STACK TEST

FACILITY: Barrett Paving Material Inc. 0855100450
10400 Haddix Rd.
Fairborn, OH. 45324
This plant is # 142
It is located in Clark Co.

CONTACT: David Collins and Jim Meckstroat

RAPCA REP: Sharon Kunselman + Jon Hilty

DATE: 6/9/94

This portable plant, #142, has been in operation at this site since April 1993. PTI # 08-2909 for this source meets NSPS and allows the plant to burn recycled used oil. The stack was tested for particulates at a limit of 0.04 grain/dry standard cubic foot of exhaust gases and for lead at a limit of 0.05 lb/hr. Visible emissions are limited to 20% opacity. Fugitive emissions in other areas are either limited to zero or must be at a minimal.

90% of a maximum 280 t/hr capacity rate is 252 t/hr. The kiln (dryer) ran at an average of 250 to 252 t/hr. Even though this plant uses 10% rap (recycled asphalt) on a daily basis, the supervisor chose to use a 100% virgin mix for testing purposes.

One oil sample was taken during each run. Each sample was taken from a tap just before the fuel line entered the mouth of the kiln. These samples will be combined and the composite sample will be tested for the required specifications listed in the PTI.

RAPCA only observed run #1 and run #2. Production rates, run times and VE sheets are attached. The stack plume was full of steam with no particulate fall out. Once the ambient air temperatures reached 80°, the stack was perfectly clear.

Two minor areas of fugitive dust were noted. Fugitives escaped the recycle auger which pushes baghouse fines back into the process. This leak only occurred when the kiln was below normal process rates (during fire-up or shut down). I asked the operator if he could correct this problem and he stopped the leak with rags and duct tape. Fugitives were also produced when the operator opened the mid-section of the elevator to release left-

over dry material which did not get mixed with the asphaltic concrete. The free fall drop is about 10' and lasts for about 5 min. This is part of the operators procedure when he brings the kiln back on line. Both areas of fugitive dust are intermittent and do not require follow-up.

All other areas for possible fugitive dust looked very good. The elevator, vibrating screens, weigh hopper, front-end loader, storage bins, silos, conveyors and transfer points had zero or minimal emissions.

The operator's control board monitors inlet and outlet temperatures for the baghouse and continuously monitors the pressure drop across the filters. I asked the operator to keep a notebook to record the pressure drop at the beginning and end of each work day.

David Collins and I went over the record keeping and reporting requirements of the PTI. He showed me where the chemical analysis sheets for the oil are kept. He checks the analysis against permit limitations before he accepts an oil shipment. I asked him to keep a notebook for maintenance and malfunction of the baghouse. I explained 3745-15-06. Production records are SOP. A PM and MAP should be submitted with the PTO application.

	START TIME	END TIME	AVG.RATE
RUN #1	10:35	11:24	250 T/H
	12:54	1:17	252 T/H
RUN #2	2:30	3:42	250 T/H

MEMORANDUM

June 15, 1994

TO: BARRETT PAVING (FAIRBORN) FILE

FROM: JON HILTY

SUBJECT: BARRETT PAVING EMISSION TEST 6-10-94

Run #3 was performed on 6-10-94 due to lack of production on the previous day. Run #3 was stopped after 50 minutes due to lack of production. The run should be considered valid (Ref. 40CFR60, Subpart D, Section 60.46, Attached).

Application of the F Factor to EPA Method 5

It appears that much confusion has arisen with regard to the use of the F factor in reporting Method 5 data. In the *Code of Federal Regulations*, 40CFR60.46, under Test Methods and Procedures for the New Source Performance Standards, emissions expressed in terms of lb/10^6 Btu are to be determined using the formula

(Eq.9-12)
$$E = c_s F_d \frac{20.9}{20.9 - \%O_2}$$

Reproduced below is: **"PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES."**

Subpart D—Standards of Performance for Fossil-Fuel Fired Steam Generators

§ 60.46 Test methods and procedures.

(a) The reference methods in Appendix A of this part, except as provided in § 60.8(b), shall be used to determine compliance with the standards as prescribed in §§ 60.42, 60.43, and 60.44 as follows:

(1) Method 1 for selection of sampling site and sample traverses.

(2) Method 3 for gas analysis to be used when applying Reference Methods 5, 6 and 7.

(3) Method 5 for concentration of particulate matter and the associated moisture content.

(4) Method 6 for concentration of SO_2, and

(5) Method 7 for concentration of NO_x.

(b) For Method 5, Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least 60 minutes and the sample volume shall be 0.85 dscm (30 dscf) except that shorter sampling times or volumes, when necessitated by process variables or other factors, may be approved by the Administrator. The probe and filter holder heating systems in the sampling train shall be set to provide a gas temperature no greater than 433 K (320°F).

(c) For Methods 6 and 7, the sampling site shall be the same as that selected for Method 5. The sampling point in the duct shall be at the centroid of the cross section or at a point no closer to the walls than 1 m (3.28 ft). For Method 6, the sample shall be extracted at a rate proportional to the gas velocity at the sampling point.

(d) For Method 6, the minimum sampling time shall be 20 minutes and the minimum sampling volume 0.02 dscm (0.71 dscf) for each sample. The arithmetic mean of two samples shall constitute one run. Samples shall be taken at approximately 30-minute intervals.

(e) For Method 7, each run shall consist of at least four grab samples taken at approximately 15-minute intervals. The arithmetic mean of the samples shall constitute the run value.

(f) For each run using the methods specified by paragraphs (a)(3), (a)(4), and (a)(5) of this section, the emissions expressed in ng/J (lb/million Btu) shall be determined by the following procedure:

$$E = CF(20.9/20.9 - \text{percent } O_2)$$

where:

(1) E=pollutant emission ng/J (lb/million Btu).

(2) C=pollutant concentration, ng/dscm (lb/dscf), determined by method 5, 6, or 7.

(3) Percent O_2=oxygen content by volume (expressed as percent), dry basis. Percent oxygen shall be determined by using the integrated or grab sampling and analysis procedures of Method 3 as applicable.

The sample shall be obtained as follows:

(i) For determination of sulfur dioxide and nitrogen oxides emissions, the oxygen sample shall be obtained simultaneously at the same point in the duct as used to obtain the samples for Methods 6 and 7 determinations, respectively [§ 60.46(c)]. For Method 7, the oxygen sample shall be obtained using the grab sampling and analysis procedures of Method 3.

(ii) For determination of particulate emissions, the oxygen sample shall be obtained simultaneously by traversing the duct at the same sampling location used for each run of Method 5 under paragraph (b) of this section. Method 1 shall be used for selection of the number of traverse points except that no more than 12 sample points are required.

(4) F=a factor as determined in paragraphs (f) (4), (5) or (6) of § 60.45.

Run Began 10:35AM STOP AT 11:24 RUN#1

Visible Emission Observation Form

START 10:57 PTI #08-2909

SOURCE NAME	Barrett Paving Materials Inc
ADDRESS	10400 Haddix Rd
	Plant #142 (Clark Co)
CITY	Fairborn
STATE	OH
ZIP	45324
PHONE	879-4727
SOURCE ID NUMBER	0855100450
PROCESS EQUIPMENT	Aggregate Kiln
OPERATING MODE	249 to 253TPH
CONTROL EQUIPMENT	6 Compartment Baghouse
OPERATING MODE	IN 270° OUT 240°
DESCRIBE EMISSION POINT	START rectangular metal STACK STOP SAME → OF Plume
HEIGHT ABOVE GROUND LEVEL	START 34' STOP 34'
HEIGHT RELATIVE TO OBSERVER	START 75' STOP 75'
DISTANCE FROM OBSERVER	START 50' STOP 50'
DIRECTION FROM OBSERVER	START 315°N STOP 315°W
DESCRIBE EMISSIONS	START N/A only see white steam STOP N/A
EMISSION COLOR	STEAM START N/A STOP N/A
PLUME TYPE	CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☐ YES ☑
IF WATER DROPLET PLUME	ATTACHED ☑ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 45 ft from EXIT STOP (SAME) AT END OF STEAM Plume.
DESCRIBE BACKGROUND	START SKY STOP SKY
BACKGROUND COLOR	START DEEP Sky Blue STOP SAME
SKY CONDITIONS	not in my view START Cloud to West STOP SAME
WIND SPEED	START 3-5 Knots STOP 3-5 Knots
WIND DIRECTION	START ENE 75° STOP ENE 75°
AMBIENT TEMP.	START 68° STOP 68°
WET BULB TEMP.	
RH. percent	54%

OBSERVATION DATE	START TIME	STOP TIME
6-9-94	10:57	11:14

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD / NUMBER OF READINGS ABOVE % WERE

RANGE OF OPACITY READINGS MINIMUM / MAXIMUM

OBSERVER'S NAME (PRINT) SHARON G. Kunselman

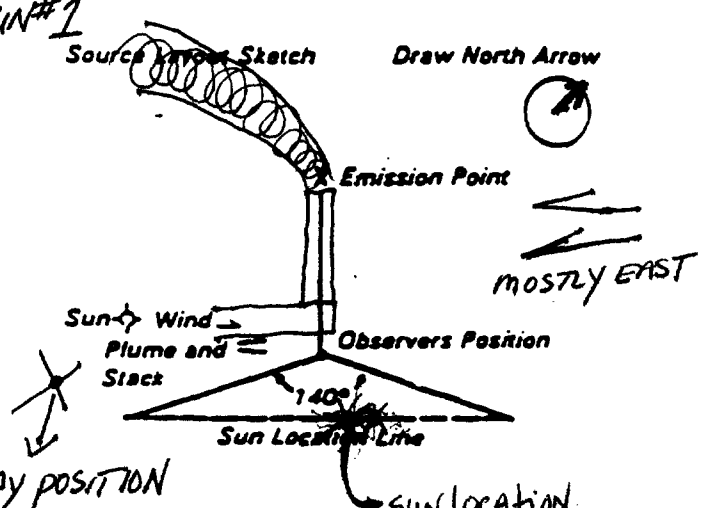
OBSERVER'S SIGNATURE Sharon G. Kunselman DATE 6-9-94

ORGANIZATION R.A.P.C.A.

CERTIFIED BY Eastern Tech. Assoc. DATE 3-3-94

VERIFIED BY Joe Spivey DATE 3.3.94.

