million of Sediment ______

-- Nature of Sediment ______

-- Sediment Seasonal ______

Disposal of Scrubber Water

To Sewer To Existing Settling Pond To Proposed Settling Pond

Reuse After Existing Clarifier Reuse After New Clarifier

Collected Dust is Valuable Enough to Recover

SPECIAL

For Coal Fired Boiler

Type of Firing ______________________

Wet or Dry Bottom Furnace

Coal Source ______________________

____

Sulfur Content ______________________

Ash Content ______________________

Ultimate Analysis (on reverse)

Carbon Content of Fly Ash ______________________

Flue Gas % Excess Air ______________________

Orsat Analysis: O_2 ________ CO_2 ________ CO ________

____

Collector Located Before or After Air Heater

Alternate Firing Oil, Gas, Other Coal

For Municipal Incineration

Refractory or Water-Walled Furnace

Type of Grate ______________________

How is gas cooled:

Water Sprays Air Tempering

GPM of Water ________ Quantity of Ambient Air

Spray Water Pressure CFM ______________________

________ PSIG

Gas Cooled from ________ ^{o}F Gas Cooled from ________ ^{o}F

to ________ ^{o}F to ________ ^{o}F

Dust Conditions:

	Max	Min	Typical
Dust conditions:			
Quantity______/______units	___	___	______
Concentration______/________units	___	___	______
Size % Weight 0 - 5 microns	___	___	______
5 - 10 microns	___	___	______
10 - 20 microns	___	___	______
+ 20 microns	___	___	______
Specific Gravity (gm/cc)	___	___	______
Bulk Density (lbs/CF)	___	___	______
Solubility in water	___	___	______
Collection efficiency	___	___	______

Spec. Characteristics - poisonous combustible explosive

Builds up on metal surface Difficult removal

Abrasive Sticky when wet Corrosive

Reactive (e.g., CaO) Temperature_______

Noxious Acid or Alkaline

ROY F. WESTON, INC.

ENVIRONMENTAL SCIENTISTS AND ENGINEERS

REPLY TO
ROY F. WESTON, INC
LEWIS LANE
WEST CHESTER
PENNSYLVANIA 19380
215-692-3030
TELEX NUMBER 83-5348
CABLE ADDRESS RFWINC

2 August 1974

United States Environmental Protection Agency
Region Five
One North Walker Drive
Chicago, Illinois 60606

Attention: Mr. R.E. Zylstra

Gentlemen:

A preliminary survey of the Barmet Industries, Inc. Plant Number Two was conducted by James W. Davison on 30 July 1974. The purpose of the inspection of the Uhrichsville, Ohio processing facilities was to determine the level of effort, the process schedules, and equipment requirements to conduct a stack sampling program which includes sampling the emissions of each of the four stacks at the plant. An investigation of the proposed sampling sites permitted selection of sampling port locations, and provided measurements necessary for preparation of the testing program. This report provides the results of that preliminary visit.

Scrubber "A"

The scope of the test program includes simultaneous testing before and after the scrubber to determine the efficiency of the unit. A suitable "inlet" sampling location exits in the horizontal duct just before the water sprays. It will be necessary to install two sampling ports in this duct as indicated on drawing number 1. The sampling ports should be at 90 degrees to each other at the location marked X on the duct with a black marker. The sampling port openings are 3 inches inside diameter, and require a three inch long metal nipple to be welded to the opening. The nipple should be threaded to receive a cap. No scaffolding will be required to sample at this location.

Drawing 2 shows the location of the two existing ports which will be suitable for test purposes. Temporary scaffolding will be necessary to allow one person and approximately 30 pounds of equipment to be within three to five feet of the ports. As shown on the drawing a section of scaffolding can be placed so that both ports can be conveniently sampled. Electricity (110V - 30 amp) should be available within 200 feet of the sampling location.

Scrubber "B"

Simultaneous sampling before and after the scrubber can be performed after two sampling ports have been installed as indicated on drawing number three. The port location is marked X on the duct with a black marker. No scaffolding will be necessary at the inlet sampling location.

The outlet sampling location has existing ports which will be suitable for test purposes. A temporary scaffolding arrangement similar to the set-up provided for the other scrubber stack will be necessary. Probably the same electricity source can be utilized.

Baghouse

Inlet and outlet ports have been installed to permit satisfactory simultaneous sampling before and after the baghouse. Scaffolding will be required at both sampling locations as indicated by drawing 5. It will be necessary to have both sets of scaffolding in place at the same time. A source of electricity should be available within 200 feet.

Washing - Drying Operation

The stack from the dryer hood will be sampled through two ports which will be installed in the stack approximately 25 feet from the top of the hood. The ports should be three inch openings with welded nipples as described previously. Scaffolding can be supported on the building roof, and will be required as indicated in drawing 6.

Preliminary estimates indicate that the testing will require four men approximately two days to accomplish three test runs on each unit. Perhaps some arrangement can be made to allow the sets of scaffolding to be moved from stack to stack just before testing to reduce the scaffolding rental costs.

Three of the six rotary furnaces were out of operation at the time of the preliminary visit. The plant engineer, Mr. Al Habibabadi, indicated that furnace C could be out of operation for some time for repairs, but that furnace A repairs had priority and would probably be in operation in the near future. It appears that several of the furnaces will be down for repairs at any given time, and that we can not expect to test when all units are operating. A decision will be required concerning the minimum number of furnaces discharging emissions through a particular scrubber that will allow representative testing.

An inspection of the scrubber water clarification treatment system suggested that greater scrubber efficiency can be maintained by proper operation and maintenance of the clarifiers. It appeared that the water uses for scrubbing was saturated with solids. It would be to Barmet's advantage to operate the scrubber systems at optimum conditions during testing.

A considerable amount of the fumes generated by the furnace operations escapes the hood arrangement and escapes to the atmosphere through the building roof and open sides. An attempt by Barmet to correct this situation by the installation of pneumatically operated hood doors may help this situation.

A tentative testing schedule indicates that we can be ready to conduct this project in the latter part of August or in the first weeks of September. This schedule is dependent upon how soon Barmet can install the sampling ports and arrange for scaffolding. Process shutdown of various furnaces, planned or otherwise, can also influence the proposed schedule.

Fluoride concentrations in the emissions are suggested by area foliage damage. The sampling train proposed can be utilized for collection of fluorides if you feel it is pertinent.

It is assumed that the EPA Project Officer will make the necessary arrangements with Barmet for scheduling of the ports installation and will arrange for a definite scheduling of testing dates, however if we can be of any assistance in these matters we will be pleased to assist. Should you have any questions concerning this report, or require additional information please do not hesitate to call.

