AP42 Section: 11.1

Reference Number: 379

Title: Stack Emission Test, Payne And Dolan, Inc., Control 34 Plant,

Environmental Technology and Engineering Corporation, Elm Grove, WI,

July 28 and October 6, 1999.

SO2 HR

Sec. 11.1
Ref. 379

Report to

PAYNE & DOLAN, INC.

Waukesha, Wisconsin

for

STACK EMISSION TEST
CONTROL 34 PLANT

July 28 & October 6, 1999

by

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORPORATION
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ETE

SUMMARY

On July 28 & October 6, 1999, Environmental Technology & Engineering Corp. personnel performed stack emissions testing at the Payne & Dolan, Inc. Control 34 portable plant. The tests were performed to determine plant specific emission factors for sulfur dioxide and hydrogen chloride. All measured are shown in the following table:

TEST NO.	HYDROGEN CHLORIDE	SULFUR DIOXIDE
1	0.017 lb/hr	12.64 lb/hr
	0.00007 lb/ton	0.046 lb/ton
2	0.008	14.01
	0.00003	0.051
3	0.006	11.95
	0.00002	0.043
AVERAGE	0.010 lb/hr	12.87 lb/hr
	0.00004 lb/ton	0.047 lb/ton

1.0 GENERAL

On July 29 & October 6, 1999, Environmental Technology & Engineering Corp. (ETE) personnel performed stack emissions testing at the Payne & Dolan, Inc. Control 34 portable plant. Tests on July 29 were performed in Denmark, Wisconsin. Tests on October 6 were performed in northern Michigan. The purpose of the testing was to determine the sulfur dioxide and hydrogen chloride emissions in order to determine plant specific emission factors. On July 29 additional tests were performed for hydrogen chloride. The laboratory erred in the analysis of these samples and it became necessary to retest on October 6.

Pete Tolsma and Dennis Linsmaier of Payne & Dolan was responsible for assuring proper operating conditions throughout the testing. The plant was fired with drain oil. A log of plant activity throughout the test was kept and is included in the APPENDIX. All testing was coordinated with the plant operator. Raj Rao of the Wisconsin DNR was notified of the July 29 test and did witness. The field tests, corresponding laboratory analysis, and report preparation were performed by ETE personnel; Bill Dick was the test team leader.

The following sections of this report document the activities and results of the test program. The report presents all of the relevant data collected. Discussions on the interpretation of the data are provided where appropriate. The report, therefore, includes much necessary detail. The results, however, have been presented in the SUMMARY section at the beginning of this report for those readers not wishing to be burdened by the details.

2.0 RESULTS

Hydrogen chloride testing was performed using non-isokinetic method 26. Sulfur dioxide samples were collected and analyzed in accordance with EPA Method 6. A brief summary of the methods is included in Section 3.0 of this report.

The tests were performed in the final discharge stack at the location shown in Figure 2-1. This same figure also depicts the location of the exact test points relative to the stack wall. Detailed results of the testing to determine sulfur dioxide emissions are shown in Tables 2-1 through 2-3. Detailed results of the hydrogen chloride emissions are included as Tables 2-4 through 2-6.. The results are summarized below:

TEST NO.	HYDROGEN CHLORIDE	SULFUR DIOXIDE
1	0.017 lb/hr	12.64 lb/hr
	0.00007 lb/ton	0.046 lb/ton
2	0.008	14.01
	0.00003	0.051
3	0.006	11.95
	0.00002	0.043
AVERAGE	0.010 lb/hr	12.87 lb/hr
	0.00004 lb/ton	0.047 lb/ton

SO2 EMISSIONS CALCULATIONS

NEA CONTROL #34 FID 999901520

Sulfur in Burner Fuel

S = 0.43% by weight

Mass of Oil

Mass of one gallon oil = mass of water x specific gravity of oil
Mass = 8.34 lb/gallon x 0.8872 = 7.40 lb/gallon

Mass Flow of Sulfur Dioxide from the Burner

7.71 gallons/minute x 60 minutes/hour x 7.40 lbs/gallon x 0.43/100 sulfur/oil x 2 SO2/S = **29.44** lbs SO2/hour

Mass Flow of Sulfur Dioxide from the Plant Stack

12.87 lbs/hour

Sulfur Dioxide Capture Efficiency

EF = 100 x (Burner SO2 - Stack SO2) / Burner SO2

EF = **56.28** %

Potential to Emit SO2 = 650 gallons/hour fuel flow x 1% sulfur in fuel / 100 x 7.4 lbs/gallon x 2SO2 per S x (1-0.5628) = **42.06** lbs/hour

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EMISSIONS CALCULATIONS

P&D Control 34 FID 9999012520

Hydogen Chloride in the Burner Fuel: Burner fuel was analyzed for total halogens, and was expressed as chlorine. Since air toxics considerations are related to hydrogen chloride emissions, chlorine masses and concentrations were corrected to hydrogen chloride.