RUN#1



COMMENTS STACK IS 35°N from observer

" " 41' " "

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE I was sitting on the ground
TITLE DISTANCE AND DIRECTION DATE

Run #2 — Visible Emission Observation Form — RUN #2

SOURCE NAME: Barrett Paving Material Inc	OBSERVATION DATE: 6-9-94	START TIME: 2 53
ADDRESS: 10400 Haddix Rd.		STOP TIME: 3:04
Plant #142 (CLARK Co.)		
CITY: Fairborn	STATE: Oh.	ZIP: 45324.
PHONE: 879-4727	SOURCE ID NUMBER: 0855100450	
PROCESS EQUIPMENT: Aggregate Kiln	OPERATING MODE: AVG.	
CONTROL EQUIPMENT: Baghouse	OPERATING MODE: IN operation	
DESCRIBE EMISSION POINT: START rectangular metal stack STOP SAME		
HEIGHT ABOVE GROUND LEVEL: START 34' STOP 34'	HEIGHT RELATIVE TO OBSERVER: START 32' STOP 32'	
DISTANCE FROM OBSERVER: START 65' STOP 65'	DIRECTION FROM OBSERVER: START 60° E STOP 60° E	
DESCRIBE EMISSIONS: START N/A STOP N/A		
EMISSION COLOR: START N/A STOP N/A	PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☑	IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☑	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START At stack exit STOP AT STACK EXIT.		
DESCRIBE BACKGROUND: START Sky - clouds STOP Sky - clouds		
BACKGROUND COLOR: START White STOP White	SKY CONDITIONS: START cloudy STOP cloudy	
WIND SPEED: START 3-5 Knots STOP 3-5 Knots	WIND DIRECTION 20°: START ENE STOP ENE	
AMBIENT TEMP: START 80° STOP 80°	WET BULB TEMP.	RH, percent: 33%

SEC / MIN	0	15	30	45	MIN	0	15	30	45
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	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
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21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: / NUMBER OF READINGS ABOVE % WERE: /

RANGE OF OPACITY READINGS: MINIMUM / MAXIMUM /

OBSERVER'S NAME (PRINT): Sharon G. Kunselman

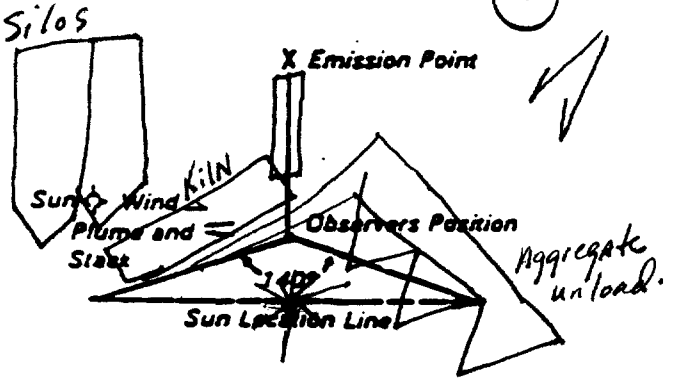
OBSERVER'S SIGNATURE: Sharon G. Kunselman DATE: 6-9-94

ORGANIZATION: R. A. P. C. A.

CERTIFIED BY: Eastern Tech. Assoc. DATE: 3.3.94

VERIFIED BY: Joe Spivey. DATE: 3.3.94.

Source Layout Sketch — Draw North Arrow



COMMENTS: Only small amounts of intermittent steam present for very short periods of time

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE

COMPLIANCE EMISSIONS TEST REPORT
DETERMINATION OF
FILTERABLE PARTICULATE AND LEAD EMISSIONS
FROM ASPHALT PLANT
BARRETT PAVING MATERIALS,INCORPORATED
FAIRBORN, OHIO

prepared for

BARRETT PAVING MATERIALS, INC.
727 East Ash Street
P.O. Box 1458
Piqua, Ohio 45356

prepared by

HAYDEN ENVIRONMENTAL GROUP, INC.
561 Congress Park Drive
Dayton, Ohio 45459

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Bruce A. Sarven
Reviewed By
Bruce A. Sarven
Project Manager
Emissions Measurement Division

July 6, 1994
P.N. 266.010

EXECUTIVE SUMMARY

Hayden Environmental Group, Incorporated was retained by the Barrett Paving Materials, Incorporated to perform a compliance filterable particulate and lead emissions evaluation on their drum mix asphalt plant located in Fairborn, Ohio. The evaluation was performed to demonstrate compliance with Ohio Environmental Protection Agency regulations restricting air emissions from stationary sources. Emission samples were collected from the baghouse outlet stack using USEPA Reference Methods for stationary source sampling. The tests were conducted on June 9-10, 1994. The results of the evaluation are summarized below.

Summary of Emissions

Run No.	Particulate Emission Rate	Lead Emission Rate
	(lb/hr)[a]	(lb/hr)[a]
1	2.33	2.09E-04
2	1.16	3.65E-04
3	1.40	3.27E-04
Average	1.63	3.00E-04

[a] pounds per hour

TABLE OF CONTENTS

1.0 INTRODUCTION

Hayden Environmental Group, Incorporated (Hayden) was contracted by Barrett Paving Materials, Incorporated (Barrett) to perform a compliance emissions evaluation to determine the filterable particulate and lead (Pb) emissions from their drum mix asphalt plant located in Fairborn, Ohio. Emission samples were collected and stack gas parameters measured at the outlet stack of the baghouse. A composite waste fuel oil sample was collected and analyzed for arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), total halogens, polychlorinated biphenyls (PCBs), flash point, and heat content.

Triplicate tests were performed using USEPA Reference Methods 1, 2, 3, 4, 5, and 12. Test runs #1 and #2 were performed on Thursday, June 8, and test run #3 on Friday, June 10, 1994. The emissions testing was performed by the Hayden test team of Messrs. Dale Davidson, Bert Forsyth, and Rick Mendenhall. Messrs. James Meckstroth and Dave Collins of Barrett coordinated test schedules with plant production and operations. Mr. John Hilty and Ms. Sharon Kunselman from the Regional Air Pollution Control Agency (RAPCA) were on site to verify process conditions and witness test procedures. Analyses of the emissions and fuel oil samples were performed by Hayden Laboratories located in Miamisburg, Ohio.

2.0 PROCESS AND SAMPLING SITE DESCRIPTION

Barrett produces asphaltic paving materials at their drum mix asphalt plant located in Fairborn, Ohio. The plant was manufactured by Caterpillar and rated for an maximum production of approximately 300 tons per hour and typically operated at 220-240 tons per hour.

In the asphalt production process, raw aggregate of various sizes and proportions are fed from feeder bins into an oil fired rotary drum kiln where it is heated, mixed and dried. Asphalt cement is mixed with the dried materials as it exits the drum drier. Recycled asphalt can also be added into the drum. The finished product is loaded into one of two storage silos, one with a capacity of 180 tons and the other 130 tons. The drum kiln can be fired with either #4 diesel fuel or waste oil.

Exhaust emissions from the drum kiln are ducted through an emissions control system consisting of a fabric filter baghouse. The exhaust gases from the baghouses are vented to the atmosphere through an approximate 35 inch by 47.5 inch rectangular stack. A simplified diagram of the process and emissions control system is included in Figure 2.1.

Emissions sampling and testing were performed from five (5) sampling ports located on the baghouse outlet stack. The sampling ports were located approximately 141 inches (3.5 equivalent stack diameters) downstream and 56 inches (1.2 equivalent stack diameters) upstream from the nearest disturbances. Twenty-four (24) sampling and velocity traverse points in a 5 x 5 matrix, were utilized. A simplified diagram of the sampling site is shown in Figure 2.2.

The drum kiln was fired with used burner fuel during the emissions testing. Production rates and process operating conditions were monitored and recorded by Barrett personnel. A summary of the production rates during testing is shown in Table A.1 and included in Appendix A.