Very truly yours,

James W. Davison

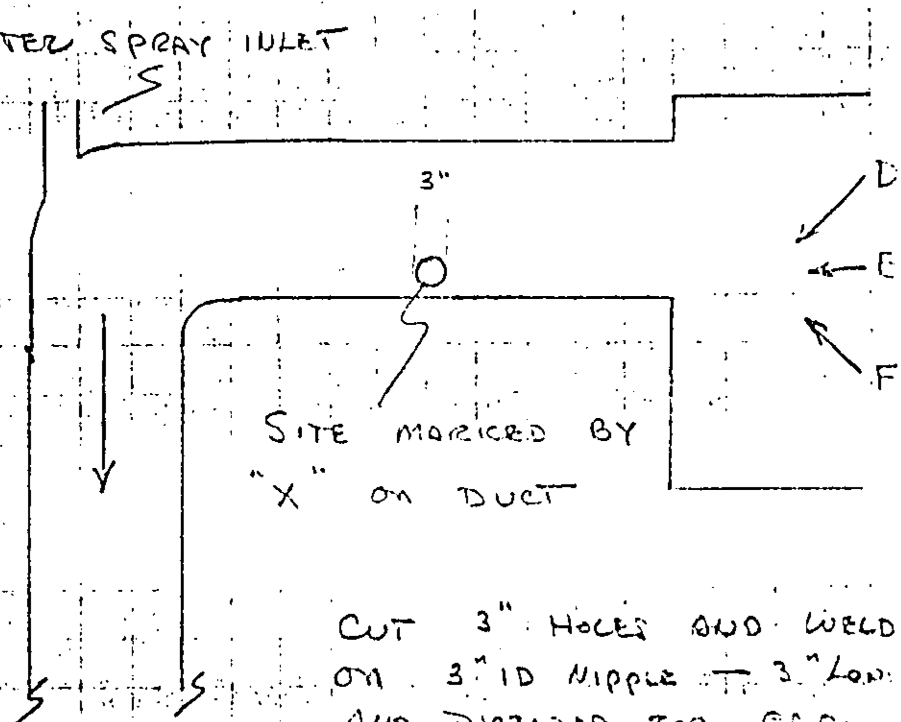
James W. Davison
ATT Sampling Supervisor

JWD:crk

cc: Lou Terz, EPA
Al Habibabadi, Barmet
Donald Kozeni, Barmet

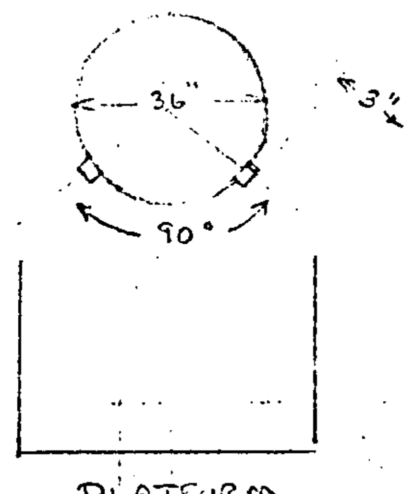
(1) SCRUBBER SERVING FURNACES D-E-F "A" #1

SAMPLING PORT REQUIREMENTS



CUT 3" HOLES AND WELD ON 3" ID NIPPLE 3" LONG AND THREADED FOR CAP.

INSTALL 2 3" ID PORTS AT RIGHT ANGLES TO EACH OTHER. CAP PORTS WITH THREADED CAP.



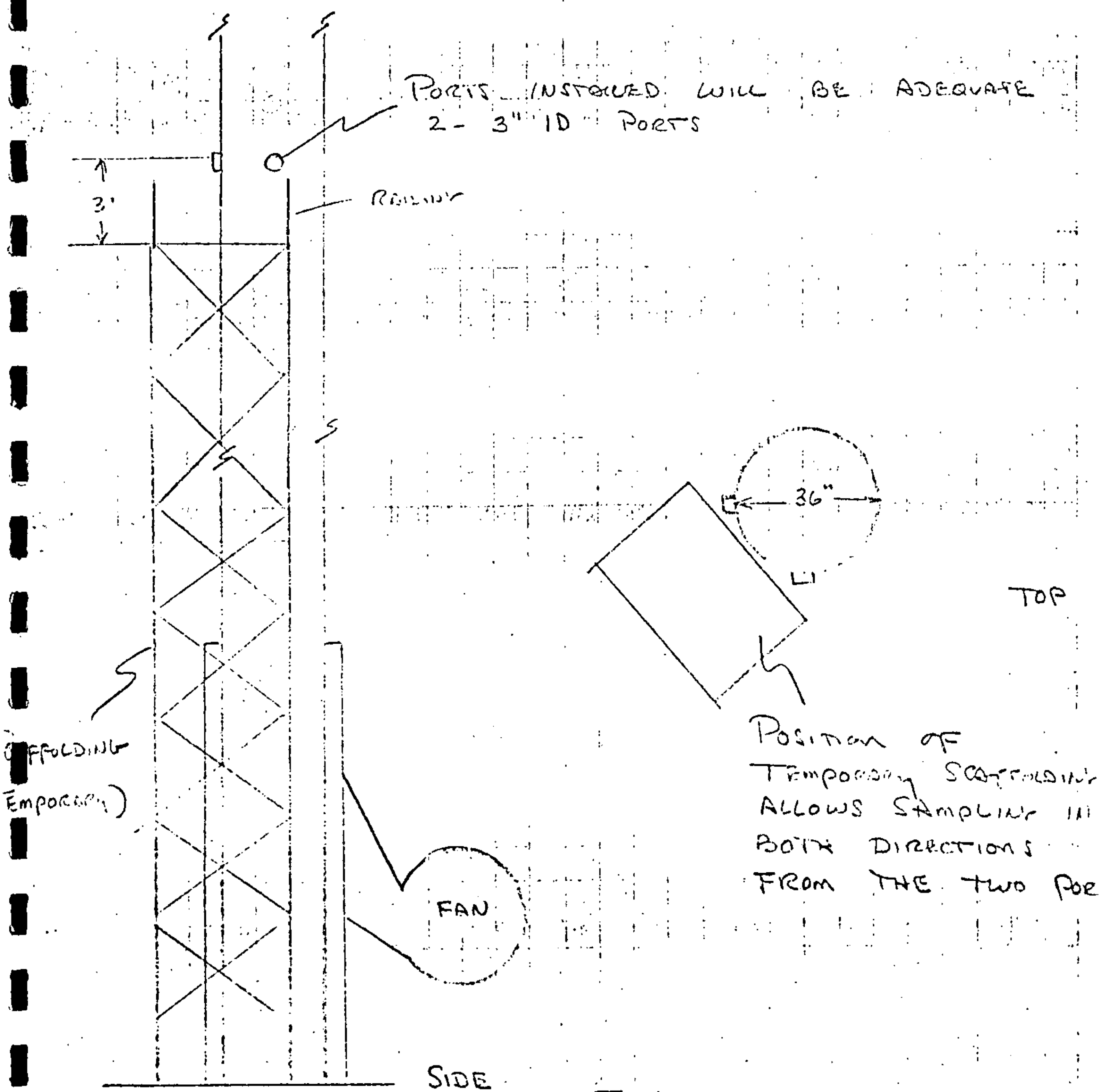
FOR ALL STACKS:
SAMPLE POINT LOCATIONS BY E.P.A. METHOD 1.
PORT LOCATIONS AT POSITIONS FOR OPTIMUM TEST CONDITIONS.

