HERMAN STRAUSS, INC.
Scrap Iron · Steel · Metals
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EMISSION TEST REPORT
DRY AUTO SHREDDER
WET SCRUBBER
DIESELS No. 1 and 2

December 8, 1987

Cross/Tessitore & Associates, P.A.
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R-5006

1.0 INTRODUCTION

Compliance Testing was conducted at the Yorke Doliner facility in Rockledge, Florida on October 26, 1987. The testing consisted of particulate (Method 5), and visual emissions (Method 9), on the wet scrubber system of the dry automotive metal shredder (Z box). Visual emission (EPA Method 9), were also run con-currently on the diesel engines powering this source.

The above tests were conducted according to FDER and U.S. EPA approved methods, in accordance with permit number A005-111877, Auto Shredder, and A005-123074, Diesels 1 and 2.

The results of the testing, including calculations, testing procedures, and laboratory procedures, are presented in the following sections of this report.

2.0 PROCESS DESCRIPTION

The junk car (without gas tank), or loose scrap such as appliances (no pressure or gas bottles) is placed on the feeding device which then tips it down under the two rollers.

The rollers (operator controlled) feed the car/scrap into the shredder where the rotor (spinning at approximately 600 rpm with 16 hammers at 280 lbs.) cuts it up and discharges the fist-sized pieces down to the discharge oscillator.

The smoke and dust from the shredder are carried up the pipe at the discharge of the shredder to the cyclone and then to the scrubber. The solids are discharged from the bottom of the cyclone, through an airlock, the the trash conveyor where it will be carried to a landfill.

The shredded scrap and trash are carried up the conveyor to the Z-box where they are exposed to a strong suction. This suction carries away almost all of the light weight trash (upholstery, etc.). The solids are discharged through the air lock onto the conveyor.

Most (75% approximately) of the air used in the Z-box is recirculated back through the bottom of the box. The other 25% is vented to the atmosphere.

The water used in the scrubber is recirculated from the in-ground tank which will be cleaned at some regular interval (30 to 60 days).

The now clean shredded scrap is fed from the Z-box to the drum magnet by the oscillator where the main product, shredded steel scrap, is carried over to the stocking conveyor. This conveyor then will discharge either onto a stockpile or directly into a railcar.

The non-magnetic fraction that is not picked up by the drum magnet falls onto the conveyor. This mixture has approximately 50% non-ferrous metals (zinc, aluminum, copper, etc.), and 50% heavy trash (rubber, wood, glass, etc.). It is cleaned by means of the trommel screen which drops out most of the minus 1/2" material (principally glass, rubber, and dirt), which will be transported to a landfill.

The non-ferrous material is discharged from the trommel to the rubber separator where much of the rubber and wood is separated. This rubber, etc., will be transported to a landfill and the non 70%+ non-ferrous metals are sold as-is.

The complete process takes junk cars and other types of light scrap and, through shredding and separation, yields about 80% as scrap steel/iron, 17% trash (carried to a landfill) and 3% non-ferrous metals.

3.0 SUMMARY OF TEST RESULTS

The particulate test results for the wet scrubber are presented in Table 3-1, and the opacity observation for the wet scrubber, and Diesels 1 and 2 results are presented in Table 3-2.

4.0 DISCUSSION OF TEST RESULTS

The test results from Tables 3-1 and 3-2 for the wet scrubber and Diesels 1 and 2 are compared with the permit limitations as shown in Table 3-1. It can be concluded that:

1. The wet scrubber and Diesels 1 and 2, have met opacity permit limitations

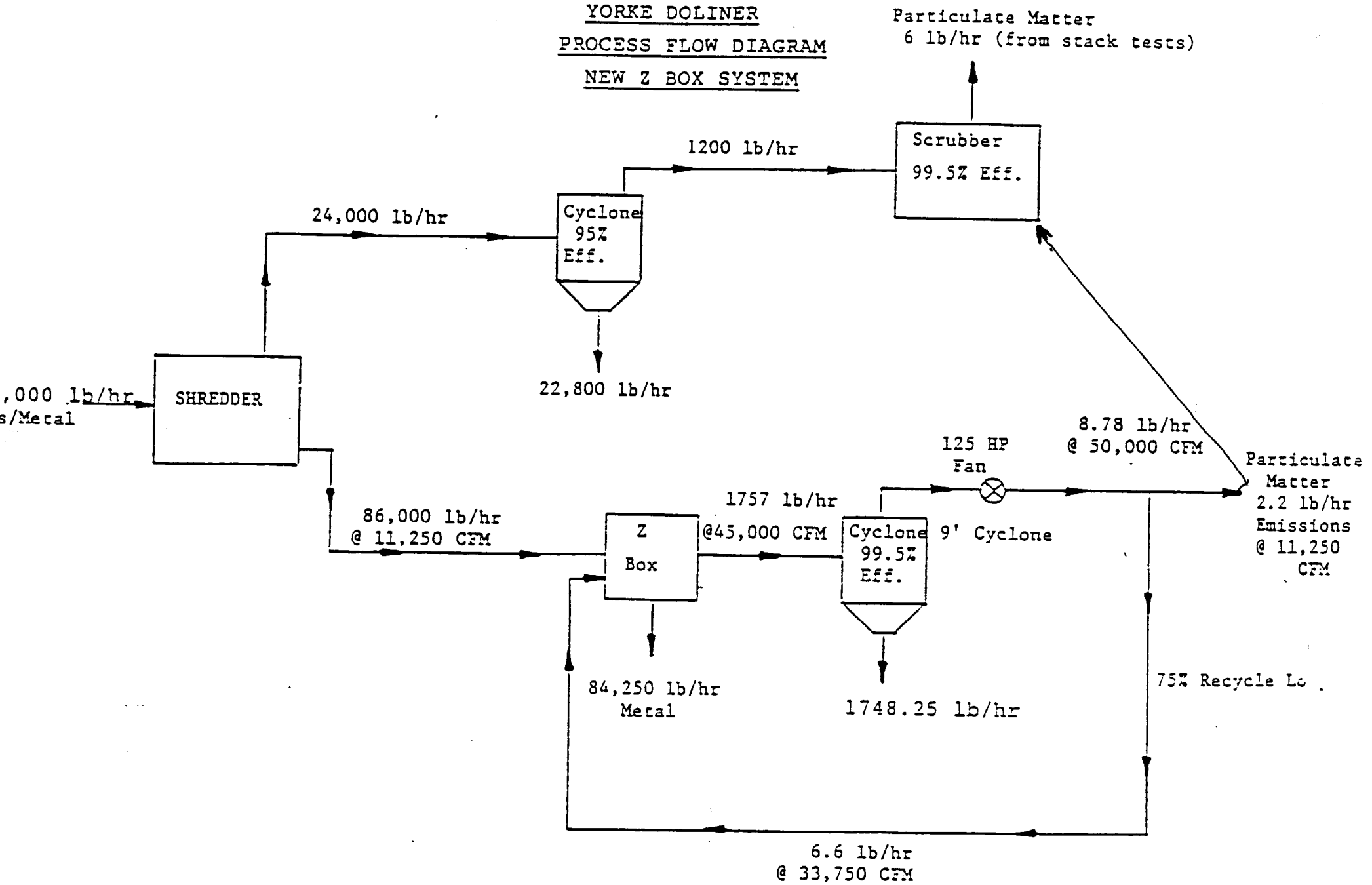
2. The wet scrubber has met particulate emissions permit limitations.

FIGURE 2-1

YORKE DOLINER

PROCESS FLOW DIAGRAM

NEW Z BOX SYSTEM



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ENVIRONMENTAL ENGINEERS ORLANDO, FLORIDA

TABLE 3-1

WET SCRUBBER TEST RESULTS FOR PARTICULATES

STACK NO. (VENT)	RUN NO.	PROCESS WEIGHT (TPH)	EMISSIONS LBS./HR.	EMISSIONS LBS./TON	ISOKINETICS (%)
Wet Scrubber	1	60.5	3.00	0.0165	99
Wet Scrubber	2	63.8	4.25	0.0157	102
Wet Scrubber	3	51.7	3.92	0.0193	108

Strauss ~45TPH

32 lbs/hr

TABLE 3-2

VISIBLE EMISSION ON WET SCRUBBER AND DIESELS 1 AND 2

STACK NO. (VENT)	TIME OF OBSERVATION	AVERAGE OPACITY (%)
Wet Scrubber	10:07-11:07 a.m.	2.29
Diesel No. 1	10:07-11:07 a.m.	11.45
Diesel No. 2	10:07-11:07 a.m.	10.00

TABLE 4-1

WET SCRUBBER AND DIESELS 1 AND 2

COMPLIANCE EMISSIONS

SOURCE	TYPE EMISSION		TEST DATE	PERMIT LIMITATION	
	% AVERAGE OPACITY	AVERAGE PARTICULATE		% AVERAGE OPACITY	AVERAGE PARTICULATE
Wet Scrubber	2.29	3.72 lb/hr	10/26/87	5%<	32.87 lb/hr
Diesel #1	11.45	N/A	10/26/87	<20	N/A
Diesel #2	10	N/A	10/26/87	<20	N/A

SUMMARY OF TEST DATA

Plant: Yorke Doliner

Unit Tested: Auto Shredder

Run Number(s) 1 - 3

Test Date: 26 October 1987

	# 1	# 2	# 3
Date	26 Oct	26 Oct	26 Oct
Start Time	0830	1004	1148
End Time	0932	1114	1255
Stack Diameter, inches	48	48	48
Nozzle Diameter, inches	0.248	0.184	0.184
Test Time, minutes	60	60	60
Number of Test Points, per run	24	24	24
Stack Gas Temperature, deg. F	96	103	111
Stack Gas Moisture Content, %	3	4	4
Stack Gas Molecular Weight	28.67	28.56	28.56
Stack Gas Volume Sampled, CF	51.23	30.93	33.23
Volume Sampled, SCF @ 68 deg. F	50.13	29.76	31.56
Stack Gas Velocity, FPS	45.09	47.21	48.13
Stack Gas Flowrate, ACFM	33,980	35,577	36,271
Stack Gas Flowrate, SCFM @ 68 deg.F	31,299	32,029	32,196
Particulate Collected, grams	0.0364	0.0299	0.0290
Part. Concentration, grains/scf	0.0112	0.0155	0.0142
Pollutant Mass Rate, lb/hr	3.00	4.25	3.92
Percent Isokinetic of Test	99	102	108