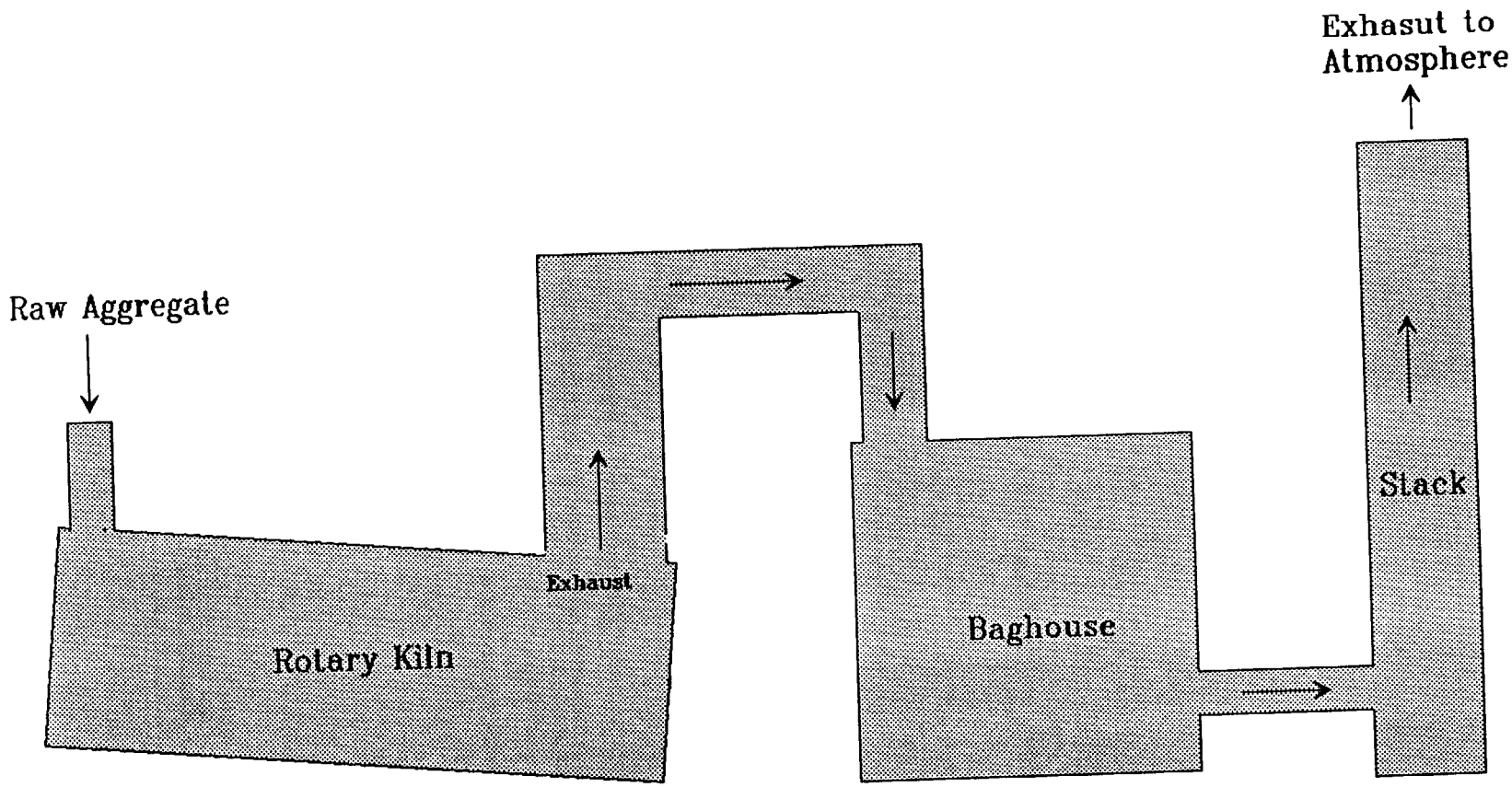


Figure 2.1 Process Diagram

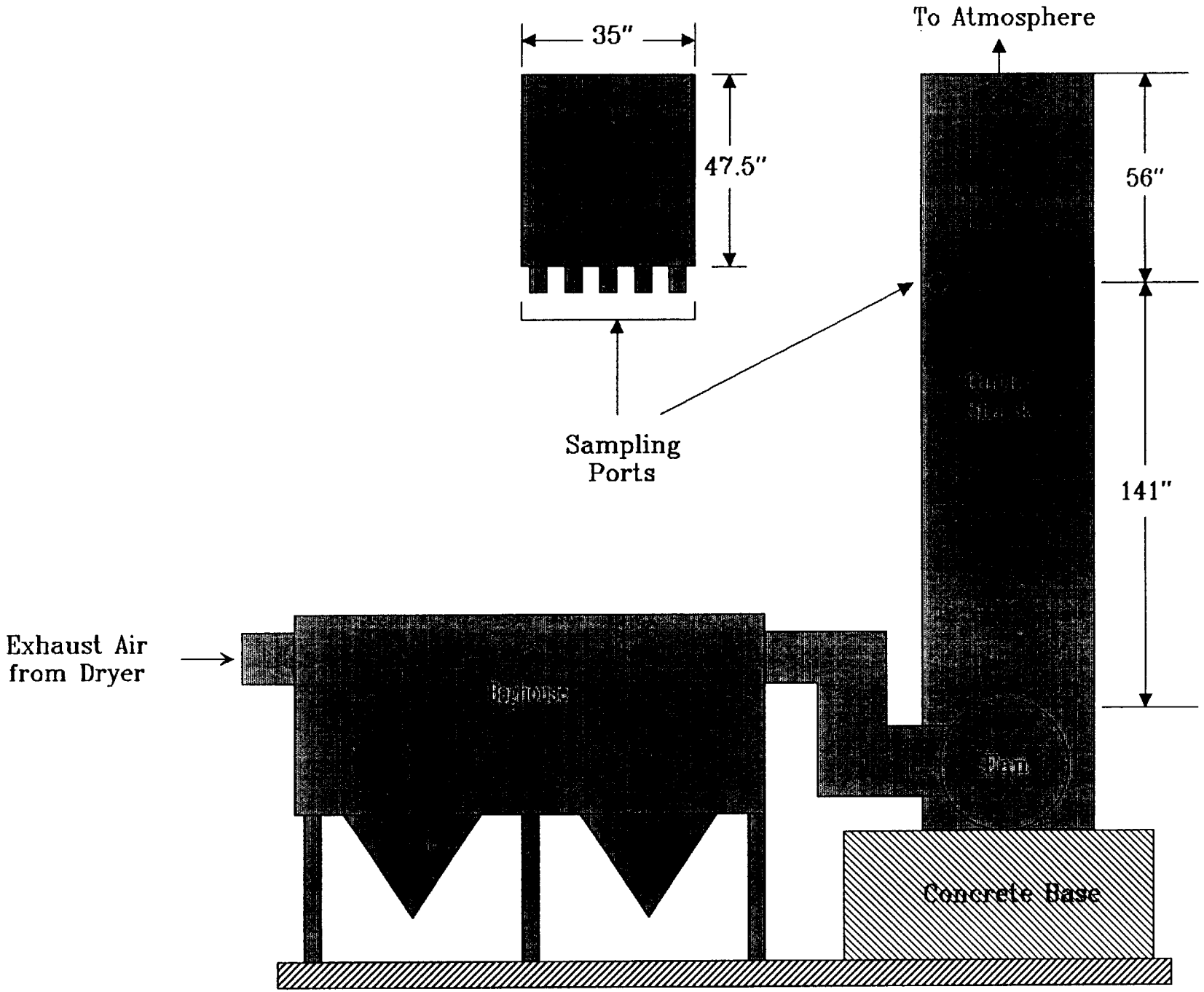


Figure 2.2. Simplified Drawing of Sampling Site

3.0 SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures used were performed in general conformance to the most recent revisions of the USEPA Reference Methods for stationary sources. A brief description of each procedure used is included below:

3.1 Measurement Sites (USEPA Method 1)

The location of measurement sites and the number of traverse points were determined using USEPA Reference Method 1, "Sample and Velocity Traverses for Stationary Sources."

3.2 Velocities and Volumetric Flow Rates (USEPA Method 2)

The stack gas velocity and volumetric flow rate was determined using USEPA Reference Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate." The stack gas velocity was measured on a 10 inch Dwyer oil filled manometer using a calibrated S-Type pitot tube. The stack gas temperature was measured with a calibrated type "K" thermocouple and Omega digital temperature readout.

3.3 Dry Molecular Weight (USEPA Method 3)

The stack gas dry molecular weight was determined using USEPA Reference Method 3, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight." Several grab samples were collected and analyzed during each test with Fyrite combustion gas analyzers which directly measured concentrations of O_2 and CO_2.

3.4 Moisture (USEPA Method 4)

The stack gas moisture contents were determined using USEPA Reference Method 4, "Determination of Moisture Content in Stack Gases." The samples were collected in a series of chilled impingers contained in the particulate sampling train. The moisture collected within the impingers were analyzed by gravimetric analysis.

3.5 Particulate Matter (USEPA Method 5)

The filterable particulate emissions were determined using USEPA Reference Method 5, "Determination of Particulate Emissions from Stationary Sources." The stack gas samples were collected isokinetically through a heated glass lined or stainless steel probe, a heated ($248° \pm 25°$) tared glass fiber filter, and a series of cooled impingers (to condense the moisture). The acetone from each probe rinse was transferred to a tared beaker. The acetone was evaporated at a temperature below its boiling point. The filter and the residue from the probe rinse were analyzed by gravimetric analysis. (Figure 3.1)

3.6 Lead (USEPA Method 12)

The Lead (Pb) emissions were determined using USEPA Reference Method 12, "Determination of Inorganic Lead Emissions from Stationary Sources." The Pb emissions were be collected in conjunction with the particulate emissions. The impingers of the Method 5 train were charged with 0.1N nitric acid to absorb any lead passing through the filter. After the acetone rinse all of the front half glassware was rinsed with nitric acid to remove any lead that was not removed with the acetone rinse. The particulate from the filter and acetone rinse were digested and re-suspended in nitric acid after the particulate had been analyzed. The re-suspended filter and acetone rinse was combined with the 0.1N nitric acid probe rinse and impinger solution. The Pb was analyzed by an inductively coupled argon plasma spectrophotometer (ICAP). A simplified drawing of the particulate and lead sampling train is included in Figure 3.1.

3.7 Fuel Analysis

A composite sample of the fuel oil was be collected during the emissions testing by Barrett personnel. The sample was analyzed for arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), total halogens, polychlorinated biphenyls (PCBs), flash point, and heat content. The metals content of the fuel oil, except for Hg, was analyzed on an inductively coupled argon plasma spectrophotometer (ICAP). The Hg content of the fuel oil was analyzed by cold vapor atomic absorption spectroscopy (CVAAS). The total halogen content of the fuel oil was analyzed by ion chromatograph (IC). The PCBs was analyzed on a gas chromatograph (GC).

Triplicate measurements will be performed for all parameters.

The Hayden air sampling Quality Assurance Program includes procedures for equipment calibration as per USEPA and manufacturers guidelines, use of and strict adherence to standard published procedures, and traceability protocols for the recording and calculation of data. Hayden participate's in the USEPA's National Source Audit Program for Methods 3, 5, 6, 7 and 25.

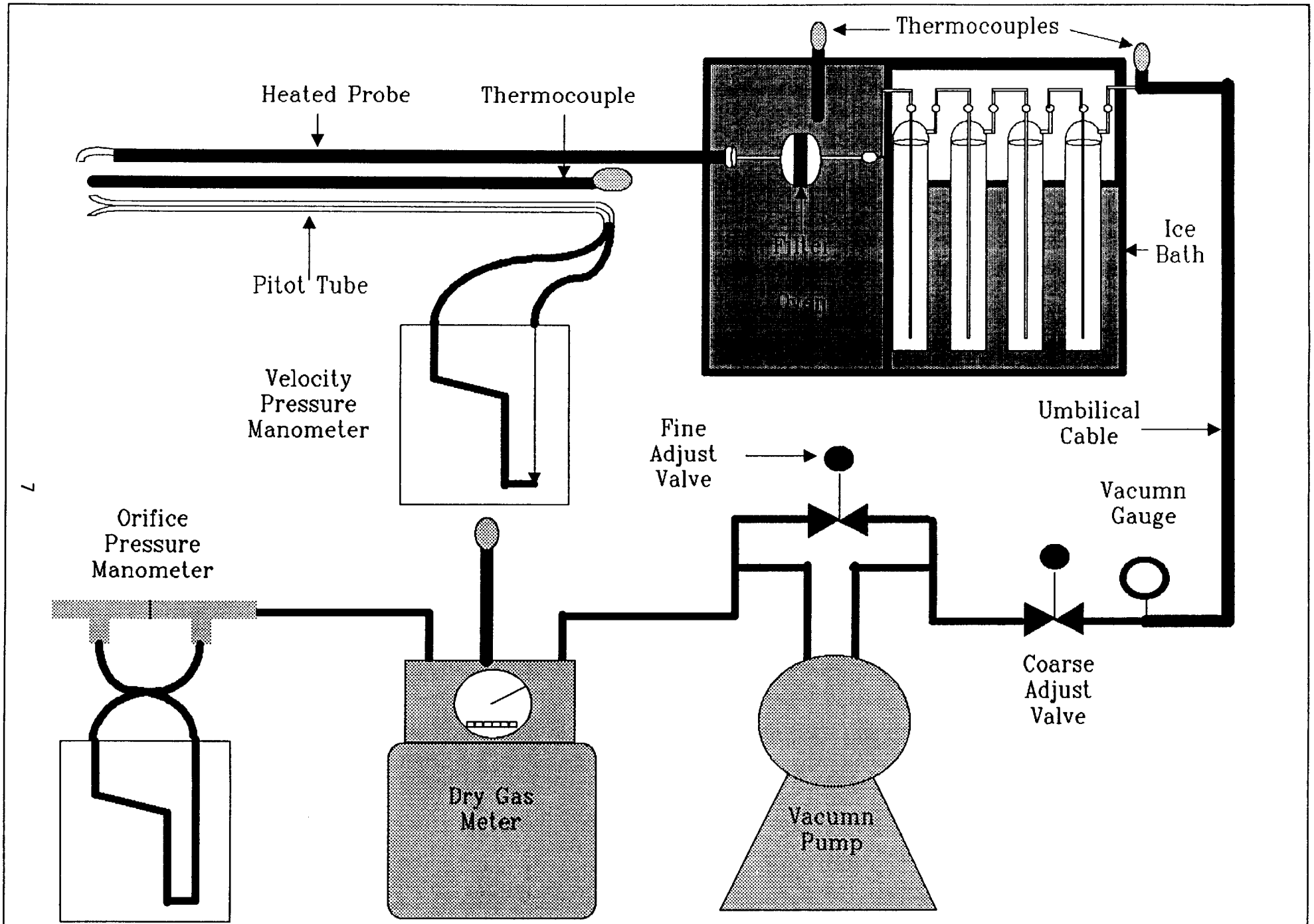


Figure 3.1. Particulate and Lead Sampling Train

4.0 TEST RESULTS

The stack gas conditions are summarized in Table 4.1. The stack gas velocity averaged 50.1 feet per second (fps). The stack gas flow rate averaged 34,689 actual cubic feet per minute (acfm) or 16,390 dry standard cubic feet per minute (dscfm) at 245°F and 35.8% moisture. The average concentrations of oxygen and carbon dioxide were 9.7% and 8.7%, respectively.

The filterable particulate and lead emissions are summarized in Table 4.2. The average filterable particulate concentration was 1.15E-02 grains per dry standard cubic foot (gr/dscf) or 1.65E-06 pounds per dry standard cubic foot (lb/dscf). The average filterable particulate emission rate was 1.63 pounds per hour (lb/hr).

The average lead concentration was 3.08E-10 lb/dscf. The average lead particulate emission rate was 3.00E-04 lb/hr.

Results from analyses of the waste fuel oil sample are contained in Appendix B, "Analytical Data".