Cl concentration in the burner fuel = 513 parts per million, by weight.
HCl concentration in the burner fuel = 36/35 x 558 =
513 parts per million, by weight

Mass of Oil

Mass of one gallon oil = mass of water x specific gravity of oil
Mass = 8.34 lb/gallon x 0.8872 = 7.40 lb/gallon

Mass Flow of Hydrogen Chloride from the Dryer Drum Burner

7.71 gallons per minute x 60 minutes per hour x 7.40 lb/gallon x 513/100000

1.76 lbs HCl/hour from the dryer drum by the combustion of waste oil

Mass Flow of Hydrogen Chloride from the Plant Stack

0.1 lbs/hour

Hydrogen Chloride Capture Efficiency

EF = 100 x (Burner HCl - Stack HCl) / Burner HCL

EF = **94.32** %

Potential to Emit HCl = 650 gallons/hour fuel flow rate x 7.40 lbs/gallon
x 4000 ppm halogens/1000000 x (1-0.9432) =
1.09 lbs HCl/Hour

comp\plt\HCltest.wk1

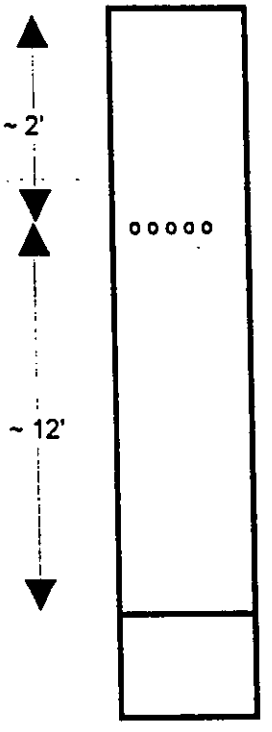
MURPHY CONCRETE
NEW LONDON
FIGURE 2-1

SAMPLE POINT LOCATION

Point	Distance in
1	4.8
2	14.4
3	24.0
4	33.6
5	43.2

TEST PORT LOCATION

L 48
W 48



PAYNE & DOLAN | 29-Jul-99 | CONTROL 34 | TABLE 2-1

TEST NO.	1			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	42.00	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	0.999			
SO2 COLLECTED	117.6	MG		
WATER COLLECTED	380	ML		
STATIC PRESSURE	-1.30	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	255	0.25	0.80	102	35.11
2	255	0.10	0.80	102	22.21
3	255	0.10	0.80	102	22.21
4	255	0.10	0.80	102	22.21
5	255	0.15	0.80	102	27.20
6	255	0.15	0.80	102	27.20
7	255	0.10	0.80	102	22.21
8	255	0.25	0.80	102	35.11
9	255	0.30	0.80	102	38.47
10	255	0.20	0.80	102	31.41
11	255	1.30	0.80	106	80.07
12	255	1.50	0.80	106	86.01
13	255	1.40	0.80	106	83.09
14	255	1.10	0.80	106	73.66
15	255	1.20	0.80	106	76.93
16	255	2.10	0.80	110	101.77
17	255	2.30	0.80	110	106.51
18	255	2.20	0.80	110	104.16
19	255	2.30	0.80	110	106.51
20	255	2.20	0.80	110	104.16
21	255	2.20	0.80	120	104.16
22	255	2.30	0.80	120	106.51
23	255	2.40	0.80	120	108.80
24	255	2.40	0.80	120	108.80
25	255	2.40	0.80	120	108.80
AVERAGE	255		0.80	108	69.73

DRY STANDARD VOLUME	41.01	SCF
	1.16	M3
PERCENT WATER VAPOR	30.37	% VOL
FLOW RATE	66941	ACFM
	33309	DSCFM
	56599	M3/HR
SO2 CONCENTRATION	101.3	MG/M3
SO2 EMISSION RATE	12.64	LB/HR

PAYNE & DOLAN | 29-Jul-99 | CONTROL 34 | TABLE 2-2

TEST NO.	2			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	42.30	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	0.999			
SO2 COLLECTED	131.7	MG		
WATER COLLECTED	397	ML		
STATIC PRESSURE	-1.30	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	255	0.10	0.80	118	22.24
2	255	0.25	0.80	118	35.17
3	255	0.10	0.80	118	22.24
4	255	0.10	0.80	118	22.24
5	255	0.10	0.80	118	22.24
6	255	0.30	0.80	122	38.53
7	255	0.25	0.80	122	35.17
8	255	0.10	0.80	122	22.24
9	255	0.15	0.80	122	27.24
10	255	0.15	0.80	122	27.24
11	255	1.60	0.80	125	88.97
12	255	1.50	0.80	125	86.15
13	255	1.50	0.80	125	86.15
14	255	1.80	0.80	125	94.37
15	255	1.60	0.80	125	88.97
16	255	2.00	0.80	128	99.48
17	255	2.10	0.80	128	101.93
18	255	2.30	0.80	128	106.68
19	255	2.20	0.80	128	104.33
20	255	2.10	0.80	128	101.93
21	255	2.40	0.80	130	108.97
22	255	2.20	0.80	130	104.33
23	255	2.30	0.80	130	106.68
24	255	2.10	0.80	130	101.93
25	255	2.20	0.80	130	104.33
AVERAGE	255		0.80	125	70.39