Field Data and Samples under control of: George T. Hawkins

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LIST OF FIGURES AND TABLES

5.0 PARTICULATE TESTING SUMMARY

6.0 OPACITY MEASUREMENT FIELD REPORTS

State of Florida

Visible Emissions Observation Form

COMPLIANCE STATUS: YES | NO | NA

Source/Process Information

FACILITY NAME: YORKE DoLiver AND Company
PERMIT NO: A005-111877
SOURCE NAME: DRY AUTO METAL Schredder
LOCATION/ADDRESS: NOVA Industrial Park; U.S. Highway 1; Rockledge Fla
CONTACT: Dan Smith
PHONE NO: 1-305-636-2781
PROCESS/PRODUCTION RATE: 58 CARS x 2200 Lb/hr 63.8 Ton/hour
CONTROL EQUIPMENT: WET Scrubber
OPERATING MODE: ON
FUEL TYPE/RATE: N/A
MATERIAL TYPE/RATE: AUTO Shredded METAL
PERMITTED RATE: 55 Ton/hr 50 CARS/2200 Lb/CAR/hr
EMISSION POINT: CYLINDRICAL VENT STACK
HEIGHT ABOVE GROUND LEVEL: 45 FT
HEIGHT RELATIVE TO OBSERVER: 36 FT

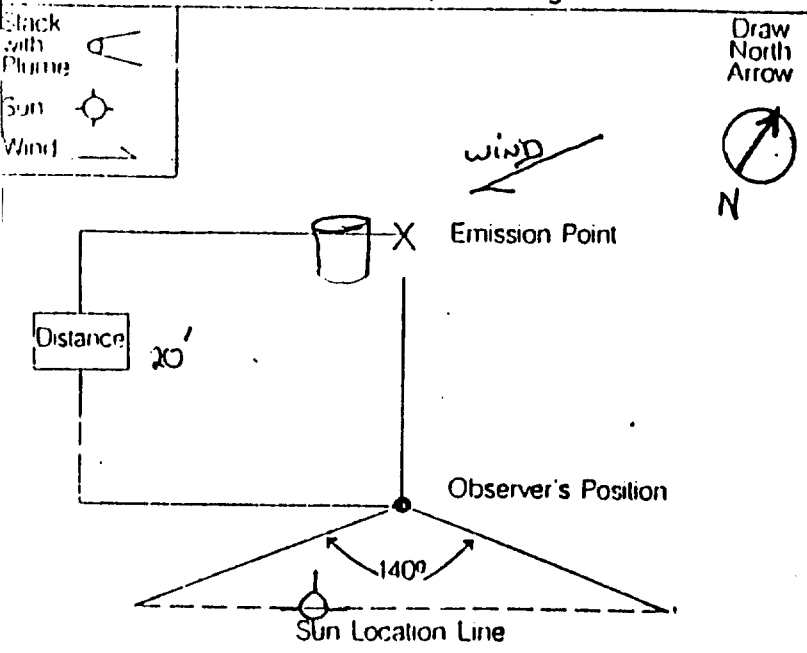
Emissions Description

PLUME EMISSIONS: START: INTERMITENT SLIGHT GRAY-white Smoke END: Same
PLUME COLOR: SLIGHT Grey-white
PLUME TYPE:
WATER DROPLETS PRESENT? YES ☐ NO ☑
IF YES IS PLUME: ATTACHED ☐ DETACHED ☐ N/A

Meteorological Information

SKY CONDITIONS: OVERCAST
BACKGROUND COLOR: START: Grey-white END: Same
PLUME VIEWED AGAINST: Scattered
AMBIENT TEMP: START: 80° END: 80°
WIND SPEED: START: 5-10 VARIABLE END: Same
WIND DIRECTION: START: NE END: NE

Observation Data, Site Diagram



Opacity Readings

OBSERVATION: 10-26-87
START TIME: 10:07AM
STOP TIME: 11:07AM

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	5	10	5	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	5	5	34	0	0	0	0
5	0	0	5	10	35	0	0	0	0
6	10	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	5	5	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	5	0	0	0	45	0	0	0	0
16	5	0	0	5	46	0	0	0	5
17	0	5	0	0	47	0	0	5	0
18	0	5	0	0	48	5	5	0	0
19	0	0	0	5	49	0	0	0	0
20	5	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	5	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	5	0	5
30	0	0	0	0	60	5	0	0	5

Comments: Permit 5% ; Production: Permit AVG 2.3%
WATER Flow METER — 200 GPM
WATER PRESSURE GAUGE — 70 PSI

CARS PROCESSED - 58
WEIGHT / CAR - 2200

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

THIS IS TO CERTIFY THAT

GREGORY GONZALES HAS COMPLETED THE STATE OF FLORIDA VISIBLE EMISSIONS EVALUATION TRAINING EPA REFERENCE METHOD 9.
THIS CERTIFICATE EXPIRES Mar 10, 1988

State of Florida

Visible Emissions Observation Form

COMPLIANCE STATUS: YES | NO | N/A

Source/Process Information

FACILITY NAME: YORKE MOLINER AND COMPANY
SOURCE NAME: Diesel no. 1
PERMIT NO: A005-123074
FACILITY ADDRESS: NOVA INDUSTRIAL PARK, U.S. Highway 1 Rockledge FLA.
CONTACT: DAN Smith
PHONE NO: 1-305-636-2781
PROCESS/PRODUCTION RATE:
CONTROL EQUIPMENT:
OPERATING MODE: ON
FUEL TYPE/RATE:
MATERIAL TYPE/RATE:
PERMITTED RATE:
EMISSIONS POINT: Exhaust STACK
HEIGHT ABOVE GROUND LEVEL: 35 FT
HEIGHT RELATIVE TO OBSERVER: 15 FT

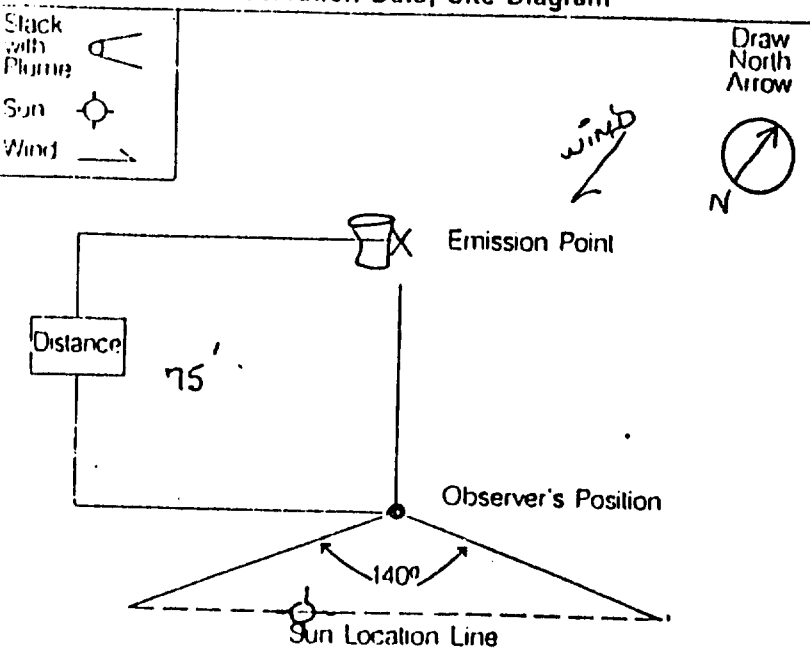
Emissions Description

TYPE OF EMISSIONS: START: INTERMITENT Grey SMOKE END: SAME
PLUME COLOR: Greysish black INTERMITENT
PLUME TYPE:
WATER DROPLETS PRESENT? YES ☐ NO ☑
IF YES IS PLUME: ATTACHED ☐ DETACHED ☐ N/A

Meteorological Information

SKY CONDITIONS: OVERCAST
START: Grey white cloud END: SAME
BACKGROUND COLOR: START: Grey-white END: SAME
WIND SPEED: START: SCATTERED END: SAME
AMBIENT TEMP: START: 80° END: 80°
WIND DIRECTION: START: 5-10 VARIABLE END: SAME START: NE END: NE

Observation Data, Site Diagram



Opacity Readings

OBSERVATION: 10-26-87
START TIME: 10:07AM
STOP TIME: 11:07AM

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
1	10	10	10	10	31	10	15	15	5
2	5	5	5	5	32	5	5	15	5
3	5	5	5	5	33	5	0	10	0
4	5	5	5	10	34	0	15	5	10
5	5	5	10	10	35	5	0	10	10
6	10	5	5	5	36	0	10	15	5
7	0	5	5	5	37	5	5	5	0
8	10	10	10	5	38	5	10	5	5
9	15	5	5	10	39	5	5	5	5
10	10	10	5	0	40	5	5	5	5
11	5	5	10	15	41	0	0	5	10
12	15	15	0	10	42	5	15	0	5
13	15	15	10	10	43	5	5	5	15
14	15	5	0	5	44	5	5	0	0
15	0	10	10	5	45	0	5	15	5
16	10	5	10	5	46	0	5	10	10
17	10	10	5	5	47	10	5	0	5
18	5	0	5	0	48	10	15	10	5
19	10	0	5	10	49	5	5	5	5
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21	0	5	5	5	51	0	10	5	10
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24	5	5	10	0	54	10	5	5	0
25	0	5	5	5	55	5	5	5	5
26	0	0	5	5	56	0	5	5	5
27	5	5	5	5	57	5	5	5	5
28	5	15	10	10	58	5	5	5	5
29	5	5	5	5	59	5	10	10	5
30	5	5	5	5	60	5	5	5	5

Comments:

Type Fuel - NO. 2
heat INPUT - 4.29 mm BTU / hour
6 min high Run AVG opacity 11.45%
permit limitation 20% ≤

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State of Florida

Visible Emissions Observation Form

COMPLIANCE STATUS: [ ] [ ] [ ]

Source/Process Information

COMPANY NAME: YORKE DOLINER AND COMPANY

SOURCE NAME: Diesel NO. 2 — PERMIT NO: A005-123074

SOURCE ADDRESS: Nova Industrial Park - U.S. highway 1; Rockledge, FLA.