Barrett Paving Materials, Inc. / Fairborn

Table 4.1 Summary of Stack Gas Conditions

Run No.	Date; Time	Velocity (fps)[a]	Flow Rate		Temp. (°F)[d]	Moisture (%)	O_2 (%)	CO_2 (%)
			(acfm)[b]	(dscfm)[c]				
1	6/9/94; 1035-1317	51.7	35,798	17,219	242	34.9	8.0	9.0
2	6/9/94; 1428-1542	50.2	34,772	16,209	246	36.6	11.0	9.0
3	6/10/94; 0716-0815	48.4	33,498	15,741	247	35.9	10.0	8.0
Averages		50.1	34,689	16,390	245	35.8	9.7	8.7

[a] feet per second
[b] actual cubic feet per minute
[c] dry standard cubic feet per minute
[d] degrees Fahrenheit

Barrett Paving Materials / Fairborn

Table 4.2 Summary of Particulate and Lead Emissions

Run No.	Time (6/8/94)	Particulate Emissions			Lead Emissions		
		(gr/dscf)[a]	(lb/dscf)[b]	(lb/hr)[c]	(ppm)[d]	(lb/dscf)	(lb/hr)
1	6/9/94 - 1035-1317	1.58E-02	2.26E-06	2.33	3.76E-04	2.02E-10	2.09E-04
2	6/9/94 - 1428-1542	0.83E-02	1.19E-06	1.16	6.99E-04	3.76E-10	3.65E-04
3	6/10/94 - 0716-0815	1.04E-02	1.49E-06	1.40	6.44E-04	3.46E-10	3.27E-04
Averages		1.15E-02	1.65E-06	1.63	5.73E-04	3.08E-10	3.00E-04

[a] grains per dry standard cubic foot
[b] pounds per dry standard cubic foot
[c] pounds per hour
[d] parts per million

5.0 DISCUSSION

An insufficient amount of scheduled production was available to allow three test runs to be performed in one day. Two test runs were performed on Thursday, June 9, 1994 which Mr. Hilty and Ms. Kunselman from RAPCA were on-site to witness. The third test run was performed the following day, Friday, June 10, 1994.

Barrett Paving Materials / Fairborn

Table A.1 Summary of Production and Operating Conditions

Run No.	Date; Time	Asphalt Production (tph)[1]
1	6/9/94; 0916-1045	250
2	6/9/94; 1221-1348	252
3	6/10/94; 1527-1644	250
Averages		251

[1] tons per hour

METHOD 1 TRAVERSE POINT LOCATION FOR RECTANGULAR DUCTS

Client: Bennett/Faibon PN: 266.010 Date: 6/4/94

Source: Asphalt Plant Site: Baghouse Outlet Stack Run: All

Calculated By: DCJ

INSIDE DUCT DIMENSIONS: 35 x 47 1/2 "

NIPPLE DEPTH: —

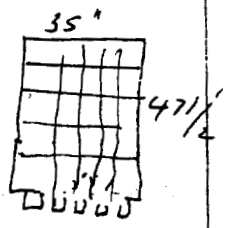
EQUIVALENT STACK DIAMETER: 40.3

NEAREST UPSTREAM DISTURBANCE: 141" = 3.5 dia.

NEAREST DOWNSTREAM DISTURBANCE: 56" = 1.2 dia

NUMBER OF TRAVERSE POINTS: 24 req. → use 25

MATRIX: 5 x 5



TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE PT.	NIPPLE DEPTH	TRAVERSE POINT LOCATION	PORT LOCATION	DISTANCE FROM EDGE OF STACK
1	4.8"	N/A	4.8"	A	3.5"
2	14.3		14.3"	B	10.5"
3	23.8		23.8"	C	17.5"
4	33.3		33.3"	D	24.5"
5	~~38~~ 42.8		42.8"	E	31.5~~28~~"

NOMOGRAPH DATA

Client: Bennett/Fairborn PN: 266.010 Date: 6/9/94
Source: Asphalt Plant Site: Baghouse Outlet stack Run: All
Calculated By: DLD

	(1)	(2)	(#3) 6/14/94
Barometric Pressure, Pb (in. Hg)	29.45	29.45	
Static Pressure, Pg (in. Hg)			
Orifice Constant, ΔH@ (in. H20)	N3 - 1.85	1.85	1.85
Average Meter Temperature, Tm (°F)	≈75°F	80°F	≈75
Moisture in the Stack Gas, Bws (%)	≈30%	≈35%	≈35%
Meter Pressure, Pm (in. Hg)			
Absolute Pressure of the Stack Gas, Ps (in. Hg)			
Ps/Pm	≈.99	≈.99	≈.99
Average Stack Temperature, Ts (°F)	≈250°F	≈250	≈250
Average Velocity Pressure, ΔP (in. H2O)	0.55	.55	
Maximum Velocity Pressure, ΔP (in. H2O)	1.20	1.20	
C Factor	.60	.54	
Calculated Nozzle Diameter (in.)	.290	.295	
Actual Nozzle Diameter (in.)	.308	.299	
Reference ΔP (in H2O)	.44	.55	

EMISSION TESTING FIELD DATA

Client: Boyett Fairborn
PN: 266.010
Date: 6/9/94
Source: Asphalt Plant
Site: Baghouse Outlet Stack
Sample Type: Particulate + lead
Run: 1
Operators: DD, BF, RM
Barometric Pressure (Pb): 29.45
Static Pressure (Pg): -.34

Meter Box #: #3
Sample Box #: 3
Filter #: 0410
Probe Length/Type: 6' SS
Stack Thermocouple #: 6E
Oven Thermocouple #: OV-3
Impinger Thermocouple #: #1
Pitot Tube #: 6E S-type
Stack I.D.: 47½ x 35"
Record Data Every 2.5 Minutes

Meter ΔH@: 1.85
Meter Y Factor: 1.024
C Factor: .60
Reference ΔP: .44
Nozzle I.D.: _ _ _ Avg. .308
Pre-Test Leak Rate: .003 cfm@ 14 "Hg
Post-Test Leak Rate: .0001 cfm@ 4 "Hg
Pitot Tube Leak Check: Pre: ✓ Post: ✓
Orsat Train Leak Check: Pre: N/A Post: N/A
Page 1 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O) Desired	Orifice Pressure ΔH@ ("H2O) Actual	Train Vacuum ("Hg)	Temperatures (°F) Stack	Filter	Probe	IMP	Meter 6/7
	0	1035	730.166									
* A1	2.5		731.740	.45	1.85	1.85	2	214	234	100%	64	76/74
2	5.0		733.075	.22	.92	.92	1	237	247		64	75/75
3	7.5		734.290	.18	.76	.76	1	241	251		65	76/75
4	10.0	10	735.215	.10	.44	.44	1	226	236		65	76/74
5	12.5	1045	736.157	.10	.44	.44	1	234	257		66	77/74
B1	15.0	1049	738.170	.57	2.40	2.40	2	236	237		67	77/75
2	17.5		740.200	.54	2.30	2.30	2	239	254		66	79/75
3	20.0		742.047	.43	1.85	1.85	2	244	251		66	81/76
4	22.5		743.745	.38	1.60	1.60	2	246	240		66	82/77
5	25.0	1100	745.298	.30	1.30	1.30	2	245	252		66	84/77

* Port A is most western port
Port D eastern most port

· operated at 98% capacity = 215 ton/hr

HAYDEN ENVIRONMENTAL GROUP, INC.

EMISSION TESTING FIELD DATA

Client: Bonett/Fairborn Run #: 1 Date: 6/9/14 Page 2 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O) Desired	Orifice Pressure ΔH@ ("H2O) Actual	Train Vacuum ("Hg)	Temperatures (°F) 2 Stack	3 Filter	Probe	4 IMP	6/7 Meter	
	25.0	1103	745.298										
C1	27.5		748.165	1.10	4.80	4.80	4	251	260	1009	67	83	78
2	30.0		750.955	1.00	4.50	4.50	4	256	255		66	87	80
3	32.5		753.380	.70	2.90	2.90	3	256	244		66	89	80
4	35.0		—	.40	1.65	1.65	2	252	232		65	90	82
5	37.5	1114	756.925	.35	1.45	1.45	2	251	254		66	90	82
D1	40.0	1118	759.900	1.70	5.00	5.00	4	252	262		65	90	84
① 2	42.5	1123/1254	762.883	1.20	5.00	5.00	4	248	250		60	91	83
3	45.0		765.540	1.00	4.50	4.50	4	238	241		67	81	80
4	47.5		767.850	.68	2.70	2.70	3	236	240		66	80	81
5	50.0	1301	769.797	.48	2.00	2.00	3	235	239		64	82	82
E1	52.5	1304	772.705	1.20	5.00	5.00	4	241	239		66	84	82
2	55.0		775.440	1.10	4.80	4.80	4	245	246		65	85	82
3	57.5		778.175	.80	3.40	3.40	3	249	245		66	87	83
4	60.0		780.160	.50	2.10	2.10	3	247	257	↓	66	89	84
5	62.5	1317	781.820	.35	1.50	1.50	2	248	260		66	90	85
			51.662 ✓✓	√ΔP = .746 ✓✓		2.61 ✓✓		242.4 ✓✓				81.2 81.2 ✓✓	

① Shut down after 42.5 minutes/@ 1123 → No trucks. Back up @ 1254

HAYDEN ENVIRONMENTAL GROUP INC.

METHOD 3 FYRITE DATA

Client: Barrett/Fuisbon PN: 266.010 Date: 6/9/94
Source: Asphalt Plant Site: Baghouse Outlet Stack Run: 1
Operator: DJ

	Oxygen (O2)	Carbon Dioxide (CO2)
Run 1	8.0	9.0
Run 2	8.0	9.0
Run 3	8.0	9.0
Average	8.0	9.0

* Sampled through umbilical

SAMPLE RECOVERY DATA

Client: BARRETT FIBERBOARD PN: 266.010 Date: 6.9.94
Source: ASPHALT PLANT Site: BAGHOUSE Outlet Run#: 1
Sample Date: 6.9.94 Recovery Date: 6/16/94

Filter No: 0418 Glassware Set No: _____ Sample Box No: 3

IMPINGER DATA

Gravimetric: ✓ Volumetric: _____

	#1	#2	#3	#4	#5	Total
Contents	6.1 N HNO3	0.1N HNO3	Empty	SILICA		
Final	741.1 ~~741.0~~	782.3	589.8	767.8		2881.0 ✓
Initial	537.8	559.0	451.4	749.5		2297.7 ✓
Net	203.3 ✓	223.3 ✓	138.4 ✓	18.3 ✓		583.3 ✓

RECOVERED SAMPLE

Description of Particulate on Filter: Very Light TAN / Little Loose Particulate

Color of Silica Gel: Blue/white/Pink 1/3 Spent

Recovered By: _____

EMISSION TESTING FIELD DATA

Client: Barrett
PN: 266.010
Date: 6/9/94
Source: Asphalt Plant
Site: Baghouse outlet Stack
Sample Type: Particulate + Lead
Run: 2
Operators: DD/BF/RM
Barometric Pressure (Pb): 29.25
Static Pressure (Pg): -.34

Meter Box #: N3
Sample Box #: 4
Filter #: 4567
Probe Length/Type: 6' SS
Stack Thermocouple #: 6F
Oven Thermocouple #: OV-4
Impinger Thermocouple #: 44D
Pitot Tube #: S-type
Stack I.D.: 47 1/2 x 35"
Record Data Every 2.5 Minutes

Meter ΔH@: 1.85
Meter Y Factor: 1.024
C Factor: .54
Reference ΔP: .50
Nozzle I.D.: _ _ _ Avg. .244
Pre-Test Leak Rate: .005 cfm@ 10 "Hg
Post-Test Leak Rate: .004 cfm@ 6 "Hg
Pitot Tube Leak Check: Pre: ✓ Post: ✓
Orsat Train Leak Check: Pre: N/A Post: —
Page 1 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O)		Train Vacuum ("Hg)	Temperatures (°F)				
					Desired	Actual		2 Stack	3 Filter	Probe	4 IMP	6/7 Meter
	0	1428	781.949									
A1	2.5		783.405	.35	1.20	1.20	2	236	255	80%	67	89/88
2	5.0		784.560	.21	.70	.70	2	241	247		66	87/87
3	7.5		785.545	.14	.48	.48	1	243	253		66	88/88
4	10.0		786.400	.11	.37	.37	1	242	243		66	89/88
5	12.5	1441	787.233	.10	.35	.35	1	240	248		65	88/87
B1	15.0	1444	788.580	.30	1.00	1.00	2	247	253		65	89/88
2	17.5		790.725	.39	1.35	1.35	2	248	249		64	90/88
3	20.0		791.420	.25	.85	.85	2	251	249		65	91/89
4	22.5		792.625	.20	.68	.68	1	252	244		64	90/87
5	25.0	1456	793.712	.20	.68	.68	1	252	248	↓	63	92/89

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ENVIRONMENTAL GROUP INC.

