CORRESPONDENCE/MEMORANDUM==========State of Wisconsin

4530

Date: August 27, 1990

To: SED Case File

From: Marvin Patton MAP

Subject: Review of Stack Tests Conducted at Miller Compressing Company on June 6, 7, and 8, 1990.

Received: 8/21/90

I. SOURCE:

Miller Compressing Company
1640 West Bruce Street
Milwaukee, WI 53204

Mr. Joseph Kovacich, Vice President
(414) 671-5980

RECEIVED
AUG 2. 1990
BUREAU OF
AIR MANAGEMENT

FID # 241096350

Permit # 88-GDB-245

Stack S21, Auto Shredder (2 stacks)
Stack S15, Coreco Melt Furnace (2 stacks)
Stack S19, United Melt Furnace

Test Dates: June 6,7 and 8, 1990

II. PROCESS DESCRIPTIONS:

There were three sources tested at the facility on the above dates. A Coreco metal separating furnace, a United aluminum melt furnace and a 6000 Auto shredder. The two furnaces were existing sources that were relocated from other areas of the facility. The auto shredder was a new installation.

In the Coreco furnace melting is done inside a externally heated steel drum in which sweating is done continuously and automatically. The furnace has a rated capacity/ throughput of 2000 pounds per hour. The raw feed scrap includes aluminum pistons with cast iron and steel inserts. The aluminum is reclaimed from the pistons at a rate 1000 pounds per hour. The furnace is controlled by a multichamber afterburner which is used to capture and ignites unburned hydrocarbons from the front end of the furnace. The particulates which travel up the drum to the back end of the furnace are collected by a hood and sent to a baghouse via a cyclone. Both the afterburner and the baghouse were tested during this test.

In the United furnace melting is done inside a primary sweat chamber. The temperature inside this chamber is controlled at the proper level to melt the aluminum without affecting the other metals.

The furnace has a rated capacity of 2000 pounds. The raw feed scrap includes aluminum and iron scrap. Approximately 2000 pounds per hour of scrap is charged to the furnace. About 1700 pounds of aluminum is separated out. The furnace is controlled by an afterburner located above the unit in the base of the stack. Smoke and gases from the process are thermally incinerated before entering the stack.

The auto shredder is designed to process 150 tons per hour of incoming material. This material is of two kinds: # 1 stock, basically automobiles, and # 2 stock, appliances and sheet metal. The # 2 stock is the cleaner of the two materials. The material is feed to the shredder via a crane. Once shredded the material is sent through an air separator built into the system. This separates the magnetic and non magnetic material from the waste. The metallic fractions fall out into storage piles. The non metallics are pneumatically conveyed to a high efficiency cyclone prior to the gas stream being discharged to the ambient air.The cleaning system is equipped with a bypass stack which is usually closed during normal operations. During testing the cyclone was tested for all three runs. The bypass stack was also tested in the first run as a worst case scenario.

III SAMPLING OPERATIONS:

A. Purpose of Test

Part 2C of permit # 88-GDB-245 required that emissions from the Coreco furnace, United Furnace and the Auto Shredder be tested for compliance with the particulate matter and opacity limits.

B. Sampling Firm

These test were conducted by Michael J. Huenink of Environmental Technology and Engineering Corporation, 13020 West Bluemound Road, Elm Grove, WI 53122, 414-784-2434.

C. Test Methods

Testing for particulate matter emissions were conducted in accordance with procedures outlined in EPA method 5 and method 17 (40 CFR. Part 60, App. A). Method 5 was used for the auto shredder cyclone stack, United furnace and Coreco furnace afterburner stack. Method 17 was used for the auto shredder zig zag stack and the Coreco furnace baghouse stack. The back half was included with both test methods.

On the cyclone of the auto shredder particulate testing was conducted from 3 ports in the final discharge stack 30 feet downstream from the nearest obstruction and 15 feet upstream from the stack outlet. The area of the stack was 8.9 square feet. For the zig zag stack testing was conducted from 2 ports in the final discharge stack 18 feet downstream from the nearest obstruction and 8 feet upstream from the outlet. The diameter of the stack was 29.5 inches. At each stack 12 points were sampled for 5 minutes per point for each of the 60 minute runs.

On the United furnace particulate testing was conducted from 2 ports in the final discharge stack, 40 feet downstream from the nearest obstruction and 15 feet upstream of the outlet. The stack diameter was 30 inches. 12 points were sampled for 5 minutes per point for each of the 60 minute runs.

On the baghouse of the Coreco furnace particulate testing was conducted from 3 ports in the final discharge stack, 12 feet downstream from the nearest obstruction and 5 feet upstream of the outlet. The area of the stack was 4.91 square feet. For the afterburner stack testing was conducted from 2 ports in the final discharge stack 11 feet downstream from the nearest obstruction and 9 feet upstream of the outlet. 12 points were sampled for 5 minutes per point for each of the 60 minute runs on the baghouse. 24 points were sampled for 2.5 minutes per point for each of the 60 minute runs on the after burner.

Visible emissions were analyzed in accordance with the procedures outlined in EPA method 9 (40 CFR, Part 60, App A). Visible emissions were observed for each operation during the testing period.

IV. SUMMARY OF RESULTS:

	PARTICULAT EMISSIONS			PERMIT LIMITS	
Source/ Stack	Emission Rate #/hr	Emission Conc. #/1000 #	Iso-Kinetic Ratio	Wis. Stat. Limit #/Hr	NR 415 Limit Conc. #/ 1000 #
Shredder					
-cyclone					
Run 1	3.96	0.022	96.09		
Run 2	4.98	0.028	96.38		
Run 3	2.83	0.016	97.90		
	---	---		---	---
avg.	3.92	0.022		6.95	0.4
-zig zag					
Run 1	1.48	0.058	91.72		0.4
				---	---
				6.95	0.4
United					
Run 1	0.27	0.018	93.29		
Run 2	0.26	0.015	91.39		
Run 3	0.31	0.019	91.97		
	---	---		---	---
avg.	0.28	0.017		0.12	0.4
Coreco					
-baghouse					
Run 1	0.03	0.002	97.94		
Run 2	0.03	0.002	95.79		
Run 3	0.02	0.002	95.31		
	---	---			---
avg.	0.03	0.002			0.4
Coreco					
-afterburner					
Run 1	4.51	0.116	97.76		
Run 2	4.31	0.111	94.74		
Run 3	4.67	0.120	93.14		
	---	---		---	---
avg.	4.50	0.116			0.4
Coreco total	4.53	0.118		2.25	0.4

V. DISCUSSION OF RESULTS:

The results of these test show that the Miller Compressing Company is operating the auto shredder in compliance with the particulate and opacity limits of permit # 88-GDB-245. The combined results of the cyclone and zig zag stacks are also in compliance. Their total emissions were 5.44 pounds per hour and 0.080 pounds per 1000 pounds of exhaust gas. The results also show that both the United and Coreco furnaces are being operated in violation of the particulate emission limits of 0.12 and 4.53 pounds per hour respectively. Both furnaces did meet the other particulate limit of 0.4 pounds per 1000 pounds of exhaust gas. Each source met the 20 % opacity limit.

The report prepared by ET & E contained calibration data for the sampling equipment. An error was found in the calibration data for meter box # 2. The numbers for the orifice coefficient and Gamma were reversed. A call to Mr. Michael Huenink verified this and the numbers were changed. Also included in the report were descriptions of the production levels for each operation during the testing period. No deviation from the standard US EPA testing procedures were noted in the report. The isokinetic ratio during all the particulate test were within the 90 to 110 % range set by the Department.

c: Joe Perez - AM/3
U.S. EPA Region V

Messrs. Larry Halverson and Joe Kovacich of Miller Compressing Company were responsible for ensuring proper operating conditions and documentation of production rates throughout the testing. The production data records are included in Appendix A and can be summarized as follows:

Operation	Production Rates
6000 Auto Shredder	Test 1 - 143.5 tons per hour No. 2 Shredded Test 2 - 152 tons per hour No. 2 Shredded Test 3 - 151.5 tons per hour No. 1 Shredded
North Coreco Furnace	2.05 tons per hour average (15,400 pounds input over 3.75 hours)
United Furnace	1.52 tons per hour average (12,120 pounds input over 4.00 hours)

Mr. Marv Patton of the DNR (Southeast District office) witnessed the testing and production conditions. The field tests, laboratory analysis, and report preparation were performed by ETE personnel; Michael Huenink 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 includes much necessary detail; the results have been presented in the SUMMARY section at the beginning of this report for those readers not wishing to be burdened by the details.

MILLER COMPRESSING 6000 Shredder Zig-Zag TABLE 2-1 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3670
STACK AREA, sq ft = 4.750
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.093
GAS METER VOLUME, acf = 47.78
WATER COLLECTED, ml = 11.0
PARTICULATE COLLECTED, grams = 0.0995
PERCENT CONDENSIBLE, % = 3.1
WET MOLECULAR WT = 28.87
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	75	0.155	1.07	82	22.83
2	75	0.170	1.17	84	23.91
3	75	0.170	1.17	87	23.91
4	75	0.115	0.80	89	19.67
5	75	0.110	0.76	90	19.24
6	75	0.100	0.70	93	18.34
7	75	0.125	0.87	96	20.50
8	75	0.140	0.90	98	21.70
9	75	0.150	1.02	100	22.46
10	75	0.120	0.84	102	20.09
11	75	0.110	0.76	103	19.24
12	75	0.100	0.70	104	18.34
AVG VALUES	75		0.897	94	20.85

TOTAL GAS WITHDRAWN, scf = 48.53
DRY AIR WITHDRAWN, scf = 48.01
WATER VAPOR WITHDRAWN, scf = 0.52
PERCENT WATER VAPOR = 1.07
ACTUAL WET FLOW RATE, acfm = 5,943.05
STANDARD DRY FLOW RATE, scfm = 5,642.26
PARTICULATE CONCENTRATION, grains/dscf = 0.032
PARTICULATE EMISSION RATE, lb/hr = 1.48
LB PARTICULATE PER 1000 LB GAS = 0.058
PERCENT OF ISOKINETIC SAMPLING = 91.72

MILLER COMPRESSING Shredder Cyclone Test 1 TABLE 2-2 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.55
WATER COLLECTED, ml = 34.0
PARTICULATE COLLECTED, grams = 0.0369
PERCENT CONDENSIBLE, % = 65.9
WET MOLECULAR WT = 28.62
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.500	1.50	65	74.33
2	120	1.800	1.80	66	81.42
3	120	1.900	1.90	68	83.65
4	120	1.800	1.80	70	81.42
5	115	1.900	1.90	72	83.29
6	120	2.100	2.10	74	87.94
7	120	2.250	2.25	76	91.03
8	120	1.900	1.90	78	83.65
9	120	1.750	1.75	80	80.28
10	120	1.900	1.90	82	83.65
11	120	2.100	2.10	85	87.94
12	120	2.250	2.25	88	91.03
AVG VALUES	120		1.929	75	84.14

TOTAL GAS WITHDRAWN, scf = 48.06
DRY AIR WITHDRAWN, scf = 46.46
WATER VAPOR WITHDRAWN, scf = 1.60
PERCENT WATER VAPOR = 3.33
ACTUAL WET FLOW RATE, acfm = 44,928.49
STANDARD DRY FLOW RATE, scfm = 38,424.04
PARTICULATE CONCENTRATION, grains/dscf = 0.012
PARTICULATE EMISSION RATE, lb/hr = 3.96
LB PARTICULATE PER 1000 LB GAS = 0.022
PERCENT OF ISOKINETIC SAMPLING = 96.09

MILLER COMPRESSING Shredder Cyclone Test 2 TABLE 2-3 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.22
WATER COLLECTED, ml = 40.0
PARTICULATE COLLECTED, grams = 0.0465
PERCENT CONDENSIBLE, % = 70.5
WET MOLECULAR WT = 28.56
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.500	1.50	89	74.41
2	125	1.750	1.75	88	80.72
3	125	1.900	1.90	90	84.10
4	125	1.800	1.80	89	81.86
5	125	1.950	1.95	90	85.20
6	125	2.000	2.00	90	86.29
7	125	2.200	2.20	92	90.50
8	125	1.950	1.95	94	85.20
9	125	1.850	1.85	96	82.99
10	125	2.000	2.00	98	86.29
11	125	2.200	2.20	99	90.50
12	125	2.100	2.10	99	88.42
AVG VALUES	125		1.933	93	84.71

TOTAL GAS WITHDRAWN, scf = 48.11
DRY AIR WITHDRAWN, scf = 46.23
WATER VAPOR WITHDRAWN, scf = 1.88
PERCENT WATER VAPOR = 3.91
ACTUAL WET FLOW RATE, acfm = 45,233.72
STANDARD DRY FLOW RATE, scfm = 38,122.88
PARTICULATE CONCENTRATION, grains/dscf = 0.016
PARTICULATE EMISSION RATE, lb/hr = 4.98
LB PARTICULATE PER 1000 LB GAS = 0.028
PERCENT OF ISOKINETIC SAMPLING = 96.38

MILLER COMPRESSING Shredder Cyclone Test 3 TABLE 2-4 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.00
WATER COLLECTED, ml = 53.0
PARTICULATE COLLECTED, grams = 0.0266
PERCENT CONDENSIBLE, % = 60.9
WET MOLECULAR WT = 28.42
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.600	1.60	88	77.03
2	120	1.800	1.80	88	81.70
3	125	1.850	1.85	88	83.19
4	130	1.800	1.80	88	82.41
5	130	1.800	1.80	90	82.41
6	130	2.100	2.10	90	89.01
7	130	2.250	2.25	90	92.13
8	130	1.900	1.90	92	84.66
9	130	1.800	1.80	94	82.41
10	130	1.950	1.95	96	85.77
11	130	2.000	2.00	98	86.86
12	130	2.000	2.00	99	86.86
AVG VALUES	128		1.904	92	84.54

TOTAL GAS WITHDRAWN, scf = 48.50
DRY AIR WITHDRAWN, scf = 46.01
WATER VAPOR WITHDRAWN, scf = 2.49
PERCENT WATER VAPOR = 5.14
ACTUAL WET FLOW RATE, acfm = 45,142.57
STANDARD DRY FLOW RATE, scfm = 37,345.92
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSION RATE, lb/hr = 2.83
LB PARTICULATE PER 1000 LB GAS = 0.016
PERCENT OF ISOKINETIC SAMPLING = 97.90

MILLER COMPRESSING United Furnace Test 1 TABLE 2-5 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.282
GAS METER VOLUME, acf = 39.62
WATER COLLECTED, ml = 41.0
PARTICULATE COLLECTED, grams = 0.0250
PERCENT CONDENSIBLE, % = 30.4
WET MOLECULAR WT = 28.69
CO2 = 2.60 O2 = 16.00 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	1000	0.120	1.55	83	33.18
2	890	0.140	1.80	85	34.47
3	870	0.150	1.95	87	35.41
4	860	0.150	1.95	91	35.28
5	870	0.120	1.55	96	31.67
6	870	0.100	1.30	100	28.91
7	1040	0.090	1.15	103	29.13
8	880	0.100	1.30	107	29.02
9	860	0.120	1.55	111	31.55
10	920	0.100	1.30	112	29.45
11	870	0.080	1.05	114	25.86
12	985	0.080	1.05	118	26.96
AVG VALUES	910		1.458	101	30.91

TOTAL GAS WITHDRAWN, scf = 40.97
DRY AIR WITHDRAWN, scf = 39.04
WATER VAPOR WITHDRAWN, scf = 1.93
PERCENT WATER VAPOR = 4.71
ACTUAL WET FLOW RATE, acfm = 9,105.55
STANDARD DRY FLOW RATE, scfm = 3,273.65
PARTICULATE CONCENTRATION, grains/dscf = 0.010
PARTICULATE EMISSION RATE, lb/hr = 0.27
LB PARTICULATE PER 1000 LB GAS = 0.018
PERCENT OF ISOKINETIC SAMPLING = 93.29

MILLER COMPRESSING United Furnace Test 2 TABLE 2-6 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.283
GAS METER VOLUME, acf = 42.13
WATER COLLECTED, ml = 47.0
PARTICULATE COLLECTED, grams = 0.0237
PERCENT CONDENSIBLE, % = 11.4
WET MOLECULAR WT = 28.62
CO2 = 2.20 O2 = 16.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	860	0.130	1.70	117	32.88
2	870	0.150	1.95	118	35.45
3	860	0.160	2.05	119	36.48
4	1100	0.170	2.15	120	40.88
5	870	0.130	1.70	120	33.00
6	880	0.100	1.30	120	29.06
7	1120	0.110	1.40	122	33.09
8	1040	0.140	1.80	122	36.37
9	1060	0.160	2.05	122	39.14
10	1000	0.160	2.05	124	38.36
11	860	0.150	1.95	126	35.32
12	900	0.090	1.20	128	27.77
AVG VALUES	952		1.775	122	34.82

TOTAL GAS WITHDRAWN, scf = 43.87
DRY AIR WITHDRAWN, scf = 41.66
WATER VAPOR WITHDRAWN, scf = 2.21
PERCENT WATER VAPOR = 5.04
ACTUAL WET FLOW RATE, acfm = 10,257.11
STANDARD DRY FLOW RATE, scfm = 3,565.40
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSION RATE, lb/hr = 0.26
LB PARTICULATE PER 1000 LB GAS = 0.015
PERCENT OF ISOKINETIC SAMPLING = 91.39

MILLER COMPRESSING United Furnace Test 3 TABLE 2-7 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.283
GAS METER VOLUME, acf = 41.63
WATER COLLECTED, ml = 54.0
PARTICULATE COLLECTED, grams = 0.0289
PERCENT CONDENSIBLE, % = 8.0
WET MOLECULAR WT = 28.57
CO2 = 2.50 O2 = 16.50 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	860	0.120	1.55	128	31.62
2	1040	0.140	1.80	128	36.41
3	940	0.170	2.15	127	38.76
4	870	0.180	2.30	127	38.87
5	840	0.120	1.55	127	31.38
6	1025	0.080	1.05	126	27.38
7	890	0.140	1.80	127	34.54
8	850	0.150	1.90	127	35.22
9	1080	0.160	2.00	128	39.44
10	1110	0.150	1.90	128	38.55
11	940	0.100	1.30	128	29.73
12	840	0.100	1.30	128	28.64
AVG VALUES	940		1.717	127	34.21

TOTAL GAS WITHDRAWN, scf = 43.73
DRY AIR WITHDRAWN, scf = 41.18
WATER VAPOR WITHDRAWN, scf = 2.54
PERCENT WATER VAPOR = 5.81
ACTUAL WET FLOW RATE, acfm = 10,078.61
STANDARD DRY FLOW RATE, scfm = 3,502.87
PARTICULATE CONCENTRATION, grains/dscf = 0.011
PARTICULATE EMISSION RATE, lb/hr = 0.31
LB PARTICULATE PER 1000 LB GAS = 0.019
PERCENT OF ISOKINETIC SAMPLING = 91.97

MILLER COMPRESSING New Coreco Baghouse Test 1 TABLE 2-8 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 51.00
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0039
PERCENT CONDENSIBLE, % = 61.5
WET MOLECULAR WT = 28.83
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	130	0.070	0.96	66	16.12
2	134	0.065	0.88	66	15.59
3	134	0.065	0.88	68	15.59
4	136	0.065	0.88	70	15.62
5	136	0.075	1.03	72	16.77
6	136	0.075	1.03	76	16.77
7	136	0.075	1.03	78	16.77
8	135	0.070	0.96	80	16.19
9	133	0.075	1.03	84	16.73
10	134	0.075	1.03	88	16.75
11	134	0.075	1.03	90	16.75
12	132	0.070	0.96	94	16.15
AVG VALUES	134		0.975	78	16.32

TOTAL GAS WITHDRAWN, scf = 51.92
DRY AIR WITHDRAWN, scf = 51.16
WATER VAPOR WITHDRAWN, scf = 0.75
PERCENT WATER VAPOR = 1.45
ACTUAL WET FLOW RATE, acfm = 2,995.78
STANDARD DRY FLOW RATE, scfm = 2,551.78
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.03
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 97.74

MILLER COMPRESSING New Coreco Baghouse Test 2 TABLE 2-9 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 49.52
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0038
PERCENT CONDENSIBLE, % = 63.2
WET MOLECULAR WT = 28.82
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	132	0.075	1.03	98	16.72
2	132	0.075	1.03	100	16.72
3	132	0.075	1.03	100	16.72
4	133	0.070	0.96	100	16.17
5	134	0.075	1.03	100	16.75
6	134	0.075	1.03	102	16.75
7	134	0.075	1.03	104	16.75
8	148	0.070	0.96	106	16.37
9	154	0.070	0.96	110	16.45
10	154	0.065	0.88	112	15.85
11	152	0.065	0.88	114	15.82
12	150	0.065	0.88	116	15.80
AVG VALUES	141		0.975	105	16.40