CONTACT: Dan Smith — PHONE NO: 1-305-636-2781

PROCESS/PRODUCTION RATE:

CONTROL EQUIPMENT: — OPERATING MODE: ON

FUEL TYPE-RATE: — MATERIAL TYPE-RATE: — PERMITTED RATE:

EMISSION POINT: EXHAUST STACK

HEIGHT ABOVE GROUND LEVEL: 35 ft — HEIGHT RELATIVE TO OBSERVER: 15 ft

Emissions Description

TYPE OF EMISSIONS: START: Intermitent Greyish-black — END: Same

PLUME COLOR: Greyish black intermitent — PLUME TYPE:

WATER DROPLETS PRESENT? YES [ ] NO [X] — IF YES IS PLUME ATTACHED [ ] DETACHED [ ]: N/A

Meteorological Information

AMBIENT CONDITIONS: OVERCAST

BACKGROUND COLOR: START: Grey-white — END: SAME

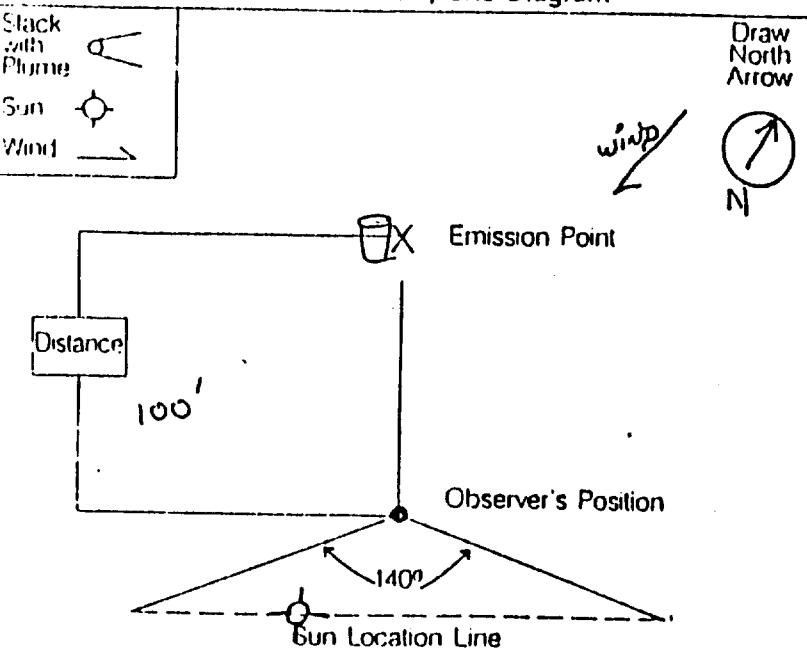
SKY CONDITIONS (CLOUD COVER): START: Scattered Partly Cloudy — END: SAME

AMBIENT TEMP: START: 80° — END: 80°

WIND SPEED: START: 5-10 VARIABLE — END: Same

WIND DIRECTION: START: NE — END: NE

Observation Data, Site Diagram



Opacity Readings

OBSERVATION: 10-26-87 — START TIME: 10:07 AM — STOP TIME: 11:07 AM

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	10	10	10	10	31	10	10	10	5
2	5	5	5	5	32	0	5	10	5
3	5	5	5	5	33	5	0	15	5
4	5	5	5	10	34	0	15	5	5
5	5	5	10	10	35	5	0	10	10
6	10	5	5	5	36	0	5	15	5
7	0	5	5	5	37	5	5	5	0
8	10	10	10	5	38	5	5	10	5
9	15	5	5	10	39	5	5	5	5
10	10	10	10	0	40	5	5	5	5
11	0	5	10	15	41	0	0	5	5
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13	10	10	10	10	43	5	5	5	15
14	10	10	0	5	44	5	5	0	0
15	0	5	10	5	45	0	10	5	5
16	5	5	5	5	46	0	5	5	10
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21	0	5	0	0	51	0	10	10	5
22	5	0	5	10	52	5	10	10	10
23	0	5	5	0	53	5	0	0	10
24	5	0	0	0	54	15	5	5	0
25	0	5	10	5	55	5	5	5	5
26	0	0	5	5	56	0	0	0	5
27	5	5	5	5	57	0	5	5	5
28	5	15	10	10	58	5	5	5	5
29	5	0	5	5	59	5	5	5	5
30	0	5	5	5	60	5	5	5	5

Comments:

Type Fuel - NO. 2

heat input - 4.29 mmBTu / hour

6 min high Run AVG opacity 10 %

Permit Limitation 20 % 6

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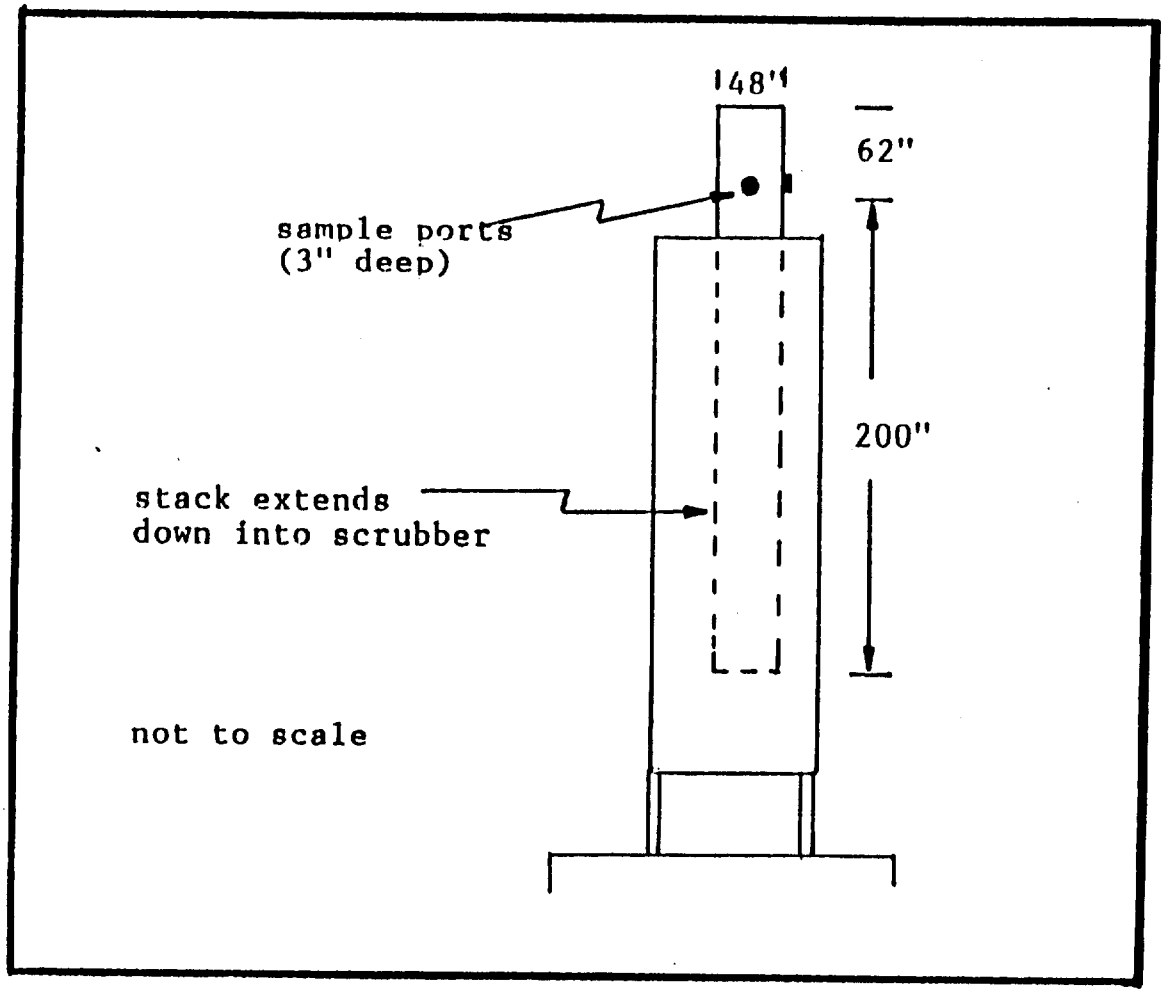
7.0 STACK CONFIGURATION

YORKE DOLINER
ROCKLEDGE, FLORIDA

AUTO SHREDDER

The auto shredder has tested at two sample ports which are located at 90° to each other. The ports are located 4.2 stack diameters down stream and 1.3 stack diameters up stream form any obstruction or opening. Each sample port was tested at 12 test points for 2.5 minutes per test point for a total of 24 test points and 60 minutes per test run. The location of the test points in relation to the stack wall is listed below.

point	distance	point	distance
1	1.0"	7	30.9"
2	3.2"	8	36.0"
3	5.7"	9	39.5"
4	8.5"	10	42.3"
5	12.0"	11	44.8"
5	17.1"	12	47.0"



8.0 PARTICULATE TESTING PROCEDURE

FIELD AND ANALYTICAL PROCEDURES

SAMPLING

The sampling equipment consisted of the following:

1. Pitobe Assembly

   a. Nozzle - Stainless steel with a sharp, tapered leading edge.

   b. Probe - Stainless steel sheath with a 5/8-inch OD stainless steel insert wrapped with nichrome wire. Rheostat controlled and capable of maintaining a minimum temperature of 250°F.

   c. Pitot - Type "S" constructed and attached to probe according to specifications outlined in Part 60 of Chapter 1 of Title 40 of the Code of Federal Regulations, Appendix A, Method 2 as amended August 18, 1977.

   d. Orsat Probe - Stainless steel 1/4-inch tubing attached to pitot tube in an interference-free arrangement.

   e. Thermocouple - Type "K" attached to the pitot tube such that the tip has no contact with metal and does not interfere with the pitot tube face openings.

2. Filter Holder - Pyrex glass with fritted glass filter support.

3. Filter Heating Assembly - Controlled heating element in aluminum module attached to end of probe; capable of maintaining 250°F±°F.

4. Impingers - Four impingers connected in series with glass ball joint fittings and placed in an ice bath. The first, third, and fourth impingers are the modified Greenburg-Smith design. The second impinger is the Greenburg-Smith design with a standard tip. Final gas exit temperature is measured to within ±5° with a dial thermometer immersed in the gas stream.

5. Control Box - Module containing vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within ±5°, dry gas meter with a minimum of 2 percent accuracy, valves, and related equipment as required to maintain an isokinetic sampling rate and to determine sample volume.

6. Nemograph - To determine isokinetic sampling rate.

A schematic of the sampling train is enclosed. (p.19)

Prior to leaving the laboratory, glass fiber filters had been numbered for identification, heated for 2 hours at 105°C, desiccated for 2 hours, and preweighed to the nearest 0.1 mg. Silica gel (indicating type, 6-16 Mesh) had also been preweighed to approximately 200 grams after drying for 2 hours.

Upon arrival at the sampling site, the control box was leak-checked from pump to orifice at 5 to 7 inches of water.

The sample train was prepared in the following manner: 125 ml of distilled water was added to each of the first two impingers. The third impinger was left empty to act as a moisture trap, and the preweighed silica gel was added to the fourth impinger. After assembling the train with the pitobe as shown in the schematic, the system was leak-checked by plugging the inlet to the probe nozzle and pulling a 15-inch Hg vacuum. A leakage rate not in excess of 0.02 cfm was considered acceptable. The pitot tube system was also leak-checked at 5 to 7 inches of water, and any leaks found were corrected.

The inside dimensions of each stack were measured and recorded. The number of sampling points and the location of these points on a traverse were determined by the guidelines set forth in the Federal Register, Vol. 36, No. 247, Sec. 60.85, Method 1. These points were then marked on the probe for easy visibility.

A preliminary traverse was conducted to determine the range of velocity head and the pressure of the stack. A wet bulb and a dry bulb temperature were taken to determine stack temperature and moisture. From this data, the correct nozzle size and the nemograph correction factor were determined. The correct nozzle tip was measured to within 0.001 in. and recorded on the data sheet.

The probe was attached and the heater was adjusted to provide a gas temperature of approximately 250°F. The filter heating system was turned on, and crushed ice was placed around the impingers. After a suitable warmup period, the nozzle was placed on the first traverse point with the tip point directly into the gas stream. The pump was started immediately, the flow was adjusted to isokinetic conditions. After the required time interval had elapsed, the probe was repositioned to the next traverse point, and isokinetic sampling was reestablished. This was done for each point on the traverse until the run was completed. Reading of stack conditions were taken at least every six minutes or when significant changes in stack conditions necessitated additional adjustments in flow rate. At the conclusion of each run, the pump was turned off and the final readings were recorded.