DRY STANDARD VOLUME	41.38	SCF
	1.17	M3
PERCENT WATER VAPOR	31.11	% VOL
FLOW RATE	67576	ACFM
	33268	DSCFM
	56530	M3/HR
SO2 CONCENTRATION	112.4	MG/M3
SO2 EMISSION RATE	14.01	LB/HR

PAYNE & DOLAN | 29-Jul-99 | CONTROL 34 | TABLE 2-3

TEST NO.	3			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	42.41	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	0.999			
SO2 COLLECTED	111.6	MG		
WATER COLLECTED	384	ML		
STATIC PRESSURE	-1.30	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	260	0.10	0.80	142	22.28
2	260	0.15	0.80	142	27.29
3	260	0.20	0.80	142	31.51
4	260	0.10	0.80	142	22.28
5	260	0.10	0.80	142	22.28
6	260	0.35	0.80	140	41.69
7	260	0.25	0.80	140	35.23
8	260	0.10	0.80	140	22.28
9	260	0.15	0.80	140	27.29
10	260	0.15	0.80	140	27.29
11	260	1.50	0.80	140	86.30
12	260	1.50	0.80	140	86.30
13	260	1.60	0.80	140	89.13
14	260	1.80	0.80	140	94.54
15	260	1.60	0.80	140	89.13
16	260	2.10	0.80	140	102.11
17	260	2.10	0.80	140	102.11
18	260	2.20	0.80	140	104.51
19	260	2.20	0.80	140	104.51
20	260	2.20	0.80	140	104.51
21	260	2.40	0.80	141	109.16
22	260	2.40	0.80	141	109.16
23	260	2.20	0.80	141	104.51
24	260	2.20	0.80	141	104.51
25	260	2.10	0.80	141	102.11
AVERAGE	260		0.80	141	70.88

DRY STANDARD VOLUME	41.57	SCF
	1.18	M3
PERCENT WATER VAPOR	30.30	% VOL
FLOW RATE	68046	ACFM
	33656	DSCFM
	57188	M3/HR
SO2 CONCENTRATION	94.8	MG/M3
SO2 EMISSION RATE	11.95	LB/HR

PAYNE & DOLAN | 6-Oct-99 | CONTROL 34 | TABLE 2-4

TEST NO.	1			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	3.03	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	1.026			
HCl COLLECTED	0.0116	MG		
WATER COLLECTED	17.5	ML		
STATIC PRESSURE	-0.80	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	235	2.80	0.20	48	113.61
2	235	3.00	0.20	48	117.59
3	235	3.00	0.20	48	117.59
4	235	2.60	0.20	48	109.47
5	235	2.40	0.20	48	105.18
6	235	2.00	0.20	48	96.02
7	235	2.20	0.20	48	100.70
8	235	2.80	0.20	48	113.61
9	235	2.30	0.20	48	102.96
10	235	1.80	0.20	48	91.09
11	235	1.00	0.20	48	67.89
12	235	0.50	0.20	48	48.01
13	235	0.60	0.20	48	52.59
14	235	0.80	0.20	48	60.73
15	235	0.90	0.20	48	64.41
16	235	0.20	0.20	48	30.36
17	235	0.20	0.20	48	30.36
18	235	0.20	0.20	48	30.36
19	235	0.10	0.20	48	21.47
20	235	0.20	0.20	48	30.36
21	235	0.10	0.20	48	21.47
22	235	0.00	0.20	48	0.00
23	235	0.00	0.20	48	0.00
24	235	0.00	0.20	48	0.00
25	235	0.10	0.20	48	21.47
AVERAGE	235		0.20	48	61.89

DRY STANDARD VOLUME	3.01	SCF
	0.09	M3
PERCENT WATER VAPOR	21.47	% VOL
FLOW RATE	59417	ACFM
	34346	DSCFM
	58360	M3/HR
HCl CONCENTRATION	0.136	MG/M3
HCl EMISSION RATE	0.017	LB/HR