NO SCAFFOLDING REQUIRED

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

BY Dawson DATE 7-31-74 SHEET (2) OF ____
CHKD BY ____ DATE ____ W.O. NO. ____
PROJECT EPA - Bormet
SUBJECT ____

(2) STACK SERVING FURNACES D-E-F

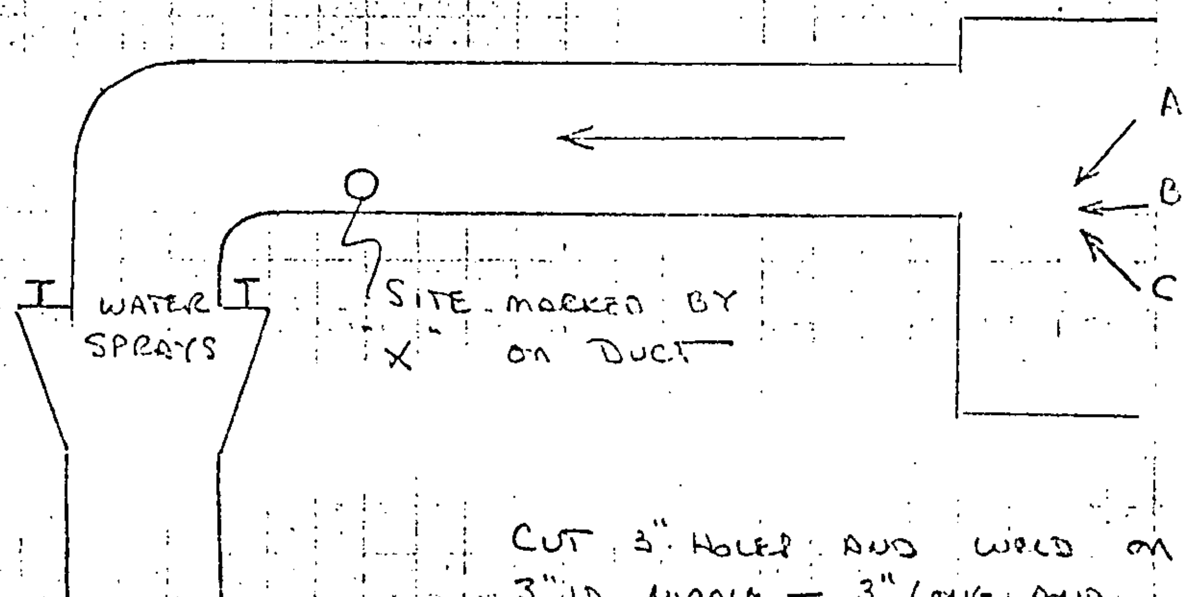


ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

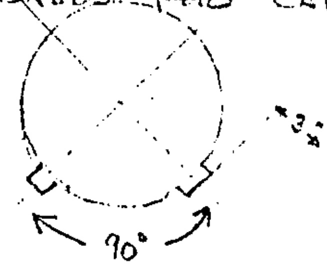
BY Dawson DATE 2-31-74 SHEET (3.) OF
CHKD BY DATE W.O. NO.
PROJECT EPA - Bacmet
SUBJECT

(3.) Scrubber Serving Furnaces A - B - C "B" #2

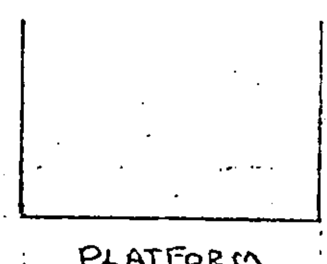
Sampling Port Requirements



CUT 3" HOLES AND WELD ON 3" ID NIPPLE — 3" LONG AND THREADED FOR CAP.



INSTALL 2 3" ID PORTS AT RIGHT ANGLES TO EACH OTHER. CAP PORTS WITH THREADED CAP.



No Scaffolding Required.

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

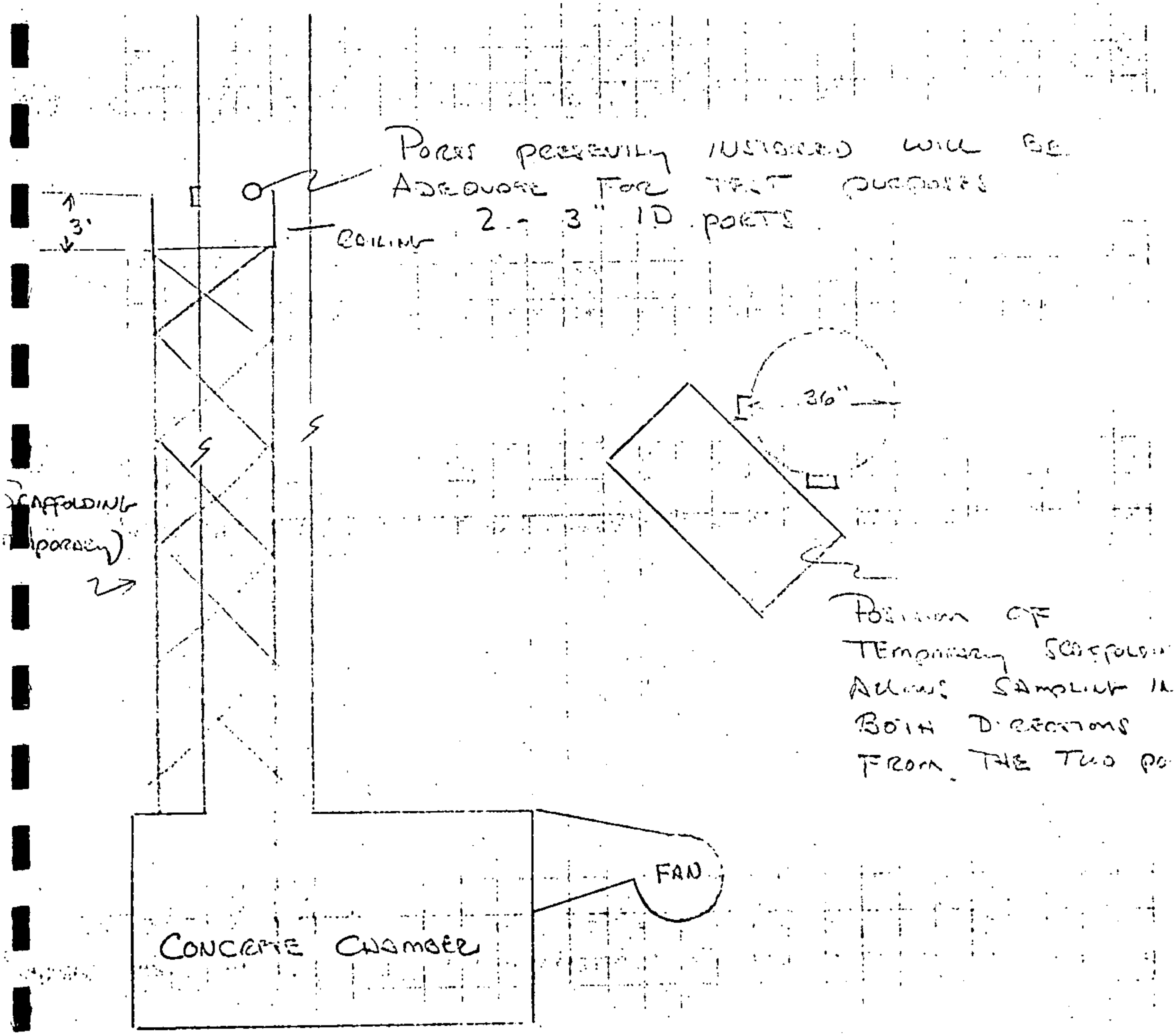
BY Davison DATE 7-31-74 SHEET (4.) OF

CHKD BY ______ DATE ______ W.O. NO. ______

PROJECT EPA - Barnett

SUBJECT

(4.) Stack serving furnace: A-B-C



ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

BY Dousa DATE 7-31-76 SHEET (5) OF

CHKD BY DATE W.O. NO.