ETIfmAug80

A final leak check of the system was performed as previously described at the highest vacuum encountered during testing and a leak check of the pitot system was repeated.

PARTICULATE SAMPLE RECOVERY

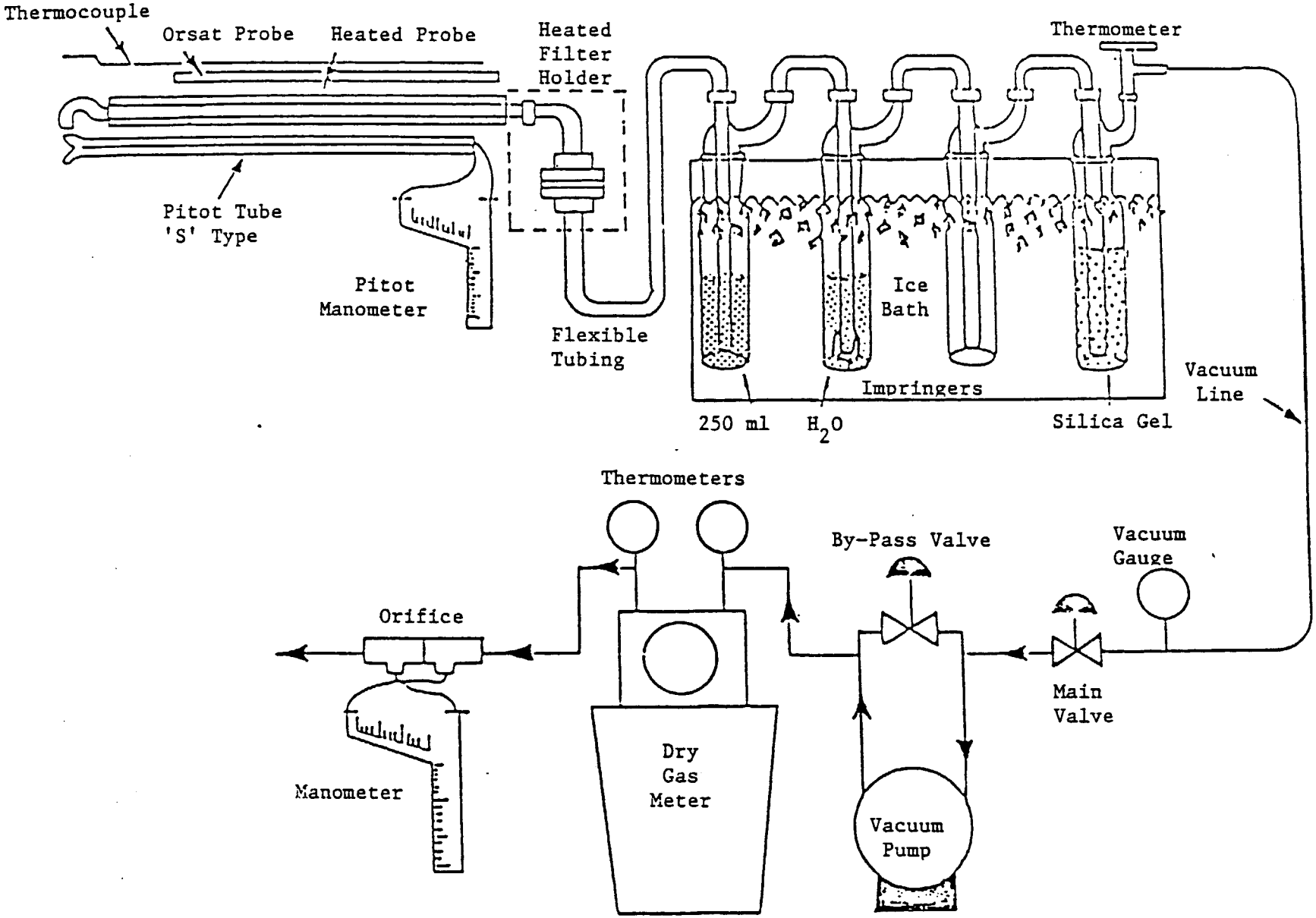
Care was exercised in moving the collection train to the sample recovery area to minimize the loss of collected sample or the gain of extraneous particulate matter. The volume of water in the first three impingers was measured and recorded on the field data sheet. The probe, nozzle, and all sample-exposed surfaces were washed with reagent grade acetone and put into a clean sample bottle marked "prefilter." A brush was used to loosen any adhering partuculate matter, and subsequent washings were put into the "prefilter" container. The filter was carefully removed from the fritted glass support and placed in its original container.* The silica gel was removed from the fourth impinger and transferred to its original container. A sample of the acetone used in washing the probe was saved for a blank laboratory analysis.

PARTICULATE ANALYTICAL PROCEDURES

The filter and any loose particulate matter were transferred from the sample bottle to a clean, tared glass weighing dish, The filter was placed in an oven at 105°C for 2 hours, desiccated for 2 hours, and then weighed. The original weight of the filter was deducted, and the weight gain was recorded to the nearest 0.1 mg.

The "prefilter" and blank solutions were transferred to clean, tared beakers, evaporated to dryness, and desiccated to a constant weight. The blank correction was made, and the weight gain was recorded to the nearest 0.1 mg. The silica gel was weighed, and the weight gain was recorded to the nearest 0.1 gram.

* When practical, samples are changed out upon return to laboratory.



METHOD 5 SAMPLING TRAIN

9.0 PARTICULATE TESTING FIELD DATA SHEETS

FIELD DATA SHEET

PLANT Yorkville Boilers UNIT TESTED Auto Scrubber DATE 26 Oct 87 RUN NUMBER 1

OPERATOR Hawkins, Patterson AMBIENT Temperature 70's Barometric Pressure 29.92

Stack Diameter 48" Probe Length 6' Probe Heater Setting -0- Nozzle Number A 1/4

Assumed Moisture 6% Number of Points 24 Heater Box Setting 250 Nozzle diameter .249 .248 .246 } 0.2

START TIME 0830 Filter Number 1 Pitot Corr. Factor 0.84 Meter Box Number A-1

END TIME 0932 "C" factor/nomograph 1.00 Meter Box DH # 1.80

******** LEAK CHECKS ******** PITOT TUBE (inlet & outlet) a) ✓ VACUUM LINE a) OK at 16"

b) ✓ b) Ok at 9"

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE in. of H_2O	STACK TEMPERATURE (Ts), F	Velocity Head (Dp_s)	($\sqrt{Dp_s}$)	Pressure Differential Across Orifice Meter (DH) in. of H_2O actual (Dh)	desired (DH)	GAS VOLUME SAMPLED (Vm) ft^3 (-)	GAS METER TEMPERATURE Inlet	Outlet	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM in. of Hg	
1-1	0		.93	.64	.80	2.40		383.645	.74	74	238	<60	<4	
2	2.5			.64	.80	2.40		386.0						
3	5		.93	.66	.81	2.60		388.0	.75	74	242	<60	<4	
4	7.5	.14		.72	.85	2.80	3.00	390.—?						
5	10		.94	.72	.85	2.80		393.06	.75	74	242	56	<4	
6	12.5			.70	.84	2.70		394.8						
7	15		.93	.64	.80	2.40		397.—	.74	74	240	54	<4	
8	17.5			.64	.80	2.38		398.98						
9	20		.94	.62	.79	2.30		401.0—	.74	73	240	52	<4	
10	22.5			.60	.77	2.20		402.91						
11	25		.96	.58	.76	2.15		404.—	.74	73	238	50	<5	
12	27.5			.54	.73	2.00		406.99						
								✓						
1	30		.97	.66	.81	2.50		409.035	.75	73	240	48	<6	
2	32.5			.66	.81	2.50		411.15						
3	35		.95	.68	.82	2.55		413.59	.75	73	242	48	<6	
4	37.5			.68	.82	2.55		415.—						

PLANT/UNIT TESTED Yorba Dolmer Auto shredder DATE 26 Oct 87 RUN # 1

TRAVERSE POINT	SAMPLING TIME (θ)	STATIC PRESSURE	STACK TEMPERATURE (Ts), F	VELOCITY HEAD (Dp_s)	VELOCITY HEAD ($\sqrt{Dp_s}$)	PRESSURE ACROSS ORIFICE AFTER METER ACTUAL (Dh)	PRESSURE ACROSS ORIFICE AFTER METER DESIRED (Dh)	GAS VOLUME SAMPLED (Vm) ft^3	GAS METER TEMPERATURE °F INLET	GAS METER TEMPERATURE °F OUTLET	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM IN. of Hg
5	40		.96	.70	.84	2.60		418.00	.75	72	240	48	<5
6	42.5			.68	.82	2.55		420.10					
7	45		.97	.68	.82	2.55		422.25	.77	73	242	48	<5
8	47.5			.64	.80	2.40		424.5					
9	50.		.98	.62	.79	2.30		426.0	.78	74	246	46	<6
10	52.5			.60	.77	2.25		428.7					
11	55		.99	.56	.51	2.10		430.85	.79	74	246	48	<6
12	57.5			.56	.51	2.10		432.9					
	60		.99	—	—	—		434.870	.79	74	—	—	—
			96		12.5	52.09			9.84	9.5			
					0.78	2.42		✓51.225	75.19	73.46			
										75			

FIELD DATA SHEET

PLANT Yorke Bolner UNIT TESTED Hato Shredder DATE 26 Oct 87 RUN NUMBER 2

OPERATOR Hawkins, Patterson AMBIENT Temperature 70's Barometric Pressure 29.92

Stack Diameter 48" Probe Length 6' Probe Heater Setting -0- Nozzle Number 4 3/16

Assumed Moisture ~5% Number of Points 24 Heater Box Setting 250 Nozzle diameter .184 .185 .183 > 0.18

START TIME 1004 Filter Number 2 Pitot Corr. Factor 0.84 Meter Box Number 2-1

END TIME 1114 "C" factor/nomograph 0.98 1.00 Meter Box DH # 1.80

******** LEAK CHECKS ******** PITOT TUBE (inlet & outlet) a) ✓ VACUUM LINE a) OK at 17"

b) ✓ b) OK at 10"