TOTAL GAS WITHDRAWN,scf = 50.59
DRY AIR WITHDRAWN,scf = 49.84
WATER VAPOR WITHDRAWN,scf = 0.75
PERCENT WATER VAPOR = 1.49
ACTUAL WET FLOW RATE, acfm = 3,011.85
STANDARD DRY FLOW RATE, scfm = 2,536.37
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.03
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 95.79

MILLER COMPRESSING New Coreco Baghouse Test 3 TABLE 2-10 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 48.88
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0035
PERCENT CONDENSIBLE, % = 65.7
WET MOLECULAR WT = 28.82
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	154	0.070	0.96	112	16.45
2	152	0.065	0.88	114	15.83
3	152	0.065	0.88	114	15.83
4	152	0.065	0.88	116	15.83
5	152	0.075	1.03	118	17.00
6	152	0.075	1.03	118	17.00
7	150	0.075	1.03	120	16.97
8	154	0.070	0.96	122	16.45
9	154	0.075	1.03	122	17.03
10	154	0.075	1.03	122	17.03
11	152	0.075	1.03	124	17.00
12	148	0.075	1.03	126	16.94
AVG VALUES	152		0.981	119	16.61

TOTAL GAS WITHDRAWN, scf = 50.03
DRY AIR WITHDRAWN, scf = 49.27
WATER VAPOR WITHDRAWN, scf = 0.75
PERCENT WATER VAPOR = 1.51
ACTUAL WET FLOW RATE, acfm = 3,049.92
STANDARD DRY FLOW RATE, scfm = 2,520.10
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.02
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 95.31

MILLER COMPRESSING Coreco Afterburner Test 1 TABLE 2-11 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.085
GAS METER VOLUME, acf = 54.85
WATER COLLECTED, ml = 35.0
PARTICULATE COLLECTED, grams = 0.2192
PERCENT CONDENSIBLE, % = 14.6
WET MOLECULAR WT = 28.71
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	750	0.500	4.75	69	61.85
2	740	0.460	4.40	70	59.08
3	720	0.380	3.65	70	53.25
4	700	0.320	3.15	70	48.45
5	640	0.260	2.50	71	42.52
6	570	0.200	1.95	72	36.09
7	550	0.150	1.50	73	30.95
8	540	0.190	1.85	75	34.66
9	570	0.250	2.40	77	40.35
10	590	0.210	2.05	78	37.34
11	590	0.240	2.35	80	39.92
12	590	0.140	1.40	81	30.49
13	540	0.320	3.10	84	44.98
14	530	0.320	3.10	87	44.76
15	530	0.340	3.30	88	46.13
16	530	0.290	2.80	90	42.61
17	500	0.300	2.90	90	42.67
18	520	0.240	2.35	92	38.56
19	700	0.160	1.60	94	34.26
20	740	0.180	1.75	96	36.96
21	750	0.240	2.35	97	42.85
22	720	0.320	3.10	98	48.86
23	700	0.390	3.75	99	53.48
24	700	0.350	3.40	100	50.67
AVG VALUES	625		2.727	83	43.40

TOTAL GAS WITHDRAWN, scf = 55.39
DRY AIR WITHDRAWN, scf = 53.75
WATER VAPOR WITHDRAWN, scf = 1.65
PERCENT WATER VAPOR = 2.97
ACTUAL WET FLOW RATE, acfm = 18,412.38
STANDARD DRY FLOW RATE, scfm = 8,447.87
PARTICULATE CONCENTRATION, grains/dscf = 0.063
PARTICULATE EMISSION RATE, lb/hr = 4.51
LB PARTICULATE PER 1000 LB GAS = 0.116
PERCENT OF ISOKINETIC SAMPLING = 97.76

MILLER COMPRESSING Coreco Afterburner Test 2 TABLE 2-12 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.085
GAS METER VOLUME, acf = 52.47
WATER COLLECTED, ml = 43.0
PARTICULATE COLLECTED, grams = 0.2060
PERCENT CONDENSIBLE, % = 5.7
WET MOLECULAR WT = 28.62
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	780	0.540	5.00	101	65.17
2	760	0.480	4.45	102	60.94
3	730	0.390	3.70	102	54.25
4	720	0.370	3.45	103	52.62
5	700	0.300	2.75	103	46.98
6	640	0.230	2.15	103	40.06
7	560	0.160	1.50	104	32.17
8	560	0.180	1.70	105	34.12
9	600	0.230	2.15	106	39.32
10	600	0.270	2.50	107	42.61
11	590	0.240	2.25	108	39.98
12	590	0.180	1.70	109	34.62
13	550	0.280	2.60	110	42.35
14	550	0.310	2.90	110	44.56
15	550	0.320	3.00	110	45.28
16	540	0.290	2.70	110	42.89
17	540	0.280	2.60	111	42.14
18	560	0.220	2.05	111	37.73
19	700	0.190	1.80	113	37.39
20	740	0.170	1.65	114	35.97
21	740	0.220	2.05	115	40.92
22	760	0.270	2.50	116	45.71
23	760	0.400	3.70	117	55.63
24	740	0.360	3.40	118	52.34
AVG VALUES	648		2.677	109	44.41

TOTAL GAS WITHDRAWN, scf = 53.59
DRY AIR WITHDRAWN, scf = 51.56
WATER VAPOR WITHDRAWN, scf = 2.02
PERCENT WATER VAPOR = 3.78
ACTUAL WET FLOW RATE, acfm = 18,837.43
STANDARD DRY FLOW RATE, scfm = 8,393.93
PARTICULATE CONCENTRATION, grains/dscf = 0.062
PARTICULATE EMISSION RATE, lb/hr = 4.31
LB PARTICULATE PER 1000 LB GAS = 0.111
PERCENT OF ISOKINETIC SAMPLING = 94.39

MILLER COMPRESSING Coreco Afterburner Test 3 TABLE 2-13 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.084
GAS METER VOLUME, acf = 51.87
WATER COLLECTED, ml = 49.0
PARTICULATE COLLECTED, grams = 0.2214
PERCENT CONDENSIBLE, % = 3.6
WET MOLECULAR WT = 28.56
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	740	0.520	4.80	116	62.98
2	740	0.470	4.35	116	59.87
3	730	0.400	3.70	117	55.00
4	710	0.330	3.10	117	49.54
5	700	0.290	2.70	117	46.24
6	630	0.220	2.00	117	39.04
7	530	0.180	1.70	117	33.65
8	580	0.190	1.80	118	35.44
9	610	0.210	1.95	118	37.79
10	570	0.240	2.25	119	39.64
11	610	0.250	2.35	119	41.23
12	560	0.230	2.15	119	38.62
13	540	0.270	2.50	120	41.43
14	550	0.300	2.80	120	43.88
15	540	0.310	2.90	120	44.39
16	540	0.270	2.50	120	41.43
17	540	0.250	2.35	120	39.86
18	560	0.220	2.00	121	37.77
19	670	0.160	1.50	121	33.90
20	720	0.220	2.00	122	40.62
21	740	0.260	2.40	123	44.53
22	760	0.320	3.00	123	49.81
23	740	0.410	3.85	124	55.92
24	680	0.370	3.50	124	51.78
AVG VALUES	637		2.673	120	44.35

TOTAL GAS WITHDRAWN, scf = 53.35
DRY AIR WITHDRAWN, scf = 51.04
WATER VAPOR WITHDRAWN, scf = 2.31
PERCENT WATER VAPOR = 4.32
ACTUAL WET FLOW RATE, acfm = 18,812.75
STANDARD DRY FLOW RATE, scfm = 8,420.58
PARTICULATE CONCENTRATION, grains/dscf = 0.067
PARTICULATE EMISSION RATE, lb/hr = 4.67
LB PARTICULATE PER 1000 LB GAS = 0.120
PERCENT OF ISOKINETIC SAMPLING = 93.14

Report to

MILLER COMPRESSING COMPANY
Milwaukee, Wisconsin

for

TOTAL PARTICULATE AND VISIBLE EMISSIONS STACK TESTING 6000 AUTO SHREDDER, NORTH CORECO FURNACE, UNITED FURNACE

June 6-8, 1990

Michael J. Huenink
Industrial Hygienist
July 27, 1990

by

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORPORATION
13020 W. Bluemound Rd - Elm Grove, Wisconsin
(414) 784-2434

SUMMARY

On June 6-8, 1990, Environmental Technology & Engineering Corp personnel performed stack emissions testing at the Miller Compressing Company facility located in Milwaukee, Wisconsin. Emissions from three separate operations (five separate stacks) were measured - the 6000 Auto Shredder (Cyclone and Zig-Zag stacks), the United Furnace, and the North Coreco Furnace (Baghouse and Afterburner stacks). The purpose of the testing was to demonstrate compliance with the particulate matter and visible emission limits set forth in Wisconsin Department of Natural Resources Air Pollution Control Permit No. 88-GDB-245. Samples were analyzed for both filterable and condensible ("backhalf") particulates.

The results of the testing indicated particulate emission levels below the permit limitations derived from NR 415 of the Wisconsin Administrative Code. However, the particulate emissions from the Coreco and United Furnace operations were in excess of the permit limitations derived through dispersion modeling to comply with Wisconsin Statutes 144.394(3). The results were as follows:

	Particulate Emissions		Permit Limitations		
			NR415 Limits		Wis. Stat.
Source/Stack	Emission Rate (#/hr)	Emission Conc. (#/1000#)	Rate (#/hr)	Conc. (#/1000#)	Limit (#/hr)
6000 Auto Shredder					
- Cyclone	3.92	0.022	79.9	0.4	6.95
- Zig-Zag	1.48	0.058		0.4	
- Zig-Zag and Cyclone Total (Test 1 only)	5.44		78.0		6.95
United Furnace	0.28	0.017	4.64	0.4	0.12
North Coreco					
- Baghouse	0.03	0.002		0.4	
- Afterburner	4.50	0.116		0.4	
Total	4.53		5.61		2.25

Note: #/hr means pounds of particulate per hour
#/1000# means pounds of particulate per thousand pounds of exhaust gas

In addition, all of the stacks were subject to a 20 percent opacity limit for visible emissions. Visible readings were taken and indicated all six minute averages of readings to be below the limit. The results were as follows:

Operation/Stack	Maximum Six Minute Average Opacity
6000 Auto Shredder	
- Cyclone Stack	8.1 %
- Zig-Zag Stack	0
United Furnace	0
Coreco Afterburner	10.8 %

1.0 GENERAL

On June 6-8, 1990, Environmental Technology & Engineering Corp (ETE) personnel performed stack emissions testing at the Miller Compressing Company facility located in Milwaukee, Wisconsin. Specifically, three separate operations, exhausted through five separate stacks, were tested: the 6000 Auto Shredder (Cyclone and Zig-Zag stacks), the United Furnace, and the North Coreco Furnace (Baghouse and Afterburner stacks). The purpose of the testing was to demonstrate compliance with the particulate and visible emission limitations set forth in the Department of Natural Resources (DNR) Air Pollution Control Permit No. 88-GDB-245.

The DNR permit included three separate particulate limitations for each of the operations, of which the most restrictive applied. Two of the limitations were based upon NR 415 of the Wisconsin Administrative Code. One was a concentration type limit of 0.4 pounds of particulate per 1000 pounds of exhaust gas; the other was a limitation based upon process weight rates and the following equation:

$$E = 3.59\ P^{0.62}$$

where E was the emission rate in pounds per hour and P was the process weight in pounds per hour.

The third limitation was based upon Wisconsin Statutes 144.394(3) and was designed to prevent violation of federal air quality standards in the immediate area. Through dispersion modeling, the DNR had determined allowable particulate emission levels from the facility and their impact on air quality in the area of concern. This third limitation was generally the most restrictive of the three and also included limitations on throughput production levels. The Wisconsin Statute based limitations were as follows:

Operation	Limitation
6000 Auto Shredder	6.95 pounds per hour and limit throughput to 6230 tons per week.
North Coreco Furnace	2.25 pounds per hour and limit throughput to 55 tons per week.
United Furnace	0.12 pounds per hour and limit throughput to 160 tons per week.

Messrs. Larry Halverson and Joe Kovacich of Miller Compressing Company were responsible for ensuring proper operating conditions and documentation of production rates throughout the testing. The production data records are included in Appendix A and can be summarized as follows:

Operation	Production Rates
6000 Auto Shredder	Test 1 - 143.5 tons per hour No. 2 Shredded Test 2 - 152 tons per hour No. 2 Shredded Test 3 - 151.5 tons per hour No. 1 Shredded
North Coreco Furnace	2.05 tons per hour average (15,400 pounds input over 3.75 hours)
United Furnace	1.52 tons per hour average (12,120 pounds input over 4.00 hours)

Mr. Marv Patton of the DNR (Southeast District office) witnessed the testing and production conditions. The field tests, laboratory analysis, and report preparation were performed by ETE personnel; Michael Huenink 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 includes much necessary detail; the results 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

Isokinetic sampling for particulate matter was performed in accordance with the procedures outlined in EPA Methods 5 (6000 Auto Shredder Cyclone, United Furnace, and Coreco Afterburner) and 17 (6000 Auto Shredder Zig-Zag Stack and Coreco Baghouse) found in 40 CFR, Part 60, Appendix A. A brief summary of this method is included in Section 3 of this report. Particulate emission rates were calculated by measuring the concentration of particulate in each of the stack exhaust gas streams and each stack exhaust flow rate. The exhaust flow rates were determined using EPA Methods 1 to 4 through the use of pitot tubes, inclined manometers, and Orsat analyzer. The exhaust flow data and results are included in the results tables (2-1 through 2-13).

The particulate emission results include both filterable and condensible ("back-half") particulate matter. The fraction of the sample weight gains considered "condensible" particulate is also included in the tables.

2.1 6000 Auto Shredder Particulate Results

Stack testing to determine particulate emissions from the 6000 Auto Shredder Cyclone and Zig-Zag stacks was performed on June 6. The sampling port and test point locations are shown in Figures 2-1 and 2-2. The results are shown in Tables 2-1 (Zig-Zag stack emissions, Test 1, Shredded No. 2), 2-1 (Cyclone stack emissions, Test 1, Shredded No. 2), 2-3 (Cyclone stack emissions, Test 2, Shredded No. 2), and 2-4 (Cyclone stack emissions, Test 3, Shredded No. 1).

Normally, the Zig-Zag stack does not emit any particulates since the damper feeding air to the stack remains closed. However, for the testing, the DNR requested that at least one test be performed with the damper open; Test 1 was performed as such. Both the Zig-Zag and Cyclone stacks were tested simultaneously during one hour of operation. Following that test, the damper was closed (normal operation) and the remaining two tests were performed on the Cyclone stack alone. Flow measurements on the Zig-Zag stack confirmed no exhaust flow when the damper was closed.

The test results indicated emission rate and concentration levels to be below all three permit limitations for that operation. Test 2 results were indicative of particulate emissions while producing Shredded No. 2 under the normal operating conditions reported. Test 1 results (Zig-Zag damper open) were approximately ten percent above the Test 2 results (Zig-Zag damper closed) for the Shredder Operation. Test 3 results were indicative of particulate emissions while producing Shredded No. 1. As was expected, Test 3 results were significantly lower due to "cleaner" throughput materials (i.e., appliances and sheet metal versus automobiles).

FIGURE 2-1

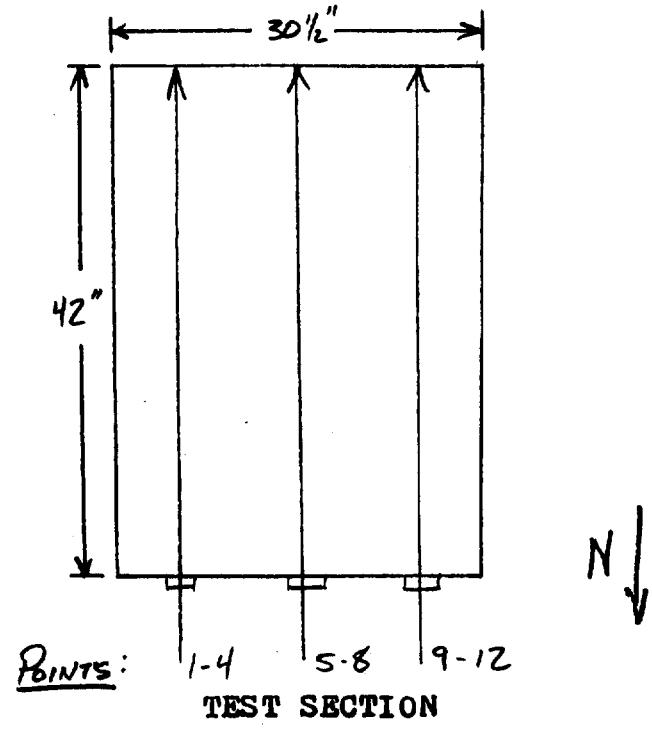
PLANT Miller Compressing

LOCATION Milwaukee, Wisc.

PROCESS 6000 Auto Shredder Cyclone Stack

DIMENSIONS 42 x 30.5 in.

COMMENTS



POINT	DISTANCE FROM STACK WALL
1, 5, 9	5.25"
2, 6, 10	15.75"
3, 7, 11	26.25"
4, 8, 12	36.75"