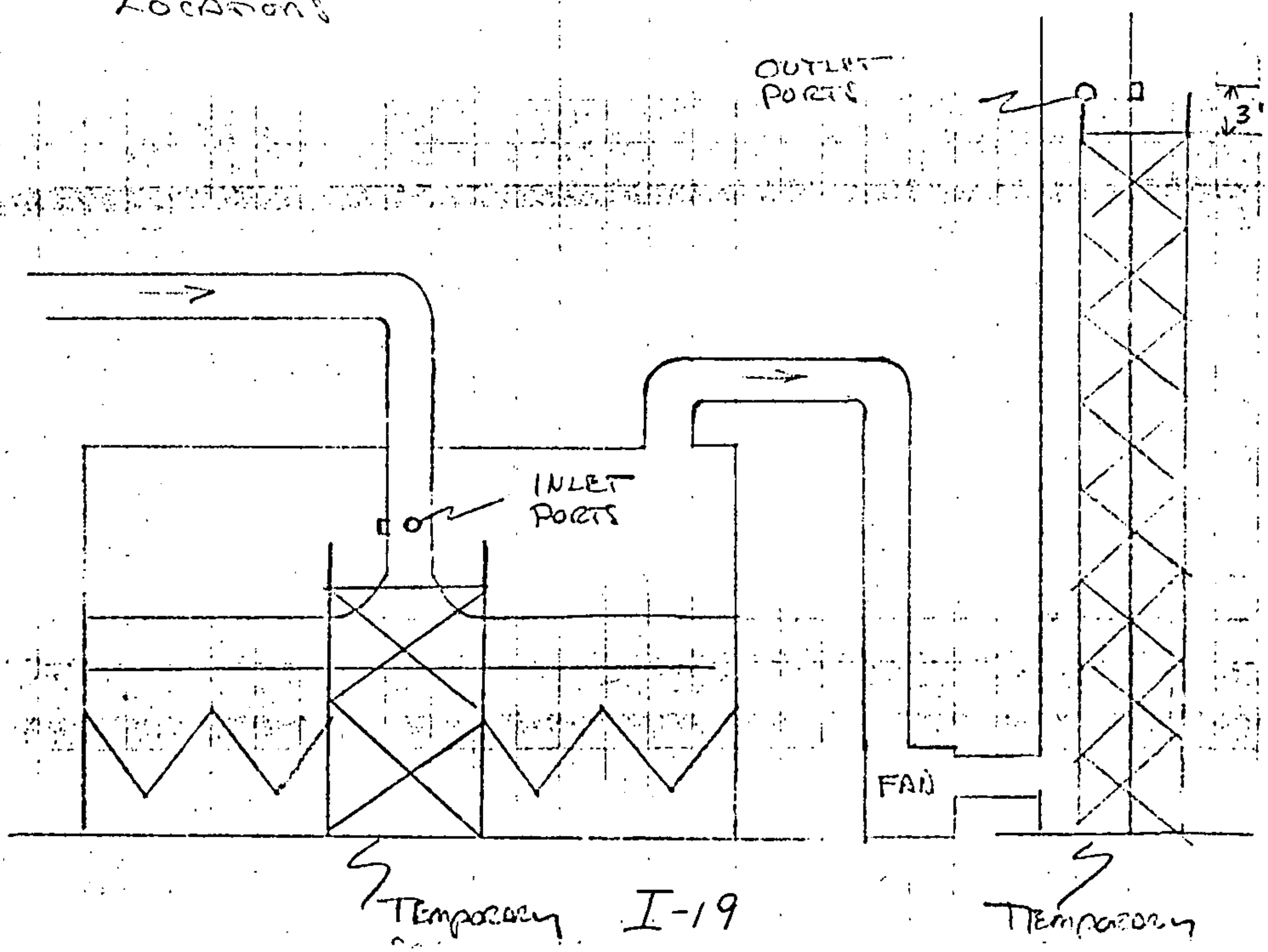
PROJECT EPA - BAEMET

SUBJECT

(5.) BAGHOUSE SERVING ALL SIX FURNACES

PORTS PRESENTLY INSTALLED IN INLET DUCT AND STACK WILL BE ADEQUATE FOR PROPOSED SAMPLING.