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE in. of H2O	STACK TEMPERATURE (Ts), F	Velocity Head (Dps)	(√Dps)	Pressure Differential Across Orifice Meter (DH) in. of H2O actual (Dh)	desired (DH)	GAS VOLUME SAMPLED (Vm) ft3	GAS METER TEMPERATURE Inlet	Outlet	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM in. of Hg	
1-1	0		.103	.62	.79	0.30		436.080	.77	77	241	52	<4	
2	2.5			.64	.80	0.77		437.0						
3	5		.101	.66	.81	0.77		439.03	.77	77	242	50	<4	
4	7.5			.66	.81	0.77		440.—						
5	10		.100	.68	.82	0.79		441.55	.78	77	244	50	<4	
6	12.5			.68	.82	0.79		442.805						
7	15		.102	.70	.84	0.82		444.08	.79	78	242	50	<5	
8	17.5			.68	.82	0.79		445.37						
9	20		.102	.68	.82	0.80		446.65	.81	79	240	48	<5	
10	22.5			.64	.80	0.76		447.9-						
11	25		.101	.64	.80	0.76		449.04	.83	79	242	46	<4	
12	27.5			.60	.77	0.71		450.02						
2-1	30		.105	.64	.80	0.75		451.545	.83	80	246	44	<6	
2	32.5			.66	.81	0.79		452.70						
3	35		.105	.68	.82	0.82		454.0	.83	81	246	44	<6	
4	37.5			.68	.82	0.82		455.445						

PLANT/UNIT TESTED Yorke Dolivar Autoshredder DATE 26 Oct 1987 RUN # 2

TRAVERSE POINT	SAMPLING TIME (θ)	STATIC PRESSURE	STACK TEMPERATURE (Ts), F	VELOCITY HEAD (Dp_s)	VELOCITY HEAD ($\sqrt{Dp_s}$)	PRESSURE ACROSS ORIFICE AFTER METER ACTUAL (Dh)	PRESSURE ACROSS ORIFICE AFTER METER DESIRED (Dh)	GAS VOLUME SAMPLED (Vm) ft^3	GAS METER TEMPERATURE °F INLET	GAS METER TEMPERATURE °F OUTLET	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM IN. of Hg
5	40		.104	.70	.84	.85		456.64	.84	82	246	46	<4
6	42.5			.70	.84	.85		457.98					
7	45		.104	.68	.82	.82		459.4	.86	83	246	46	<4
8	47.5			.68	.82	.82		460.6					
9	50		.103	.66	.81	.80		461.3	.88	84	246	48	<5
10	52.5			.66	.81	.80		463.3					
11	55		.104	.64	.80	.76		464.6	.89	84	248	46	<5
12	57.5			.64	.80	.76		465.7					
	60		.103	—	—	—		467.010	.90	84	—	—	—
			103✓		0.81✓	0.39✓		30.930✓		82✓			

FIELD DATA SHEET

PLANT York Dalmia UNIT TESTED Auto Shredder DATE 26 Oct 87 RUN NUMBER 3

OPERATOR Hawkins AMBIENT Temperature 80's Barometric Pressure 29.92

Stack Diameter 48" Probe Length 6' Probe Heater Setting -0- Nozzle Number H 3/16

Assumed Moisture 6% Number of Points 24 Heater Box Setting 250 Nozzle diameter 0.184

START TIME 1148 Filter Number 3 Pitot Corr. Factor .84 Meter Box Number H-1

END TIME 1255 "C" factor/nomograph 1.00 Meter Box DH # 1.50

******** LEAK CHECKS ******** PITOT TUBE (inlet & outlet) a) ✓ VACUUM LINE a) Ok at 16"

b) ✓ b) Ok at 10"

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE in. of H2O	STACK TEMPERATURE (Ts), F	Velocity Head (Dp_s)	($\sqrt{Dp_s}$)	Pressure Differential Across Orifice Meter (DH) in. of H_2O actual (Dh)	desired (DH)	GAS VOLUME SAMPLED, (V_m) ft^3	GAS METER TEMPERATURE Inlet	Outlet	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM in. of Hg	
1-1	0		.118	.66	.81	.80		466.405	.89	89	258	<60	<4	
2	2.5			.66	.81	.80		469.-						
3	5		.119	.70	.84	.84		470.9	.89	89	253	<60	<4	
4	7.5	.16		.76	.87	.92		472.33						
5	10		.116	.76	.87	.92		473.71	.90	89	258	48	<4	
6	12.5			.74	.86	.88		475.0						
7	15		.117	.74	.86	.88		476.-	.89	89	258	48	<4	
8	17.5			.66	.81	.80		477.8						
9	20		.114	.66	.81	.80		479.09	.90	89	260	46	<5	
10	22.5			.64	.80	.76		480.37						
11	25		.111	.64	.80	.76		481.64	.90	88	258	48	<5	
12	27.5			.60	.77	.72		482.92						
1	30		.110	.64	.80	.76		484.145	.90	88	256	<50	<4	
2	32.5			.64	.80	.76		485.24						
3	35		.111	.66	.81	.80		487.0	.90	88	252	<50	<4	
4	37.5			.66	.81	.80		488.0						

PLANT/UNIT TESTED Yorktown Boiler Auto shredder DATE 26 Oct 87 RUN # 3

TRAVERSE POINT	SAMPLING TIME (θ)	STATIC PRESSURE	STACK TEMPERATURE (Ts), F	VELOCITY HEAD (Dp_s)	VELOCITY HEAD ($\sqrt{Dp_s}$)	PRESSURE ACROSS ORIFICE AFTER METER ACTUAL (Dh)	PRESSURE ACROSS ORIFICE AFTER METER DESIRED (Dh)	GAS VOLUME SAMPLED (Vm) ft^3	GAS METER TEMPERATURE °F INLET	GAS METER TEMPERATURE °F OUTLET	SAMPLE BOX TEMPERATURE	TEMPERATURE OF LAST IMPINGER	PUMP VACUUM IN. of Hg
5	40		.108	.66	.81	.86		489.38	.90	88	262	46	<5
6	42.5			.68	.83	.88		490.-?					
7	45		.107	.70	.84	.86		491.98	.90	88	260	46	<5
8	47.5			.70	.84	.86		493.22					
9	50		.105	.68	.82	.82		494.57	.91	89	262	46	<5
10	52.5			.66	.81	.80		495.88					
11	55		.103	.64	.80	.76		497.12	.91	88	260	48	<5
12	57.5			.60	.77	.72		498.44					
	60		.104	—	—	—		499.635	.91	88	—	—	—
			111		.82	.81		33.230		89			

10.0 PARTICULATE TESTING LABORATORY WORK SHEET

LABORATORY WORKSHEET

Plant Yorke Dolmer RUN# 1

Source Auto shredder Date 26 Oct 87

A. Weight of Water Collected

Impinger NO.	all	____	Dessicant NO. 1
Final Wt.	____	____	760.0 gms
Initial wt.	____	____	744.5 gms
difference	12 ml	____	15.5 gms

Total volume collected = (gms water)+(gms dessicant)= 27.5 gms

B. Weight of particulate collected in probe wash

Container NO. 1 into dish NO. 523 Blank dish NO. ____

Date/Time of wt 28Oct0630 gross wt 22.2473 gms Apr 87 lot gms

tare wt 22.2276 gms ____ gms

less acetone blank wt .0002 gms +0.0002 blank wt

Weight of particulate in wash 0.0195 gms

C. Weight of particulate collected on filter

FILTER NO.	1	____	BLANK
Date/time of wt. 28Oct0630 gross wt.	0.4252	____	0.4091 gms
less tare wt.	0.4084	____	0.4092 gms
+ ~~less~~ blank wt.	0.0001	____	(-) 0.0001 blank
Total weight collected wt.	0.0169	____	

Total particulate collected on all filters 0.0169 gms

Plus weight of particulate in probe wash 0.0195 gms

Total wt. 0.0364 gms

Signature of Analyst George Hawkins

ETIfmApr82

LABORATORY WORKSHEET

Plant Yorke Bohner RUN# 2

Source auto shredder Date 26 Oct '87

A. Weight of Water Collected

Impinger NO.	all	____	Dessicant NO. 2
Final Wt.	____	____	708.3 gms
Initial wt.	____	____	701.1 gms
difference	20	____	7.2 gms

Total volume collected = (gms water)+(gms dessicant)= 27.2 gms

B. Weight of particulate collected in probe wash

Container NO. 522 into dish NO. 522 Blank dish NO. ____

Date/Time of wt 280630 gross wt	22.9929 gms	____ gms
tare wt	22.9766 gms	see #1 gms
less acetone blank wt	.0002 gms	____ blank wt
Weight of particulate in wash	0.0161 gms	

C. Weight of particulate collected on filter

FILTER NO.	2	____	BLANK
Date/time of wt. 280 0630 gross wt.	.4223	____	____ gms
less tare wt.	.4086	____	see #1 gms
+ ~~less~~ blank wt.	0.0001	____	____ blank
Total weight collected wt.	0.0138	____	

Total particulate collected on all filters 0.0138 gms

Plus weight of particulate in probe wash 0.0161 gms

Total wt. 0.0299 gms

Signature of Analyst George H Hawkins

ETIfmApr82

LABORATORY WORKSHEET

Plant Yorke Deliner RUN# 3

Source auto shredder Date 26 Oct 87

A. Weight of Water Collected

Impinger NO.	all		Dessicant NO. 3
Final Wt.			744.3 gms
Initial wt.			736.4 gms
difference	68		7.9 gms

Total volume collected = (gms water)+(gms dessicant)= 25.9 gms

B. Weight of particulate collected in probe wash

Container NO. 3 into dish NO. 87 Blank dish NO. —

Date/Time of wt 2800630 gross wt	28.4924 gms	gms
tare wt	22.4771 gms	see #1 gms
less acetone blank wt	.0002 gms	blank wt
Weight of particulate in wash	0.0151 gms	

C. Weight of particulate collected on filter

FILTER NO.	3		BLANK
Date/time of wt. 2800630 gross wt.	0.4400		gms
less tare wt.	0.4262		see #1 gms
+ ~~less~~ blank wt.	0.0001		blank
Total weight collected wt.	0.0139		

Total particulate collected on all filters	0.0139 gms
Plus weight of particulate in probe wash	0.0151 gms
Total wt.	0.0290 gms

Signature of Analyst George A Hawkins

ETIfmApr82

11.0 PARTICULATE EMISSION CALCULATIONS

TERMS USED FOR CALCULATIONS:

DP - AVERAGE PRESSURE ON PITOT TUBE

TS - AVERAGE TEMPERATURE OF STACK, DEGREES ABSOLUTE

TM - AVERAGE TEMPERATURE OF DRY GAS METER, DEGREES ABSOLUTE

VM - VOLUME OF DRY GAS METER, ACTUAL CUBIC FEET

θ - TOTAL TIME OF THE TEST RUN, MINUTES

AN - AREA OF THE NOZZLE TIP, SQUARE FEET

PB - BAROMETRIC PRESSURE

DH - AVERAGE PRESSURE ON THE LIMITING ORIFICE

VWC - VOLUME OF WATER COLLECTED FROM IMPINGERS AND SILICA GEL, GRAMS

VMSTD - VOLUME OF THE DRY METER IN STANDARD CUBIC FEET

BWO - PERCENT OF MOISTURE IN FLUE GAS

MD - MOLECULAR WEIGHT OF DRY FLUE GAS

MS - MOLECULAR WEIGHT OF FLUE GAS

VS - VELOCITY OF FLUE GAS

QS - VOLUMETRIC FLOW OF FLUE GAS, CUBIC FEET PER MINUTE

QS STD- VOLUMETRIC FLOW OF FLUE GAS, STANDARD CUBIC FEET DRY

%I - PERCENT OF THEORETICAL IDEAL SAMPLING RATE

WT COLLECTED - TOTAL WEIGHT OF PARTICULATE COLLECTED BY SAMPLING TRAIN, IN GRAMS

DIAMETER AVERAGE - AVERAGE DIAMETER OF NOZZLE TIP, INCHES

Derivation of Constants on Calculation Sheet

Equation

A. Volume of water vapor collected

$$\text{Volume} = \frac{(\text{volume collected, grams})(pw)(R)(Tstd)}{(Pstd)\quad(Mw)}$$

$$\text{Volume} = (\text{grams})\ (0.02201, pw)(21.85, R)(528,\ Tstd)/(29.92, Pstd)(18, Mw)$$
$$\text{Volume} = (\text{grams})\ (0.0471)$$