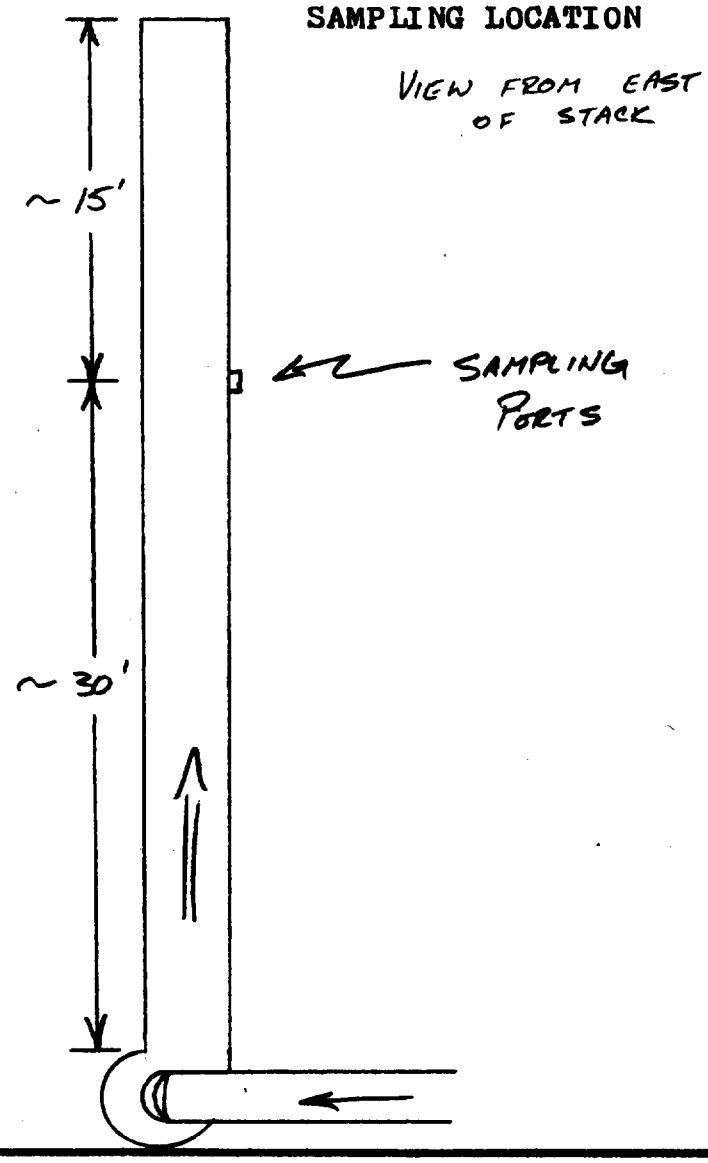


FIGURE 2-2

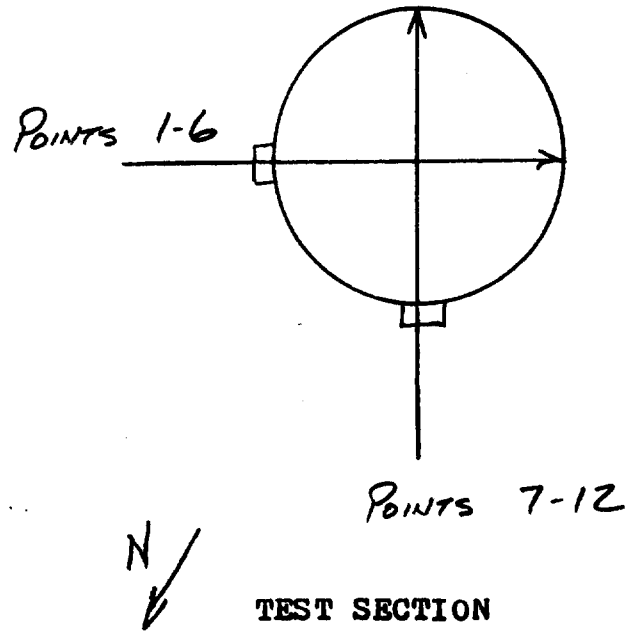
PLANT MILLER COMPRESSING

LOCATION MILWAUKEE, WISC

PROCESS 6000 AUTO SHREDDER ZIG-ZAG STACK

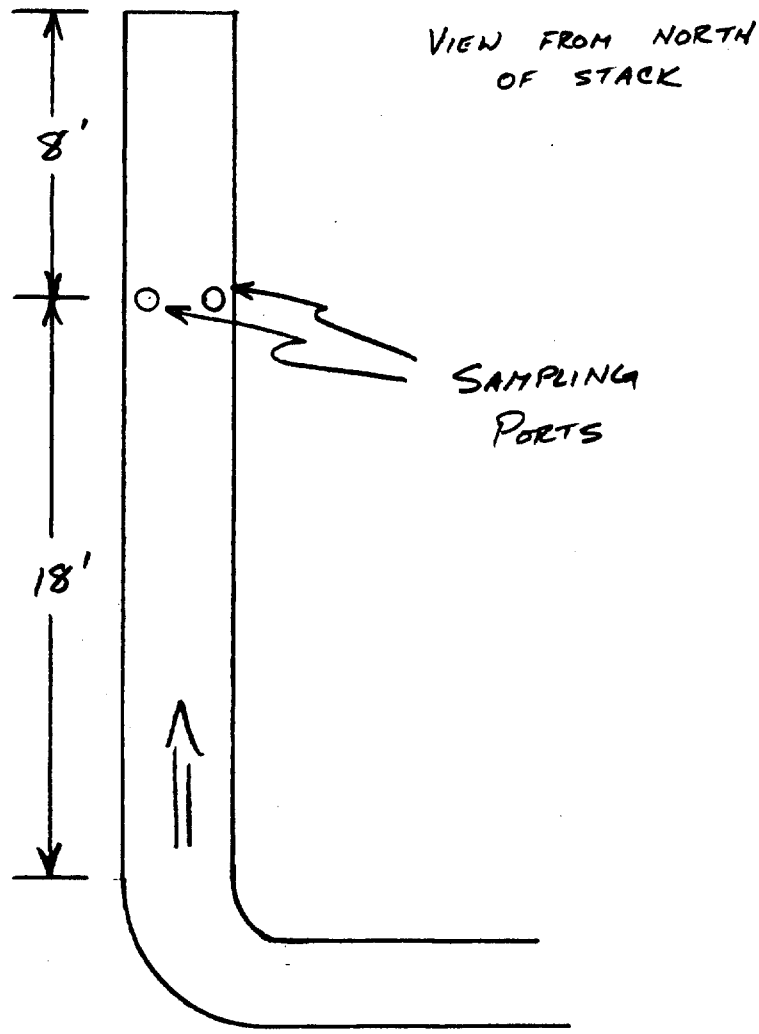
DIMENSIONS 29½ in. DIAM.

COMMENTS



POINT	DISTANCE FROM STACK WALL
1, 7	1.3 in
2, 8	4.3 in
3, 9	8.6 in.
4, 10	20.9 in.
5, 11	25.2 in
6, 12	28.2 in

SAMPLING LOCATION



MILLER COMPRESSING 6000 Shredder Zig-Zag TABLE 2-1 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3670
STACK AREA, sq ft = 4.750
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.093
GAS METER VOLUME, acf = 47.78
WATER COLLECTED, ml = 11.0
PARTICULATE COLLECTED, grams = 0.0995
PERCENT CONDENSIBLE, % = 3.1
WET MOLECULAR WT = 28.87
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	75	0.155	1.07	82	22.83
2	75	0.170	1.17	84	23.91
3	75	0.170	1.17	87	23.91
4	75	0.115	0.80	89	19.67
5	75	0.110	0.76	90	19.24
6	75	0.100	0.70	93	18.34
7	75	0.125	0.87	96	20.50
8	75	0.140	0.90	98	21.70
9	75	0.150	1.02	100	22.46
10	75	0.120	0.84	102	20.09
11	75	0.110	0.76	103	19.24
12	75	0.100	0.70	104	18.34
AVG VALUES	75		0.897	94	20.85

TOTAL GAS WITHDRAWN,scf = 48.53
DRY AIR WITHDRAWN,scf = 48.01
WATER VAPOR WITHDRAWN,scf = 0.52
PERCENT WATER VAPOR = 1.07
ACTUAL WET FLOW RATE, acfm = 5,943.05
STANDARD DRY FLOW RATE, scfm = 5,642.26
PARTICULATE CONCENTRATION, grains/dscf = 0.032
PARTICULATE EMISSION RATE, lb/hr = 1.48
LB PARTICULATE PER 1000 LB GAS = 0.058
PERCENT OF ISOKINETIC SAMPLING = 91.72

MILLER COMPRESSING Shredder Cyclone Test 1 TABLE 2-2 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.55
WATER COLLECTED, ml = 34.0
PARTICULATE COLLECTED, grams = 0.0369
PERCENT CONDENSIBLE, % = 65.9
WET MOLECULAR WT = 28.62
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.500	1.50	65	74.33
2	120	1.800	1.80	66	81.42
3	120	1.900	1.90	68	83.65
4	120	1.800	1.80	70	81.42
5	115	1.900	1.90	72	83.29
6	120	2.100	2.10	74	87.94
7	120	2.250	2.25	76	91.03
8	120	1.900	1.90	78	83.65
9	120	1.750	1.75	80	80.28
10	120	1.900	1.90	82	83.65
11	120	2.100	2.10	85	87.94
12	120	2.250	2.25	88	91.03
AVG VALUES	120		1.929	75	84.14

TOTAL GAS WITHDRAWN, scf = 48.06
DRY AIR WITHDRAWN, scf = 46.46
WATER VAPOR WITHDRAWN, scf = 1.60
PERCENT WATER VAPOR = 3.33
ACTUAL WET FLOW RATE, acfm = 44,928.49
STANDARD DRY FLOW RATE, scfm = 38,424.04
PARTICULATE CONCENTRATION, grains/dscf = 0.012
PARTICULATE EMISSION RATE, lb/hr = 3.96
LB PARTICULATE PER 1000 LB GAS = 0.022
PERCENT OF ISOKINETIC SAMPLING = 96.09

MILLER COMPRESSING Shredder Cyclone Test 2 TABLE 2-3 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.22
WATER COLLECTED, ml = 40.0
PARTICULATE COLLECTED, grams = 0.0465
PERCENT CONDENSIBLE, % = 70.5
WET MOLECULAR WT = 28.56
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.500	1.50	89	74.41
2	125	1.750	1.75	88	80.72
3	125	1.900	1.90	90	84.10
4	125	1.800	1.80	89	81.86
5	125	1.950	1.95	90	85.20
6	125	2.000	2.00	90	86.29
7	125	2.200	2.20	92	90.50
8	125	1.950	1.95	94	85.20
9	125	1.850	1.85	96	82.99
10	125	2.000	2.00	98	86.29
11	125	2.200	2.20	99	90.50
12	125	2.100	2.10	99	88.42
AVG VALUES	125		1.933	93	84.71

TOTAL GAS WITHDRAWN,scf = 48.11
DRY AIR WITHDRAWN,scf = 46.23
WATER VAPOR WITHDRAWN,scf = 1.88
PERCENT WATER VAPOR = 3.91
ACTUAL WET FLOW RATE, acfm = 45,233.72
STANDARD DRY FLOW RATE, scfm = 38,122.88
PARTICULATE CONCENTRATION, grains/dscf = 0.016
PARTICULATE EMISSION RATE, lb/hr = 4.98
LB PARTICULATE PER 1000 LB GAS = 0.028
PERCENT OF ISOKINETIC SAMPLING = 96.38

MILLER COMPRESSING Shredder Cyclone Test 3 TABLE 2-4 6-6-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .1850
STACK AREA, sq ft = 8.900
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.056
GAS METER VOLUME, acf = 47.00
WATER COLLECTED, ml = 53.0
PARTICULATE COLLECTED, grams = 0.0266
PERCENT CONDENSIBLE, % = 60.9
WET MOLECULAR WT = 28.42
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	120	1.600	1.60	88	77.03
2	120	1.800	1.80	88	81.70
3	125	1.850	1.85	88	83.19
4	130	1.800	1.80	88	82.41
5	130	1.800	1.80	90	82.41
6	130	2.100	2.10	90	89.01
7	130	2.250	2.25	90	92.13
8	130	1.900	1.90	92	84.66
9	130	1.800	1.80	94	82.41
10	130	1.950	1.95	96	85.77
11	130	2.000	2.00	98	86.86
12	130	2.000	2.00	99	86.86
AVG VALUES	128		1.904	92	84.54

TOTAL GAS WITHDRAWN,scf = 48.50
DRY AIR WITHDRAWN,scf = 46.01
WATER VAPOR WITHDRAWN,scf = 2.49
PERCENT WATER VAPOR = 5.14
ACTUAL WET FLOW RATE, acfm = 45,142.57
STANDARD DRY FLOW RATE, scfm = 37,345.92
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSION RATE, lb/hr = 2.83
LB PARTICULATE PER 1000 LB GAS = 0.016
PERCENT OF ISOKINETIC SAMPLING = 97.90

2.2 United Furnace Particulate Results

Stack testing to determine particulate emissions from the United Furnace stack was performed on June 7. The sampling port and test point locations are shown in Figure 2-3. The results are shown in Tables 2-5, 2-6, and 2-7. The test results indicated emission rate and concentration levels to be below the NR 415 limitations but above the Wisconsin Statute based limitation of 0.12 pounds per hour. All three test results were in close agreement.

2.3 North Coreco Furnace Particulate Results

Stack testing to determine particulate emissions from the North Coreco Furnace Operations (Baghouse and Afterburner stacks) was performed on June 8. The sampling port and test point locations are shown in Figures 2-4 and 2-5. Testing on both stacks was performed simultaneously. The results are shown in Tables 2-8, 2-9, and 2-10 (Baghouse) and Tables 2-11, 2-12, and 2-13 (Afterburner). The test results indicated emission rate and concentration levels to be below the NR 415 limitations but above the Wisconsin Statute based limitation of 2.25 pounds per hour. Again, all three test results were in close agreement.

2.4 Visible Emissions Results

Visible emission observations to determine percent opacity were taken on all of the stacks tested except the Coreco Baghouse stack. That stack discharged near the ground and appeared to have zero opacity. The field data sheets are included in Appendix B.

The 6000 Auto Shredder Zig-Zag stack had zero opacity. The Cyclone stack observations are summarized in Tables 2-14, 2-15, and 2-16 along with the calculated six minute averages. The maximum six minute average during each of the three test periods was below the permit limitation of 20 percent.

The United Furnace stack also had zero opacity during the test efforts.

The Coreco Afterburner visible emissions and six minute averages are presented in Tables 2-17, 2-18, and 2-19. Again, the maximum six minute average during each of the three test periods was below the permit limitation of 20 percent.

FIGURE 2-3

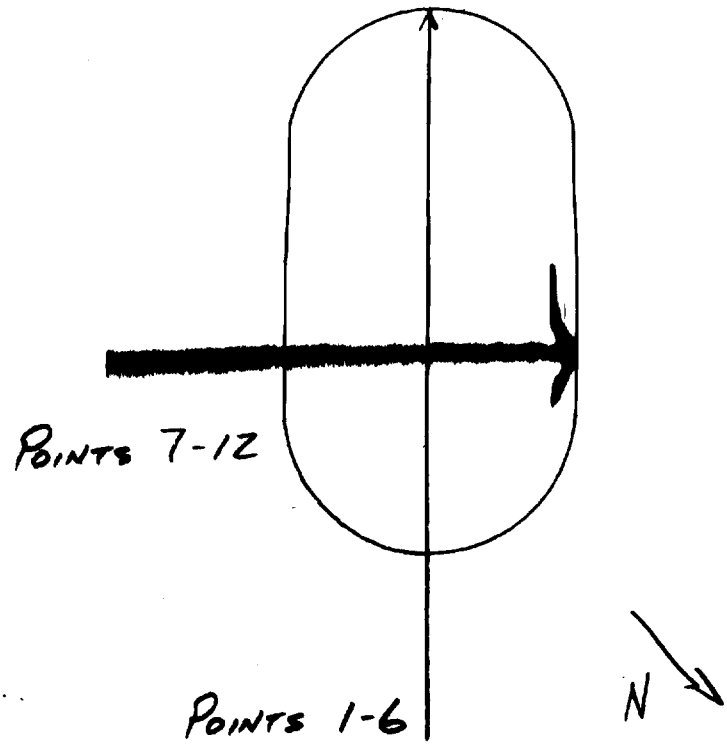
PLANT MILLER COMPRESSING

LOCATION [redacted] WISC

PROCESS UNITED FURNACE

DIMENSIONS 30 in. DIAM.

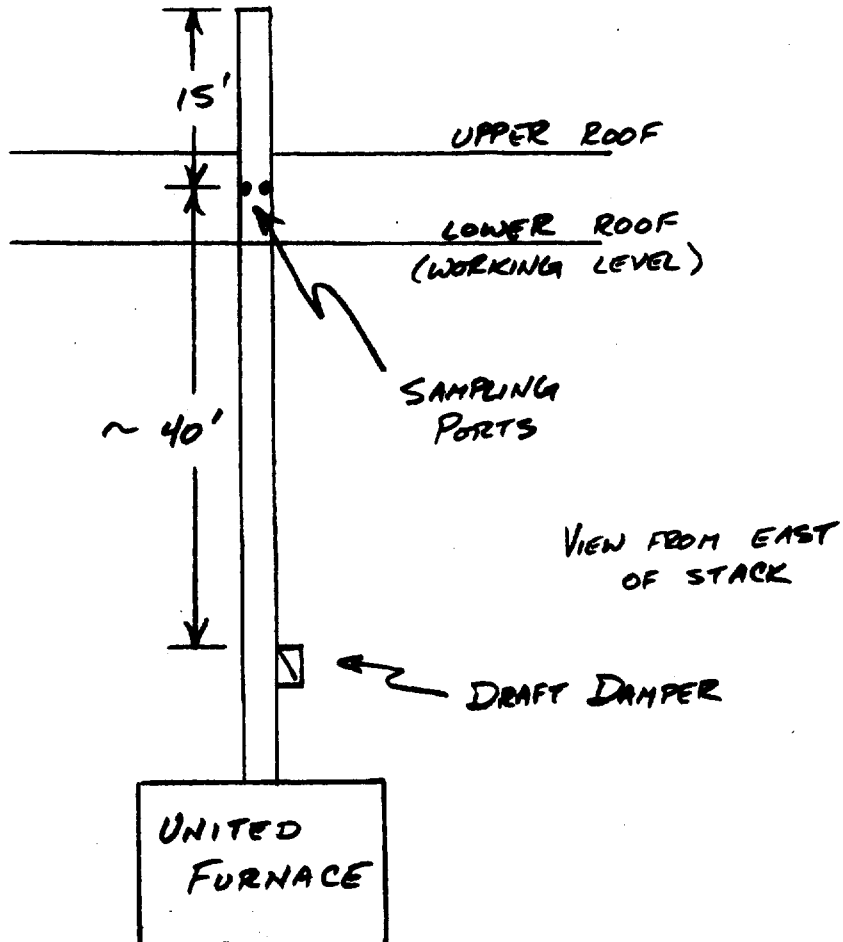
COMMENTS



TEST SECTION

POINT	DISTANCE FROM STACK WALL
1, 7	1.3
2, 8	4.4
3, 9	8.9
4, 10	21.1
5, 11	25.6
6, 12	28.7

SAMPLING LOCATION



MILLER COMPRESSING United Furnace Test 1 TABLE 2-5 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.282
GAS METER VOLUME, acf = 39.62
WATER COLLECTED, ml = 41.0
PARTICULATE COLLECTED, grams = 0.0250
PERCENT CONDENSIBLE, % = 30.4
WET MOLECULAR WT = 28.69
CO2 = 2.60 O2 = 16.00 CO = 0.00 N2 = 81.40

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	1000	0.120	1.55	83	33.18
2	890	0.140	1.80	85	34.47
3	870	0.150	1.95	87	35.41
4	860	0.150	1.95	91	35.28
5	870	0.120	1.55	96	31.67
6	870	0.100	1.30	100	28.91
7	1040	0.090	1.15	103	29.13
8	880	0.100	1.30	107	29.02
9	860	0.120	1.55	111	31.55
10	920	0.100	1.30	112	29.45
11	870	0.080	1.05	114	25.86
12	985	0.080	1.05	118	26.96
AVG VALUES	910		1.458	101	30.91

TOTAL GAS WITHDRAWN,scf = 40.97
DRY AIR WITHDRAWN,scf = 39.04
WATER VAPOR WITHDRAWN,scf = 1.93
PERCENT WATER VAPOR = 4.71
ACTUAL WET FLOW RATE, acfm = 9,105.55
STANDARD DRY FLOW RATE, scfm = 3,273.65
PARTICULATE CONCENTRATION, grains/dscf = 0.010
PARTICULATE EMISSION RATE, lb/hr = 0.27
LB PARTICULATE PER 1000 LB GAS = 0.018
PERCENT OF ISOKINETIC SAMPLING = 93.29

MILLER COMPRESSING United Furnace Test 2 TABLE 2-6 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.283
GAS METER VOLUME, acf = 42.13
WATER COLLECTED, ml = 47.0
PARTICULATE COLLECTED, grams = 0.0237
PERCENT CONDENSIBLE, % = 11.4
WET MOLECULAR WT = 28.62
CO2 = 2.20 O2 = 16.80 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	860	0.130	1.70	117	32.88
2	870	0.150	1.95	118	35.45
3	860	0.160	2.05	119	36.48
4	1100	0.170	2.15	120	40.88
5	870	0.130	1.70	120	33.00
6	880	0.100	1.30	120	29.06
7	1120	0.110	1.40	122	33.09
8	1040	0.140	1.80	122	36.37
9	1060	0.160	2.05	122	39.14
10	1000	0.160	2.05	124	38.36
11	860	0.150	1.95	126	35.32
12	900	0.090	1.20	128	27.77
AVG VALUES	952		1.775	122	34.82

TOTAL GAS WITHDRAWN,scf = 43.87
DRY AIR WITHDRAWN,scf = 41.66
WATER VAPOR WITHDRAWN,scf = 2.21
PERCENT WATER VAPOR = 5.04
ACTUAL WET FLOW RATE, acfm = 10,257.11
STANDARD DRY FLOW RATE, scfm = 3,565.40
PARTICULATE CONCENTRATION, grains/dscf = 0.009
PARTICULATE EMISSION RATE, lb/hr = 0.26
LB PARTICULATE PER 1000 LB GAS = 0.015
PERCENT OF ISOKINETIC SAMPLING = 91.39

MILLER COMPRESSING United Furnace Test 3 TABLE 2-7 6-7-90

BAROMETRIC PRESSURE, in Hg = 29.300
TIP DIAMETER, in .4380
STACK AREA, sq ft = 4.910
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.283
GAS METER VOLUME, acf = 41.63
WATER COLLECTED, ml = 54.0
PARTICULATE COLLECTED, grams = 0.0289
PERCENT CONDENSIBLE, % = 8.0
WET MOLECULAR WT = 28.57
CO2 = 2.50 O2 = 16.50 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	860	0.120	1.55	128	31.62
2	1040	0.140	1.80	128	36.41
3	940	0.170	2.15	127	38.76
4	870	0.180	2.30	127	38.87
5	840	0.120	1.55	127	31.38
6	1025	0.080	1.05	126	27.38
7	890	0.140	1.80	127	34.54
8	850	0.150	1.90	127	35.22
9	1080	0.160	2.00	128	39.44
10	1110	0.150	1.90	128	38.55
11	940	0.100	1.30	128	29.73
12	840	0.100	1.30	128	28.64
AVG VALUES	940		1.717	127	34.21

TOTAL GAS WITHDRAWN,scf = 43.73
DRY AIR WITHDRAWN,scf = 41.18
WATER VAPOR WITHDRAWN,scf = 2.54
PERCENT WATER VAPOR = 5.81
ACTUAL WET FLOW RATE, acfm = 10,078.61
STANDARD DRY FLOW RATE, scfm = 3,502.87
PARTICULATE CONCENTRATION, grains/dscf = 0.011
PARTICULATE EMISSION RATE, lb/hr = 0.31
LB PARTICULATE PER 1000 LB GAS = 0.019
PERCENT OF ISOKINETIC SAMPLING = 91.97

FIGURE 2-4

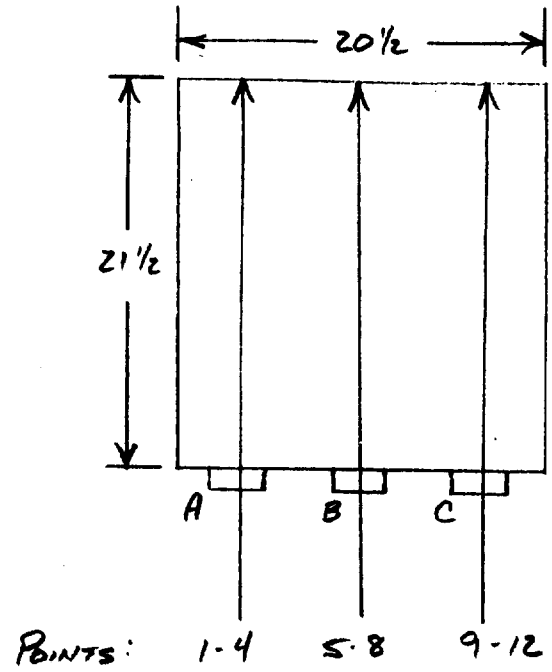
PLANT MILLER COMPRESSING

LOCATION MILWAUKEE, WISC

PROCESS NORTH CORECO BAGHOUSE

DIMENSIONS 20½ x 21½ in.