PAYNE & DOLAN | 6-Oct-99 | CONTROL 34 | TABLE 2-5

TEST NO.	2			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	3.31	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	1.026			
HCl COLLECTED	0.0048	MG		
WATER COLLECTED	19	ML		
STATIC PRESSURE	-1.40	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	242	3.10	0.20	52	120.20
2	242	3.20	0.20	52	122.13
3	242	3.20	0.20	52	122.13
4	242	2.90	0.20	52	116.26
5	242	2.70	0.20	52	112.18
6	242	2.40	0.20	52	105.76
7	242	2.90	0.20	52	116.26
8	242	3.20	0.20	52	122.13
9	242	2.80	0.20	52	114.24
10	242	2.20	0.20	52	101.26
11	242	1.50	0.20	52	83.61
12	242	1.20	0.20	52	74.79
13	242	2.00	0.20	52	96.55
14	242	1.70	0.20	52	89.01
15	242	1.10	0.20	52	71.60
16	242	0.20	0.20	52	30.53
17	242	0.20	0.20	52	30.53
18	242	0.20	0.20	52	30.53
19	242	0.30	0.20	52	37.39
20	242	0.30	0.20	52	37.39
21	242	0.10	0.20	52	21.59
22	242	0.00	0.20	52	0.00
23	242	0.00	0.20	52	0.00
24	242	0.00	0.20	52	0.00
25	242	0.10	0.20	52	21.59
AVERAGE	242		0.20	52	71.11

DRY STANDARD VOLUME	3.29	SCF
	0.09	M3
PERCENT WATER VAPOR	21.36	% VOL
FLOW RATE	68262	ACFM
	39061	DSCFM
	66373	M3/HR
HCl CONCENTRATION	0.051	MG/M3
HCl EMISSION RATE	0.008	LB/HR

PAYNE & DOLAN | 6-Oct-99 | CONTROL 34 | TABLE 2-6

TEST NO.	3			
BAROMETRIC PRESSURE	29.05	IN HG		
TIP DIAMETER	0.245	IN		
STACK DIMENSIONS	48	IN	48	IN
STACK AREA	16.000	FT3		
SAMPLING TIME PER POINT	2.4	MIN		
NUMBER OF POINTS	25			
METER VOLUME	3.31	FT3		
PITOT COEFFICIENT	0.84			
METER COEFFICIENT	1.026			
HCl COLLECTED	0.0040	MG		
WATER COLLECTED	19.2	ML		
STATIC PRESSURE	-1.20	IN H2O		

ORSAT RESULTS

CO2	O2	CO	N2
5.00%	10.80%	0.00%	84.20%

POINT	STACK TEMP DEG F	DELTA P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	VELOCITY AFPS
1	245	2.70	0.20	58	112.43
2	245	2.80	0.20	58	114.49
3	245	3.00	0.20	58	118.51
4	245	2.80	0.20	58	114.49
5	245	2.50	0.20	58	108.18
6	245	2.20	0.20	58	101.49
7	245	2.40	0.20	58	106.00
8	245	2.90	0.20	58	116.52
9	245	2.50	0.20	58	108.18
10	245	2.00	0.20	58	96.76
11	245	1.40	0.20	58	80.96
12	245	0.90	0.20	58	64.91
13	245	1.60	0.20	58	86.55
14	245	1.30	0.20	58	78.01
15	245	1.10	0.20	58	71.76
16	245	0.20	0.20	58	30.60
17	245	0.20	0.20	58	30.60
18	245	0.20	0.20	58	30.60
19	245	0.20	0.20	58	30.60
20	245	0.30	0.20	58	37.48
21	245	0.10	0.20	58	21.64
22	245	0.00	0.20	58	0.00
23	245	0.00	0.20	58	0.00
24	245	0.00	0.20	58	0.00
25	245	0.10	0.20	58	21.64
AVERAGE	245		0.20	58	67.30

DRY STANDARD VOLUME	3.29	SCF
	0.09	M3
PERCENT WATER VAPOR	21.53	% VOL
FLOW RATE	64604	ACFM
	36752	DSCFM
	62450	M3/HR
HCl CONCENTRATION	0.043	MG/M3
HCl EMISSION RATE	0.006	LB/HR

3.0 METHODS

3.1 Sulfur Dioxide

Samples were collected and analyzed in accordance with the procedures outlined in EPA Method 6 (40 FR, Part 60, Appendix A). The sampling train consisted of a heated stainless steel probe with a glass wool plug serving as a filter. A series of four impingers followed in an ice bath. The first impinger contained 100 milliliters (ml) of 80% isopropyl alcohol, the second and third each contained 100 ml of 3% hydrogen peroxide, and the fourth was dry to serve as a trap for carry-over of any liquid. This train separates out sulfuric acid and sulfur trioxide in the first impinger and sulfur dioxide is collected in the second and third impingers. The gas then passed through a water trap and silica gel tube to trap all water vapor prior to the sampling pump and dry gas meter. A schematic of the sampling train is included as Figure 3-2.