EMISSION TESTING FIELD DATA

Client: Burnett/Fairborn Run #: 2 Date: 6/9/94 Page 2 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O)		Train Vacuum ("Hg)	Temperatures (°F)					
					Desired	Actual		Stack	Filter	Probe	IMP	Meter	
	25.0	1458	793.712										
C1	27.5		796.250	1.05	3.60	3.60	5	245	250		66	92	89
2	30.0		798.570	.96	3.30	3.30	5	244	247		64	93	89
3	32.5		800.715	.70	2.40	2.40	4	245	249		63	94	89
4	35.0		802.464	.46	1.60	1.60	3	251	242		65	94	88
5	37.5	1510	804.047	.40	1.35	1.35	3	251	248		64	93	87
D1	40.0	1514	—	1.20	4.10	4.10	6	247	241		66	91	87
2	42.5		809.435	1.20	4.10	4.10	6	248	253		67	93	88
3	45.0		811.806	.81	2.80	2.80	5	246	250		66	93	88
4	47.5		—	.53	1.80	1.80	3	245	245		65	93	88
5	50.0 ~~50.0~~	1526	815.252	.41	1.40	1.40	3	247	252		64	93	88
E1	52.5	1529	817.870	1.20	4.20	4.20	6	244	256		66	92	89
2	55.0		820.435	1.10	3.70	3.70	6	244	251		66	94	89
3	57.5		822.765	.80	2.70	2.70	5	~~244~~	236		65	94	88
4	60.0		825.200	1.00	3.50	3.50	5	248	248		66	95	89
6	62.5	1542	827.128	.55	1.85	1.85	4	252	249	↓	65	95	89
			45.179 ✓✓	ΔP = ~~.711~~ .726 ✓✓		2.00 ✓✓		246.1 ✓✓					89.9 ✓✓

HAYDEN ENVIRONMENTAL GROUP INC.

METHOD 3 FYRITE DATA

Client: Bovett / Fairborn PN: 266-010 Date: 6/9/94
Source: Asphalt Plant Site: Baghouse Outlet Run: 2
Operator: DD + BF

	Oxygen (O2)	Carbon Dioxide (CO2)
Run 1	11.0	9.0
Run 2	11.0	9.0
Run 3	11.0	9.0
Average	11.0	9.0

SAMPLE RECOVERY DATA

Client: BARRETT FARRGREN PN: 2660 Date: 6/9/94
Source: ASPHALT PLANT Site: BAGHOUSE OUTLET Run#: 2
Sample Date: 6-9-94 Recovery Date: 6/10/94

Filter No: 4567 Glassware Set No: _____ Sample Box No: 4

IMPINGER DATA

Gravimetric: ✓ Volumetric: _____

	#1	#2	#3	#4	#5	Total
Contents	0.1N HNO3	0.1N HNO3	Empty	Silica		
Final	716.6	754.1	566.8	743.3		2780.8 ✓
Initial	520.6	553.7	453.6	713.7		2241.6 ✓
Net	196	200.4	113.2	29.6		539.2 ✓

RECOVERED SAMPLE

Description of Particulate on Filter: _____

Color of Silica Gel: _____

Recovered By: _____

EMISSION TESTING FIELD DATA

Client: Barrett / Fairbairn
PN: 266.010
Date: 6/16/94 DLD
Source: Asphalt Plant
Site: Baghouse Outlet
Sample Type: Particulate + Lead
Run: 3
Operators: DD + BF DLD
Barometric Pressure (Pb): 29.42 29.38
Static Pressure (Pg): -.27

Meter Box #: N3
Sample Box #: 1
Filter #: 7720
Probe Length/Type: 5' glass
Stack Thermocouple #: 4A
Oven Thermocouple #: OV3
Impinger Thermocouple #: P-1
Pitot Tube #: S-type
Stack I.D.: 47.5 x 35.4
Record Data Every 2 Minutes

Meter ΔH@: 1.85
Meter Y Factor: 1.024
C Factor: .54
Reference ΔP: .50
Nozzle I.D.: _ _ _ Avg. .301
Pre-Test Leak Rate: .001 cfm@ 13 "Hg
Post-Test Leak Rate: .002 cfm@ 6 "Hg
Pitot Tube Leak Check: Pre: ✓ Post: _
Orsat Train Leak Check: Pre: N/A Post: N/A
Page 1 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O) Desired	Orifice Pressure ΔH@ ("H2O) Actual	Train Vacuum ("Hg)	Temperatures (°F) 2 Stack	3 Filter	Probe	4 IMP	6/7 Meter
	0	0716	827.495									
A1	2		828.410	.26	.96	.96	1	245	256	80%	61	65/65
2	4		829.450	.26	.96	.96	1	243	253		62	65/65
3	6		830.270	.15	.56	.56	1	239	258		63	65/65
4	8		830.995	.12	.45	.45	1	242	253		61	65/65
5	10	0726	831.667	.10 ~~.08~~	.36 ~~.29~~	.36	1	238	257		60	66/66
B1	12	0729	832.165	.55	2.10	2.10	3	237	257		60	67/66
2	14		834.540	.43	1.60	1.60	3	236	256		62	68/66
3	16		835.675	.30	1.10	1.10	2	236	257		58	69/67
4	18		836.650	.20	.74	.74	1	237	257		59	70/67
5	20	0734	837.485	.17	.62 ~~.44~~	.62	1	241	255		59	70/67

HAYDEN ENVIRONMENTAL GROUP, INC.

EMISSION TESTING FIELD DATA

Client: Bennett/Fairborn Run #: 3 Date: 6/16/94 Page 2 of 2

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O) Desired	Orifice Pressure ΔH@ ("H2O) Actual	Train Vacuum ("Hg)	Temperatures (°F) 2 Stack	3 Filter	Probe	4 IMP	6/7 Meter	
	20	0741	837.485										
C1	22		839.190	.80	~~2.80~~ 3.00	3.00	4	247	259	809	61	71	68
2	24		841.050	.77	2.90	2.90	4	247	259	|	60	72	68
3	26		—	.62	2.30	2.30	4	247	260	|	60	74	68
4	28		844.125	.40	1.50	1.50	3	250	259	|	63	75	69
5 ✓	30 ✓	0751	845.297	.27	.99	.99	2	252	255	|	64	75	69
D1	32	0753	847.285	1.00	3.80	3.80	6	254	259	|	66	74	70
2	34		849.300	.96	3.60	3.60	6	256	259	|	66	75	70
3	36		851.140	.75	2.85	2.85	5	258	256	|	66	76	70
4	38		852.670	.51	1.90	1.90	4	258	259	|	66	76	70
5 ✓	40 ✓	0803	853.804	.26	.98	.98	3	255	258	|	66	76	71
E1	42	0805	855.840	1.00	3.80	3.80	6	249	255	|	67	75	71
2	44		857.870	.95	3.60	3.60	6	250	251	|	66	77	71
3	46		859.665	.70	2.70	2.70	5	248	259	|	65	78	71
4	48		861.630	.87	3.30	3.30	6	248	259	↓	66	78	72
5	50	0815	863.534	.84	3.20	3.20	6	249	261		66	79	72
			36.04	√Δp = .643		1.99.		~~226.~~					70.2
			✓✓	✓✓		✓✓		227.0					✓✓
								246.5 ✓✓					
								✓✓					

HAYDEN ENVIRONMENTAL GROUP INC.

METHOD 3 FYRITE DATA

Client: Fairbanks/Fairborn PN: 266.010 Date: 6/10/94
Source: Asphalt Plant Site: Baghouse Outlet Stack Run: 3
Operator: DD + BF

	Oxygen (O2)	Carbon Dioxide (CO2)
Run 1	10.0	8.0
Run 2	10.0	8.0
Run 3	10.0	8.0
Average	10.0 ✓	8.0 ✓

SAMPLE RECOVERY DATA

Client: BARRET, FAIRBAN PN: 266.008 Date: 6/10/99
Source: ASPHALT PLANT Site: BAGHOUSE - OUT Run#: 3
Sample Date: 6/10/99 Recovery Date: _____

Filter No: 7720 Glassware Set No: _____ Sample Box No: 1

IMPINGER DATA

Gravimetric: ✓ Volumetric: _____

	#1	#2	#3	#4	#5	Total
Contents	.1N HNO3	.1N HNO3	Empty	SILICA		
Final	733.6	755.1	455.0	626.9		2570.6 VJ
Initial	536.4	556.9	435.9	609.4		2138.6 VJ
Net	197.2 VJ	198.2 VJ	19.1 VJ	17.5 VJ		432.0 VJ

RECOVERED SAMPLE

Description of Particulate on Filter: Light Brown

Color of Silica Gel: 1/4 Spent B

Recovered By: B Forgt

METHOD 2 VELOCITY FIELD DATA

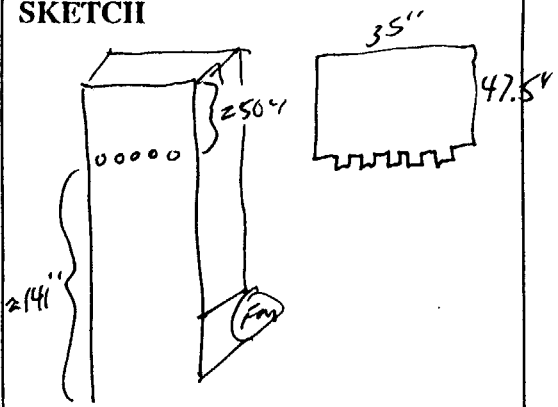
Client: Barrett/Fairborn
Project Number: 266.010
Date: 6/9/94
Source: Asphalt Plant
Site: Baghouse outlet Stack
Run: Pretest Velocity
Operators: DP, BF, RM
Barometric Pressure: 29.45
Static Pressure: -.20

Pitot Tube I.D.: S-type
Thermocouple I.D.:
Pre-Test Leak Check: ✓
Post-Test Leak Check:
Stack I.D.: 47½" x 35"
METHOD 4 DATA
Wet Bulb Thermocouple I.D.: N/A
Dry Bulb Thermocouple I.D.: —
Temperatures (°F); Wet: — Dry: —

Traverse Point #	Δ P ("H_2O)	Stack Temp. (°F)	Traverse Point #	Δ P ("H_2O)	Stack Temp. (°F)
A1	.93	231	D1	.60	246
2	.86	242	2	.45	248
3	.75	246	3	.30	249
4	.55	248	4	.25	248
5	.40	248	5	.18	248
B1	1.20	248	E1	.24	245
2	1.05	248	2	.12	244
3	.92	250	3	.12	245
4	.67	250	4	.10	245
5	.30	249	5	.08	248
C1	1.10	248			
2	.90	250			
3	.70	250			
4	.52	249			
5	.30	249			

O_2:
CO_2:
Bws:
Δ P: 0.54
√Δ P: .704
Ts: 250
Vs:
Qa:
Qstd:

SKETCH



Port A face EAST

HAYDEN ENVIRONMENTAL GROUP, INC.