COMMENTS STACK EXTENSION ADDED TO FACILITATE TESTING



TEST SECTION

POINT	DISTANCE FROM STACK WALL
1,5,9	2.7
2,6,10	8.1
3,7,11	13.4
4,8,12	18.8

SAMPLING LOCATION

VIEW FROM EAST OF STACK

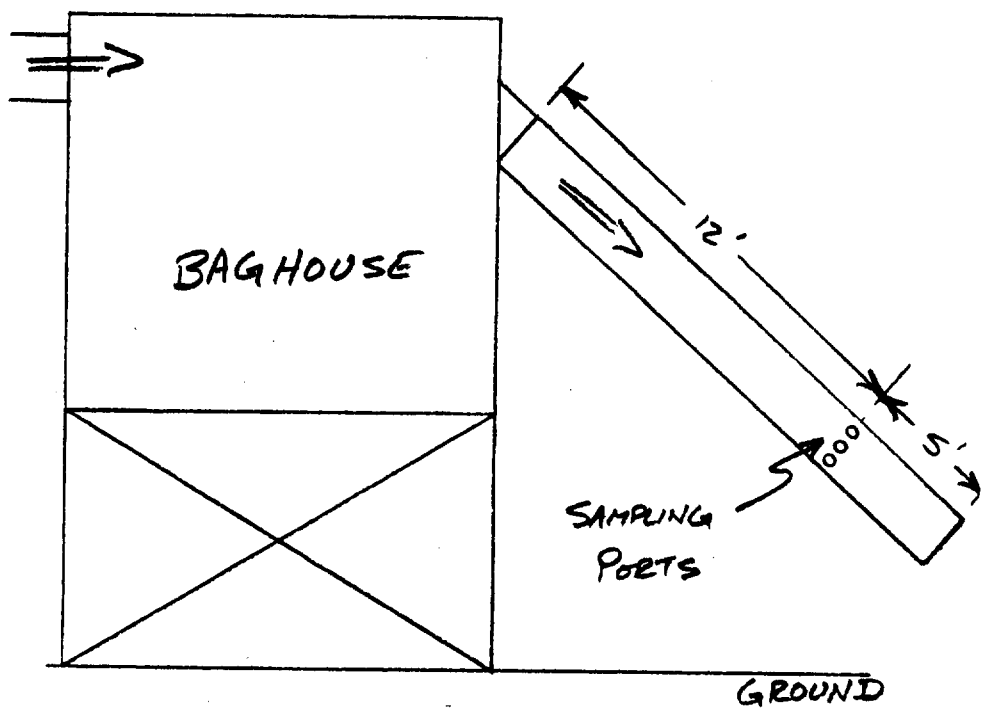


FIGURE 2-5

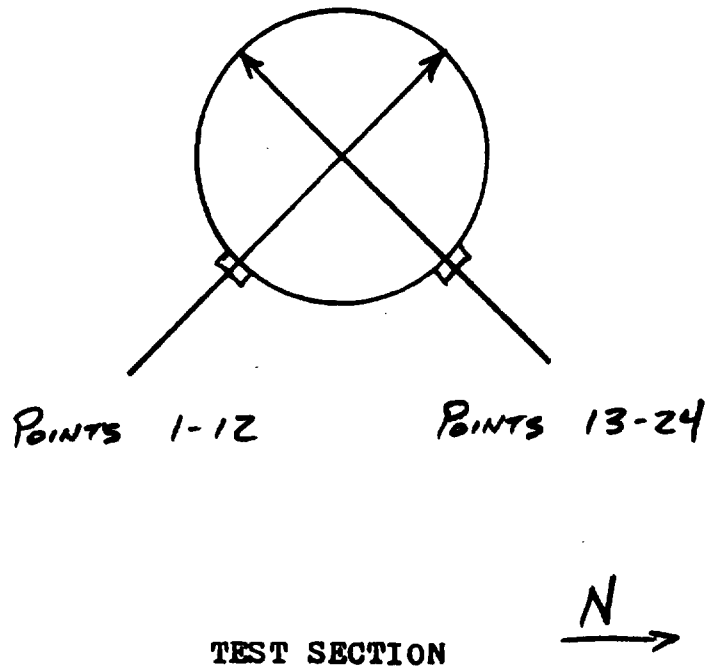
PLANT MILLER COMPRESSING

LOCATION MILWAUKEE, WISC

PROCESS NORTH CORROO AFTERBURNER

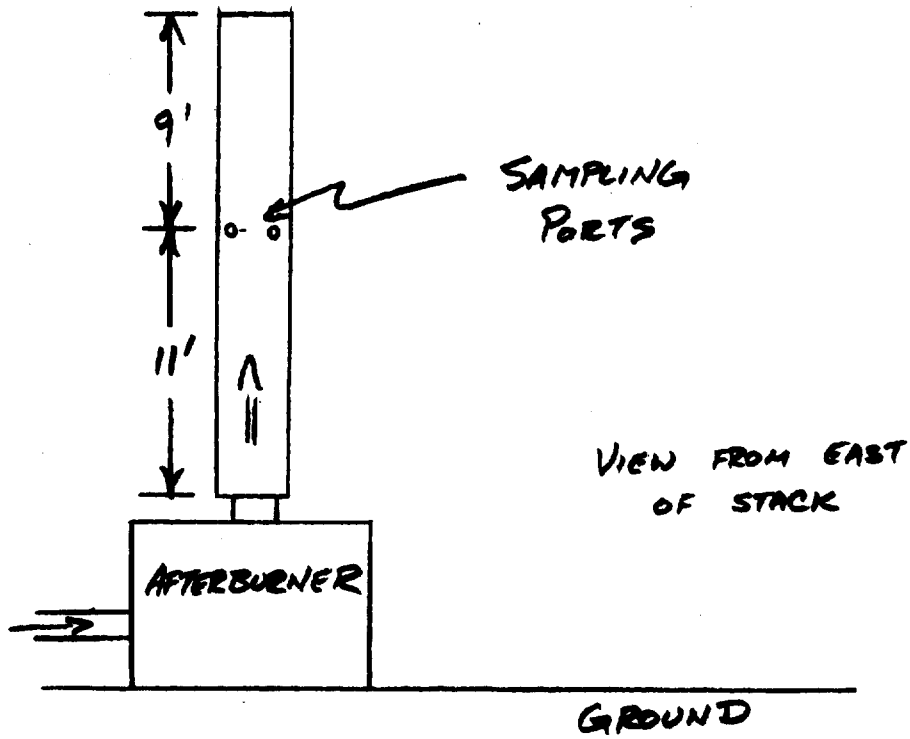
DIMENSIONS 36 in DIAM.

COMMENTS



POINT	DISTANCE FROM STACK WALL
1, 13	1.0 in
2, 14	2.4
3, 15	4.2
4, 16	6.4
5, 17	9.0
6, 18	12.8
7, 19	23.2
8, 20	27.0
9, 21	29.6
10, 22	31.8
11, 23	33.6
12, 24	35.0

SAMPLING LOCATION



MILLER COMPRESSING New Coreco Baghouse Test 1 TABLE 2-8 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 51.00
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0039
PERCENT CONDENSIBLE, % = 61.5
WET MOLECULAR WT = 28.83
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	130	0.070	0.96	66	16.12
2	134	0.065	0.88	66	15.59
3	134	0.065	0.88	68	15.59
4	136	0.065	0.88	70	15.62
5	136	0.075	1.03	72	16.77
6	136	0.075	1.03	76	16.77
7	136	0.075	1.03	78	16.77
8	135	0.070	0.96	80	16.19
9	133	0.075	1.03	84	16.73
10	134	0.075	1.03	88	16.75
11	134	0.075	1.03	90	16.75
12	132	0.070	0.96	94	16.15
AVG VALUES	134		0.975	78	16.32

TOTAL GAS WITHDRAWN,scf = 51.92
DRY AIR WITHDRAWN,scf = 51.16
WATER VAPOR WITHDRAWN,scf = 0.75
PERCENT WATER VAPOR = 1.45
ACTUAL WET FLOW RATE, acfm = 2,995.78
STANDARD DRY FLOW RATE, scfm = 2,551.78
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.03
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 97.74

MILLER COMPRESSING New Coreco Baghouse Test 2 TABLE 2-9 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 49.52
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0038
PERCENT CONDENSIBLE, % = 63.2
WET MOLECULAR WT = 28.82
CO2 = 0.00 O2 = 20.70 CO = 0.00 N2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	132	0.075	1.03	98	16.72
2	132	0.075	1.03	100	16.72
3	132	0.075	1.03	100	16.72
4	133	0.070	0.96	100	16.17
5	134	0.075	1.03	100	16.75
6	134	0.075	1.03	102	16.75
7	134	0.075	1.03	104	16.75
8	148	0.070	0.96	106	16.37
9	154	0.070	0.96	110	16.45
10	154	0.065	0.88	112	15.85
11	152	0.065	0.88	114	15.82
12	150	0.065	0.88	116	15.80
AVG VALUES	141		0.975	105	16.40

TOTAL GAS WITHDRAWN,scf = 50.59
DRY AIR WITHDRAWN,scf = 49.84
WATER VAPOR WITHDRAWN,scf = 0.75
PERCENT WATER VAPOR = 1.49
ACTUAL WET FLOW RATE, acfm = 3,011.85
STANDARD DRY FLOW RATE, scfm = 2,536.37
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.03
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 95.79

MILLER COMPRESSING New Coreco Baghouse Test 3 TABLE 2-10 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .4380
STACK AREA, sq ft = 3.060
SAMPLING TIME PER POINT, min = 5.00
NUMBER OF POINTS = 12
STACK PRESSURE, in Hg = 29.101
GAS METER VOLUME, acf = 48.88
WATER COLLECTED, ml = 16.0
PARTICULATE COLLECTED, grams = 0.0035
PERCENT CONDENSIBLE, % = 65.7
WET MOLECULAR WT = 28.82
CO_2 = 0.00 O_2 = 20.70 CO = 0.00 N_2 = 79.30

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	154	0.070	0.96	112	16.45
2	152	0.065	0.88	114	15.83
3	152	0.065	0.88	114	15.83
4	152	0.065	0.88	116	15.83
5	152	0.075	1.03	118	17.00
6	152	0.075	1.03	118	17.00
7	150	0.075	1.03	120	16.97
8	154	0.070	0.96	122	16.45
9	154	0.075	1.03	122	17.03
10	154	0.075	1.03	122	17.03
11	152	0.075	1.03	124	17.00
12	148	0.075	1.03	126	16.94
AVG VALUES	152		0.981	119	16.61

TOTAL GAS WITHDRAWN, scf = 50.03
DRY AIR WITHDRAWN, scf = 49.27
WATER VAPOR WITHDRAWN, scf = 0.75
PERCENT WATER VAPOR = 1.51
ACTUAL WET FLOW RATE, acfm = 3,049.92
STANDARD DRY FLOW RATE, scfm = 2,520.10
PARTICULATE CONCENTRATION, grains/dscf = 0.001
PARTICULATE EMISSION RATE, lb/hr = 0.02
LB PARTICULATE PER 1000 LB GAS = 0.002
PERCENT OF ISOKINETIC SAMPLING = 95.31

MILLER COMPRESSING Coreco Afterburner Test 1 TABLE 2-11 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.085
GAS METER VOLUME, acf = 54.85
WATER COLLECTED, ml = 35.0
PARTICULATE COLLECTED, grams = 0.2192
PERCENT CONDENSIBLE, % = 14.6
WET MOLECULAR WT = 28.71
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	750	0.500	4.75	69	61.85
2	740	0.460	4.40	70	59.08
3	720	0.380	3.65	70	53.25
4	700	0.320	3.15	70	48.45
5	640	0.260	2.50	71	42.52
6	570	0.200	1.95	72	36.09
7	550	0.150	1.50	73	30.95
8	540	0.190	1.85	75	34.66
9	570	0.250	2.40	77	40.35
10	590	0.210	2.05	78	37.34
11	590	0.240	2.35	80	39.92
12	590	0.140	1.40	81	30.49
13	540	0.320	3.10	84	44.98
14	530	0.320	3.10	87	44.76
15	530	0.340	3.30	88	46.13
16	530	0.290	2.80	90	42.61
17	500	0.300	2.90	90	42.67
18	520	0.240	2.35	92	38.56
19	700	0.160	1.60	94	34.26
20	740	0.180	1.75	96	36.96
21	750	0.240	2.35	97	42.85
22	720	0.320	3.10	98	48.86
23	700	0.390	3.75	99	53.48
24	700	0.350	3.40	100	50.67
AVG VALUES	625		2.727	83	43.40

TOTAL GAS WITHDRAWN,scf = 55.39
DRY AIR WITHDRAWN,scf = 53.75
WATER VAPOR WITHDRAWN,scf = 1.65
PERCENT WATER VAPOR = 2.97
ACTUAL WET FLOW RATE, acfm = 18,412.38
STANDARD DRY FLOW RATE, scfm = 8,447.87
PARTICULATE CONCENTRATION, grains/dscf = 0.063
PARTICULATE EMISSION RATE, lb/hr = 4.51
LB PARTICULATE PER 1000 LB GAS = 0.116
PERCENT OF ISOKINETIC SAMPLING = 97.76

MILLER COMPRESSING Coreco Afterburner Test 2 TABLE 2-12 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.085
GAS METER VOLUME, acf = 52.47
WATER COLLECTED, ml = 43.0
PARTICULATE COLLECTED, grams = 0.2060
PERCENT CONDENSIBLE, % = 5.7
WET MOLECULAR WT = 28.62
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	780	0.540	5.00	101	65.17
2	760	0.480	4.45	102	60.94
3	730	0.390	3.70	102	54.25
4	720	0.370	3.45	103	52.62
5	700	0.300	2.75	103	46.98
6	640	0.230	2.15	103	40.06
7	560	0.160	1.50	104	32.17
8	560	0.180	1.70	105	34.12
9	600	0.230	2.15	106	39.32
10	600	0.270	2.50	107	42.61
11	590	0.240	2.25	108	39.98
12	590	0.180	1.70	109	34.62
13	550	0.280	2.60	110	42.35
14	550	0.310	2.90	110	44.56
15	550	0.320	3.00	110	45.28
16	540	0.290	2.70	110	42.89
17	540	0.280	2.60	111	42.14
18	560	0.220	2.05	111	37.73
19	700	0.190	1.80	113	37.39
20	740	0.170	1.65	114	35.97
21	740	0.220	2.05	115	40.92
22	760	0.270	2.50	116	45.71
23	760	0.400	3.70	117	55.63
24	740	0.360	3.40	118	52.34
AVG VALUES	648		2.677	109	44.41

TOTAL GAS WITHDRAWN,scf = 53.59
DRY AIR WITHDRAWN,scf = 51.56
WATER VAPOR WITHDRAWN,scf = 2.02
PERCENT WATER VAPOR = 3.78
ACTUAL WET FLOW RATE, acfm = 18,837.43
STANDARD DRY FLOW RATE, scfm = 8,393.93
PARTICULATE CONCENTRATION, grains/dscf = 0.062
PARTICULATE EMISSION RATE, lb/hr = 4.31
LB PARTICULATE PER 1000 LB GAS = 0.111
PERCENT OF ISOKINETIC SAMPLING = 94.39

MILLER COMPRESSING Coreco Afterburner Test 3 TABLE 2-13 6-8-90

BAROMETRIC PRESSURE, in Hg = 29.100
TIP DIAMETER, in .3750
STACK AREA, sq ft = 7.070
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
STACK PRESSURE, in Hg = 29.084
GAS METER VOLUME, acf = 51.87
WATER COLLECTED, ml = 49.0
PARTICULATE COLLECTED, grams = 0.2214
PERCENT CONDENSIBLE, % = 3.6
WET MOLECULAR WT = 28.56
CO2 = 1.00 O2 = 18.00 CO = 0.00 N2 = 81.00

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE METER inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	740	0.520	4.80	116	62.98
2	740	0.470	4.35	116	59.87
3	730	0.400	3.70	117	55.00
4	710	0.330	3.10	117	49.54
5	700	0.290	2.70	117	46.24
6	630	0.220	2.00	117	39.04
7	530	0.180	1.70	117	33.65
8	580	0.190	1.80	118	35.44
9	610	0.210	1.95	118	37.79
10	570	0.240	2.25	119	39.64
11	610	0.250	2.35	119	41.23
12	560	0.230	2.15	119	38.62
13	540	0.270	2.50	120	41.43
14	550	0.300	2.80	120	43.88
15	540	0.310	2.90	120	44.39
16	540	0.270	2.50	120	41.43
17	540	0.250	2.35	120	39.86
18	560	0.220	2.00	121	37.77
19	670	0.160	1.50	121	33.90
20	720	0.220	2.00	122	40.62
21	740	0.260	2.40	123	44.53
22	760	0.320	3.00	123	49.81
23	740	0.410	3.85	124	55.92
24	680	0.370	3.50	124	51.78
AVG VALUES	637		2.673	120	44.35

TOTAL GAS WITHDRAWN,scf = 53.35
DRY AIR WITHDRAWN,scf = 51.04
WATER VAPOR WITHDRAWN,scf = 2.31
PERCENT WATER VAPOR = 4.32
ACTUAL WET FLOW RATE, acfm = 18,812.75
STANDARD DRY FLOW RATE, scfm = 8,420.58
PARTICULATE CONCENTRATION, grains/dscf = 0.067
PARTICULATE EMISSION RATE, lb/hr = 4.67
LB PARTICULATE PER 1000 LB GAS = 0.120
PERCENT OF ISOKINETIC SAMPLING = 93.14

Table 2-14

MILLER COMPRESSING 6000 SHREDDER TEST 1 JUNE 6, 1990

SEC MIN	0	15	30	45	6 MIN OP	SEC MIN	0	15	30	45	6 MIN OP
0	0	0	5	5		30	0	0	0	0	
1	0	0	0	5		31	0	5	0	0	
2	5	0	5	0		32	0	0	0	0	
3	0	5	5	0		33	5	5	0	0	
4	0	0	5	10		34	5	0	0	0	
5	5	0	5	5	2.7	35	0	0	0	5	1.0
6	0	0	0	0		36	0	0	5	0	
7	0	0	0	0		37	0	5	5	0	
8	0	0	0	5		38	0	0	0	0	
9	0	0	0	5		39	10	10	5	0	
10	0	5	0	0		40	0	0	0	0	
11	5	0	0	10	1.3	41	0	5	0	10	2.3
12	5	0	5	0		42	15	0	0	0	
13	0	0	0	0		43	0	10	5	0	
14	5	0	0	0		44	0	5	0	0	
15	5	0	0	0		45	5	10	5	5	
16	0	0	0	0		46	0	0	0	0	
17	0	0	5	5	1.3	47	0	5	5	0	2.9
18	0	0	0	0		48	5	5	0	0	
19	0	0	5	5		49	5	0	0	5	
20	0	0	10	5		50	0	0	5	15	
21	0	0	0	0		51	5	0	0	0	
22	0	0	0	5		52	0	0	5	0	
23	0	0	5	0	1.5	53	0	5	5	0	2.5
24	0	5	0	0		54	0	0	5	5	
25	0	5	10	5		55	0	0	0	0	
26	0	0	0	5		56	0	0	0	0	
27	0	0	0	0		57	0	0	0	0	
28	0	0	0	0		58	0	0	0	0	
29	0	5	5	5	1.9	59	0	0	0	0	.4