The principle of the method was to collect a representative sample of the exhaust gas stream by placing the probe at a single point in the duct and sampling for a 60 minute period at a nominal sampling rate of 0.7 cubic feet per minute. At the completion of each test, a leak check was performed and ambient air was purged through the sampling train for approximately 15 minutes.

The first impinger contents were then discarded while the second and third impinger contents were combined along with the washings from the connected tubing. Aliquots of this solution were diluted with known quantities of isopropyl alcohol and titrated with barium perchlorate using thorin indicator. From the quantity of titrant required, the weight of sulfur dioxide was calculated. This information was combined with the volume of gas sampled to determine the sulfur dioxide concentration. The emission rates were then calculated using these concentrations and the volumetric flow rate.

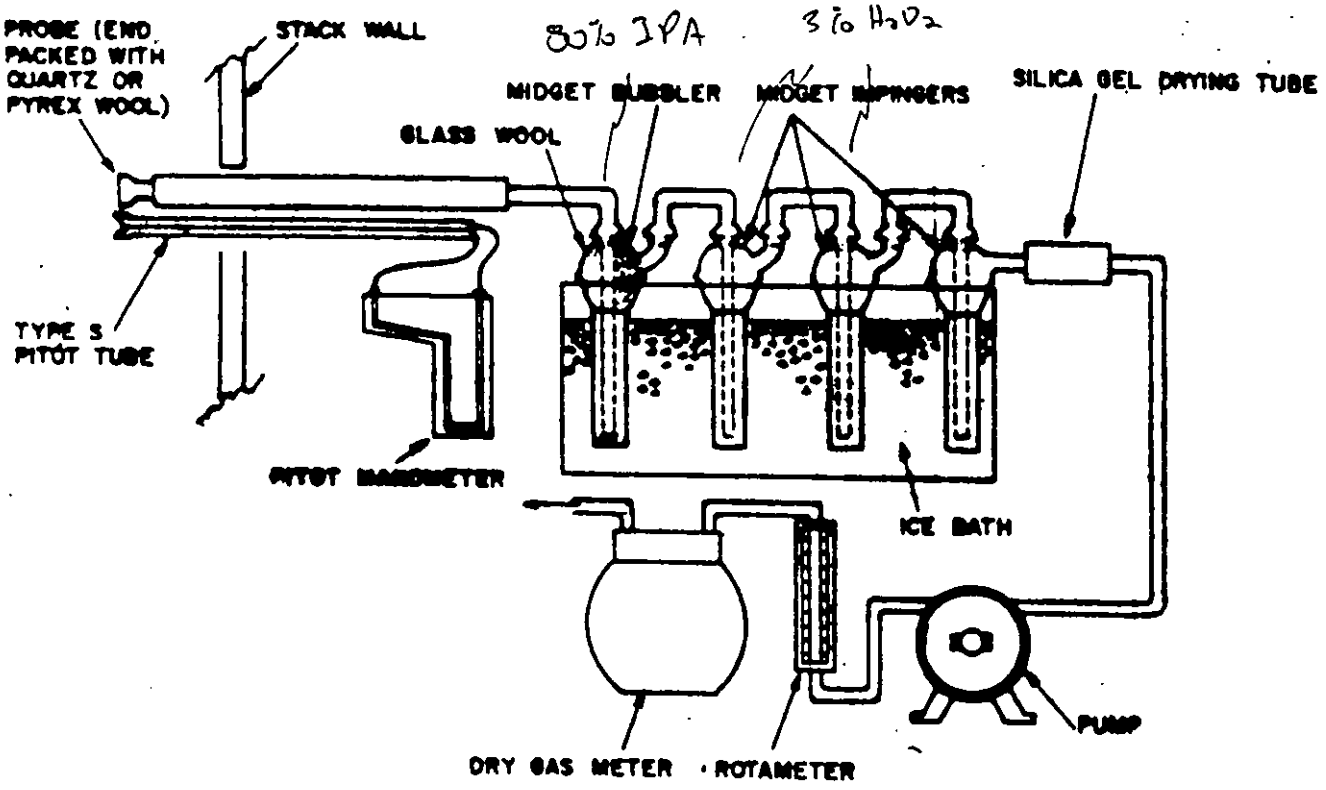


FIGURE - 1 SO_2 SAMPLING TRAIN

3 - 1 HR TESTS

3.2 Hydrogen Chloride

Samples were collected and analyzed in accordance with the procedures outlined in EPA Method 26 (4O FR, Part 6O, Appendix A). The sampling train consisted of a heated glass probe followed by a heated filter. A series of five midget impingers followed in an ice bath. The first two impingers contained 15 milliliters (ml) of 0.1 N sulfuric acid, the third and fourth each contained 15 ml of 0.1 N sodium hydroxide, and the fifth contained silica gel to remove moisture. The gas then passed through a sampling pump and dry gas meter. A schematic of the sampling train is included as Figure 3-3.