TEMPORARY SCAFFOLDING WILL BE NECESSARY TO TEST BOTH INLET AND OUTLET LOCATIONS



ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

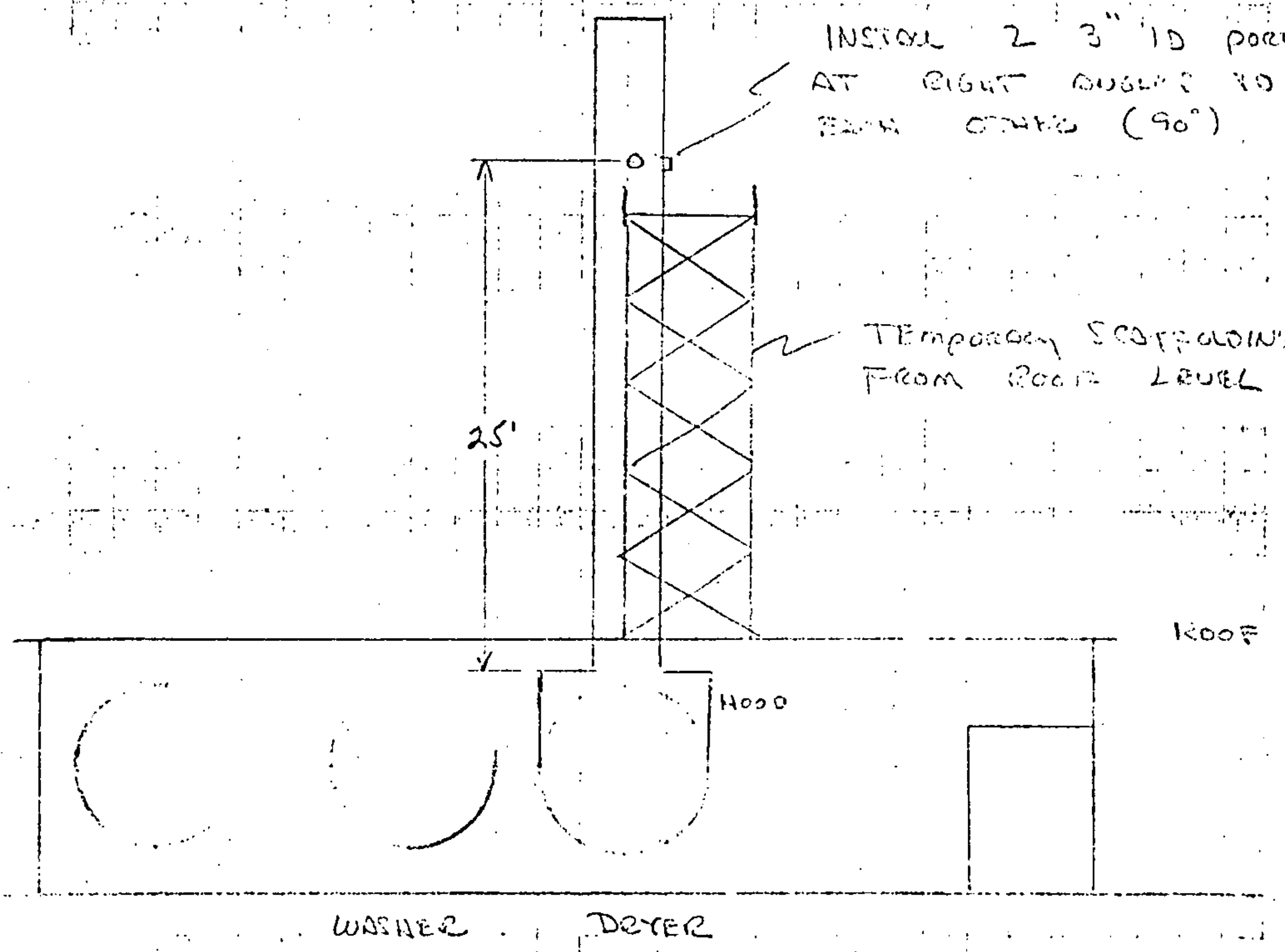
BY Dow DATE 7-31-74 SHEET (6) OF

CHKD BY DATE W.O. NO.

PROJECT EPA - Piermet

SUBJECT

(6) STACK ON DRYER AT WASHING-DRYER OPERATION.



FRONT VIEW

PORTS - CUT 3" HOLES AND WELD ON 3" ID NIPPLES — 3" LONG AND THREADED FOR CAP.

AGENCY USE ONLY
Date Received ____________
No. Assigned ____________
Premise # ____________

INTENT TO TEST NOTIFICATION

I. SOURCE INFORMATION

NAME Barmet Industries, Inc. ADDRESS Uhrichsville, Ohio

PERSON TO CONTACT Donald Kozeni TELEPHONE 614-922-4126

II. TESTING FIRM INFORMATION

NAME Roy F. Weston, Inc. ADDRESS 1 Weston Way, West Chester, Pa. 19380

PERSON TO CONTACT James W. Davison TELEPHONE 215-692-3030 Ext. 347

III. GAS STREAM SAMPLING INFORMATION. IDENTIFY ALL GAS STREAM POLLUTANTS TO BE SAMPLED.

Pollutants	Number of Sampling Points	Total Time Per Test	Number of Tests (minimum of 3)	Estimated Pollutant Concentration (Specify Units)	Method employed to estimate pollutant concentration, i.e., material balance, emission factor, reference, (specify), etc
1. Particulates	As per EPA Method 1	2 Hours	3/Stack	Unknown	-----
2. HCl	" "	" "	" "	" "	"" "
3. $AlCl_3$	" "	" "	" "	" "	" "
4. Fluorides	" "	" "	" "	" "	" "
5. Cyanides	" "	" "	" "	" "	" "

IV. STACK INFORMATION – Data Not Available

1. Approx. gas temp. ____________ °F
2. Approx. gas flow ____________ A.C.F.M.
3. Approx. percent moisture ____________ % (percent by volume)
4. Approx. gas density ____________ lb/ft^3 (at stack conditions)

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THE FOLLOWING ADDITIONAL INFORMATION SHALL BE SUBMITTED AS ATTACHMENTS:

V. DATE OF LAST CALIBRATION

1. Velocity measuring equipment________________________.

2. Gas volume metering equipment________________________.

3. Gas flow rate metering equipment________________________.

4. Gas temperature measuring equipment________________________.

VI. SAMPLING TRAIN INFORMATION

1. A schematic diagram of each sampling train. The name, model number, and date of purchase of commercially manufactured trains should be included with the diagram.

2. The type or types of capture media to be used to collect each gas stream pollutant.

3. Sample tube type, i.e., glass, teflon, stainless steel, etc.

4. Probe cleaning method and solvent to be used, if applicable.

VII. LABORATORY ANALYSIS

A description of the laboratory analysis methods to be used to determine the concentration of each pollutant.

VIII. DATA SHEETS

A sample of all field data sheets to be used in the test or tests.

IX. DESCRIPTION OF OPERATIONS

A description of any operation, process, or activity that could vent exhaust gasses to the test stack. This shall include the description and feed rate of all materials capable of producing pollutant emissions used in each separate operation.

NOTE: All testing shall be performed at maximum rated capacity as specified by the equipment manufacturer, or at the maximum rate actually used in the source operation, whichever is greater.

X. STACK AND VENT DESCRIPTION

A dimensional sketch or sketches showing the plan and elevation view of the entire ducting and stack arrangement. The sketch should include the relative position of all processes or operations venting to the stack or vent to be tested. It should also include the position of the sampling ports relative to the nearest upstream and downstream gas flow directional or duct dimensional change. The sketches should include the relative position, type, and manufacturer's claimed efficiency of all gas cleaning equipment.

A cross sectional dimensional sketch of the stack or duct at the sampling ports, showing position of sampling points. In the case of a rectangular duct, show division of duct into equal areas.

V. DATE OF LAST CALIBRATION

1. Velocity measuring equipment - 9/4/74

2. Gas volume metering equipment - RAC Control Box No. 1226 - 9/7/74

   No. 1205 - 9/24/74
   No. 1227 - 8/28/74
   No. 1225 - 8/26/74
   No. 1204 - 8/27/74

3. Gas flow rate metering equipment - Same as above

4. Gas temperature measuring equipment - 9/5/74

VI. SAMPLING TRAIN INFORMATION

1. A schematic diagram of each sampling train. The name, model number, and date of purchase of commercially manufactured trains should be included with the diagram......Attached.

2. The type of types of capture media to be used to collect each gas stream pollutant.

   a. Particulate - Alundum medium porosity ceramic thimbles backed by 47 mm gelman glass fiber type A filters.
   b. HCl - Distilled Water
   c. $AlCl_3$ - Distilled Water
   d. Fluorides - Distilled Water
   e. Cyanides - Sodium hydroxide solution

3. Sample tube type, i.e., glass, teflon, stainless steel, etc.

   Nozzle - Stainless steel
   Probe - Inconel
   Thimble - Ceramic
   Filter - Glass Fiber
   Tubing - Teflon
   Impingers & connectors - Glass

4. Probe cleaning method and solvent to be used, if applicable.

   Nozzle - Acetone & brush
   Probe (behind filter) - Distilled water

VII. LABORATORY ANALYSIS

1. Particulate - ASME power test codes PTC 27, 1957,"Determining Dust Concentration in a Gas Stream".

2. HCl - L.A. A.P.C.D., 1972, Method 5.4.10.3

3. $AlCl_3$ -

   a. Chloride by Standard Methods for the Examination of Water and Wastewater, 13th Edition, 1971, Method...112-B, Mercuric Nitrate Method.

   b. Aluminum by atomic adsorption.

4. Fluoride - Standard Methods, 13th Edition, 1971, Method....121-B, Electrode Method. Preliminary distillation step (Method 121-A) preceeds analysis.