MAXIMUM SIX MINUTE AVERAGE OPACITY 2.9

Table 2-15

MILLER COMPRESSING 6000 SHREDDER TEST 2 JUNE 6, 1990

SEC MIN	0	15	30	45	6 MIN OP	SEC MIN	0	15	30	45	6 MIN OP
0	0	5	5	10		30	5	5	10	10	
1	15	10	5	10		31	5	0	0	0	
2	0	0	5	0		32	0	5	5	10	
3	0	5	10	5		33	0	0	5	5	
4	0	0	5	10		34	5	0	5	0	
5	5	5	0	10	5.0	35	0	0	5	5	3.5
6	5	10	5	5		36	5	5	5	10	
7	0	0	0	0		37	5	5	5	0	
8	5	10	10	5		38	0	0	0	0	
9	5	5	5	5		39	5	0	5	10	
10	5	5	0	0		40	10	5	5	0	
11	5	5	0	0	4.0	41	5	5	0	0	3.8
12	0	5	5	5		42	5	10	5	0	
13	10	5	5	5		43	5	5	5	5	
14	10	5	5	5		44	5	5	5	10	
15	0	5	5	5		45	5	0	0	0	
16	10	10	10	5		46	0	5	0	0	
17	5	0	0	5	5.2	47	0	10	5	5	4.0
18	0	5	10	5		48	5	10	5	5	
19	5	5	5	0		49	10	5	10	5	
20	0	0	5	5		50	5	5	0	0	
21	0	5	5	5		51	0	5	10	0	
22	5	5	10	0		52	0	5	5	5	
23	0	5	10	5	4.2	53	5	5	0	0	4.4
24	5	5	5	5		54	0	0	5	0	
25	0	5	0	10		55	5	10	5	10	
26	5	5	5	5		56	0	0	0	0	
27	5	0	0	5		57	5	5	0	5	
28	10	10	15	10		58	5	5	5	0	
29	5	10	5	0	5.4	59	0	5	5	5	3.3

MAXIMUM SIX MINUTE AVERAGE OPACITY 5.4

Table 2-16

MILLER COMPRESSING 6000 SHREDDER TEST 3 JUNE 6, 1990

SEC MIN	0	15	30	45	6 MIN OP	SEC MIN	0	15	30	45	6 MIN OP
0	0	0	0	0		30	0	0	0	0	
1	0	0	0	0		31	0	0	0	0	
2	0	0	0	0		32	0	0	0	0	
3	0	0	0	0		33	5	0	0	0	
4	0	0	0	0		34	0	0	5	0	
5	0	5	0	0	.2	35	10	5	5	5	1.5
6	0	0	0	0		36	5	10	15	15	
7	0	0	0	0		37	10	5	5	5	
8	0	0	0	0		38	5	0	0	0	
9	0	5	5	0		39	5	0	0	5	
10	10	15	10	5		40	10	5	5	5	
11	5	0	5	10	2.9	41	5	10	5	5	5.6
12	10	5	5	5		42	10	10	5	10	
13	5	5	5	5		43	5	10	5	5	
14	0	5	5	5		44	0	5	15	15	
15	5	0	0	0		45	10	5	5	0	
16	5	5	5	10		46	5	5	10	15	
17	5	5	5	5	4.6	47	10	10	5	5	7.5
18	5	5	5	0		48	5	0	0	0	
19	0	0	0	0		49	0	0	0	10	
20	0	5	0	5		50	10	0	5	5	
21	5	5	10	5		51	0	0	0	0	
22	10	5	5	5		52	0	0	0	5	
23	5	5	5	10	4.2	53	5	5	5	10	2.7
24	10	15	10	10		54	10	5	0	5	
25	10	5	10	10		55	0	5	10	10	
26	15	10	5	10		56	5	5	5	10	
27	5	5	5	10		57	5	5	5	0	
28	10	5	5	10		58	10	5	5	10	
29	5	10	5	0	8.1	59	0	5	15	10	6.0

MAXIMUM SIX MINUTE AVERAGE OPACITY 8.1

Table 2-17

MILLER COMPRESSING CORECO AFTERBURNER TEST 1 JUNE 8, 1990

SEC MIN	0	15	30	45	6 MIN OP
0	5	10	5	10	
1	15	10	10	5	
2	5	10	5	5	
3	10	15	5	10	
4	10	5	5	5	
5	10	10	5	15	8.3
6	10	5	5	5	
7	10	10	10	5	
8	5	5	5	5	
9	15	15	10	5	
10	5	5	5	10	
11	15	10	10	5	7.9
12	5	5	10	10	
13	10	5	5	5	
14	5	5	10	15	
15	5	5	5	10	
16	5	10	10	10	
17	5	5	5	10	7.3
18	10	5	10	15	
19	5	5	5	10	
20	5	5	10	10	
21	5	10	10	10	
22	5	5	10	5	
23	15	10	5	10	8.1
24	5	5	15	10	
25	10	5	5	5	
26	5	10	15	10	
27	5	5	5	5	
28	5	5	15	10	
29	5	5	5	5	7.3

MAXIMUM SIX MINUTE AVERAGE OPACITY 8.3

Table 2-18

MILLER COMPRESSING CORECO AFTERBURNER TEST 2 JUNE 8, 1990

SEC MIN	0	15	30	45	6 MIN OP
0	5	10	5	5	
1	10	5	5	5	
2	5	10	10	10	
3	5	5	5	5	
4	5	5	5	5	
5	10	10	5	5	6.5
6	5	5	5	5	
7	10	10	15	5	
8	5	5	10	5	
9	5	10	5	10	
10	10	5	5	5	
11	5	10	10	5	7.1
12	5	5	10	15	
13	5	5	5	5	
14	10	5	10	5	
15	5	10	15	10	
16	10	10	10	5	
17	5	5	10	10	7.9
18	10	10	5	5	
19	5	10	10	5	
20	5	5	5	10	
21	10	5	10	5	
22	5	5	15	10	
23	10	10	5	5	7.5
24	5	5	10	10	
25	5	5	5	10	
26	5	5	10	10	
27	5	5	5	5	
28	5	5	5	5	
29	5	10	5	10	6.5

MAXIMUM SIX MINUTE AVERAGE OPACITY 7.9

Table 2-19

MILLER COMPRESSING CORECO AFTERBURNER TEST 3 JUNE 8, 1990

SEC MIN	0	15	30	45	6 MIN OP
0	10	10	5	10	
1	5	10	5	5	
2	5	15	5	10	
3	10	5	10	5	
4	5	10	10	5	
5	5	10	10	15	8.1
6	10	5	5	5	
7	10	10	10	10	
8	10	5	5	10	
9	5	10	15	15	
10	10	10	5	15	
11	10	10	5	10	9.0
12	10	10	10	10	
13	20	15	10	5	
14	5	10	5	10	
15	10	5	10	10	
16	5	10	15	20	
17	10	10	10	15	10.4
18	15	10	10	10	
19	10	10	10	15	
20	10	10	15	15	
21	5	10	15	10	
22	10	10	10	10	
23	10	10	10	10	10.8
24	10	5	5	5	
25	5	10	10	5	
26	10	5	10	15	
27	10	10	5	10	
28	10	10	15	10	
29	10	10	10	5	8.8

MAXIMUM SIX MINUTE AVERAGE OPACITY 10.8

3.0 METHOD OF TESTING

The equipment used to sample was the Western Precipitation Division of the Joy Manufacturing Company Emission Parameter Analyzer. Samples were collected and analyzed in accordance with EPA Method 5 or 17 (40 CFR, Part 60, Appendix A).

The Method 5 sampling train consisted of a stainless steel probe tip, a heated stainless steel lined probe (quartz lined in the case of the United Furnace), heated glass cyclone and flask, and a heated filter holder with a tared filter. The Method 17 sampling train consisted of a stainless steel probe tip, a fiberglass thimble mounted in a thimble holder (at stack temperature), a probe, and connective tubing.

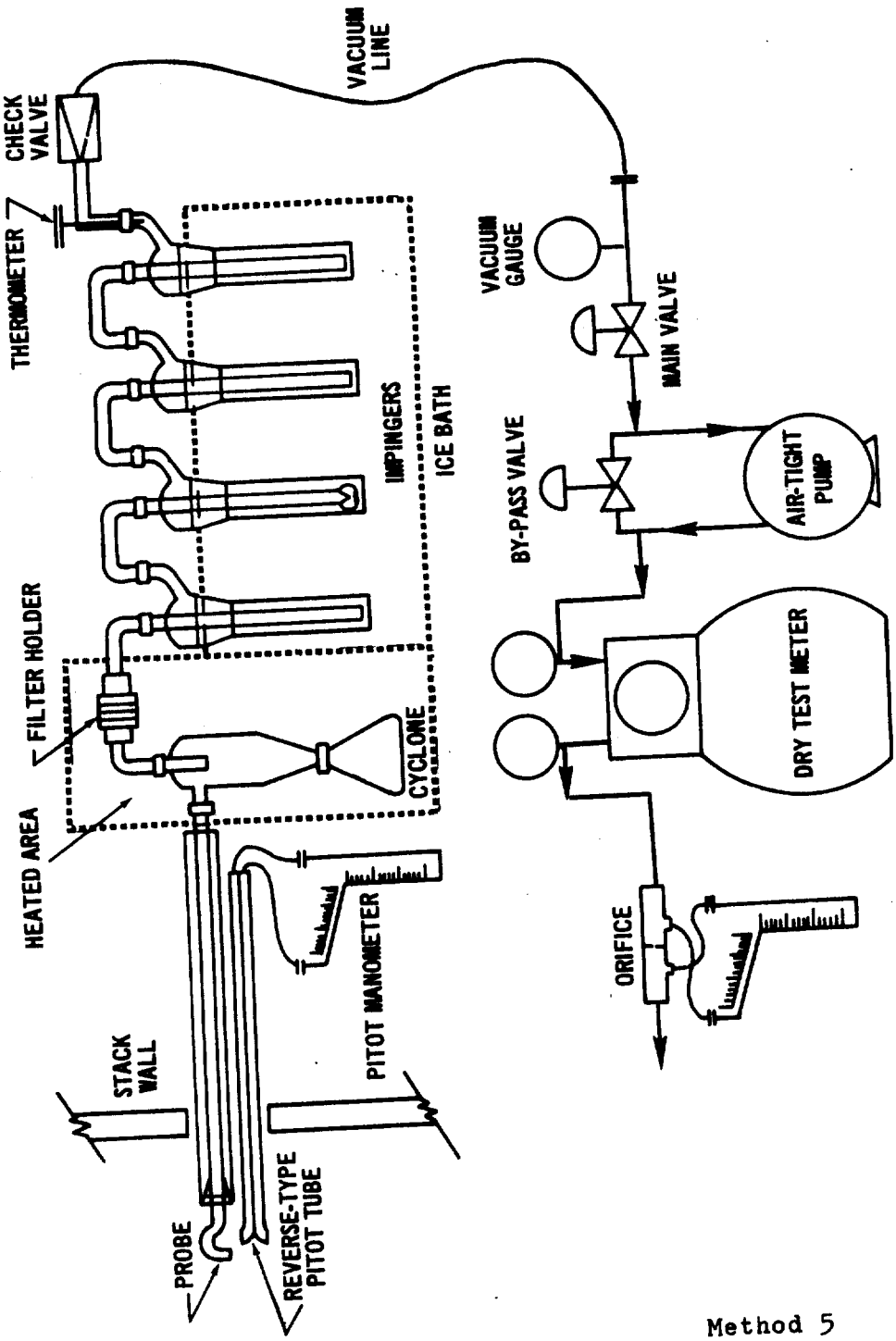
For both sampling trains, a series of four impingers followed in an ice bath. The first was a modified Greenburg-Smith impinger with 100 ml of distilled water; the second was a Greenburg-Smith impinger with 100 ml of distilled water; the third was a modified Greenburg-Smith impinger dry; the fourth was also a modified Greenburg-Smith impinger containing a tared quantity of Silica Gel. The gas then passed through a vacuum pump, calibrated dry gas meter, and a calibrated orifice. Schematic drawings of the sampling trains are included as Figures 3-1 and 3-2.

The temperatures of the stack gas stream, as well as strategic locations within the sampling devices, were monitored by RTDs and read directly from a gauge on the control unit.

The initial gas stream velocity was obtained from a preliminary traverse using an "S" type pitot tube. The initial moisture was estimated from previous stack testing experience. This data, along with the stack temperature, was used to set a nomograph so that rapid calculations of isokinetic sampling conditions could be made during the test.

The principle of the method was to collect a representative sample of the exhaust gas stream. This was done by adjusting the sample collection velocity to match the exhaust gas stream velocity at the point of collection. The velocity at the point of collection was measured with an "S" type pitot tube attached to the probe and the collection velocity was matched to the stack gas velocity by adjusting the flow as indicated by the calibrated orifice.

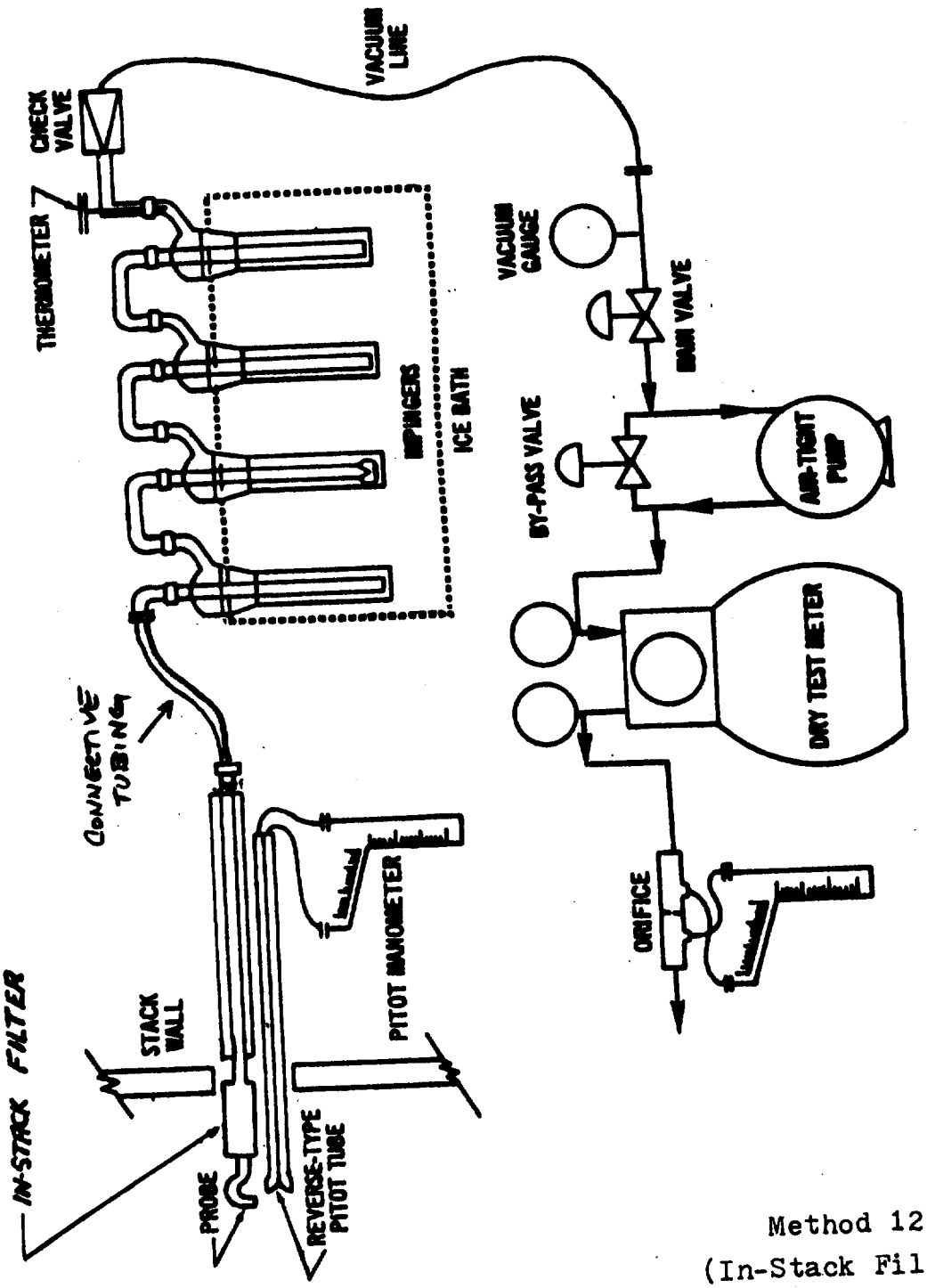
FIGURE 3-1



Particulate sampling train.

Method 5

FIGURE 3-2



Particulate sampling train.

Method 12
(In-Stack Filter)

3.0 (continued)

At the completion of the test, the impinger contents were measured and weighed for determination of the actual moisture content of the exhaust gas stream. The impingers were rinsed with acetone, the rinsings were placed in tared beakers, and the acetone was evaporated off. The impinger solutions were first subjected to an extraction with freon in a similar manner to oil and grease extractions in water. The freon was then evaporated off and an aliquot of the remaining water was also evaporated.

The sum of the three remaining residues from above was considered the "back-half" or "condensible" particulate matter. This procedure was published by the Wisconsin DNR in the AIR MANAGEMENT OPERATIONS HANDBOOK as "The Proposed Method for Condensible Particulate."

The probe tip and probe were washed with acetone (only the probe tip was washed for the method 17 samples), placed in a tared beaker, and evaporated at room temperature. The filter and beaker were then desiccated to the tared humidity conditions and weighed. The combined weight of the filter catch and the washing residue was used for the determination of "filterable" particulates. The filterable particulate data was then combined with the condensible particulate data to calculate total particulate concentrations in the exhaust gas streams.

Analysis of sampling solutions (distilled water, acetone, and freon) was performed to obtain blank values for use in the calculations. All test results were then blank corrected.

A computer was used to calculate the stack velocities, emission concentrations, emission rates and volumetric flow rates using the field and laboratory data.

3.1 Calibration Data

The probe tips, pitot tube, dry gas meters, and orifices were calibrated prior to the particulate and particle sizing testing according to procedures outlined in the Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment as published by the EPA. The values obtained were:

Probe tip diameters	d = 0.185, 0.367, 0.375, 0.438 inches
Pitot tube coeff.	Cp = 0.85
Orifice coeff.	Box 1 - *d*H@ = 1.726
	Box 2 - *d*H@ = 1.028

3.1 Calibration Data (continued)

The dry gas meters in the control boxes were temperature compensating meters. The correction factors for the dry gas meters are best represented by the following equations:

$$\text{Box 1 Gama} = 0.999 + ((Td - 70) \times .00012)$$
$$\text{Box 2 Gama} = 0.718 + ((Td - 70) \times .00012)$$

where: Td = Dry Gas Meter Temperature

The most recent calibrations were performed April 19 (Box 1) and June 1 (Box 2), 1990.

4.0 DISCUSSION AND COMMENTS

All of the results were well below two of the three permit limitations, but the United Furnace and Coreco particulate emissions were above the Wisconsin Statute derived "pound per hour" limitations. This latter limitation was the most restrictive of the three limits.

Based upon opacity observations (see Section 2.4), it was somewhat surprising that any of the permit limitations for the United Furnace would be exceeded. However, the Wisconsin Statute based limit for the operation was relatively low. For example, if particulate emissions were to be lower than the limitation, particulate concentrations within the exhaust gas would be lower than the OSHA limit for employee exposure to nuisance particulates.

Realizing that the Wisconsin Statute derived limitations were based upon dispersion modeling, it may be possible to demonstrate compliance with federal air quality standards using the test results. Now that the operations have been tested and the emission rates have been determined, dispersion modeling could be run again to determine ambient air impact. If it can be shown that emissions would not cause exceedance of the air quality levels, request for permit modification may be appropriate.

APPENDIX A

PRODUCTION RECORDS

6000 Shredder.

1st hr test #2 Shredded	143.5 T.P.H.
2nd hr test #2 Shredded.	152 T.P.H.
3rd hr. test #1 Shredded.	151.5 T.P.H.

CORECO SOUTH ☐ HEARTH ☒ CORECO NORTH ☐

STACK TEST

PRODUCTION RECORD

		TYPE	INGOTS	OUTPUT IRON	SKIMS
DATE: 6/7/90 SHIFT	1ST				
NAME:	Miller Compressing				
TOTAL HOURS:	4 HRS.				
TOTAL DOWN TIME:	0				
TOTAL INPUT	12,120#				
TOTAL OUTPUT					
START:	8:00				
FINISH:	12:00				

	B. Cylinders B1-A	WM Sows	Bumpers	A-Sub Ingot
HEARTH	950# 2122# 1386# 1980#			
PUDDLE		582# 608# 746# 718#	280#	748#

CORECO SOUTH ☐ HEARTH ☐ CORECO NORTH ☒

PRODUCTION RECORD

DATE: 6/18/90 SHIFT 1ST

NAME: Miller Compressing Co.