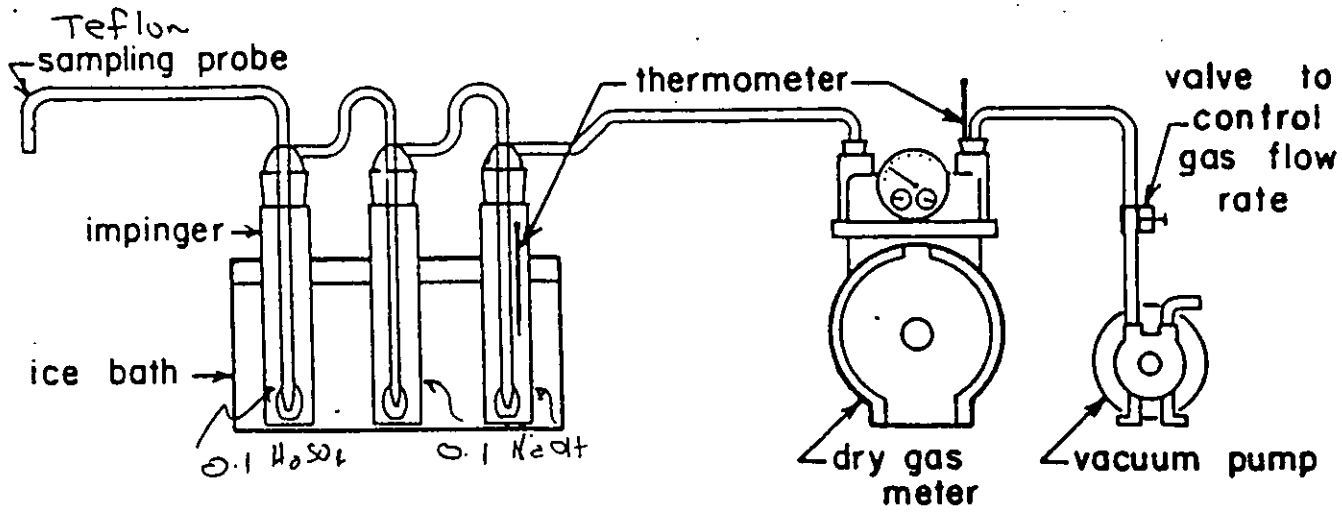
The principle of the method was to collect a representative sample of the exhaust gas stream by placing the probe at a single point in the duct and sampling for a 60 minute period at a nominal sampling rate of about 1.5 liters per minute. At the completion of each test, a leak check was performed and ambient air was purged through the sampling train for approximately 15 minutes.

The first two impinger contents were then analyzed for hydrogen chloride content by ion chromatography. The analysis was performed at DAT, Inc. The laboratory information was combined with the volume of gas sampled to determine the HCl concentration. The emission rates were then calculated using these concentrations and the volumetric flowrate.

4.0 CALIBRATIONS

A dry gas meter was used to determine the sample volume obtained in the SO2 and HCl tests. These dry gas meters were calibrated with a wet test meter. The values obtained were:

Sulfur Dioxide Meter	0.999
Hydrogen Chloride Meter	1.026



MIDGET IMPINGER SAMPLING TRAIN
FOR HCl

3. 1 hr TESTS

APPENDIX A

Field and Laboratory Data

SO. : 174

Cp = 0.84
γ = 6.999 } 7-19

Environmental Technology & Engineering Corp.

PARTICULATE FIELD DATA

PLANT Payne Flow
DATE 7-29-99
LOCATION DENMARK
OPERATOR WJO
STACK NO. Control 3 R
RUN NO. 1
SAMPLE BOX NO. 1
METER BOX NO. 2

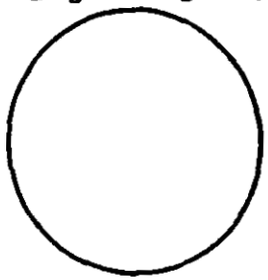
AMBIENT TEMPERATURE 90
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 28
PROBE LENGTH, in.
NOZZLE DIAMETER, in. N/A
STACK DIAMETER, in. 48 x 48
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH 0.750
C FACTOR
PROCESS WEIGHT RATE