5. Cyanide - Standard Methods, 13th Edition, 1971, Method...207-C, Specific Ion Probe.

VIII. DATA SHEETS

See Attached Sheets

IX. DESCRIPTION OF OPERATIONS

1. Origin of gas and dust: rotary furnaces.

2. Chemical reactions: dross + NaCl + Heat ⟶ Purified Al

3. Feed Materials: dross + NaCl (Feed rate not known by contractor at this time)

4. Product rate: 10-20 tons/day aluminum

5. Conditions: three furnaces/scrubber (2-8' dia. and 1-10' dia.)

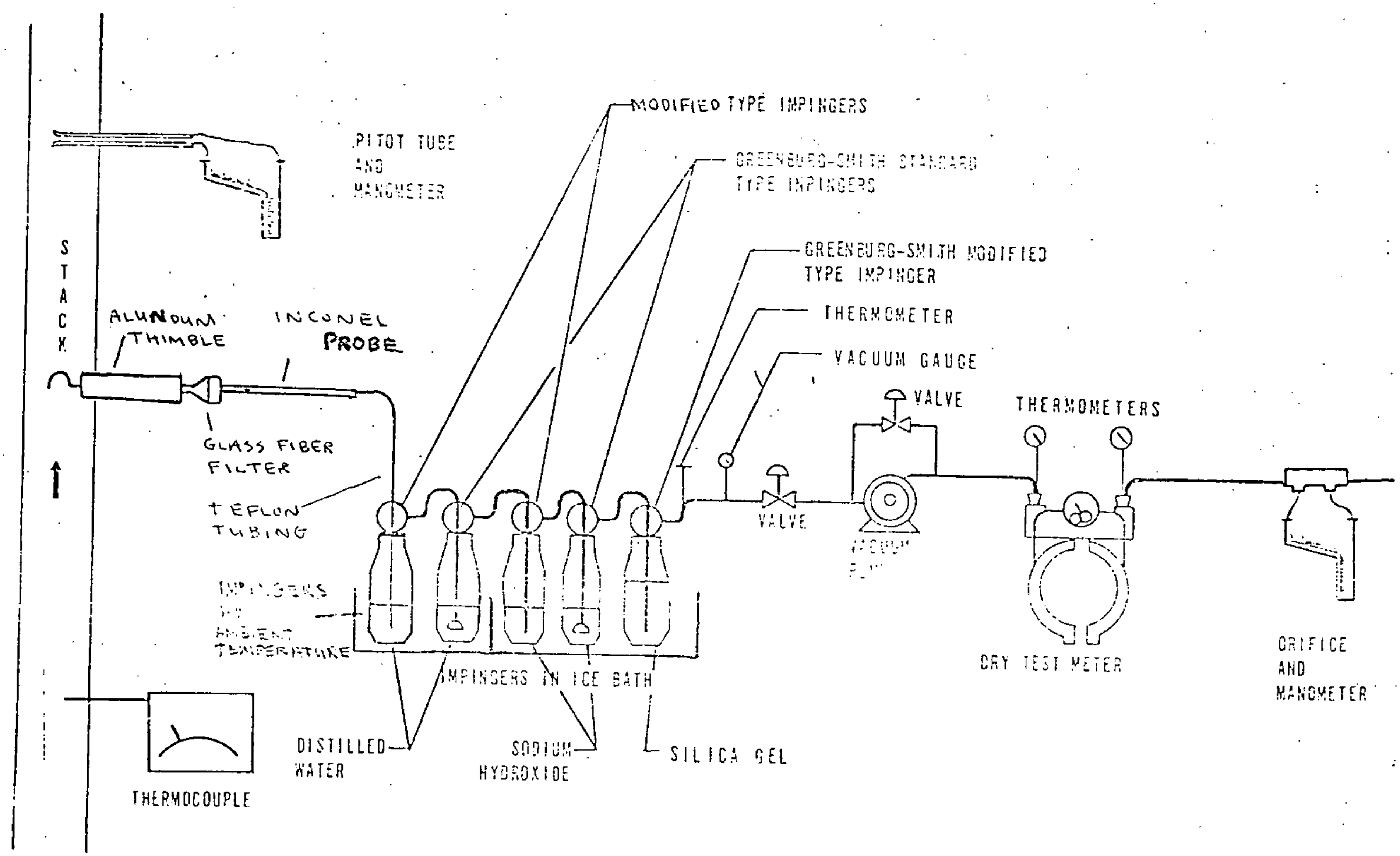
6. Batch cycles: 8' dia. furnaces - 3/day
   10' dia. furnaces - 2/day

7. All process parameters will be monitored during the tests.

X. STACK AND VENT DESCRIPTION

See attached sketches.

ASME POWER TEST CODE PTC-27
MODIFIED SAMPLING TRAIN



I-25

"STAKSAMPLER"

ROY F. WESTON, INC.

APPENDIX J

APPENDIX J

SAMPLE CALCULATIONS

Particulate Calculations

Example: Run 1, Scrubber Number Two Inlet

1. Volume of dry gas sampled at standard conditions: 70°F., 29.92 in. Hg, cu.ft.

$$V_{m_{std}} = \frac{17.7 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)} = \frac{17.7 \times 63.597\left(30.34 + \frac{.405}{13.6}\right)}{(79.1 + 460)} =$$

$$= 63.42 \text{ cu.ft.}$$

2. Volume of water vapor at 70°F and 29.92 in. Hg, cu.ft.

$$V_{w_{gas}} = 0.0474 \times V_w = 0.0474 \times 40 = 1.896$$

3. Percent moisture in stack gas.

$$\%M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \times 1.896}{63.42 + 1.896} = 2.90$$

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100} = \frac{100 - 2.90}{100} = 0.971$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left(\%CO_2 \times \frac{44}{100}\right) + \left(\%O_2 \times \frac{32}{100}\right) + \left[(\%CO + \%N_2) \times \frac{28}{100}\right]$$

$$\left(1.4 \times \frac{44}{100}\right) + \left(17.8 \times \frac{32}{100}\right) + \left[(0.4 + 80.4) \times \frac{28}{100}\right] = 28.936$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\,(1 - M_d) = 28.936 \times .971 + 18\,(1 - .971) = 28.579$$

7. Stack velocity at stack conditions, fpm

$$V_s = 4359 \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2} =$$

$$4359 \times 19.45 \left[\frac{1}{30.3 \times 28.58}\right]^{1/2} = 2881.1 \text{ fpm}$$

8. Stack gas volume at standard conditions*, SCFM

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times 2881.1 \times 1256.6 \times .971 \times 30.3}{(438.3 + 460)} =$$

$$= 14584 \text{ SCFM}$$

9. Percent Isokinetic

$$\%I = \frac{1032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2} = \frac{1032 \times (438.3 + 460) \times 63.42}{2881.1 \times 180 \times 30.3 \times .971 \times (.188)^2} =$$

$$= 109.0$$

*70°F, 29.92 in Hg

10. Particulate: ASME-PTC-27, gr/SCF*, Dry Basis

$$C_{as} = 0.0154 \frac{M_a}{V_{m_{std}}} = 0.0154 \times \frac{1815.7}{63.42} = 0.4409 \text{ gr/SCF}$$

11. Particulate: EPA-5, gr/SCF, Dry Basis

$$C_{es} = 0.0154 \frac{M_e}{V_{m_{std}}} = 0.0154 \times \frac{1929.5}{63.42} = 0.4685 \text{ gr/SCF}$$

12. Particulate: Total, gr/SCF, Dry Basis

$$C_{ts} = 0.0154 \frac{M_t}{V_{m_{std}}} = 0.0154 \times \frac{2193.1}{63.42} = 0.5325 \text{ gr/scf}$$