B. Converting to standard volume

$$Vm\ std = (Vm)\ \frac{Tstd}{Tm}\ \frac{Pm^*}{Pstd} \qquad * Pm = (Pb+Dh/13.6)$$

$$Vm\ std = (Vm)\ \frac{Pm}{Tm}\ \frac{528°A}{29.92"Hg} = (Vm)\ \frac{Pm}{Tm}\ (17.65)$$

F. Stack gas velocity

$$\text{Pitot tube constant (Kp)} = 85.49\ ft/s \left[\frac{(lb/lb\text{-}mole)(in.Hg)}{(°R)(in.H_2O)}\right] 1/2$$

G. same as B above

H. Isokinetic sampling rate

$$\%I = \frac{100\ Ts\ Vmstd\ Pstd}{60\ \ \theta\ Vs\ Ps\ An\ Tstd\ (1\text{-}Bwo)}$$

$$\%I = \frac{Ts\ Vmstd}{\theta\ Vs\ Ps\ An\ (1\text{-}Bwo)}\ \frac{(100)(29.92,\ "Hg)}{(60)\ (528°A)} = 0.0945 \quad [\ \text{etc.}\ ]$$

J. Factor (0.00857) converts grains to pounds and flow per minute to flow per hour.

$$0.00857 = \frac{1}{(7000\ grains/lb)}\ (60\ min/hour)$$

*Area of nozzle

$$An = \frac{(3.14)\left[\frac{(\text{diameter, inches})}{2}\right]^2}{144\ inches/sq.ft.} = (0.0055)$$

Terms

R = ideal gas constant, 21.85 (in.Hg)(ft^3)/ (lb-mole)
Tstd = standard absolute temperature, 528°K
Pstd = standard absolute pressure, 29.92 in.Hg
Mw = molecular weight of water, 18.0 lb/lb-mole
pw = density of water, 0.002201 lb/ml

CALCULATIONS: PLANT Yorke Boiler RUN# 1

SOURCE auto shredder DATE 26 Oct 87

A) Volume of water vapor collected

Vwc = (0.0471) (27.5 gm) = 1.30

B) Volume of air metered to 68 deg.F, 29.92"Hg, dry

Vmstd = (17.64)(Y)(Vm)(Pm)/(Tm)

Vmstd = (17.64)(.986)(51.225)$\frac{(30.10)}{(535)}$ = 50.13 cuft

C) Moisture Content of Flue Gas

Bwo= $\frac{Vwc}{Vwc + Vmstd}$ = $\frac{1.30}{(50.13 + 1.30)}$ (100)= 3 %H_2O

D) Dry Gas Molecular Weight

Md = 0.44(%CO_2)+0.32(%O_2)+0.28(%N+%CO)

Md = 0.44( )+0.32( )+0.28( )= assume 29

E) Stack Gas Molecular Weight

Ms = Md(1-Bwo)+(18)(Bwo)=(29)(.97)+(18)(.03)

Ms = 28.67

F) Stack Gas Velocity

Vs=Kp Cp$\sqrt{\overline{Dp}}\sqrt{\frac{(Ts\ avg)}{Ps\ \ Ms}}$ =(85.49)(.84)(0.78)$\sqrt{\frac{(556)}{(29.93)(28.67)}}$ = 45.09 ft/sec

G) Stack Gas Flowrate

Qs = (60 sec/min) (As)(Vs)=(60)(12.56)(45.09)= 33980 cuftmin

Qs std=$\frac{Qs(Tstd)(Ps)(1-Bwo)}{(Ts)\ \ (Pstd)}$=$\frac{(17.64)(33980)(29.93)(.97)}{(556)}$= 31299 DSCFM

H) Isokinetic Sampling Rate %I = 0.0945 $\frac{Ts\ \ (Vmstd)}{Ps\ Vs\ An\ \theta\ (1-Bwo)}$

%I = $\frac{(0.0945)(556)(50.13)}{(29.93)(45.09)(0.00034)(60)(.97)}$ = $\frac{2634}{26.70}$ = 99 %

I) Concnetration = (15.43 grains/gram)(Wt collected)/(Vm std)

= (15.43) (0.0364)/(50.13)= 0.0112 grains/dscf

J) Emission Rate = (0.00857)(grains/dscf)(Qstd)

= (0.00857)(0.0112)(31,299)= 3.00 lbs/hr

VALUES FROM TEST FORM	
$\sqrt{\overline{Dp}}$= 0.78	"H_2O
96 Ts= 556	deg R
75 Tm= 535	deg R
Vm= 51.225	cuft
Y = 0.986	--
θ = 60	min
An= 0.00034	cuft
Pb= 29.92	"Hg
Dh= 0.18	"Hg
Cp= 0.84	--
Ps= 29.93	"Hg
As= 12.56	cuft
Md= 29	lb/cuft
Vwc= 27.5	gm
Wt(PM)= .0364	gm
Pm = 30.10	"Hg

CALCULATIONS: PLANT Yorke Bolmer RUN# 2

SOURCE auto shredder DATE 26 Oct '87

A) Volume of water vapor collected

Vwc = (0.0471) (27.2 gm) = 1.28

B) Volume of air metered to 68 deg.F, 29.92"Hg, dry

Vmstd = (17.64) (Y) (Vm) (Pm) / (Tm)

Vmstd = (17.64) (.986) (30.930) $\frac{(29.98)}{(542)}$ = 29.76 cuft

C) Moisture Content of Flue Gas

Bwo = $\frac{Vwc}{Vwc + Vmstd}$ = $\frac{1.28}{(1.28+29.76)}$ (100) = 4 %H_2O

D) Dry Gas Molecular Weight

Md = 0.44(%CO_2)+0.32(%O_2)+0.28(%N+%CO)

Md = 0.44( )+0.32( )+0.28( ) = assume 29

E) Stack Gas Molecular Weight

Ms = Md(1-Bwo)+(18)(Bwo) = (29) (.96)+(18) (.04)

Ms = 28.56

F) Stack Gas Velocity

Vs = Kp Cp $\sqrt{\overline{Dp}}$ $\sqrt{\frac{(Ts\ avg)}{Ps\ \ Ms}}$ = (85.49) (0.84) (0.81) $\sqrt{\frac{(563)}{(29.93)(28.56)}}$ = 47.21 ft/sec

G) Stack Gas Flowrate

Qs = (60 sec/min) (As) (Vs) = (60) (12.56) (47.21) = 35,577 cuftmin

Qs std = $\frac{Qs\,(Tstd)\,(Ps)\,(1-Bwo)}{(Ts)\quad(Pstd)}$ = $\frac{(17.64)(35,577)(29.93)(.96)}{(563)}$ = 32,029 DSCFM

H) Isokinetic Sampling Rate %I = 0.0945 $\frac{Ts\quad(Vmstd)}{Ps\ Vs\ An\ \theta\ (1-Bwo)}$

%I = $\frac{(0.0945)\ (563)(29.76)}{(29.93)(47.21)(.00019)(60)(.96)}$ = $\frac{1583}{15.46}$ = 102 %

I) Concnetration = (15.43 grains/gram) (Wt collected) / (Vm std)

= (15.43) (0.0299) / (29.76) = 0.0155 grains/dscf

J) Emission Rate = (0.00857) (grains/dscf) (Qstd)

= (0.00857) (0.0155) (32,029) = 4.25 lbs/hr

VALUES FROM TEST FORM

$\sqrt{\overline{Dp}}$ = 0.81	"H_2O
Ts = 563	deg R
Tm = 542	deg R
Vm = 30.930	cuft
Y = 0.986	--
θ = 60	min
An = .00019	cuft
Pb = 29.92	"Hg
Dh = 0.06	"Hg
Cp = 0.84	--
Ps = 29.93	"Hg
As = 12.56	cuft
Md = 29	lb/cuft
Vwc = 27.2	gm
Wt(PM) = .0299	gm
Pm = 29.98	"Hg

103
82

CALCULATIONS: PLANT York Bolivia RUN# 3

SOURCE auto shredder DATE 26 Oct 87

A) Volume of water vapor collected

Vwc = (0.0471) (25.9 gm) = 1.22

B) Volume of air metered to 68 deg.F, 29.92"Hg,dry

Vmstd = (17.64)(Y)(Vm)(Pm)/(Tm)

Vmstd = (17.64)(.986)(33.230)$\frac{(29.98)}{(549)}$ = 31.56 cuft

C) Moisture Content of Flue Gas

Bwo = $\frac{Vwc}{Vwc + Vmstd}$ = $\frac{1.22}{(1.22+31.56)}$ (100) = 4 %H_2O

D) Dry Gas Molecular Weight

Md = 0.44(%CO_2)+0.32(%O_2)+0.28(%N+%CO)

Md = 0.44( )+0.32( )+0.28( ) = assume 29

E) Stack Gas Molecular Weight

Ms = Md(1-Bwo)+(18)(Bwo) = (29)(.96)+(18)(.04)

Ms = 28.56

F) Stack Gas Velocity

Vs = Kp Cp$\sqrt{Dp}\sqrt{\frac{(Ts\ avg)}{Ps\ \ Ms}}$ = (85.49)(.84)(0.82)$\sqrt{\frac{(571)}{(29.93)(28.56)}}$ = 48.13 ft/sec

G) Stack Gas Flowrate

Qs = (60 sec/min) (As)(Vs) = (60)(12.56)(48.13) = 36,271 cuftmin

Qs std = $\frac{Qs(Tstd)(Ps)(1-Bwo)}{(Ts)\ \ (Pstd)}$ = $\frac{(17.64)(36,271)(29.93)(.96)}{(571)}$ = 32,196 DSCFM

H) Isokinetic Sampling Rate %I = 0.0945 $\frac{Ts\ \ (Vmstd)}{Ps\ Vs\ An\ \theta\ (1-Bwo)}$

%I = $\frac{(0.0945)(571)(31.56)}{(29.93)(48.13)(0.00019)(60)(.96)}$ = $\frac{1703}{15.77}$ = 108 %

I) Concnetration = (15.43 grains/gram)(Wt collected)/(Vm std)

= (15.43)(.0290)/(31.56) = 0.0142 grains/dscf

J) Emission Rate = (0.00857)(grains/dscf)(Qstd)

= (0.00857)(0.0142)(32,196) = 3.92 lbs/hr

VALUES FROM TEST FORM	
$\sqrt{Dp}$ = 0.82	"H_2O
Ts = 571	deg R
Tm = 549	deg R
Vm = 33.230	cuft
Y = 0.986	—
θ = 60	min
An = 0.00019	cuft
Pb = 29.92	"Hg
Dh = .06	"Hg
Cp = 0.84	—
Ps = 29.93	"Hg
As = 12.56	cuft
Md = 29	lb/cuft
Vwc = 25.9	gm
Wt (PM) = .0290	gm
Pm = 29.98	"Hg

111
89

etifmSep83

12.0 EQUIPMENT CALIBRATION DATA

CALIBRATION OF EQUIPMENT

Calibration of the stack sampling equipment was performed as directed by Chapter 17-2.700 (6)(a) 5.f. of the Florida Administrative Code and the Federal EPA handbook on Quality Assurance. While in the field the following quality assurance is performed.