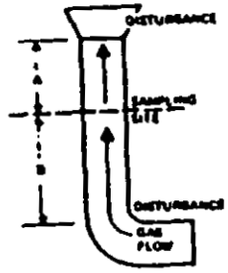
ORSAT RESULTS
CO2 5.0
O2 10.8
CO
N2

LEAK CHECKS
Pre 00
Pitot ON
Post 01
Pitot 00

60 min test



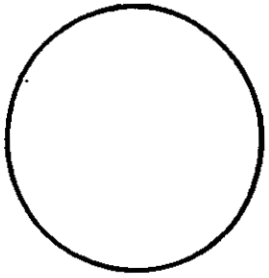
CROSS SECTION



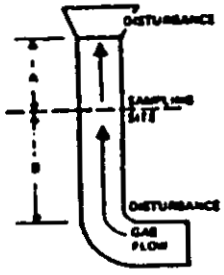
TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s) ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER: INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	HCl γ = 1.026 (7-19-99) SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	1100		255	.25	0.8		3474.00		102	790.57/100	-3	5	
2		-0.4		.10									
3				.10									
4				.10									
5				.15					102		38		
6				.15	0.8								
7		-0.5		.10									
8				.25									
9				.30									
10				.20					106		42		
11				1.35	0.8								
12		-2.0		1.5									
13				1.4									
14				1.1									
15				1.2					110		48		
16				2.1	0.8								
17		-1.8		2.3									
18				2.2									
19				2.3									
20				2.2					120		52		
21				2.21				92.00		345			
22				2.3									
23		-1.7		2.4									
24				2.1			3516.00			799.10/100		5	

Environmental Technology Engineering Corp.

PARTICULATE FIELD DATA



CROSS SECTION



PLANT Prairie Dulac
DATE 7-29 99
LOCATION DENMARK
OPERATOR WJD
STACK NO. Control 3 / 2
RUN NO.
SAMPLE BOX NO. 2
METER BOX NO. 2

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 20
PROBE LENGTH, in.
NOZZLE DIAMETER, in. N/A
STACK DIAMETER, in. 48 x 48
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH
C FACTOR
PROCESS WEIGHT RATE

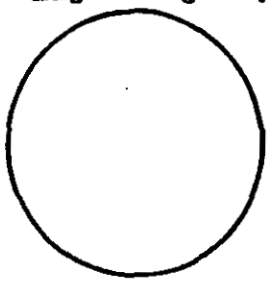
ORSAT RESULTS
CO2 18
O2 10.3
CO
N2

LEAK CHECKS
Pre OK
Pitot OK
Post OK
Pitot OK

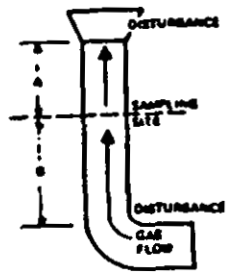
TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s) ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY (ps
A 1	1203		255	.10			3517.00		118	794.10/102	35	5	
2				.25									
3		-0.4		.10									
4				.10									
5				.10					122		38		
6				.30									
7				.25									
8		-0.4		.10									
9				.15									
10				.15									
11				1.6					125		45		
12		-2.0		1.5									
13				1.5									
14				1.8									
15				1.6									
16				2.0					128		52		
17				2.1									
18		-2.0		2.3									
19				2.2									
20				2.1			(4230)		130	(3.20)	55		
21				2.1									
22				2.2									
23		-1.6		2.3									
24				2.1									
25	1303			2.2			3559.20			797.30			

Environmental Technology Engineering Corp.

PARTICULATE FIELD DATA



CROSS SECTION



PLANT Payne's Dulan
DATE 7-29-99
LOCATION Denmark
OPERATOR WJD
STACK NO. Control 3 4
RUN NO. 3
SAMPLE BOX NO. 3
METER BOX NO. 2

AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 28
PROBE LENGTH, in.
NOZZLE DIAMETER, in. N/A
STACK DIAMETER, in. 48 x 96
PROBE HEATER SETTING 210
HEATER BOX SETTING 350

METER ΔH
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO2
O2
CO
N2

LEAK CHECKS
Pre OK
Pitot OK
Post
Pitot

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD ($\sqrt{\Delta P_s}$) ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER: INLET ($T_{m_{IN}}$), °F	OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F (HC)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
1	1305		260	.10	0.8		3560.00		142	797.3/110	35	6	
2		-0.5		.15									
3				.20									
4				.10									
5				.10					140		40		
6		-0.5		.35									
7				.25									
8				.10									
9				.15									
10				.15					140		45		
11				1.5									
12		-2.0		1.5									
13				1.6									
14				1.8									
15				1.6									
16				2.1					140		50		
17		-1.6		2.1									
18				2.2									
19				2.2									
20				2.2									
21				2.4			(47.41)		141	(3.22)	55		
22		-1.6		2.4									
23				2.2									
24				2.2									
25	1405			2.1			3602			800.5/110			