TOTAL HOURS: 3.75 HRS

TOTAL DOWN TIME:

TOTAL INPUT 15,400#

TOTAL OUTPUT

START: 9:00 AM

FINISH: 1245pm.

TYPE	INGOTS	OUTPUT IRON	SKIMS

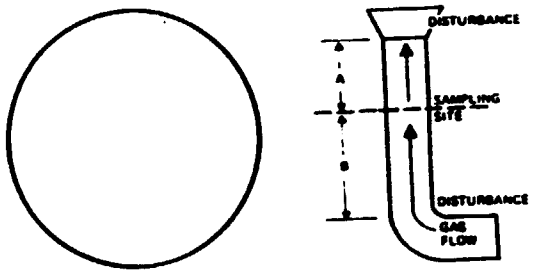
APPENDIX B

FIELD & LABORATORY DATA SHEETS

Environmental
schi gy &
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMP
DATE 6/6/90
LOCATION MILW
OPERATOR MJH
STACK NO. 6000 ZIG-ZAG
RUN NO. 1 OF 1
SAMPLE BOX NO. 2
METER BOX NO. 2

AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 29.1
ASSUMED MOISTURE, % 1%
PROBE LENGTH, in.
NOZZLE DIAMETER, in. 3/8
STACK DIAMETER, in. 29½
PROBE HEATER SETTING
HEATER BOX SETTING

METER ΔH
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 Air
O_2
CO
N_2

SHRED #2
ZIG ZAG DAMPER OPEN

883
PRELKOW PITTSKIM

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 (V_m), 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 fps
1	850:00	-0.10	75	.155	1.07		2986.00		82			4	
2	55			.170	1.17		90.4		84			4	
3	900			.170	1.17		95.1		87			4	
4	5		75	.115	.80		99.7		89			3	
5	10	-0.10		.110	.76		3003.5		90			3	
6	15		75	.100	.70		7.3		93			3	
1	22			.125	.87		10.9		96			3½	
2	27	-0.10	75	.140	.98		14.8		98			3½	
3	32			.150	1.02		19.0		100			3½	
4	37			.120	.84		23.2		102			3	
5	42	-0.10	75	.110	.76		26.8		103			3	
6	47			.100	.70		30.4		104			2½	
							33.78						

1.3
1.3
8.6
20.9
25
28

47.78

8:48 - NO CONV. FEED

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-6-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 1 STACK Zig-Zag

SAMPLE BOX 2 FILTER T-882 WASH BOTTLE —

BEAKERS: FH Ace 21 BH Trichl 7 BH Ace 22 BH H_2O 28

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	100	100	0
2	100	100	0
3	1	0	1
SIC GEL	618	608	10
		WATER TOTAL	11

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		1.3869	1.2957	0.0912
FH Wash	0.0006	97.3817	97.3759	0.0052
			FILTERABLE TOTAL	0.0964
Extract	0.0005	67.5256	67.5231	0.0020
Acetone	0.0006	93.3106	93.3091	0.0009
Water	0.0002	109.1383	109.1380	0.0002
			CONDENSIBLE TOTAL	0.0031
			PARTICULATE TOTAL	0.0995

1 2

ZIG-ZAG ROUND

SMOKE FORM
Form 4500-29 Rev. 6-85

CYCLONE SHREDDER

Name of Company: MILLER COMPR.	Date: 6-6-90
Location: MILW	FID Number:
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 4-17-90
Discharge Location: 6000 SHREDDER STACKS	Control Device: SCRUBBER/NONE
Height of Discharge Above Ground: ~50 ft	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	0850		0930
Observer Location: Distance to Discharge	~400		
Direction from Discharge	E		
Height of Observation Point in Relation to Discharge	-10'		
Plume Description (Color, Length, etc.)	WHT, 30 FT		
Plume Background Description	ROOF		
Weather Conditions: Wind Direction	VARIABLE		
Wind Speed	~5		
Ambient Temperature	65		
Sky Conditions (clear, overcast, % clouds, etc.)	M. CLEAR ~10% CLOUDS		

Describe Point in Plume at Which Opacity was Determined: ~10' ABOVE TOP.

Remarks: BACKGROUND IS CORRUGATED ROOF OF BLDG + SKY LINE

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

Summary of Average Opacity
(From Computer Program)

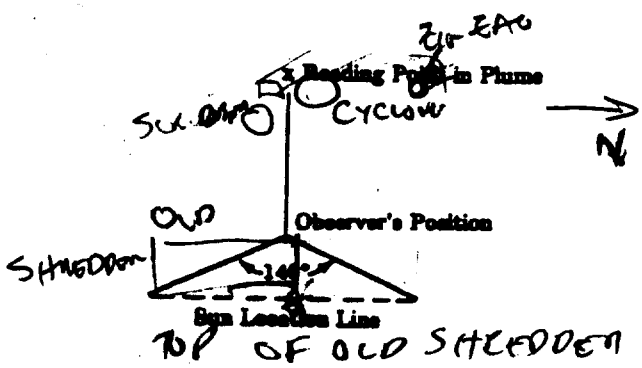
Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

RON #1

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

SMOKE FORM
Form 4500-29 Rev. 6-85

Cyclone Scrubber

Zia-Zaka 2 Rouna

Name of Company	Date 6-6-90
Location	FID Number
City, State, Zip Code	Observer Certification Date 4-17-90
Discharge Location	Control Device Scrubber / None
Height of Discharge Above Ground	Steam Plume? Yes No Attached Detached

	Initial		Final
Time of Observation	0920		0950
Observer Location			
Distance to Discharge			
Direction from Discharge			
Height of Observation Point in Relation to Discharge			
Plume Description (Color, Length, etc.)			
Plume Background Description			
Weather Conditions			
Wind Direction	W		W-SW
Wind Speed	~5 MPH		
Ambient Temperature			
Sky Conditions (clear, overcast, % clouds, etc.)			

Describe Point in Plume at Which Opacity was Determined
~10' ABOVE TOP

Remarks:

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

Summary of Average Opacity
(From Computer Program)

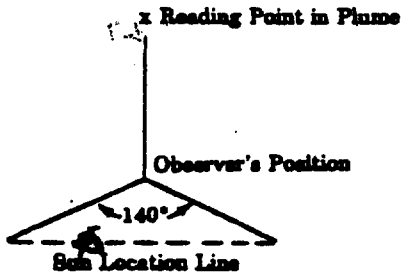
Set Number	Time Start — End	Opacity Sum	Opacity Average

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DUNN

Sketch of Observer, Discharge, and Sun Location.

SAME AS SHEET 1



Allowable Source Opacity

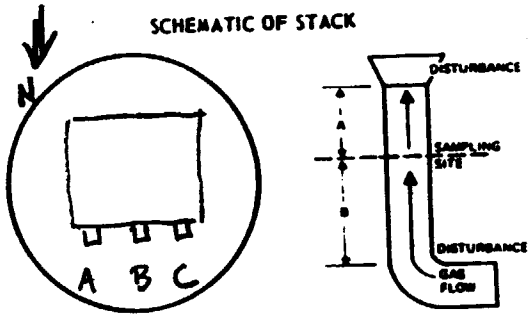
Environmental
Technology &
Engineering Corp.

NP - NH

PARTICULATE FIELD DATA

γ = 0.799
Cp = 0.85 } 4.19.90

SCHEMATIC OF STACK



CROSS SECTION

PLANT: Miller
DATE: 6-6-90
LOCATION: Milwaukee
OPERATOR:
STACK NO.: Smelter
RUN NO.: 1
SAMPLE BOX NO.:
METER BOX NO.: 1

AMBIENT TEMPERATURE: 60
BAROMETRIC PRESSURE: 29.1
ASSUMED MOISTURE, %: SAT 10%
PROBE LENGTH, in.: 52
NOZZLE DIAMETER, in.: 3/16
STACK DIAMETER, in.: 42 x 30 1/2
PROBE HEATER SETTING:
HEATER BOX SETTING:

METER ΔH: 1.726
C FACTOR:
PROCESS WEIGHT RATE:

ORSAT RESULTS
CO_2
O_2
CO
N_2

Pre Leak

5 min/pt

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 (V_m), ft^3	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 fps
C 1	8:50		120	1.50	1.50		3008.00		65				
2	5		120	1.80	1.80		11.6		66				
3	9:00		120	1.90	1.90		15.6		68				
4	5		120	1.80	1.80		19.6		70				
A 5	13		115	1.90	1.90		23.5		72				
6	18		120	2.10	2.10		27.4		74				
7	23		120	2.25	2.25		31.6		76				
8	28		120	1.90	1.90		35.8		78				
B 9	37		120	1.75	1.75		39.7		80				
10	42		120	1.90	1.90		43.5		82				
11	47		120	2.10	2.10		47.3		85				
12	52		120	2.25	2.25		51.4		88				
							55.55						
							47.55						

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing

DATE OF TEST 6-6-90

JOB NO. _____

TEST ENGINEER CJH

RUN NO. 1 STACK Shredder Cyclone

SAMPLE BOX 1 FILTER 1226 WASH BOTTLE —

BEAKERS: FH Ace 2 BH Trichl 2 BH Ace 4 BH H_2O 22

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	108	100	8
2	113	100	13
3	3	0	3
SIL GEL	650	640	10
		WATER TOTAL	34

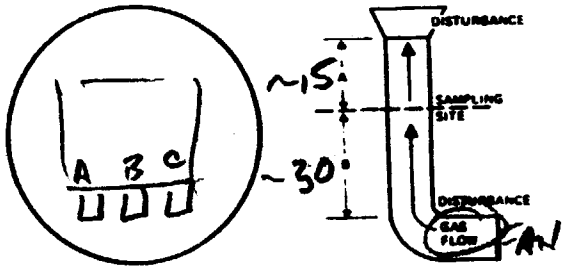
PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.8056	0.8042	0.0014
FH Wash	0.0006	98.2504	98.2386	0.0112
			FILTERABLE TOTAL	0.0126
Extract	0.0005	70.3071	70.2955	0.0111
Acetone	0.0006	95.3939	95.3882	0.0051
Water	0.0002	109.3572	109.3534	0.0081
			CONDENSIBLE TOTAL	0.0243
			PARTICULATE TOTAL	0.0369

Environmental Technology Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT: MILLER
DATE: 6-6-90
LOCATION: MINNAVILLE
OPERATOR: LWH
STACK NO.: SHREDDER 6000 EXCL
RUN NO.: 2
SAMPLE BOX NO.: 3
METER BOX NO.: 1

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.1
ASSUMED MOISTURE, %: 10%
PROBE LENGTH, in.:
NOZZLE DIAMETER, in.: 3/16
STACK DIAMETER, in.: 42 x 30 1/2
PROBE HEATER SETTING: 250
HEATER BOX SETTING: 250

METER ΔH@:
C FACTOR:
PROCESS WEIGHT RATE:

ORSAT RESULTS
CO_2 Air
O_2
CO
N_2

Pre Lk on
Post OK

SHRED #2 - ZIGZAG DAMPER CLOSED (TEST 1 WAS OPEN)

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 (V_m), ft^3	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 fps
C1	1040:00		120	1.50	1.50	1.50	3057.00		89			0	
2	45	-.50	125	1.75	1.75	1.75	60.5		88				
3	50		125	1.90	1.90	1.90	64.4		90				
4	55		125	1.80	1.80	1.80	68.3		89			0	
A 5	1102		125	1.95	1.95	1.95	72.2		90				
6	7		125	2.00	2.00	2.00	76.1		90				
7	12		125	2.20	2.20	2.20	80.1		92			0	
8	17		125	1.95	1.95	1.95	84.3		94				
B 9	23	-.70	125	1.85	1.85	1.85	88.3		96			0	
10	28		125	2.00	2.00	2.00	92.0		98				
11	33		125	2.20	2.20	2.20	96.0		99			0	
12	38		125	2.10	2.10	2.10	3100.2		99				
							9.22						

47.22

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: MILLER COMPRESSING	Date: 6-6-90
Location: SHREDDER SITE	FID Number:
City, State, Zip Code:	Observer Certification Date: 4-17-90
Discharge Location:	Control Device: SCRUBBER
Height of Discharge Above Ground:	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	1045		1145
Observer Location / Distance to Discharge	~ 50 YD	→	
Direction from Discharge	E - SE	→	
Height of Observation Point in Relation to Discharge	SAME	→	
Plume Description (Color, Length, etc.)	WHITE ~ 30'	→	
Plume Background Description	ROOF/ CYCLONE	→	
Weather Conditions / Wind Direction	S - SW	→	
Wind Speed	~5	→	
Ambient Temperature	70	→	
Sky Conditions (clear, overcast, % clouds, etc.)	M. CLOUDY	→	

Describe Point in Plume at Which Opacity was Determined
~10 FT ABOVE STACK

Remarks:

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

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start – End	Opacity Sum	Opacity Average

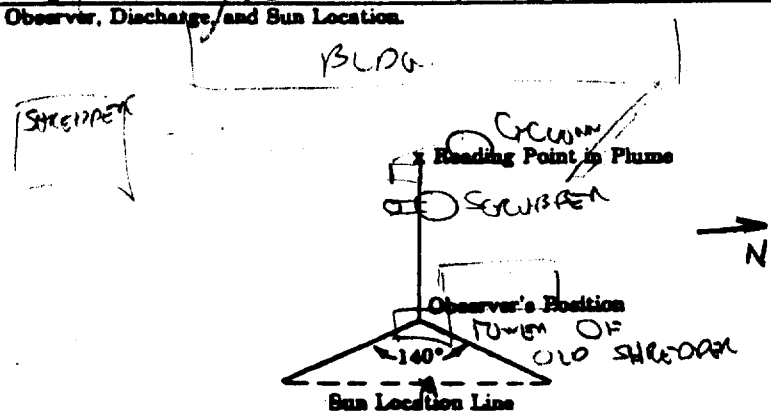
Allowable Source Opacity

RUN #2

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing

DATE OF TEST 6-6-90

JOB NO.

TEST ENGINEER LJH

RUN NO. 2

STACK Shredder Cyclone

SAMPLE BOX 3

FILTER 1228

WASH BOTTLE —

BEAKERS: FH Ace 23 BH Trichl 10 BH Ace 24 BH H_2O 30

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	121	100	21
2	103	100	3
3	3	0	3
SIC GEL	635	622	13
		WATER TOTAL	40

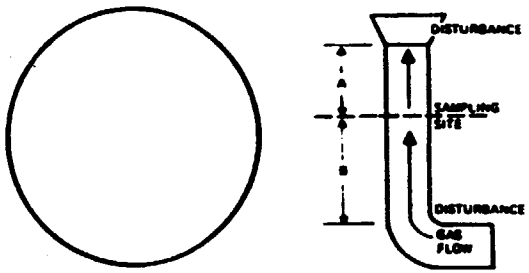
PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.7963	0.7908	0.0055
FH Wash	0.0006	94.3545	94.3457	0.0082
			FILTERABLE TOTAL	0.0137
Extract	0.0005	67.4872	67.4[illegible]0	0.0167
Acetone	0.0006	99.0527	99.0426	0.0095
Water	0.0002	105.6050	105.6019	0.0066
			CONDENSIBLE TOTAL	0.0328
			PARTICULATE TOTAL	0.0465

Environmental
Technology &
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT Miller Comp
DATE 6-6-90
LOCATION
OPERATOR MJB
STACK NO. 6000 Cycl Shred
RUN NO. 3
SAMPLE BOX NO. 4
METER BOX NO. 1

AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE 29.1
ASSUMED MOISTURE, % 10%
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 3/16
STACK DIAMETER, in. 42 x 30 1/2
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

γ = .999
METER ΔH@ 1.729 (4/19/90)
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 A
O_2 1
CO
N_2 R

PRE-CK OK
POST CK OK

5/pt

SHRED NO. 1

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 (V_m), ft^3	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 fps
1	12:25		120	1.6		1.6		3105.00		88				
2			120	1.8		1.8		08.6		88				
3			125	1.85		1.85		12.5		88				
4			130	1.80		1.80		16.4		88				
5	11:30		130	1.80		1.80		20.2		90				
6			130	2.10		2.10		24.1		90				
7			130	2.25		2.25		28.2		90				
8			130	1.90		1.90		32.4		92				
9	09 00		130	1.80		1.80		36.2		94				
10			130	1.95		1.95		40.0		96				
11			130	2.00		2.00		43.9		98				
12			130	2.00		2.00		47.8		98				
								52.0						
								(47.00)						

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing

DATE OF TEST 6-6-90

TEST ENGINEER VJH

JOB NO. [redacted]

RUN NO. 3 STACK Shelder

SAMPLE BOX 4 FILTER 1229 WASH BOTTLE —

BEAKERS: FH Ace 5 BH Trichl 12 BH Ace 16 BH H_2O 4

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	132	100	32
2	109	100	9
3	1	0	1
SIL GEL	663	652	11
		WATER TOTAL	53

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.7972	0.7907	0.0065
FH Wash	0.0006	96.4405	96.4360	0.0039
			FILTERABLE TOTAL	0.0104
Extract	0.0005	68.6638	68.6518	0.0115
Acetone	0.0006	96.0807	96.0754	0.0047
Water	0.0002	107.9239	107.9237	0.0000
			CONDENSIBLE TOTAL	0.0162

0.0266

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-6-90

JOB NO. _____ TEST ENGINEER CJH

RUN NO. 3 STACK Shredder

SAMPLE BOX 4 FILTER 1229 WASH BOTTLE —

BEAKERS: FH Ace 5 BH Trichl 12 BH Ace 16 BH H_2O 4

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	132	100	32
2	109	100	9
3	1	0	1
SIL GEL	663	652	11
		WATER TOTAL	53

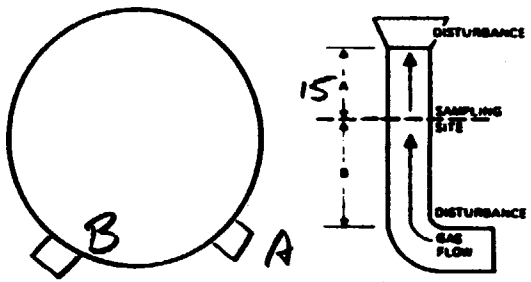
PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.7972	0.7907	0.0065
FH Wash	0.0006	96.4405	96.4360	0.0039
			FILTERABLE TOTAL	0.0104
Extract	0.0005	68.6638	68.6518	0.0115
Acetone	0.0006	96.0807	96.0754	0.0047
Water	0.0002	107.9239	107.9237	0.0000
			CONDENSIBLE TOTAL	0.0162
			PARTICULATE TOTAL	0.0266

Environmental
Technology &
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT Miller Compressing
DATE 6-7-90
LOCATION Milwaukee
OPERATOR MJH
STACK NO. United
RUN NO. 1
SAMPLE BOX NO. 1
METER BOX NO. 1

AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 8
PROBE LENGTH, in. 4' Q
NOZZLE DIAMETER, in. 7/16
STACK DIAMETER, in. 30
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

C_p = 0.00
γ = 0.999
METER $\Delta H_@$ 1.726
4-19-90

C FACTOR
PROCESS WEIGHT RATE 3000 #/HR

ORSAT RESULTS
CO_2 2.6
O_2 16.0
CO —
N_2 82.4

Pre Lkon
Pitot Lk ok
POST LK 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 (V_m), 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 fps
A 1	810:00		1000	.12		1.55	1.55	3174.00		83			0	
2	15		890	.14		1.80	1.80	7.5		85				
3	20		870	.15		1.95	1.95	81.2		87				
4	25		860	.15		1.95	1.95	85.0		91				
5	30	-.25	870	.12		1.55	1.55	89.1		96				
6	35		870	.10		1.30	1.30	92.6		100				
B 7	42		1040	.09		1.15	1.15	95.6		103				
8	47		880	.10		1.30	1.30	98.5		107			0	
9	52		860	.12		1.55	1.55	3201.9		111				
10	57		920	.10		1.30	1.30	5.0		112				
11	902		870	.08		1.05	1.05	7.9		114				
12	7		985	.08		1.05	1.05	10.8		118				
								13.62						

39.62

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: MILLER COMPRESSING	Date: 6-7-90
Location:	FID Number: UNITED FURNACE
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 4-17-90
Discharge Location: SAME	Control Device: AFTER BURNER
Height of Discharge Above Ground: ~ 80 FT.	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	0910		0910
Observer Location: Distance to Discharge	~ 30 FT.	→	→
Direction from Discharge	E-SE	→	→
Height of Observation Point in Relation to Discharge	- 40'	→	→
Plume Description (Color, Length, etc.)	CLEAR	→	→
Plume Background Description	BLUE SKY	→	→
Weather Conditions: Wind Direction	S	→	→
Wind Speed	~ 5	→	→
Ambient Temperature	70	→	→
Sky Conditions (clear, overcast, % clouds, etc.)	CLEAR	→	→