13. Particulate: ASME-PTC 27, gr/ACF

$$C_{aa} = \frac{17.7 \times C_{as} \times P_s \times Md}{T_s + 460} = \frac{17.7 \times .4409 \times 30.3 \times .971}{(438.3 + 460)}$$

$$= 0.2555 \text{ gr/ACF}$$

14. Particulate: EPA-5, gr/ACF

$$C_{ea} = \frac{17.7 \times C_{es} \times P_s \times Md}{T_s + 460} = \frac{17.7 \times .4685 \times 30.3 \times .971}{438.8 + 460}$$

$$= 0.2714 \text{ gr/ACF}$$

15. Particulate: Total, gr/ACF

$$C_{ta} = \frac{17.7 \times C_{ts} \times P_s \times Md}{T_s + 460} = \frac{17.7 \times .5325 \times 30.3 \times .971}{438.8 + 460}$$

$$= 0.3085 \text{ gr/ACF}$$

16. Particulate: ASME-PTC 27, lb/hr

$$PMR_q = 0.00857 \times C_{as} \times Q_s =$$

$$0.00857 \times .4409 \times 14584 = 55.11 \text{ lb/hr}$$

*70°F, 29.92 in. Hg

17. Particulate: EPA-5, lb/hr

$$PMR_e = 0.00857 \times C_{es} \times Q_s =$$

$$0.00857 \times .4685 \times 14584 = 58.56 \text{ lb/hr}$$

18. Particulate: Total, lb/hr

$$PMR_t = 0.00857 \times Ct_s \times Q_s =$$

$$0.00857 \times .5325 \times 14584 = 66.55 \text{ lb/hr}$$

19. Particulate: ASME-PTC 27, lb/ton charge

$$Mac = \frac{PMR_a}{Mc} = \frac{55.11}{3.7565} = 14.67 \text{ lb/ton charge}$$

20. Particulate: EPA-5, lb/ton charge

$$M_{ec} = \frac{PMR_e}{Mc} = \frac{58.56}{3.7565} = 15.59 \text{ lb/ton charge}$$

21. Particulate: Total, lb/ton charge

$$Mtc = \frac{PMRt}{Mc} = \frac{66.55}{3.7565} = 17.72 \text{ lb/ton charge}$$

Particulate and Gaseous Contaminants

Run 1, Scrubber #2 Inlet

Particulate Fraction:

1. Chlorides, $\mu g/m^3$

$$\text{Chlorides} = 35310 \times \frac{[\text{Chlorides}]}{V_{m_{std}}} = 35310 \times \frac{375.}{63.42} = 208785.$$

2. Fluorides, $\mu g/m^3$

$$\text{Fluorides} = 35310 \times \frac{[\text{Fluorides}]}{V_{m_{std}}} = 35310 \times \frac{1.07}{63.42} = 595.$$

3. Aluminum, $\mu g/m^3$

$$\text{Al} = 35310 \times \frac{[\text{Al}]}{V_{m_{std}}} = 35310 \times \frac{12.47}{63.42} = 6945.$$

4. Lead, $\mu g/m^3$

$$\text{Pb} = 35310 \times \frac{[\text{Pb}]}{V_{m_{std}}} = 35310 \times \frac{25.63}{63.42} = 14270.$$

5. Cadmium, $\mu g/m^3$

$$\text{Cd} = 35310 \times \frac{[\text{Cd}]}{V_{m_{std}}} = 35310 \times \frac{0.01}{63.42} = 5.6$$

6. Strontium, $\mu g/m^3$

$$\text{Sr} = 35310 \times \frac{[\text{Sr}]}{V_{m_{std}}} = 35310 \times \frac{0.0}{63.42} = 0.0$$

Gaseous Fraction:

1. Hydrogen Chloride, $\mu g/m^3$

$$\text{HCL} = 35310 \times \frac{[\text{Hcl}]}{V_{m_{std}}} = 35310 \times \frac{15.84}{63.42} = 8820.$$

2. Chlorides, $\mu g/m^3$

$$\text{Chlorides} = 35310 \times \frac{[\text{Chlorides}]}{V_{m_{std}}} = 35310 \times \frac{211}{63.42} = 117475.$$

3. Fluorides, $\mu g/m^3$

$$\text{Fluorides} = 35310 \times \frac{[\text{Fluorides}]}{V_{m_{std}}} = 35310 \times \frac{2.48}{63.42} = 1380.$$

4. Cyanide, $\mu g/m^3$

$$CN = 35310 \times \frac{[CN]}{V_{m_{std}}} = 35310 \times \frac{0.0}{63.42} = 0.0$$

5. Aluminum, $\mu g/m^3$

$$Al = 35310 \times \frac{[Al]}{V_{m_{std}}} = 35310 \times \frac{0.40}{63.42} = 225.$$

6. Lead, $\mu g/m^3$

$$Pb = 35310 \times \frac{[Pb]}{V_{m_{std}}} = 35310 \times \frac{0.04}{63.42} = 22.$$

7. Cadmium, $\mu g/m^3$

$$Cd = 35310 \times \frac{[Cd]}{V_{m_{std}}} = 35310 \times \frac{0.016}{63.42} = 8.9$$

8. Strontium, $\mu g/m^3$

$$Sr = 35310 \frac{[Sr]}{V_{m_{std}}} = 35310 \times \frac{0.0}{63.42} = 0.0$$

Total Particulate and Gaseous Contaminants:

1. Hydrogen Chloride, $\mu g/m^3$

$$Hcl = Hcl_g = 8820$$

2. Chlorides, $\mu g/m^3$

$$\text{Chlorides} = \text{Chlorides}_p + \text{Chlorides}_g = 208785 + 117475 = 326260$$

3. Fluorides, $\mu g/m^3$

$$\text{Fluorides} = \text{Fluorides}_p + \text{Fluorides}_g = 595 + 1380 = 1975.$$

4. Cyanide, $\mu g/m^3$

$$CN = Cyanide_g = 0.0$$

5. Aluminum, $\mu g/m^3$

$$Al = Al_p + Al_g = 6945 + 225 = 7170.$$

6. Lead, $\mu g/m^3$

$$Pb = Pb_p + Pb_g = 14270 + 22 = 14292.$$

7. Cadmium, $\mu g/m^3$

$$Cd = Cd_p + Cd_g = 5.6 + 8.9 = 14.5$$

8. Strontium, $\mu g/m^3$

$$Sr = Sr_p + Sr_g = 0.0 + 0.0 = 0.0$$

APPENDIX K

OHIO EPA REGULATIONS

Regulations of the Ohio Air Pollution Control Board

EP-11-11. Restriction of emission of particulate matter from industrial processes.

(A) General provisions.

(1) This regulation applies to any operation, process, or activity from which particulate matter is emitted except (a) the burning of fuel for the primary purpose of producing heat or power by indirect heating in which the products of combustion do not come into direct contact with process materials, (b) the burning of refuse, and (c) the processing of salvageable material by burning.