ASPHALT PLANT STACK TEST DATA

Plant Name: P.D C 34

Date: July 29, 1999
FID # 999012520

Time*	Burner Setting	PSI Fuel Pressure	Production TPH	Aggregate TPH	% Moisture in Aggregate	RAP TPH	Mix Temp	Stack Temp	Photo-helic	Magne-helic	Fuel Flow Rate	CO ppm	CO2 ppm	O2 %
11:00	4.5		260	210	3.7	15	315	306	.75	.5	8			
11:15	6		270	215	3.7	15	295	310	.75	5	8			
11:30	6		268	220	3.7	15	300	318	.75	5	8			
11:45	6.25		275	225	3.7	15	303	322	.75	5	7			
12:00	6.5		276	227	3.7	15	303	322	.75	5	7			
12:15	6		270	221	3.7	15	311	324	.75	5	8			
1230	6		273	224	3.7	15	303	322	.75	5	8			
12:45	5 1/2		277	221	3.7	15	298	318	.75	5	8			
13:00	5 1/2		275	225	3.7	15	301	319	.75	4.75	7			
13:15	5 1/2		276	223	3.7	15	301	321	.75	4.75	8			
13:30	5 1/2		279	227	3.7	15	302	318	.75	4.75	8			
13:45	5 1/2		275	226	3.7	15	308	320	.75	4.75	7			
14:00	5 1/2		271	223	3.7	15	303	323	.75	4.75	8			
14:15	5 1/2		273	221	3.7	15	310	325	.75	4.75	8			

$\bar{x}$ = 7.7 gallons/min = 462.6 gal/hr

Fuel Type Waste Oil
Plant Drum Type Parallel

Sulfur in Fuel 0.83 %
829 ppm Halogens as Cl

* Record data in 15-minute intervals during stack test runs.

$\bar{x}$ = 273 TPH

COMPLYTESTDATA.WK1

S-F ANALYTICAL LABORATORIES, INC.
A Subsidiary of Somme:-Frey Laboratories, Inc

Payne & Dolan of Wisc.,Inc.
Attn: Peter Tolsmo
P.O. Box 781
Waukesha, WI 53186

Received Date: 10/6/99
Report Date: 10/07/199

- Analytical Results -

Test	Result	Units	MDL	Analysis Date	By	Method
Lab #: 99B01621-001	Sample ID:	C34 Oil	10/06/99			
BTU	138000	BTU/Gal	100	10/07/1999	GGG	D240
Sulfur	0.43	% wt	0.04	10/07/1999	GGG	D129
Total Halogens as Cl	513	mg/Kg	100	10/07/1999	GGG	D808
Gravity	0.8789			10/07/1999	GGG	D1298
Arsenic	1.0	mg/Kg	0.5	10/07/1999	GGG	6010B
Antimony	17.2	mg/Kg		10/07/1999	GGG	
Cadmium Oil	0.6	mg/Kg	0.1	10/07/1999	GGG	6010B
Chromium Oil	1.6	mg/Kg	0.1	10/07/1999	GGG	6010B
Lead in Oil	27.3	mg/Kg	0.1	10/07/1999	GGG	6010B

Gary G. Geipel
Senior Analyst

6125 West National Avenue, P.O. Box 14513, Milwaukee, Wisconsin 53214
(414) 475-6700 FAX: (414) 475-7216
Toll-Free: 800-300-6700

PAYNE & DOLAN
CONTROL 34 PLANT
SO2 LAB RESULTS

Sample no.	Vol.Solution ml	Vol. Aliq. ml	Vol.Titrant ml	Vol.Tit. Bl. ml	N. Titrant	mg. SO2
1	560.0	5.0	3.50	0.05	0.0095	117.6
2	601.0	5.0	3.65	0.05	0.0095	131.7
3	573.0	5.0	3.25	0.05	0.0095	111.6

PAYNE & DOLAN CONTROL 34
DRUM MIX PLANT
HYDROGEN CHLORIDE RESULTS

TABLE 2-4

Sample No.	Meter Vol. ft3	Meter Temp deg F	Standard Vol liters	HCl Captured ug	HCl Conc mg/m3	Flow Rate m3/hr	HCl ER lb/hr	Production Rate TPH	Emission Factor lb/ton
C34-1	3.03	48	88.85	11.6	0.131	59417	0.017	245	0.00007
C34-2	3.31	52	96.30	4.8	0.050	68262	0.008	290	0.00003
C34-3	3.31	58	95.18	4.0	0.042	64604	0.006	290	0.00002
		AVERAGE			0.074		0.010		0.00004

Meter Gama 1.026
Bar.Pressure 29.05

Calculations

Standard Volume = Meter Vol * Meter Gama*Bar.Pressure*28.32*528/(29.92*(460+Meter Temp))

Concentration = ug/liters = mg/m3

Emission Rate = mg/m3 * m3/hr/453600