A. Nozzles. Prior to starting the test, the nozzle selecteld for the test is calibrated by micrometer. This is normally found listed on the first run field data sheet in the blank after nozzle diameter. The general appearance of the pitot and probe is noted before and after the test.

B. Dry Gas Meter. Before beginning each series of tests, the back half of the sample train (in the control box) is checked for leaks.

C. Sampling Train. Before the test and after the train has been assembled, a leak check is performed from the nozzle back. A vacuum of 15" or greater is used. During the test the vacuum on the sampling train is recorded to allow a final (after the test run) leak check equal to or greater than the highest vacuum during the run.

Other calibration as required by the above listed code, was performed in the lab in a manner prescribed by the State Code.

Calibration Schedule
(Reference: 17-2.700(6)(a)5.f.)

DER 17 - 2.700

10/83

Item	Minimum Calibration	Reference Instrument Frequency	Tolerance
Thermometers Liquid in glass	Annually	ASIM Hg in glass ref. thermometer or equivalent or thermometric points.	±2%
Bimetallic	Quarterly	Calib. liq. in glass thermometer	5°F
Thermocouple	Annually	ASIM Hg in glass ref. thermometer, NBS calibrated reference thermocouple and potentiometer.	5°F
Barometer	Monthly	Hg barometer, or NOAA station	±1% scale
Pitot Tube	1. When required 2. When damaged	By construction or measurements or wind tunnel D greater than 16" and standard pitot tube	See EPA Method 2 Figs. 2-2 & 2-3
Probe Nozzles	1. Before each test or 2. When nicked, dented, corroded	Micrometer	±0.001" mean of at least 3 readings. Maximum deviation between readings 0.004"
Dry Gas Meter and Orifice Meter	1. Full Scale: When received; When 5% change observed; annually	Spirometer of calibrated wet test or dry gas test meter	2%
	2. One Point: semiannually		
	3. Check after each test series	Comparison check	5%

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test numbers _____ Date 10 Mar 87 Meter box number H-1 Plant _____

Barometric pressure, P_b = 29.98 in. Hg Dry gas meter number H-1 Pretest Y 1.80

	Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d P_b + \frac{\Delta H}{13.6} t_w + 460}$
1	1.5	10	10.312	74	84	84	84 / 544	14.86	7	.982	
2	1.5	10	10.324	74	84.5	84	544.25	14.84	7	.981	
3	1.5	10	10.230	74	84.5	84	544.25	14.91	7	.990	
										Y = 0.984	

Vacc = 7"

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y

P_b = Barometric pressure, in. Hg.

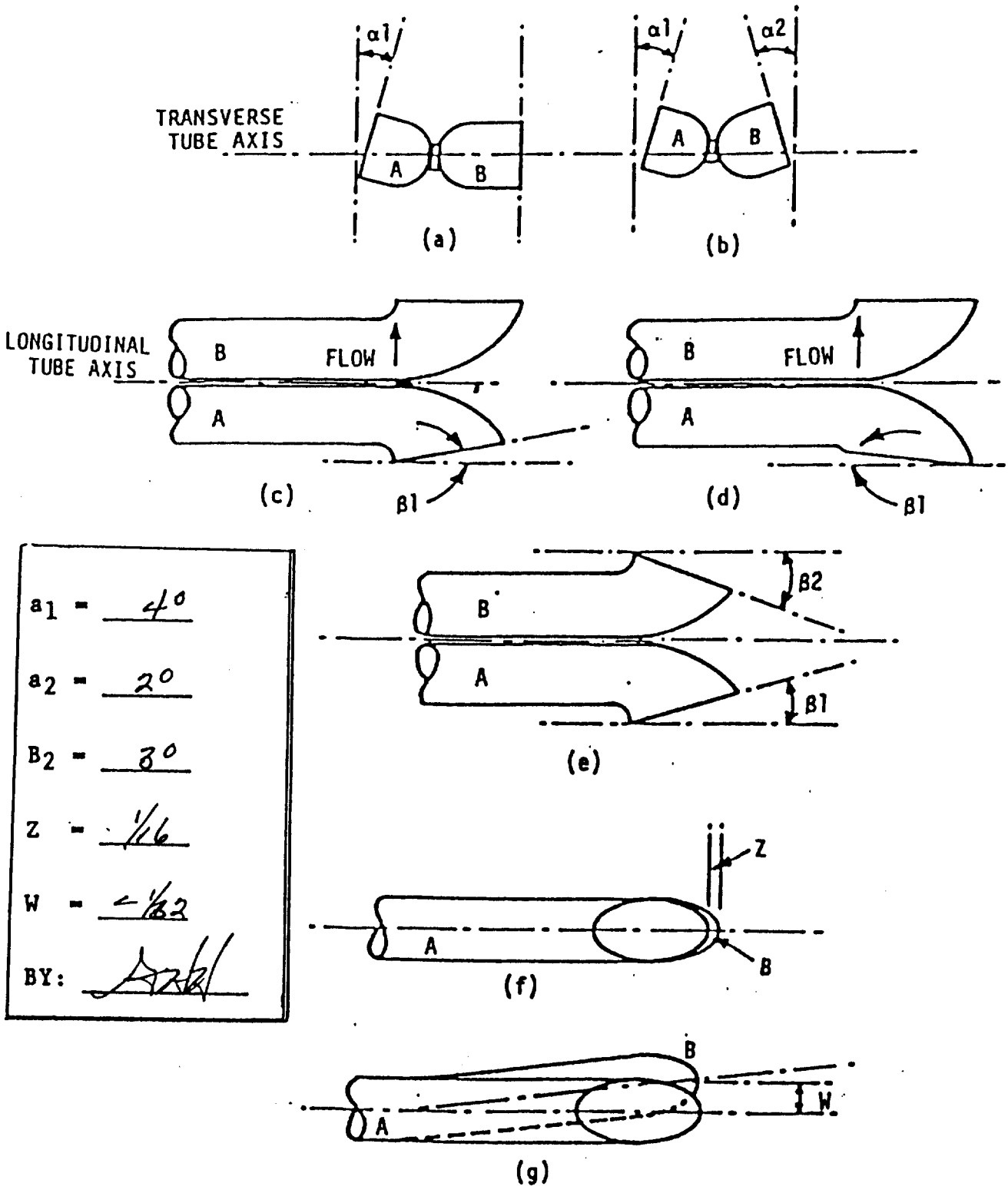
θ = Time of calibration run, min.

$\frac{(10)(29.98)(544)}{(x)(30.17)(534)} = \frac{163091.2}{x(16110.8)}$

PITOT TUBE ALIGNMENT CHECK

PITOT TUBE # 146'

DATE: 2 Nov 87



a_1 = 4°

a_2 = 20°

B_2 = 30°

Z = 1/16

W = 1/32

BY:

Figure 1.4. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect Cp so long as α_1 and α_2 <10°, β_2 <5°, z <0.32 cm (1/8 in.) and w<0.08 cm (1/32 in.).

STACK TEMPERATURE SENOR CALIBRATION

CALIBRATION DATE: 2 Nov '87

THERMOCOUPLE NUMBER: #6 AMBIENT TEMPERATURE: 74F

BAROMETRIC PRESSURE: 29.91 CALIBRATOR: GHH

REFERENCE TEMPERATURE SENSOR: BESD Hg in Glass

REFERENCE PT. No. (a)	CAL. MEDIUM (b)	REFERENCE TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	DIFFERENCE % DEGREES (c),
1	oil	74°	73°	<1%
2	"	86	87	"
3	"	109.5	110	"
4	"	125	126	"
5	"	140	139	"
6	"	161	160	"

a. Every (50°F).
b. Type of calibration system used.
c. calculation of % difference. MUST BE LTEQ TO 1.5 %

$$\left(\frac{(\text{ref temp deg F} + 460) - (\text{test thermon temp. deg. F} + 460)}{\text{ref temp. deg. F} + 460}\right) 100$$

POST TEST METER ORFICE CHECK

Meter Box NO. H-1

Delta Ha of box 1.80

Date of Check 21 Nov 87

Time required to draw 10 ft^3 at Delta Ha of control box 13 min 46 sec

10 cuft ÷ by 13.77 total minutes = 0.73 DHa_2

$\frac{0.75}{DHa_2}$ = 1.03 X (100) = 103 % of present calibration for meter box.

Procedure.

Set the flow of meter box at DHa of meter box as determined by last calibration. Record the amount of time required to draw 10.00 cuft. If the percent of the resulting ratio to the calibration of the meter box is NOT five percent or less, the meter box must be recalibrated.

NOZZLE CALIBRATION DATA

Nozzle ID Number	D_1	D_2	D_3	$D_{avg.}$
H 1/4	see run #1			
H 3/16	see run #2			

a. $D_{1,2,3}$ = three different nozzle diameters, each diameter must be within 0.001 in.

b. Maximum difference between any two diameters $\leq$ 0.004 in.

c. $D_{avg.}$ = average of $D_{1,2,3}$.