EMISSION TESTING FIELD DATA

Client: Barrett/Fairdon
PN: 266.010
Date: 6/9/94
Source: Asphalt Plant
Site: Baghouse Outlet Stack
Sample Type: Method Moist
Run: Moist #1
Operators: DD, BF
Barometric Pressure (Pb): 29.45
Static Pressure (Pg): ___

Meter Box #: N3
Sample Box #: —
Filter #: —
Probe Length/Type: —
Stack Thermocouple #: —
Oven Thermocouple #: —
Impinger Thermocouple #: —
Pitot Tube #: —
Stack I.D.: 47½ x 35"
Record Data Every — Minutes

Meter ΔH@: 1.85
Meter Y Factor: ~~.206~~ 1.024
C Factor: —
Reference ΔP: —
Nozzle I.D.: __ __ __ Avg. —
Pre-Test Leak Rate: ~~.006~~ cfm@ 5 "Hg
Post-Test Leak Rate: ___ cfm@ ___ "Hg
Pitot Tube Leak Check: Pre: — Post: —
Orsat Train Leak Check: Pre: — Post: —
Page 1 of 1

Traverse Point Number	Sampling Time (min)	Clock Time (hr)	Meter Reading (cu ft.)	Velocity Pressure ΔP ("H2O)	Orifice Pressure ΔH@ ("H2O) Desired	Orifice Pressure ΔH@ ("H2O) Actual	Train Vacuum ("Hg)	Temperatures (°F) Stack	Filter	Probe	IMP	Meter
	0	0857	716.247									
N/A	10		723.415	N/A	1.85	1.05	5	N/A	N/A	N/A	66	67/66
	~~20~~ 19	0916	730.034		1.85	1.85	8					72/68
			~~14.168~~									
			13.792									68.25

Test @ 190 tons/hr.

HAYDEN ENVIRONMENTAL GROUP INC.

SAMPLE RECOVERY DATA

Client: Brett Fairbanks PN: 266.010 Date: 6/9/94
Source: Asphalt Plant Site: Baghouse outlet Run#: Pretest Mon84.
Sample Date: 6/9/94 Recovery Date: 6/9/94

Filter No: _____ Glassware Set No: _____ Sample Box No: _____

IMPINGER DATA

Gravimetric: X Volumetric: _____

	#1	#2	#3	#4	#5	Total
Contents						
DDRM Final	704.9	448.8	805.7			1959.4 ✓
BF Initial	~~641~~ 590.3	441.7	300.8			1832.8 ✓
Net	114.6 ✓	7.1 ✓	4.9 ✓			126.6 ✓

RECOVERED SAMPLE

Description of Particulate on Filter: _____

Color of Silica Gel: _____

Recovered By: _____

HAYDEN LABORATORIES

Amended July 07, 1994
June 24, 1994

Mr. Chris Ziehler
BARRETT PAVING MATERIALS, INC.
P.O. Box 1458
727 East Ash Street
Piqua, OH 45356

Subject: HEG Lab Task # 94060145
HEG Sample Number(s) 9407532 - 9407536

Project # : 266.010
Project Name: Barrett Paving

Dear Mr. Ziehler:

We are pleased to submit the report of analysis for the sample(s) you recently submitted to our laboratory. This report contains results for samples you submitted on 6/11/94.

If you need additional information regarding these samples or if you have any questions regarding the results, please contact one of the persons listed below at 513/866-5908. We can provide additional report copies, method summaries or quality control data reports that you may require for full documentation of your samples. Please request pricing for these additional reports.

Thank you for choosing Hayden Laboratories for your environmental or industrial hygiene laboratory needs. We hope to continue to provide you with quality analytical services and support. If you have any comments on the services we have provided, we would appreciate hearing from you.

Sincerely,

HAYDEN LABORATORIES

Rebecca F. Tipps
QA/QC Officer

Sue Barto
Client Services Representative

cc: Client File

LABORATORY ANALYSIS REPORT
(Amended Report 7/7/94)

Mr. Chris Ziehler
BARRETT PAVING MATERIALS, INC.
P.O. Box 1458
727 East Ash Street
Piqua, OH 45356

Page 1
Report Date : 06/24/94
HEG Task # : 94060145
HEG P/N, Acct: 266.010

P.O. Number:
Proj Name: Barrett Paving

Date Received: 06/11/94
Proj #: 266.010

HEG Sample # : 9407532 Sample Date: 06/09/94 Sample Priority: Normal
Sample ID : Run #1

Parameter	Units	Results	Comments
EPA Method 5			99
Acetone	mg	23.9	
Filter	mg	28.6	
Sample Volume Submitted	mL	415	
Lead	mg	< 0.0050	
Sample Volume Submitted	mL	935	

HEG Sample # : 9407533 Sample Date: 06/09/94 Sample Priority: Normal
Sample ID : Run #2

Parameter	Units	Results	Comments
EPA Method 5			99
Acetone	mg	8.2	
Filter	mg	15.6	
Sample Volume Submitted	mL	480	
Lead	mg	0.0083	
Sample Volume Submitted	mL	900	

HAYDEN LABORATORIES

LABORATORY ANALYSIS REPORT

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Piqua, OH 45356

Report Date : 06/24/94
HEG Task # : 94060145
HEG P/N, Acct: 266.010

HEG Sample # : 9407534 Sample Date: 06/10/94 Sample Priority: Normal
Sample ID : Run #3

Parameter	Units	Results	Comments
EPA Method 5			99
Acetone	mg	17.1	
Filter	mg	7.4	
Sample Volume Submitted	mL	320	
Lead	mg	0.0068	
Sample Volume Submitted	mL	840	

HEG Sample # : 9407535 Sample Date: 06/09/94 Sample Priority: Normal
Sample ID : Blank

Parameter	Units	Results	Comments
EPA Method 5			
Acetone	mg	3.8	
Filter	mg	0.7	
Sample Volume Submitted	mL	175	
Lead	mg	< 0.0050	
Sample Volume Submitted	mL	270	

LABORATORY ANALYSIS REPORT

Mr. Chris Ziehler
BARRETT PAVING MATERIALS, INC.
P.O. Box 1458
727 East Ash Street
Piqua, OH 45356

Report Date : 06/24/94
HEG Task # : 94060145
HEG P/N, Acct: 266.010

HEG Sample # : 9407536 Sample Date: 06/09/94 Sample Priority: Normal
Sample ID : Fuel

Parameter	Units		Results	Comments
T.Chlorine,ASTM D808	%		0.01	
Flashpoint	deg. C		55.6	
Heat of Combustion	BTU/lb		19215	
Lead	mg/kg		22.4	
Chromium	mg/kg		2.07	
Cadmium	mg/kg	<	0.41	
Mercury	mg/kg		0.30	
Arsenic	mg/kg	<	16.5	
PCB, Oil				
Aroclor 1016	mg/kg	<	2.4	
Aroclor 1221	mg/kg	<	2.4	
Aroclor 1232	mg/kg	<	2.4	
Aroclor 1242	mg/kg	<	2.4	
Aroclor 1248	mg/kg	<	2.4	
Aroclor 1254	mg/kg	<	2.4	
Aroclor 1260	mg/kg	<	2.4	
Total	mg/kg	<	2.4	

99 Sample is corrected with blank

HEG / LIMS
Analysis Date Report
Report Date: 06/24/94

HEG Lab Task # 94060145
HEG Client: HAYDEN ENVIRONMENTAL GROUP

Date Received : 06/11/94 Date Reported: 06/24/94

Sample #: 9407532 Sample Date: 06/09/94
Sample ID: Run #1

Analysis Date	Analyst	Test Performed	Hold Time (Days)
06/23/94	kw	Lead total, volumesubmitted ICP	180
06/21/94	ovp	Sample Volume Submitted	
06/21/94	ovp	EPA5-Particulate	28

Sample #: 9407533 Sample Date: 06/09/94
Sample ID: Run #2

Analysis Date	Analyst	Test Performed	Hold Time (Days)
06/23/94	kw	Lead total, volumesubmitted ICP	180
06/21/94	ovp	Sample Volume Submitted	
06/21/94	ovp	EPA5-Particulate	28

Sample #: 9407534 Sample Date: 06/10/94
Sample ID: Run #3

Analysis Date	Analyst	Test Performed	Hold Time (Days)
06/23/94	kw	Lead total, volumesubmitted ICP	180
06/21/94	ovp	Sample Volume Submitted	
06/21/94	ovp	EPA5-Particulate	28

HEG / LIMS
Analysis Date Report
Report Date: 06/24/94

Sample #: 9407535 Sample Date: 06/09/94
Sample ID: Blank

Analysis Date	Analyst	Test Performed	Hold Time (Days)
06/23/94	kw	Lead total, volumesubmitted ICP	180
06/21/94	ovp	Sample Volume Submitted	
06/21/94	ovp	EPA5-Particulate	28

Sample #: 9407536 Sample Date: 06/09/94
Sample ID: Fuel

Analysis Date	Analyst	Test Performed	Hold Time (Days)
06/22/94	jep	PCB Extraction(Oil)	28
06/16/94	jrw	Mercury total, solid	28
06/21/94	kw	Solid Sample Prep for metals	28
06/23/94	msn	Arsenic total, furnace, solid	180
06/23/94	msn	Cadmium total solidICP	180
06/23/94	msn	Chromium total solidICP	180
06/23/94	msn	Lead total solidICP	180
06/23/94	ovp	Flashpoint	28
06/23/94	rll	Polychlorinated Bi-phenyls-Oil	40
06/16/94	sub	Total Halogens****(as Chlorine)	28
06/20/94	sub	BTU *** Heat on Combustion	28

CHAIN OF CUSTODY

Project Number:	766.008.010	Sealed By Signature:	
Company:	Barrett Perring ~~Fuel~~	Date Sealed:	
City:	Fairborn	Time Sealed:	
State:	OH	Seal Number:	

Container Type (petri dish, 1000 ml polyethylene, 1000 ml glass etc.)	Sample media (acetone, 0.1N HNO_3, etc.)	Analyses	Run Numbers (Number of bottles are recorded in the squares below)								
			Run #1	Run #2	Run #3	Blank	Fuel				
1000ml poly	Acetone	Particulate per USEPA Meth 5	1	1	1	1					
petri dish	Gilter	and Lead per USEPA Meth 12	1	1	1	1					
—	—	—	—	—	—	—					
1000ml poly	.1N HNO_3	Lead per USEPA Meth 12	1	1	1	1					
—	—	—	—								
1000ml poly	Fuel Oil	As, Cd, Cr, Pb, PCB, Hg, total halogens, flashpoint, BTU	→			→	1				

Received By:		Affiliation:			Date:			Time:			
Received By:		Affiliation:			Date:			Time:			
Opened at lab by:	Virginia Kaelber	Date opened:	6/10/94	Time opened:	1610	Seal Number:	NA	Seal Intact:	Y	N	

HAYDEN ENVIRONMENTAL GROUP, INC.