Describe Point in Plume at Which Opacity was Determined
~ 10 ABOVE STACK

Remarks:

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	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	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	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	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	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	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Summary of Average Opacity
(From Computer Program)

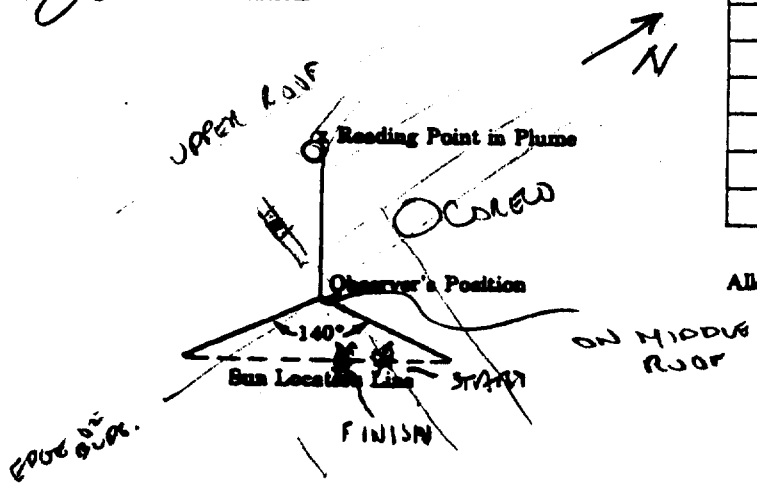
Set Number	Time Start — End	Opacity Sum	Opacity Average

RUN #1

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-7-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 1 STACK United Furnace

SAMPLE BOX 1 FILTER 1231 WASH BOTTLE —

BEAKERS: FH Ace 1 BH Trichl 5 BH Ace 2FH BH H_2O 27

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	119	100	19
2	110	100	10
3	4	0	4
SIL GEL	658	650	8
		WATER TOTAL	41

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		.7929	0.7879	0.0050
FH Wash	0.0006	96.6200	96.6070	0.0124
			FILTERABLE TOTAL	0.0174
Extract	0.0005	71.7300	71.7295	0.0000
Acetone	0.0006	97.6917	97.6879	0.0032
Water	0.0002	109.3553	109.3532	0.0044
			CONDENSIBLE TOTAL	0.0076
			PARTICULATE TOTAL	0.0250

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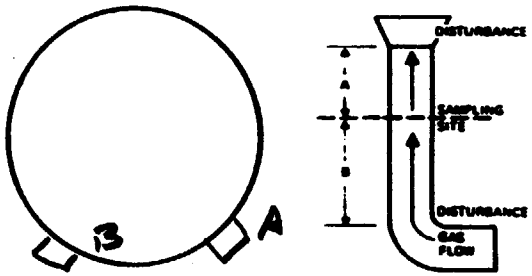
PARTICULATE FIELD DATA

$\gamma = .999$

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMPR
DATE 6/7
LOCATION MILW
OPERATOR MJH
STACK NO. UNITED
RUN NO. 2
SAMPLE BOX NO. 2
METER BOX NO. 1

AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 8
PROBE LENGTH, in. 4' Q
NOZZLE DIAMETER, in. 7/16
STACK DIAMETER, in. 30
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH@ 1.726
C FACTOR
PROCESS WEIGHT RATE 3000 #/HR

ORSAT RESULTS
CO_2 2.2
O_2 16.8
CO —
N_2 81.0

PROBE OK
PITOT OK
POST 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 (V_m), ft^3	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 fps
A 1	930:00		860	.13		1.70	1.70	3215.00		117			0	
2	35		870	.15		1.95	1.95	18.5		118				
3	40		860	.16		2.05	2.05	22.3		119				
4	45	.23	1100	.17		2.15	2.15	26.1		120				
5	50		870	.13		1.70	1.70	30.0		120				
6	55		880	.10		1.30	1.30	33.3		120				
B 1	02		1120	.11		1.40		36.3		122				
2	07		1040	.14		1.80		39.5		122				
3	12		1060	.16		2.05		43.0		122				
4	17		1000	.16		2.05		46.7		124				
5	22		860	.15		1.95		50.5		126				
6	27		900	.09		1.20		54.3		128				
								57.13						

42.13

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: MILLER	Date: 6-7-90
Location:	FID Number: UNITED FURNACE
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 4-17-90
Discharge Location:	Control Device: AFTERBURNER
Height of Discharge Above Ground:	Steam Plume? Yes / No (circled) Attached / Detached

	Initial		Final
Time of Observation	0900		1020
Observer Location: Distance to Discharge	~30 YD		
Direction from Discharge	SE		
Height of Observation Point in Relation to Discharge	-30'		
Plume Description (Color, Length, etc.)	CLEAR HEAT WAVES		
Plume Background Description	BLUE SKY		
Weather Conditions: Wind Direction	S-SE		
Wind Speed	5-10		
Ambient Temperature	70		
Sky Conditions (clear, overcast, % clouds, etc.)	CLEAR		

Describe Point in Plume at Which Opacity was Determined
~1 D FROM TOP

Remarks:

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30				
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	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	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				

Summary of Average Opacity
(From Computer Program)

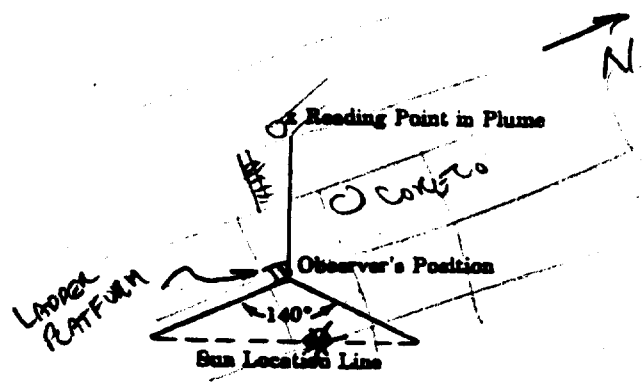
Set Number	Time Start – End	Opacity Sum	Opacity Average

Run #2

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-7-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 2 STACK United Furnace

SAMPLE BOX 2 FILTER 1227 WASH BOTTLE —

BEAKERS: FH Ace 3 BH Trichl 6 BH Ace 7 BH H_2O 28

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	128	100	28
2	110	100	10
3	2	0	2
SIL GEL	625	618	7
		WATER TOTAL	47

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.8013	0.7974	0.0039
FH Wash	0.0006	102.6147	102.5970	0.0171
			FILTERABLE TOTAL	0.0210
Extract	0.0005	69.6564	69.6559	0.0000
Acetone	0.0006	93.8953	93.8927	0.0020
Water	0.0002	109.1378	109.1373	0.0007
			CONDENSIBLE TOTAL	0.0027
			PARTICULATE TOTAL	0.0237

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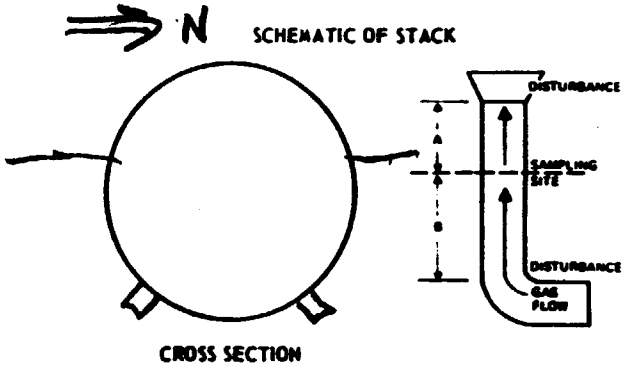
PARTICULATE FIELD DATA



PLANT MILLER COMP
DATE 6-7-90
LOCATION MILWAUKEE
OPERATOR MJH
STACK NO. UNITED
RUN NO. 3
SAMPLE BOX NO. 3
METER BOX NO. 1

AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 6
PROBE LENGTH, in. 3 ft
NOZZLE DIAMETER, in. 7/16
STACK DIAMETER, in. 30"
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

γ = .999
METER ΔH 1.726
C FACTOR
PROCESS WEIGHT RATE 3000 #/HR INPUT

ORSAT RESULTS
CO_2 2.5
O_2 16.5
CO –
N_2 81.0

PRE LK OK
PITOT OK
POST LK 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 (V_m), 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 fps
A 1	1045:00		860	.12		1.55	1.55	3258.00		128			0	
2	50		1040	.14		1.80	1.80	61.4		128				
3	55		940	.17		2.15	2.15	64.8		127				
4	1100	-.23	870	.18		2.30	2.30	68.7		127				
5	5		840	.12		1.55	1.55	72.7		127				
6	10		1025	.08		1.05	1.05	76.0		126			0	
B 7	16		890	.14		1.80	1.80	78.8		127				
8	21		850	.15		1.90	1.90	82.4		127				
9	26		1080	.16		2.00	2.00	86.1		128				
10	31	-.23	1110	.15		1.90	1.90	89.8		128				
11	36		940	.10		1.30	1.30	93.4		128			0	
12	41		840	.10		1.30	1.30	96.5		128				
								99.63						
									41.63					

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: ILLER COMP.	Date: 6-7-90
Location: MAIN YARD	FID Number: UNITED FURNACE
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 4-17-90
Discharge Location:	Control Device: AFTERBURNER
Height of Discharge Above Ground: ~ 80	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	11:00		11:29:45
Observer Location: Distance to Discharge	100 ft		
Direction from Discharge	SE		
Height of Observation Point in Relation to Discharge	-30 ft		
Plume Description (Color, Length, etc.)	—		
Plume Background Description	BLUE SKY		
Weather Conditions: Wind Direction	ESE		
Wind Speed	10		
Ambient Temperature	80		
Sky Conditions (clear, overcast, % clouds, etc.)	CLEAR		

Describe Point in Plume at Which Opacity was Determined
+ 1 DIA

Remarks:

TEST
RUN 3

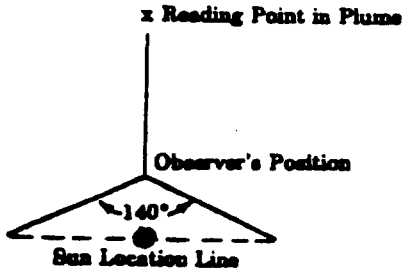
Signature of Observer: Lowell J. Huenink	Name of Observer (Please print): LOWELL HUENINK

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	0	0	0	0	30				
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	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	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-7-96

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 3 STACK United Furnace

SAMPLE BOX 3 FILTER 1232 WASH BOTTLE —

BEAKERS: FH Ace 9 BH Trichl 8 BH Ace 19 BH H_2O 30

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	140	100	40
2	110	100	10
3	1	0	1
SIL GEL	638	635	3
		WATER TOTAL	54

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.7907	0.7858	0.0049
FH Wash	0.0006	95.7876	95.7653	0.0217
			FILTERABLE TOTAL	0.0266
Extract	0.0005	68.8019	68.8014	0.0000
Acetone	0.0006	95.5313	95.5289	0.0018
Water	0.0002	105.6013	105.6009	0.0005
			CONDENSIBLE TOTAL	0.0023
			PARTICULATE TOTAL	0.0289

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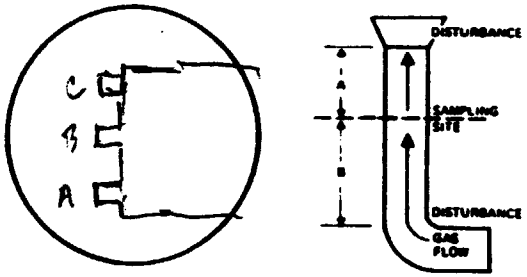
PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT: MILLER
DATE: 6-8-90
LOCATION: MILWAUKEE
OPERATOR: JJH
STACK NO: CORECO BAG HOUSE
RUN NO.: 1
SAMPLE BOX NO.: 4
METER BOX NO.: 2

AMBIENT TEMPERATURE: 65
BAROMETRIC PRESSURE:
ASSUMED MOISTURE, %: 5
PROBE LENGTH, in.: 2 ft
NOZZLE DIAMETER, in.: 7/16
STACK DIAMETER, in.: 20½ x 21½
PROBE HEATER SETTING:
HEATER BOX SETTING:

METER ΔH:
C FACTOR:
PROCESS WEIGHT RATE:

ORSAT RESULTS
CO_2
O_2
CO
N_2

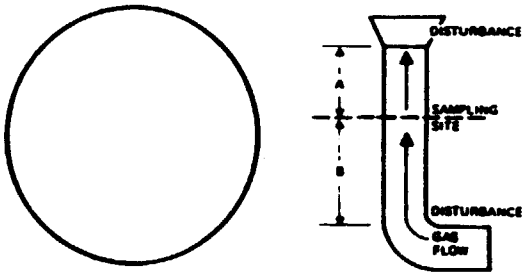
LK CK OK
T 883

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 (V_m), ft^3	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 fps
1	9:10:30		130	.070	.96		3035.00		66				
2		0.02	134	.065	.88		39.30		66				
3			134	.065	.88		43.4		68				
4			136	.065	.88		47.5		70				
5	32		136	.075	1.03		51.5		72				
6	37		136	.075	1.03		55.9		76				
7	42		136	.075	1.03		60.3		78				
8			135	.070	.96		64.6		80				
9	53:30		133	.075	1.03		69.0		84				
10	8:30		134	.075	1.03		73.2		88				
11	03:30		134	.075	1.03		77.5		90				
12	04:30		132	.070	.96		81.9		94				
							86.00						
							51.00						

Environmental
'ech gy &
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMP
DATE 6-8-90
LOCATION MILWAUKEE
OPERATOR JH
STACK NO. CORECO BAGHOUSE
RUN NO. 2
SAMPLE BOX NO. 4 B
METER BOX NO. 2

AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 5
PROBE LENGTH, in. 2 ft
NOZZLE DIAMETER, in. 7/16
STACK DIAMETER, in. 20½ x 21½
PROBE HEATER SETTING
HEATER BOX SETTING

METER ΔH@
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 A
O_2 M
CO B
N_2

LK CK OK
T 884

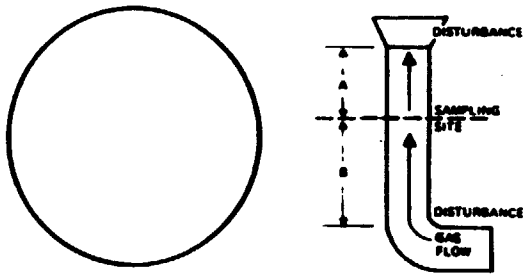
TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s) ($\sqrt{\Delta P_s}$)		PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in., H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (V_m), ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °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 fps
1	10:31		132	.075		1.03		3087.00		98				
2			132	.075		1.03		91.3		100				
3			132	.075		1.03		95.6		100				
4		0.02	133	.070		.96		99.9		100				
5			134	.075		1.03		04.1		100				
6			134	.075		1.03		08.3		102				
7			134	.075		1.03		12.5		104				
8			148	.070		.96		16.8		106				
9	11:14 00		154	.070		.96		21.8		110				
10			154	.065		.88		25.0		112				
11			152	.065		.88		29.1		114				
12			150	.065		.88		32.7		116				
								36.52						

49.52

Environmental
Technology &
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMP
DATE 6-8-90
LOCATION MILWAUKEE
OPERATOR SJH
STACK NO. CORECO BAGHOUSE
RUN NO. 3
SAMPLE BOX NO. 4a
METER BOX NO. 2

AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 5
PROBE LENGTH, in. 2 ft
NOZZLE DIAMETER, in. 7/16
STACK DIAMETER, in. 20 1/2 x 21 1/2
PROBE HEATER SETTING
HEATER BOX SETTING

METER ΔH@
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2
O_2
CO
N_2

LK CK OK
T = 885

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 (V_m), ft^3	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 fps
1	11:50:00		154	070		.96		3137.00		112				
2			152	065		.88		41.1		114				
3		0.02	152	065		.88		45.0		114				
4			152	065		.88		48.9		116				
5			152	075		1.03		52.8		118				
6			152	075		1.03		57.1		118				
7			150	075		1.03		61.1		120				
8			154	070		0.96		65.3		122				
9			154	075		1.03		69.3		122				
10			154	075		1.03		73.5		122				
11			152	075		1.03		77.6		124				
12			148	070		1.03		81.7		126				
								85.88						

48.88

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-8-90

JOB NO. _____ TEST ENGINEER LJH

RUN NO. 1-3 STACK Coreco Baghouse

SAMPLE BOX 4 FILTER T-883, 884, 885 WASH BOTTLE —

BEAKERS: FH Ace _____ BH Trichl _____ BH Ace _____ BH H_2O _____

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	125	100	25
2	105	100	5
3	1	0	1
SIL GEL	680	663	17
		WATER TOTAL	48

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter				
FH Wash				
		FILTERABLE TOTAL		
Extract	T-883			
Acetone	T-884			
Water	T-885			
		CONDENSIBLE TOTAL		
		PARTICULATE TOTAL		

SEE ATTACHED

Miller Compressing

Coreco Baghouse 6-8-90

Ft1 Acetone

					Total
#1	93.8930	(Blank .0006)	T-883	1.1457	
(7)	93.8912			1.1454	
.0039	.0012			.0003	.0015
#2	95.7669		T-884	1.1914	
(9)	95.7649			1.1914	
.0038	.0014			.0000	.0014
#3	94.3476		T-885	1.2059	
(23)	94.3467			1.2050	
.0035	.0003			.0009	.0012

	Back ½		Extract (.0005)		H_2O (231) (.0002)	
(24)	99.0464	(12)	68.6568	(A)	107.9240	
	99.0443		68.6521		107.9230	
	.0015		0.0047		.0014	TOT
1	.0005		.0014		.0005	.002
2	.0005		.0014		.0005	.002
3	.0005		.0014		.0004	.002

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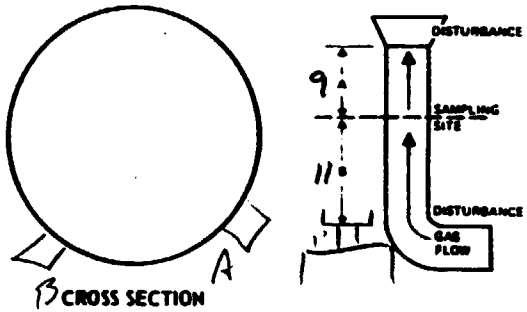
Engineering Corp.