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 5 Sept 1985 Meter box number H-1

Barometric pressure, P_b = 29.98 in. Hg Calibrated by Hawkins

Orifice manometer setting (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Avg[a] (t_d), °F	Time (θ), min	Y_i	$\Delta H@_i$ in. H_2O
0.5	5	5.215	74	88.5	87	87.75	2.38	.982	1.69
1.0	5	5.205	74	88.5	87	87.75	8.75	.982	1.69
1.5	10	10.308	75	89	87.5	88.25	4.90	.991	1.84
2.0	10	10.268	75	89	87.5	88.25	2.97	.994	1.86
3.0	10	10.355	75.5	90	88	89.0	0.70	.983	1.90
4.0	10								
							Avg	.986	1.80

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w}\right]^2$
0.5	0.0368	82107.7 ÷ 83591.1	27708.5 ÷ 16421.5
1.0	0.0737	82107.7 ÷ 83611.6	27735.2 ÷ 16421.5
1.5	0.110	164365.3 ÷ 165939.7	30215.5 ÷ 16436.5
2.0	0.147	164515.3 ÷ 165499.1	30526.5 ÷ 16451.5
3.0	0.221	164590.2 ÷ 167467.6	31222.5 ÷ 16459.0
4.0	0.294		

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

Quality Assurance Handbook M4-2.3A (front side)

APPENDIX

PROCESS DATA SHEETS

Yorke Doliner & Company

TELEPHONE - 305-636-2781
TELEX - YD & C BONA 564373

POST OFFICE BOX 1659
COCOA, FLORIDA 32923-1659

October 26, 1987

INPUT PROCESS WEIGHT

Test 1

8:30 - 9:30 a.m. 55 Cars X 2200# = 121,000

Test 2

10:00 - 11:10 a.m. 58 Cars X 2200# = 127,600

Test 3

11:42 - 12:52 p.m. 47 Cars X 2200# = 103,400

Daniel W. Smith, Maintenance Supervisor

Yorke Doliner & Company

TELEPHONE - 305-636-2781
TELEX - YD & C BONA 564373

POST OFFICE BOX 1659
COCOA, FLORIDA 32923-1659

November 25, 1987

To Whom It May Concern:

On October 20th, the following readings were taken on the Scrubber System:

Measurement Readings:

-Scrubber-

Input (+) 1 1/2"

Output - (-) 1/4"

Differential= 1 3/4"

Water PSI = 70 PSI
Water Flow = 200 GPM-

Daniel W. Smith,
Maintenance Supervisor

WEST VIRGINIA
AIR POLLUTION CONTROL COMMISSION
NORTHERN PANHANDLE REGIONAL OFFICE
1911 Warwood Avenue
WHEELING, WEST VIRGINIA 26003
Telephone: 304-277-2662

MEMORANDUM FOR RECORD

TO: Dale Farley
Chief, Engineering

DATE: September 3, 1982

FROM: John Reggi
Regional Engineer

SUBJECT: HERMAN STRAUSS COMPANY
Aluminum Reclaiming Furnace

FILE: Herman Strauss Co.

As per our phone conversation on August 24, 1982, I have completed an inspection of the Aluminum Reclaiming Furnace installed (without permit) by Herman Strauss Company. The unit began operation during the first week of August, 1982. Enclosed please find operating and construction data supplied by the manufacturer.

During my observation the furnace was operating with temperatures in the primary and secondary chambers as described in the data (i.e. 1500° F and 1700°F respectively). The unit is natural gas fired. No stack emissions were observed during charging, tapping, or in the melting phase of operation. Also no fugitive emissions were observed during charging or topping.

Mr. Ken Burns representing the company indicated that most aluminum scrap was obtained from the Ormet plant located in Ohio north of New Martinsville, W.Va. He indicated the operation would be essentially as described in the enclosed letter from Eurich-Falcone Incinerator Co. to Mr. Nim of the Allegheny Health Department.

In my estimation there will be no visible emissions from this operation. Stack emissions although not measured will probably not be a problem because of the natural gas fuel and clean scrap charged. I have made no evaluation of any emissions that might occur from the melting aluminum scrap (approximately 97% pure aluminum).

John Reggi
Regional Engineer

JR/gag
cc: C.G. Beard, II

EURICH-FALCONE INCINERATOR CO.

"FORMERLY O'HARA INCINERATOR CO."

51 WILL STREET • McKEESPORT, PA 15132

PHONE (412) 751-6700

Allegheny County Health Department
Bureau of Air Pollution Control
39th & Penn Avenue
Pittsburgh, PA 15224

ATTN: Mr. Karl Nim

Dear Mr. Nim: Re: Permit information on Aluminum Furnace

The following is the information you requested on the aluminum furnace to be installed at our location:

A. Secondary combustion air blower is rated at 880 CFM @ 1½" S.P./ ½ H.P. 1750 RPM.

B. Two secondary gas burners are rated at 800.000 BTU/HR capacity each.

C. There are five air port openings into the base of the secondary holding chamber, for combustion air and mixing (turbulence).

D. We have four primary gas burners for melting the aluminum, each burner is rated at 1,200.000 BTU/HR (max. rating). One burner is used also for keeping the aluminum in a liquid form in the holding pot area.

E. Both the primary chamber and the secondary chamber is equipped with temperature modulation controls to maintain proper temperatures for smoke destruction and melting aluminum. 1500°F primary and 1700°F secondary chamber.

F. The volume of the primary chamber, less the hearth area, is 359.92 cu/ft.

G. Total volume of the secondary chamber is 56.27 cu/ft plus additional smoke cumbustion in the refractory stack. Stack is 16½" diamter @ 8'-0" high with a volume of 20.53 cu/ft.

H. Upper stack is equipped with a test port for reading temperature, velocity, and particulate matter.

I. We estimate the holding time @ 1700°F to be at least ½ sec residence time.

J. The melting chamber is of starved air design, with combustion air supplied through the burners only.

K. We will not be doing any fluxing of the aluminum bath.

Very truly yours,

EURICH-FALCONE INCINERATOR CO.

"FORMERLY O'HARA INCINERATOR CO."

51 WILL STREET • McKEESPORT, PA 15132

PHONE (412) 751-6700

Aug. 25, 1982

City County Building
1500 Chapline Street
Wheeling, W. Va. 26003
ATTN: Mr. Tim Carroll

Dear Tim:

We installed a aluminum reclaiming furnace at the Herman Strauss Company in Wheeling, W. Va.

This equipment was installed at our Pittsburgh plant, and was approved by the local Air Pollution Control Dept.

Attached is the information you requested on the furnace along with drawing.

Please inspect the installation so the new owner can obtain the necessary permits to operate the equipment.

If there are any questions, please feel free to call my office at any time.

Very truly yours,
EURICH-FALCONE INCINERATOR CO.

Donald C. Eurich

Donald C. Eurich
President

DCE/re
Encl.

Allegheny County Health Department

Bureau of Air Pollution Control
301 Thirty-ninth Street
Pittsburgh, Pennsylvania 15201

November 24, 1980

Eurich-Falcone Incinerator Company
51 Will Street
McKeesport, Pennsylvania 15132

Attention: Mr. Donald C. Eurich

PERMIT NO.: 80-I-0074-P
EQUIPMENT: Aluminum Melting Process
LOCATION: McKeesport
FIRST OPERATING PERMIT FEE: $50.00

NOTICE OF INSTALLATION PERMIT APPROVAL

The subject installation has been approved for construction. The installation shall be made in conformity with the plans and specifications which are a part of your application, and must be inspected and approved by the Bureau before it can be placed into operation.

Upon completion of the installation, please submit an application for an Operating Permit with the fee listed above, and an inspection will then be scheduled. When it is determined by the Bureau that the installation complies with the Regulations and the approved permit application, the facility may be placed into operation.

The installation will require emission testing prior to the issuance of the Operating Permit. The approved test procedure, as outlined in Article XVIII, shall apply. The Bureau must be notified at least ten (10) days prior to the date of any tests.

If emission testing demonstrates compliance with Article XVIII, the Operating Permit will be issued.

This Installation Permit shall be posted at the site during the construction period.

Permit Issued by:

BUREAU OF AIR POLLUTION CONTROL

J. D. Graham
Engineering and Plan Review Section

JDG/cg

Attachment

PERMIT - PROCESS

Receipt No. 11512
Issued 11/24/80
Expires
Fee $60.00
Basis

1 INSTALLATION [X] COMPLETION DATE Novemeber 1980 DATE INSTALLED OPERATING [ ]

	NAME	ADDRESS		BUSINESS
2	Eurich-Falcone Incinerator Co.	51 Will Street	McKeesport, PA 15132	
	OWNER	ADDRESS		PHONE
3	Eurich-Falcone Incinerator Co.	51 Will Street	McKeesport, PA 15132	751-6700
	INSTALLER OR CONTRACTOR	ADDRESS		PHONE
4	Eurich-Falcone Incinerator Co.	51 Will Street	McKeesport, PA 15132	751-6700
	AUTHORIZED REPRESENTATIVE	TITLE	SIGNATURE	PHONE
5	Donald C. Eurich	President		751-6700

	PROCESS / YOUR IDENTIFICATION		FEE
6	Aluminum Melting	PRODUCTION RATE [ ] 1000 LB/HR Gross* · CHARGING RATE [ ] TONS/HR.	$ 60.00
7	OPERATING TIME: 16 HOURS/DAY 5 - 6 DAYS/WK. 52 WEEKS/YR.	CONTINUOUS [ ] BATCH [X]	BATCH TIME 1 HR.
8	RAW MATERIALS: Aluminum Scrap		TOTAL
9	MATERIALS PRODUCED: Aluminum Ingots & Sows		TOTAL

	FUEL	AMT./HR.	BTU	% ASH	% SULFUR	FUEL	AMT./HR.	BTU	% ASH	% SULFUR
10	Nat.Gas	4,800,000		-------	-------					
	FUEL	AMT./HR.	BTU	% ASH	% SULFUR	FUEL	AMT./HR.	BTU	% ASH	% SULFUR

	GAS CLEANER	GAS FLOW	INLET TEMP.	DUST LOADING	EFFICIENCY	PRESSURE DROP
11	None ★	SCFM	°F	GR./SCF.	%	"W.G.
12	GAS CLEANER: None	GAS FLOW SCFM	INLET TEMP. °F	DUST LOADING GR./SCF.	EFFICIENCY %	PRESSURE DROP "W.G.

13	EMISSION ANALYSIS	PARTICULATE	SO_2	CO	NOx	HC	OTHER
	POTENTIAL						
	FINAL	Less than .125 LBS/100 LBS waste (scrap) ~~E~~ < 1.25 #/HR ~~0.5~~					

	STACK HEIGHT	STACK AREA	EXHAUST FLOW	TEMPERATURE	DUST LOADING
14	32 FT.	16" Dia. SQ. FT.	ACFM	500 °F	--------- GR./SCF.

15	EMISSION BASIS	MFG. DATA [X]	EMISSION FACTORS [ ]	STACK TEST [ ]	COMPANY ESTIMATE [ ]	SUBMIT SUPPORTING DATA FOR METHOD USED.

16	NEAREST BUILDING:	HEIGHT	DISTANCE	COST OF EQUIPMENT	COST OF GAS CLEANING SYSTEM
		28 FT.	20 FT.	$	$ --------

17 DRAWING NO'S. AND TITLES

18 REMARKS

Conversion of solid waste incinerator, to reclaim aluminum from scrap yards, to melt and form ingots and sows.

* Gross weight is aluminum and steel mixed, approximately 50/50%

19	REVIEWED BY	TITLE	DATE	REVIEWED BY	TITLE	DATE
	[illegible]	[illegible]	11 18 80			
	REVIEWED BY	TITLE	DATE	PERMIT APPROVED BY	TITLE	DATE
				[illegible]	Asst Chief Engr	11/24/80

APC USE ONLY

★ Secondary combustion chamber @ 1500-1700 °F and 0.5 sec residence time ~~per BAPC~~ See letter Eurich to Nine 11/21/80