(2) Emission restriction requirements for sources not exempted under subsection (A)(1) above are specified in Figure II and in Table I. Figure II relates Uncontrolled Mass Rate of Emission (abscissa) to maximum allowable mass rate of emission (ordinate). Table I relates process weight rate to maximum allowable mass rate of emission. Figure II shall apply where the Uncontrolled Mass Rate of Emission can be ascertained by an acceptable method, such as stack tests, materials balance, or application of an emission factor characterization from a reference such as U.S. EPA Publication EP-42, Compilation of Air Pollutant Emission Factors, 2nd Edition, April, 1973. Table I shall apply in Priority I regions where the Uncontrolled Mass Rate of Emission cannot be ascertained by an acceptable method. In Priority I regions, where both the process weight rate and the Uncontrolled Mass Rate of Emissions can be determined for a source, the more stringent of the applicable values from Figure II and Table I shall govern that source.

(3) Compliance with the limits specified in section (B) of this regulation shall be determined by sampling and other measurements made at the air contamination source or sources prior to the point at which air contaminants are

emitted to the atmosphere. The uncontrolled mass rate of emission may be determined by sampling in the stack upstream from the inlet of the control equipment. Estimating techniques approved by the Board may be substituted for the above required source testing.

(4) The amount of particulate matter emitted shall be determined by test methods 1 through 5 set forth in the Appendix on Test Methods to 40 CFR, Part 60 - Standards of Performance for New Stationary Sources, as amended, with any modifications required by specific sampling needs or conditions. The Director may refuse to accept the results of test conducted without a prior review of the test specifications by an Ohio EPA District Office or delegate agency. Test specifications must be submitted for this purpose at least 30 days before the proposed test date.

(5) For purposes of Figure II, the total uncontrolled mass rate of emission from all similar process units at a plant, such units being united either physically or operationally, or otherwise located in close proximity to each other, shall be used for determining the maximum allowable mass rate of emission of particulate matter that passes through a stack or stacks.

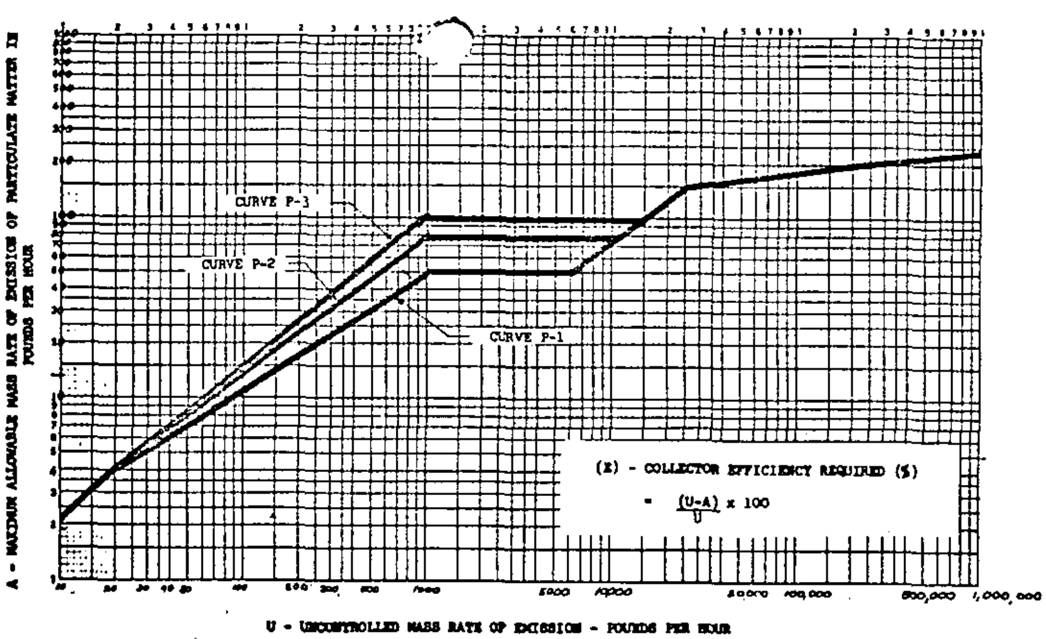


FIGURE II

(6) For purposes of Table 1, process weight per hour is the total weight of all materials introduced into any single, specific process that may cause any emission of particulate matter. Solid fuels charged will be considered as part of the process weight, but liquid and gaseous fuels and combustion air will not. For a cyclical or batch operation, the process weight per hour will be derived by dividing the total process weight by the number of hours in one complete operation from the beginning of any given process to the completion thereof, excluding any time during which the equipment is idle. For a continuous operation, the process weight per hour will be derived by dividing the process weight for a typical period to time.

TABLE I

ALLOWABLE RATE OF EMISSION BASED ON PROCESS WEIGHT RATE

PROCESS WEIGHT RATE		RATE OF EMISSION	PROCESS WEIGHT RATE		RATE OF EMISSION
Lb/Hr	Tons/Hr	Lb/Hr	Lb/Hr	Tons/Hr	Lb/Hr
100	0.05	0.551	16,000	8.00	16.5
200	0.10	0.877	18,000	9.00	17.9
400	0.20	1.40	20,000	10.	19.2
600	0.30	1.83	30,000	15.	25.2
800	0.40	2.22	40,000	20.	30.5
1,000	0.50	2.58	50,000	25.	35.4
1,500	0.75	3.38	60,000	30.	40.0
2,000	1.00	4.10	70,000	35.	41.3
2,500	1.25	4.76	80,000	40.	42.5
3,000	1.50	5.38	90,000	45.	43.6
3,500	1.75	5.96	100,000	50.	44.6
4,000	2.00	6.52	120,000	60.	46.3
5,000	2.50	7.58	140,000	70.	47.8
6,000	3.00	8.56	160,000	80.	49.0
7,000	3.50	9.49	200,000	100.	51.2
8,000	4.00	10.4	1,000,000	500.	69.0
9,000	4.50	11.2	2,000,000	1,000.	77.6
10,000	5.00	12.0	6,000,000	3,000.	92.7
12,000	6.00	13.6			

(B) Emission limitations.

(1) No person shall cause, suffer, allow, or permit the emission of particulate matter in any one hour from any source in excess of the amount shown in the following Figure II.

(2) All persons located within air quality control regions classified as Priority I Regions shall attain or exceed that degree of emission reduction specified by Curve P-1 by the effective date of this regulation.

(3) All persons located within air quality control regions classified as Priority II and III Regions shall attain or exceed that degree of emission reduction specified by Curve P-2 by the effective date of this regulation.

(4) All persons located within air quality control regions classified as Priority II and III Regions shall attain or exceed, no later than July 1, 1975, that degree of emission reduction specified by Curve P-1.

AP-3-07. Control of visible air contaminants from stationary sources.

(A) Emission limitation.

(1) No person shall discharge into the atmosphere from any single source of emission whatsoever any air contaminant of a shade or density equal to or darker than that designated as No. 1 on the Ringelmann Chart or 20 percent opacity, except as set forth in subsection (A) (2) and section (B) of this regulation.

(2) A person may discharge into the atmosphere from any single source of emission for a period of periods aggregating not more than three minutes in any sixty minutes or for a period of time deemed necessary by the Board, air contaminants of a shade or density not darker than No. 3 on the Ringelmann Chart or 60 percent opacity.

(B) Uncombined water.

It shall be deemed not to be a violation of this regulation where the presence of uncombined water is the only reason for failure of an emission to meet the requirements of this regulation.

(Adopted January 28, 1972; effective February 15, 1972).