IN HOUSE PROJECT INFORMATION FORM

PROJECT MANAGER: NAME Dale Davidson

EMP.# 292

JOB # 266.008

SAMPLES SUBMITTED BY/DATE: 6/10/94

PRIORTIY (N/R/E): N → 6/24/94
DUE DATE:

PROJECT CLIENT: CONTACT Chris Ziehler

COMPANY Barnett Poring

PO#

MAIL REPORT DIRECTLY TO CLIENT: YES____ NO X

ANALYTICAL INFORMATION

OF SAMPLES: 5

DESCRIPTIONS/TEST:

(4) Sample { Particulate per USEPA Method 5
Lead per USEPA Method 12 } Filter and Acetone Rinse. 1N HNO_3 (Impinger)

Fuel Oil Analysis for As, Cd, Cr, Pb, Hg, PCB, total Halogens, flash point, heat content

SPECIAL NOTES:

HAYDEN

CLIENT/PROJECT #:	Barrett (Troy)/ 266.010		
SAMPLE LOCATION:	Baghouse Outlet		
DATE/TIME:	6/9/94; 1035-1317		
RUN #:	1		
STATIC PRESSURE("H2O):	-0.34	"HG	29.43
BAROMETRIC("HG):	29.45		
SAMPLE TIME(min):	62.50	Vm(corr)	51.662
ACTUAL METER VOLUME:	51.662	DSCF	51.132
SQ. ROOT /\P:	0.746		
AVG ORIFICE /\H:	2.61		
AVG STACK TEMP °F:	242.4	°R	702.4
AVG METER TEMP °F:	81.2		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.308	An(ft^2)	5.17E-04
METER GAMMA:	1.024		
LEAK RATE(IF>0.02):			
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	11.55
DIA OR DIM (inches):	1662.50		
% O2 :	8.00	DRY MOLE WT	29.76
% CO2 :	9.00	ST MOLE WT	25.65
VOL CONDENSATE(ml):	583.30	% H2O	34.94
FILTER GAIN(mg):	28.60		
RINSE GAIN(mg):	23.90	NET WT(mg)	52.50
ANALYTE #1 :	Lead		
MOLE WEIGHT:	207.19		
µg/sample :	4.7		
PPM :			

********** CALCULATED RESULTS **********

Gas Velocity (Vs):	51.68	FT/SEC
Stack Gas Flow (Qs):	35798.3	ACFM
:	17218.7	DSCFM
Stack Gas Temp :	242	Deg F
Moisture (H2O):	34.94	%
Isokinetic :	106.08	%

FILTERABLE PARTICULATE SUMMARY

Concentration (Cs):	1.58E-02	Gr/DSCF
:	2.26E-06	lb/DSCF
Emission Rate (Er):	2.33	lb/hr

LEAD EMISSIONS SUMMARY

Concentration (Cs):	2.02E-10	lb/DSCF
Emission Rate (Er):	2.09E-04	lb/hr

COMMENTS:

CLIENT/PROJECT #:	Barrett (Troy)/ 266.010		
SAMPLE LOCATION:	Baghouse Outlet		
DATE/TIME:	6/9/94; 1442-1542		
RUN #:	2		

STATIC PRESSURE("H2O):	-0.34	"HG	29.43
BAROMETRIC("HG):	29.45		
SAMPLE TIME(min):	62.50	Vm(corr)	45.179
ACTUAL METER VOLUME:	45.179	DSCF	43.941
SQ. ROOT /\P:	0.721		
AVG ORIFICE /\H:	2.00		
AVG STACK TEMP °F:	246.1	°R	706.1
AVG METER TEMP °F:	89.9		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.299	An(ft^2)	4.88E-04
METER GAMMA:	1.024		
LEAK RATE(IF>0.02):			
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	11.55
DIA OR DIM (inches):	1662.50		
% O2 :	11.00	DRY MOLE WT	29.88
% CO2 :	9.00	ST MOLE WT	25.53
VOL CONDENSATE(ml):	539.20	% H2O	36.61
FILTER GAIN(mg):	15.60		
RINSE GAIN(mg):	8.20	NET WT(mg)	23.80
ANALYTE #1 :	Lead		
MOLE WEIGHT:	207.19		
µg/sample :	7.5		
PPM :			

********** CALCULATED RESULTS **********

Ga[illegible]		[illegible]/SEC
Stack Gas Flow (Qs):	34771.7	ACFM
:	16208.8	DSCFM
Stack Gas Temp :	246	Deg F
Moisture (H2O):	36.61	%
Isokinetic :	102.76	%

FILTERABLE PARTICULATE SUMMARY

Concentration (Cs):	8.34E-03	Gr/DSCF
:	1.19E-06	lb/DSCF
Emission Rate (Er):	1.16	lb/hr

LEAD EMISSIONS SUMMARY

Concentration (Cs):	3.76E-10	lb/DSCF
Emission Rate (Er):	3.65E-04	lb/hr

COMMENTS:

CLIENT/PROJECT #:	Barrett (Troy)/ 266.010		
SAMPLE LOCATION:	Baghouse Outlet		
DATE/TIME:	6/10/94; 0716-0815		
RUN #:	3		
STATIC PRESSURE("H2O):	-0.27	"HG	29.36
BAROMETRIC("HG):	29.38		
SAMPLE TIME(min):	50.00	Vm(corr)	36.040
ACTUAL METER VOLUME:	36.040	DSCF	36.268
SQ. ROOT /\P:	0.693		
AVG ORIFICE /\H:	1.99		
AVG STACK TEMP °F:	246.5	°R	706.5
AVG METER TEMP °F:	70.2		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.301	An(ft^2)	4.94E-04
METER GAMMA:	1.024		
LEAK RATE(IF>0.02):			
CIRC STACK? 1=Y,0=N:	0	As(ft^2)	11.55
DIA OR DIM (inches):	1662.50		
% O2 :	10.00	DRY MOLE WT	29.68
% CO2 :	8.00	ST MOLE WT	25.48
VOL CONDENSATE(ml):	432.00	% H2O	35.92
FILTER GAIN(mg):	7.40		
RINSE GAIN(mg):	17.10	NET WT(mg)	24.50
ANALYTE #1 :	Lead		
MOLE WEIGHT:	207.19		
µg/sample :	5.7		
PPM :			

********** CALCULATED RESULTS **********

Gas Velocity (Vs):	48.36	FT/SEC
Stack Gas Flow (Qs):	33498.2	ACFM
:	15740.9	DSCFM
Stack Gas Temp :	247	Deg F
Moisture (H2O):	35.92	%
Isokinetic :	107.73	%

FILTERABLE PARTICULATE SUMMARY

Concentration (Cs):	1.04E-02	Gr/DSCF
:	1.49E-06	lb/DSCF
Emission Rate (Er):	1.40	lb/hr

LEAD EMISSIONS SUMMARY

Concentration (Cs):	3.46E-10	lb/DSCF
Emission Rate (Er):	3.27E-04	lb/hr

COMMENTS:

BARRETT PAVING / Fairborn - PN 266.010

EXAMPLE CALCULATIONS

RUN #1

1.0 Volume Metered, Standard Conditions (68°F, 29.92 In Hg)

$$V_{mstd}=(17.647)\times(V_m)\times(Y)\times\frac{(P_b)+\frac{(\Delta H)}{(13.6)}}{(T_m+460)}$$

$$V_{mstd}=(17.647)\times(51.662)\times(1.024)\times\frac{(29.45)+\frac{(2.61)}{(13.6)}}{(81.2+460)}=51.132$$

2.0 Volume Water Vapor Collected, Standard Conditions

$$V_{wstd}=(0.04707)\times(V_{lc})$$
$$V_{wstd}=(0.04707)\times(583.3)=27.456$$

3.0 Proportion Water Vapor, By Volume

$$B_{ws}=\frac{(V_{wstd})}{(V_{wstd}+V_{mstd})}$$
$$B_{ws}=\frac{(27.456)}{(27.456+51.132)}=0.3494$$

4.0 Molecular Weight of Stack Gas, Dry Conditions

$$M_d=(0.44\times CO_2)+(0.32\times O_2)+(0.28\times(N_2+CO))$$
$$M_d=(0.44\times 9.0)+(0.32\times 8.0)+(0.28\times 83.0)=29.76$$

5.0 Molecular Weight of Stack Gas, Stack Conditions

$$M_s=M_d\times(1-B_{ws})+(18\times B_{ws})$$
$$M_s=29.76\times(1-0.3494)+(18\times 0.3494)=25.65$$

6.0 Absolute Stack Gas Pressure, inches Hg

$$P_g = P_B + \frac{(P_g)}{(13.6)}$$

$$P_g = 29.45 + \frac{(-0.34)}{(13.6)} = 29.43$$

7.0 Stack Gas Velocity, fps

$$V_s = (85.49) \times (c_p) \times (\sqrt{\Delta p}) \times \sqrt{\frac{(T_s + 460)}{(P_s) \times (M_s)}}$$

$$V_s = (85.49) \times (0.84) \times (0.746) \times \sqrt{\frac{(242.4 + 460)}{(29.43) \times (25.65)}} = 51.68$$

8.0 Stack Gas Flow Rate, acfm

$$Q_a = (60) \times (V_s) \times (6.944E-03) \times (L) \times (W)^2$$

$$Q_a = (60) \times (6.944E-03) \times (51.68) \times (47.5) \times (35) = 35,798$$

9.0 Stack Gas Flow Rate, dscf

$$Q_{std} = (17.647) \times (Q_a) \times (1 - B_{ws}) \times \frac{(P_s)}{(T_s + 460)}$$

$$Q_{std} = (17.647) \times (35,798) \times (1 - 0.3494) \times \frac{(29.43)}{(242.4 + 460)} = 17,220$$

10.0 Isokinetic Variation, %

$$\%I = 0.0944 \frac{(T_s + 460) \times (V_{mstd})}{(P_s) \times (V_s) \times (A_n) \times (\theta) \times (1 - B_{ws})}$$

$$\%I = 0.0944 \frac{(242.4 + 460) \times (51.662)}{(29.43) \times (51.68) \times (5.174E-04) \times (62.5) \times (1 - 0.3494)} = 107$$

11.0 Filterable Particulate Concentration, gr/dscf

$$C_1 = \frac{(0.0154) \times (Mn)}{(V_{mstd})}$$

$$C_1 = \frac{(0.0154) \times (52.5)}{(51.662)} = 1.58E-02$$

12.0 Filterable Particulate Concentration, lb/dscf

$$C_2 = (1.429E-04) \times (C_1)$$

$$C_2 = (1.429E-04) \times (1.58E-02) = 2.26E-06$$

13.0 Filterable Particulate Emission Rate, lb/hr

$$ER = (C_2) \times (Q_{std}) * (60)$$

$$ER = (2.26E-06) \times (17{,}219) \times (60) = 2.33$$

14.0 Lead Concentration, lb/dscf

$$C_{Pbl} = \frac{(2.205E-09) \times (Mn_{Pb})}{(V_{mstd})}$$

$$C_{Pbl} = \frac{(2.205E-09) \times (4.7)}{(51.662)} = 2.01E-10$$

15.0 Lead Emission Rate, lb/hr

$$ER = (C_{Pbl}) \times (Q_{std}) \times (60)$$

$$ER = (2.02E-10) \times (17{,}219) \times (60) = 2.09E-04$$

QUALITY ASSURANCE PROCEDURES

The sampling and analytical equipment used in this test series was calibrated in accordance with procedures outlined in the USEPA Reference Methods for stationary source sampling and also in the Quality Assurance Handbook for Air Pollution Measurement Systems. All pertinent calibration data for the equipment used in this test series are included. The following calibration procedures were employed:

a. Probe-tips (Nozzles)
Probe-tips were inspected before use to detect damage or irregularities. If the nozzle showed signs of damage, it was repaired and measured before use. The nozzle diameter was determined in the field by measuring three diameters with a precision micrometer. The average of the three measurements was the measured nozzle diameter.

b. Pitot Tubes
The S-type pitot tubes were built to the design specifications cited in reference Method 2. Standard pitot tubes are supplied from the manufacturer with a coefficient of 0.99. The pitot tubes, connecting lines, and manometers were leak-checked in the field before and after each test.

c. Thermocouples
Thermocouples were calibrated upon receipt and annually thereafter. The thermocouples were calibrated at approximately 32°F, ambient temperature, 212°F, and approximately 450°F.

d. Fyrite Analyzers
The Fyrite analyzers were leak-checked on-site and the reagents were replenished as needed.

e. Method 5 Control Consoles
The dry gas meter and the orifice in the Method 5 control console were calibrated at six (6) points from 0 to 4 inches of mercury. The dry gas meter coefficients (y-factor) and the orifice constant ($\Delta H@$) are established from this calibration. The dry gas meter is calibrated after each test series to confirm the y-factor has not changed more than plus or minus 5%. The lower of the pre-test and post-test y-factors is used in all sample volume calculations. Hayden Environmental participates in the USEPA Method 5 Dry Gas Meter Inter-Laboratory Performance Audit.

f. Barometers
The aneroid field barometers are calibrated with a stationary mercury column barometer prior to each use. The reference barometer is permanently mounted in the Hayden Environmental laboratory.