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT Miller
DATE 6-8-90
LOCATION Milwaukee
OPERATOR WJP
STACK NO. Coreco
RUN NO. 1
SAMPLE BOX NO. 1
METER BOX NO. 1

AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
ASSUMED MOISTURE, %
PROBE LENGTH, in.
NOZZLE DIAMETER, in. 3/8
STACK DIAMETER, in. 36
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH 1.726
C FACTOR .95
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 1.0
O_2 8.0
CO
N_2

Pre Lkcm
Post Lkcm
POST OK

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (SYSC T_s), °F BOX	VELOCITY HEAD (ΔP_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	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge	VELOCITY fps	
A 1	0910:00		505 / 750	.50		4.75	4.75	3316.00		69			3		1.0
2	2½		525 / 740	.46		4.40	4.40	19.1		70					2.4
3	5	-.20	525 / 720	.38		3.65	3.65	22.1		70					8.2
4	7½		500 / 700	.32		3.15	3.15	24.8		70			2		6.4
5	20		500 / 640	.26		2.50	2.50	27.3		71					9.0
6	2½	-.20	500 / 570	.20		1.95	1.95	29.5		72					12.8
7	5		490 / 550	.15		1.50	1.50	31.5		73			1		23.2
8	7½		510 / 540	.19		1.85	1.85	33.3		75					27.0
9	30		500 / 570	.25		2.40	2.40	35.3	54.85	77					29.6
10	2½	-.15	515 / 590	.21		2.05	2.05	37.5		78					31.8
11	5		490 / 60	.24		2.35	2.35	39.5		80			2		33.6
12	7½		485 / 60	.14		1.40	1.40	41.7		81					35.0
B 1	42½		640 / 540	.32		3.10	3.10	43.4		84					
2	5		670 / 530	.32		3.10	3.10	45.8		87			2		
3	7½		670 / 530	.34		3.30	3.30	48.3		88					
4	50	-.20	670 / 530	.29		2.80	2.80	50.8		90					
5	2½		680 / 500	.30		2.90	2.90	53.2		90					
6	5		690 / 520	.24		2.35	2.35	55.5		92					
7	7½		660 / 700	.16		1.60	1.60	57.6		94					
8	1000		680 / 740	.18		1.75	1.75	59.4		96					
9	2½	-.20	650 / 750	.24		2.35	2.35	61.2		97					
10	5		690 / 720	.32		3.10	3.10	63.3		98					
11	7½		700 / 700	.39		3.75	3.75	65.7		99					
12	10		680 / 60	.35		3.40	3.40	68.3		100					

70.85

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: MILLER COMPRESSING	Date: 6-8-90
Location:	FID Number: CORELO AFTERBURNER
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 6-17-90
Discharge Location: SAME	Control Device: AFTERBURNER
Height of Discharge Above Ground: ~ 20'	Steam Plume? Attached Yes Detached (No)

	Initial		Final
Time of Observation	0910		0940
Observer Location: Distance to Discharge	~ 15 YD	→	
Direction from Discharge	E · SE	→	
Height of Observation Point in Relation to Discharge	+ 5'	→	
Plume Description (Color, Length, etc.)	WHITE BEAM ~20 FT HIGH	→	
Plume Background Description	DARK BLDG.	→	
Weather Conditions: Wind Direction	S-SW	→	
Wind Speed	~ 5	→	
Ambient Temperature	65	→	
Sky Conditions (clear, overcast, % clouds, etc.)	OVERCAST	→	

Describe Point in Plume at Which Opacity was Determined
~ 10' ABOVE DISCHARGE

Remarks:

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

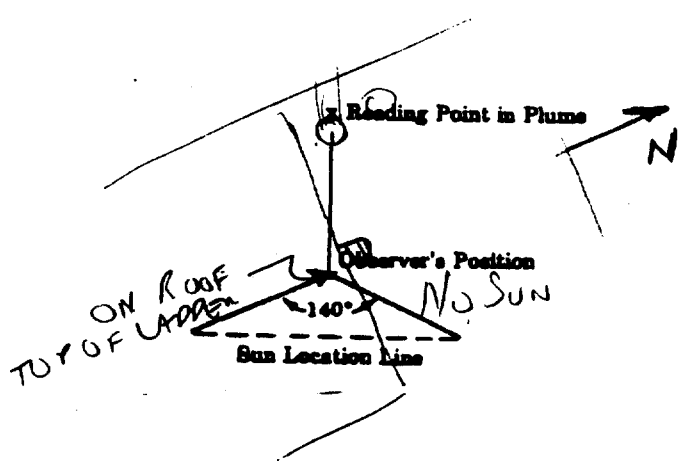
Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average

RUN #1

Signature of Observer: [signature] Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-8-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 1 STACK Corsco

SAMPLE BOX 1 FILTER 1230 WASH BOTTLE —

BEAKERS: FH Ace 2 BH Trichl 3 BH Ace 4 BH H_2O 30

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	92	100	-8
2	120	100	20
3	9	0	9
SIL GEL	664	650	14
		WATER TOTAL	35

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.8394	0.7959	0.0435
FH Wash	0.0006	98.3832	98.2390	0.1436
			FILTERABLE TOTAL	0.1871
Extract	0.0005	70.3024	70.2950	0.0069
Acetone	0.0006	95.4021	95.3882	0.0133
Water	0.0002	105.6069	105.6013	0.0119
			CONDENSIBLE TOTAL	0.0321
			PARTICULATE TOTAL	0.2192

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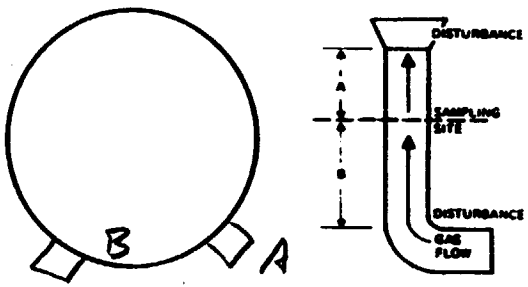
Engineering Corp.

185 -> 1.75 (RESET)

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMPR
DATE 6-8-90
LOCATION MILW
OPERATOR MJH
STACK NO. CORECO CYCLONE AFTERBURNER
RUN NO. 2
SAMPLE BOX NO. 2
METER BOX NO. 1

AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
ASSUMED MOISTURE, %
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 3/8 (1230)
STACK DIAMETER, in. 36
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH@ 1.726
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 1.0
O_2 18.0
CO
N_2 81.0

PRELK OK
PITOT OK
POST LK OK

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	VELOCITY HEAD ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O DESIRED	GAS SAMPLE VOLUME (V_m), ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge	VELOCITY fps
A1	1030:00		780	.54		5.00	5.00	3372.00		101			2	
2	2 1/2	-.26	760	.48		4.45	4.45	5.0		102				
3	5		730	.39		3.70	3.70	7.9		102			2	
4	7 1/2		720	.37		3.45	3.45	0.5		103				
5	10	-.24	700	.30		2.75	2.75	83.0		103			1	
6	2 1/2		640	.23		2.15	2.15	5.3		103				
7	5		560	.16		1.50	1.50	7.3		104				
8	7 1/2	-.18	560	.18		1.70	1.70	9.0		105				
9	50		600	.23		2.15	2.15	90.7	52.47	106			1	
10	2 1/2		600	.27		2.50	2.50	2.7		107				
11	5	-.16	(460) 60	.24		2.25	2.25	4.9		108				
12	7 1/2		—	.18		1.70	1.70	6.9		109			1	
B 1	1101	-.20	550	.28		2.60	2.60	8.7		110				
2	3 1/2		550	.31		2.90	2.90	3400.9		110				
3	6		550	.32		3.00	3.00	3.2		110			1	
4	8 1/2	-.23	540	.29		2.70	2.70	5.5		110				
5	1111		540	.28		2.60	2.60	7.8		111				
6	3 1/2		560	.22		2.05	2.05	10.0		111				
7	6	-.20	700	.19		1.80	1.80	11.9		113			1	
8	8 1/2		740	.17		1.65	1.65	13.7		114				
9	21		740	.22		2.05	2.05	15.4		115				
10	3 1/2	-.24	760	.27		2.50	2.50	17.4		116			1	
11	6		760	.40		3.70	3.70	19.5		117				
12	8 1/2		740	.36		3.40	3.40	22.1		118			1	

24.47

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: MILLER COMPRESSING	Date: 6-8-90
Location	FID Number: CORELCO AFTERBURNER
City, State, Zip Code: MILWAUKEE	Observer Certification Date: 4-17-90
Discharge Location	Control Device: AFTERBURNER
Height of Discharge Above Ground: ~20'	Steam Plume? Attached Yes Detached No

	Initial		Final
Time of Observation	1035		1105
Observer Location: Distance to Discharge	~15 YD	→	→
Direction from Discharge	E-SE	→	→
Height of Observation Point in Relation to Discharge	+5'	→	→
Plume Description (Color, Length, etc.)	WHITE BROWN ~20' RISE	→	→
Plume Background Description	DARK ROOF	→	—
Weather Conditions: Wind Direction	LIGHT VARIABLE		S-SW
Wind Speed	~5		~5
Ambient Temperature	70	→	→
Sky Conditions (clear, overcast, % clouds, etc.)	OVERCAST		M. CLOUDY ~80% CLOUDS

Describe Point in Plume at Which Opacity was Determined: ~10' ABOVE DISCHARGE

Remarks:

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

Summary of Average Opacity
(From Computer Program)

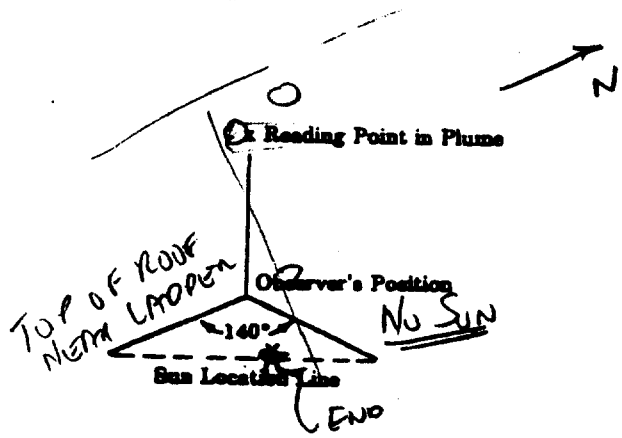
Set Number	Time: Start — End	Opacity: Sum	Opacity: Average

RUN #2

Signature of Observer: [signature]

Name of Observer (Please print): WILLIAM J. DICK

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity

LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-8-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 2 STACK Corsco

SAMPLE BOX 2 FILTER 1235 WASH BOTTLE —

BEAKERS: FH Ace 5 BH Trichl ____ BH Ace 16 BH H_2O 27

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	110	100	10
2	115	100	15
3	3	0	3
SIL GEL	685	670	15
		WATER TOTAL	43

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.8498	0.7991	0.0507
FH Wash	0.0006	96.5801	96.4360	0.1435
			FILTERABLE TOTAL	0.1942
Extract	0.0005	71.7280	71.7285	0.0000
Acetone	0.0006	96.0819	96.0754	0.0059
Water	0.0002	109.3565	109.3537	0.0059
			CONDENSIBLE TOTAL	0.0118

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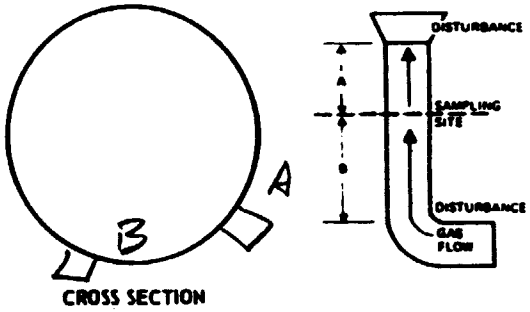
Technology & Engineering Corp.

.185 → 1.75

PARTICULATE FIELD DATA

SCHEMATIC OF STACK



CROSS SECTION

PLANT MILLER COMPR
DATE 6-8-90
LOCATION MILW
OPERATOR MJH
STACK NO. COR. CYCL AFTERBURNER
RUN NO. 3
SAMPLE BOX NO. 3
METER BOX NO. 1

AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE
ASSUMED MOISTURE, % 5%
PROBE LENGTH, in. 3'
NOZZLE DIAMETER, in. 3/8
STACK DIAMETER, in. 36
PROBE HEATER SETTING 250
HEATER BOX SETTING 250

METER ΔH 1.726
C FACTOR
PROCESS WEIGHT RATE

ORSAT RESULTS
CO_2 1.0
O_2 18.0
CO
N_2 81.0

PRE LK OK
PITOT OK
POST LK

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMPERATURE (T_s), °F	VELOCITY HEAD (ΔP_s)	VELOCITY HEAD ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O DESIRED	GAS SAMPLE VOLUME (V_m), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET ($T_{m_{IN}}$), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET ($T_{m_{OUT}}$), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge	VELOCITY fps
A 1	1147:30		740	.52		4.80	4.80	3426.00		116			2	
2	50	-.27	740	.47		4.35	4.35	28.9		116				
3	2½		730	.40		3.70	3.70	31.8		117				
4	5		710	.33		3.10	3.10	34.4		117			1	
5	7½	-.23	700	.29		2.70	2.70	36.7		117				
6	1200		630	.22		2.00	2.00	38.9		117			1	
7	2½		530	.18		1.70	1.70	40.8		117				
8	5	-.18	580	.19		1.80	1.80	42.6		118				
9	7½		610	.21		1.95	1.95	44.4		118			1	
10	10		570	.24		2.25	2.25	46.3		119				
11	12½	-.17	610	.25		2.35	2.35	48.3		119				
12	15		560	.23		2.15	2.15	50.3		119			1	
B 1	19	-.20	540	.27		2.50	2.50	52.3	51.87	120				
2	21½		550	.30		2.80	2.80	54.4		120				
3	24		540	.31		2.90	2.90	56.6		120			1	
4	26½	-.25	540	.27		2.50	2.50	58.9		120				
5	29		540	.25		2.35	2.35	61.0		120				
6	31½		560	.22		2.00	2.00	63.1		121			1	
7	34	-.19	670	.16		1.50	1.50	64.9		121				
8	36½		720	.22		2.00	2.00	66.6		122				
9	39		740	.26		2.40	2.40	68.4		123			1	
10	41½	-.23	760	.32		3.00	3.00	70.5		123				
11	44		740	.41		3.85	3.85	72.8		124				
12	46½		680	.37		3.50	3.50	75.4		124				

77.87

SMOKE FORM
Form 4500-29 Rev. 6-85

Name of Company: Miller Compressing	Date: 6-8-90
Location:	FID Number: North Corelo Afterburner
City, State, Zip Code: Milwaukee	Observer Certification Date: 4-17-90
Discharge Location: Milwaukee	Control Device: Afterburner
Height of Discharge Above Ground: ~20'	Steam Plume? Attached / Yes / Detached / No

	Initial		Final
Time of Observation	1150		1220
Observer Location: Distance to Discharge	~15 yd	→	
Direction from Discharge	E-SE	→	
Height of Observation Point in Relation to Discharge	+5'	→	
Plume Description (Color, Length, etc.)	White Brown ~20' Rise	→	
Plume Background Description	Park Roof	→	
Weather Conditions: Wind Direction	SW	→	
Wind Speed	~5	→	
Ambient Temperature	75	→	
Sky Conditions (clear, overcast, % clouds, etc.)	M. Cloudy ~80% Clouds		Pt. Cloudy ~50%

Describe Point in Plume at Which Opacity was Determined
~10' Above Discharge

Remarks:

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

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average

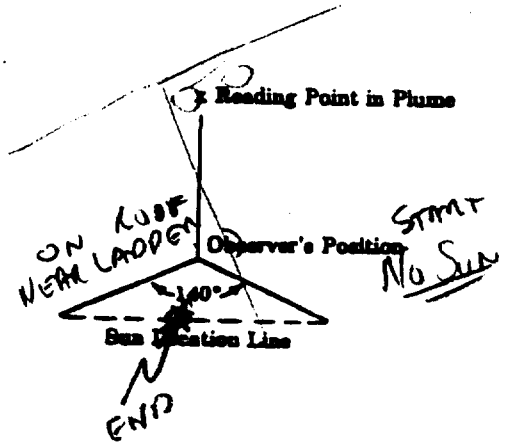
Allowable Source Opacity

Sun #3

Signature of Observer: [signature]

Name of Observer (Please print): William J. Dick

Sketch of Observer, Discharge, and Sun Location.



LABORATORY DATA SHEET
PARTICULATE & WATER COLLECTED

JOB NAME Miller Compressing DATE OF TEST 6-8-90

JOB NO. _____ TEST ENGINEER MJH

RUN NO. 3 STACK Coreco

SAMPLE BOX 3 FILTER 1236 WASH BOTTLE —

BEAKERS: FH Ace 21 BH Trichl 6 BH Ace 22 BH H_2O 28

WATER COLLECTED

Impinger No.	Final Wt. - g	Initial Wt. - g	Collected - g
1	115	100	15
2	110	100	10
3	5	0	5
SIL GEL	699	680	19
		WATER TOTAL	49

PARTICULATE COLLECTED

	Blank	Final Wt.	Tare Wt.	Collected - g
Filter		0.8439	0.7969	0.0470
FH Wash	0.0006	97.5439	97.3769	0.1664
			FILTERABLE TOTAL	0.2134
Extract	0.0005	69.6555	69.6535	0.0015
Acetone	0.0006	93.3132	93.3098	0.0028
Water	0.0002	109.1387	109.1369	0.0037
			CONDENSIBLE TOTAL	0.0080
			PARTICULATE TOTAL	0.2214

APPENDIX C

SAMPLE CALCULATIONS

SAMPLE CALCULATION

BAROMETRIC PRESSURE, in Hg (Pb) = 29.200
STACK PRESSURE, in Hg (Pb + Pg/13.6) = 29.178
TIP DIAMETER, in (An = PI*D^2/576) = .2450
STACK AREA, sq ft (A) = 10.560
SAMPLING TIME PER POINT, min = 2.50
NUMBER OF POINTS = 24
GAS METER VOLUME, acf (Vm) = 66.06
WATER COLLECTED, ml (Vf - Vi) = 86.00
PARTICULATE COLLECTED, grams (Mn) = 0.0755
CO2 = 0.60 O2 = 21.00 CO = 0.00 N2 = 78.40
WET MOLECULAR WEIGHT, lb/mole (Ms) = 28.45

SAMPLING POINT	STACK TEMP deg F	PITOT DEL P inches	ORIFICE DEL H inches	GAS METER OUTLET T deg F	GAS VELOCITY fps
1	110	1.450	4.05	32	72.51
2	110	1.350	3.75	32	69.97
3	110	1.350	3.75	32	69.97
4	110	1.300	3.70	32	68.66
5	110	1.250	3.60	32	67.33
6	110	1.250	3.60	32	67.33
7	110	1.050	2.95	32	61.71
8	110	1.000	2.85	32	60.22
9	110	1.000	2.85	34	60.22
10	110	1.050	2.95	34	61.71
11	110	0.950	2.75	38	58.69
12	115	0.950	2.75	38	58.95
13	115	1.300	3.70	42	68.96
14	115	1.250	3.60	42	67.62
15	115	1.200	3.40	42	66.26
16	115	1.200	3.40	42	66.26
17	115	1.150	3.30	44	64.86
18	115	1.150	3.30	46	64.86
19	115	1.050	2.95	48	61.98
20	115	1.150	3.30	48	64.86
21	115	1.000	2.85	50	60.48
22	115	1.100	3.15	50	63.43
23	115	1.050	2.95	50	61.98
24	115	0.900	2.55	50	57.38
AVG VALUES	113		3.250	40	64.42

TOTAL GAS WITHDRAWN, scf = 69.39
DRY GAS WITHDRAWN, scf (Vmstd) = 65.35
WATER VAPOR WITHDRAWN, scf (Vwstd) = 4.05
PERCENT WATER VAPOR (%H2O) = 5.83
ACTUAL WET FLOW RATE, acfm = 40,819.39
STANDARD DRY FLOW RATE, scfm (Qs) = 34,558.69
PARTICULATE CONCENTRATION, grains/dscf (Cs) = 0.018
PARTICULATE EMISSION RATE, lb/hr (ER) = 5.325
PARTICULATE EMISSIONS, lb/1000 lb (EC) = 0.033
PERCENT OF ISOKINETIC SAMPLING (I) = 101.67

SAMPLE CALCULATIONS

1. **DRY MOLECULAR WEIGHT (Md)** lb/lb-mole

   Md = .44*% CO2 + .32*%O2 + .282*%N2 + .28*%CO

2. **WATER VAPOR PERCENT (%H2O)**

   Vw std = 0.04707*(Vf - Vi)

   where: Vw std = standard cubic feet of water vapor
   Vf = Final volume of impingers, ml
   Vi = Initial volume of impingers, ml

   %H2O = Vw std * 100/(Vm std + Vw std)

   where Vm std = standard cubic feet of gas sampled

3. **WET MOLECULAR WEIGHT (Ms)** lb/lb-mole

   Ms = Md*(1 - %H2O/100) + 18*%H2O/100

4. **STACK PRESSURE (Ps)** in. Hg

   Ps = Pb + Pg/13.6

   where: Pb = barometric pressure (uncorrected), in. Hg
   Pg = stack gauge pressure, in. H2O
   13.6 = specific gravity of mercury (Hg)

5. **AVERAGE STACK VELOCITY (Vs)** feet per second

   Vs = Kp*Cp* (DELP) Tsavg/(Ps*Ms)

   where: Kp = 85.49 unit conversion
   Cp = 0.85, pitot tube calibration factor
   DELP = square root of velocity head, in. H2O
   Tsavg = average stack temperature, deg R (460+F)
   Ps = stack pressure
   Ms = wet molecular weight

6. **STACK GAS FLOW RATE (Qs)** std cubic feet per minute

   Qs = 60*(1 - %H2O/100)*Vs*A*(528*Ps/Tsavg/29.92)

   where: A = stack area, ft2
   528 = std temperature, deg R
   29.92 = std pressure, in. Hg

7. **DRY GAS VOLUME (Vm std)** std cubic feet

Vm std = GAMA*(Vm-(AL-.02)t)*(Pb+DELH/13.6)/29.92

where: GAMA = dry gas meter calibration factor
Vm = volume of dry gas metered, cubic feet
AL = post test leak rate, cubic feet per minute
t = total time of test, minutes
DELH = average orifice pressure drop, in.H2O

8. **PARTICULATE CONCENTRATION (Cs)** grains/dry std cubic foot

Cs = Mn * 15.43/Vm std

where: Mn = particulate captured, grams
15.43 = grains per gram

9. **EMISSION RATE (ER)** pounds per hour

PMRA = Mn*A*60/(t*An*453.6) AREA METHOD lb/hr

PMRC = Cs*Qs*60/(15.43*453.6) CONC. METHOD lb/hr

ER = (PMRA + PMRC)/2

where: An = area of sampling nozzle, square feet

10. **EMISSION CONCENTRATION (EC)** lb/1000 lb exhaust gas

EC = ER * 386700 * (1-%H2O/100)/(Qs*60*Ms)

where: 386700 = cubic feet per lb mole * 1000

11. **ISOKINETIC SAMPLING PERCENTAGE (I)** %

I = PMRA/PMRC