Accuracy Test Data for Calibration Test Meter

Rockwell Model #R275 Test Meter S/N 1334637

Calibrated April 4, 1993

Test Point	Flow Rate % of Max.Capacity	% Accuracy	% Error +/-
1	100	99.97	-0.03
2	66	99.98	-0.02
3	52	100.15	+0.15
4	26	100.12	+0.12
5	12	99.98	-0.02

Average % Accuracy = 100.04 %

Average % Error = +0.04 %

Y = 1 - (+0.04) = 0.9996

HEAT EQUIPMENT AND TECHNOLOGY INC.

951 NORTH BEND ROAD • CINCINNATI, OHIO 45224 • 513-591-3000 • FAX 513-591-0024

METER TEST DATA SHEET

CUSTOMER: HAYDEN ENVIRONMENTAL

METER DESCRIPTION: Rockwell R275 Test Meter

SERIAL NUMBER: 1334637

DATE: 4-7-93

TEST DATA

ACCURACY TEST

Test Point	Flow Rate CFH	Percent of Max. Cap.	Percent Accuracy	Differential Inches W.C.	Percent of Error -/+
1	272	100%	99.97	N A	-.03
2	180	66%	99.98	N A	-.02
3	144	52%	100.15	N A	+.15
4	72	26%	100.12	.11-.14	+.12
5	35	12%	99.98	.06-.11	-.02
				Average % error →	0.04%

Static Pressure Test

Test Pressure	Length of Test	Means of Testing
5 #	5 MINUTES	BUBBLE TANK

The above data has been determined from tests performed with air at atmospheric pressure and ambient temperature. The tests were done using positive displacement proving devices, dimensionally traceable to the United States National Bureau of Standards.

$$Y = 1 - 0.0004 = 0.9996$$

Dayton
1931 Cudgel Drive
Miamisburg, Ohio 45342
513-847-8064

Cleveland
8030 Deepwood Blvd.
Mentor, Ohio 44060
216-255-3000
FAX 216-255-6588

Columbus
4780 Sportsman Club Road
Johnstown, Ohio 43031
614-967-3111

Meter Post Test Calibration

Client	Barrett	P.N.	266.01	Date	6/16/94
Ref. Meter	1334637	Yr	1	Pb	29.61
Meter Box	N-3	Pre Test Y	1.0241	▲ H	1.85
Vacumn	6	Calib. Time	10		

Performed By: Bill Forsyth (RMD)

Run #	Vr(f-i)	Tr(avg)	Vd(f-i)	Td(avg)	Pb	Y
1	7.353	76.0	7.265	86.0	29.610	1.031
2	7.339	76.0	7.271	88.3	29.610	1.032
3	7.334	76.0	7.264	89.5	29.610	1.035
Average Y						1.032

$$Y = Y_r * \frac{(V_r) * (T_d + 460) * (Pb)}{(V_d) * (T_r + 460) * (Pb + \frac{\Delta H}{13.6})}$$

POST TEST METER BOX CALIBRATION

CLIENT ~~BARNett~~ / ~~EARTH~~ TROY DATE 6/16/94 Ref Meter # 2334637

PN ~~266.008~~ 266.010 Pb ("Hg) 29.61 Test Meter Y 0.9996

METER BOX N-3 PRE-TEST Y 1.0241

ΔH@	Vr (Reference)	Tr (Reference)	Vd (Meter Box)	Td (Meter Box)	Time	Vaccum
1.85	231.363	76°F	936.746	86/83	0	6
	238.716	76°F	944.011	91/84	10	6
1.85	238.716	76°F	944.011	91/84	0	6
	246.055	76°F	951.282	93/85	10	6
1.85	246.055	76°F	951.282	93/85	0	6
	253.389	76°F	958.546	94/86	10	6

HAYDEN ENVIRONMENTAL GROUP, INC.

Leak-Check ✓ Brad H. Foight

Meter Box #	N-3	N-3	N-3
Date	3/21/94	3/21/94	3/21/94
Reference Meter #	1334637	1334637	1334637
Y Reference	0.9996	0.9996	0.9996
Barometric Pressure	28.85	28.85	28.85
Orifice Setting ^ H (" H2O)	0.5	1	1.5
Total Gas Volume Reference	4.029	5.619	6.78
Average Temperature Reference	67	67	68
Total Gas Volume Dry Gas Meter	3.967	5.551	6.674
Average Temperature Dry Gas Meter	72.5	73	75.75
Time (min)	10	10	10
Vacumn	5	5	5

******* Calculations **********

Meter Box Y	1.0245	1.0208	1.0265
Meter Box ^ H@	1.765	1.813	1.866

Meter Box #	N-3	N-3	N-3
Date	3/21/94	3/21/94	3/21/94
Reference Meter #	1334637	1334637	1334637
Y Reference	0.9996	0.9996	0.9996
Barometric Pressure	28.85	28.85	28.85
Orifice Setting ^ H (" H2O)	2	3	4
Total Gas Volume Reference	7.765	9.605	11.093
Average Temperature Reference	69.5	70.5	72
Total Gas Volume Dry Gas Meter	7.658	9.424	10.827
Average Temperature Dry Gas Meter	77.5	78	77.25
Time (min)	10	10	10
Vacumn	5	5	5

******* Calculations **********

Meter Box Y	1.0237	1.0254	1.0238
Meter Box ^ H@	1.901	1.869	1.882

Average y	1.0241
Average delta H	1.84935

DGM/ORIFICE CALIBRATION

DATE 3/21/94 METER BOX NO. N-3

BAROMETRIC PRESSURE 28.85 in. Hg REFERENCE METER NO. 1334637

CALIBRATOR B. Forsyth REFERENCE Y 0.9996

ORIFICE SETTING in. H_2O	REFERENCE METER		DRY GAS METER			TIME θ min.	VACUUM
	GAS VOLUME V_R ft^3	TEMP. T_R °F	GAS VOLUME V_D ft^3	IN TEMP T_i °F	OUT TEMP T_o °F		
0.5	722.051	67°	557.228	74°	71°	10	5
	718.022	67°	553.261	74°	71°		
	4.029	67°	3.967	72.5°			
1.0	729.288	67°	564.373	75	72	10	5
	723.669	67°	558.822	74	71		
	5.619	67°	5.551	73°			
1.5	741.531	68°	576.432	79	74	10	5
	734.751	68°	569.758	77	73		
	6.780	68°	6.674	75.75			
2.0	752.126	70°	586.868	81	75	10	5
	744.341	69°	579.210	80	74		
	7.765	69.5°	7.658	77.5			
3.0	763.636	71°	598.158	81	76	10	5
	754.031	70°	588.734	80	75		
	9.605	70.5	9.424	78°			
4.0	778.542	72°	612.684	80	76	10	5
	767.449	72°	601.857	78	75		
	11.093	72°	10.827	77.25			

orifice leak check ✓ Bob Forsyth

Vacuum leak check ✓

HAYDEN ENVIRONMENTAL GROUP, INC.

Meter Box Field Check

Meter Box #: N-3

Y: 1.024

delta H: 1.8494

Date: 3/21/94

Calibrator: B. Forsyth

Leak Check: B.F

Barometric: 28.85

Run No.	Initial Volume	Final Volume	Net Volume	Initial Temp.	Final Temp.	Avg. Temp.	Y_c Comparison
1	619.635	627.043	7.408	74/72	78/73	74.25	1.0375
2	627.043	634.463	7.420	78/73	80/74	76.25	1.0378
3	634.463	641.911	7.448	80/74	81/75	77.5	1.0351

$$y_c = \frac{10}{Vm} \times \sqrt{\frac{(0.0319) \times (Tm)}{(Pb)}}$$

Compare with Y_c

$0.97 * Y < Y_c < 1.03 * Y$

$0.97 * Y =$ 0.9933

$1.03 * Y =$ 1.0547

THERMOCOUPLE CALIBRATION

THERMOCOUPLE I.D.: 4A LENGTH: 4' DATE: 6/20/94

CALIBRATED BY: D. Michelle Conroy 6/23/94

REFERENCE THERMOMETER: 402947452

Source	Reference Thermometer Temperature °R	Test Thermocouple Temperature °R	Temperature Difference ΔR / %	Thermocouple Simulator Display	Thermocouple Simulator Setting
Amb. Air	535.9	532.0	3.9 / 0.7%	560.1	560
Ice H_2O	490.0	487.6	2.4 / 0.5%	558.6	560
Boil H_2O	668.9	670.0	1.1 / 0.16%	159.4	160
Hot oil.	924.1	924.3	0.2 / 0.04%	959.1	960

THERMOCOUPLE CALIBRATION

THERMOCOUPLE I. D.: 6E LENGTH: 6' DATE: 10/25/93

CALIBRATED BY: Bert Forsyth

REFERENCE THERMOMETER: VWR 9992 -20°- 150°

SOURCE	REFERENCE THERMOMETER TEMPERATURE °F	TEST THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F
Am. Air	15.4°C	15.4°C	0.0°
ICE BATH	6.0°C	6.0°C	0.0°
Boiling H_2O	100.0°C	99.5°C	0.5°
Hot oil	146.5°C	145.0°C	1.5°

THERMOCOUPLE CALIBRATION

THERMOCOUPLE I. D.: 6F LENGTH: 6' DATE: 10/25/93

CALIBRATED BY: Bert Fossett

REFERENCE THERMOMETER: VWR 9992 -20° — 150°

SOURCE	REFERENCE THERMOMETER TEMPERATURE °F	TEST THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F
Am. Air	~~16.8~~ 16.5°C	16.8°C	.3°
ICE BATH	5.0°C	3.8°C	1.2°
Boiling H_2O	100.0°C	100.0°C	0.0°
HOT oil	146.5	146.3	0.2°

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: OV-2 Length: OVEN Therm. Date: 8/19/93

Calibrated By: Bert G. Forgot

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
Am. Air	25.0	24.7	0.3
Ice Bath	9.0	7.9	1.1
Boiling H_2O	100.0	99.0	1.0
Hot Oil	165.5	166.7	1.2

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: OV-3 Length: Oven Therm Date: 8/19/93

Calibrated By: Bert Y. Forsyth

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
AM. AIR	25.0	25.0	0.0
ICE BATH	8.0	7.7	0.3
BOILING H_2O	100.0	99.1	0.9
HOT OIL	175.5	176.2	0.7

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: OV-4 Length: Oven Therm. Date: 8/19/93

Calibrated By: Bert H. Forsyth

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
Am. Air	25.0	25.1	0.1
Ice Bath	7.0	5.7	1.3
Boiling H_2O	100.0	99.1	0.9
Hot Oil	167.5	168.4	0.9

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: F-1 Length: Imp. Head Date: 8/19/93

Calibrated By: Brent M. Forsyth

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
Am. Air	24.7	24.0	0.7
ICE BATH	6.5	4.7	1.8
Boil H2O	99.0	98.7	0.3
Hot Oil	159.5	158.6	0.9

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: 44D Length: Emp. Lead Date: 8/19/93

Calibrated By: Brad Y. Forsyth

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
AM AIR	24.7	24.1	0.6
ICE BATH	6.0	5.3	0.7
BOILING H_2O	100.0	98.7	1.3
HOT OIL	161.0	158.0	3.0

THERMOCOUPLE CALIBRATION

Thermocouple I.D.: P-1 Length: Imp Lead Date: 8/19/93

Calibrated By: Bert Y. Joyce

Reference Thermometer: 1248

Source	Reference Thermometer Temperature °F	Test Thermocouple Temperature °F	Temperature Difference °F
Hm. AIR	24.7	23.9	0.8
ICE BATH	6.0	5.8	0.2
Boiling H_2O	100.0	99.1	0.9
HOT OIL	159.0	158.8	0.2