

Air



Nonfossil Fueled Boilers

Visible Opacity Observations At Five Boiler Installations



NONFOSSIL FUELED BOILERS

Visible Opacity Observations
At Five Boiler Installations

Georgia-Pacific
Emporia, Virginia

Nashville Thermal Transfer Company
Nashville, Tennessee

Champion International
Corrigan, Texas

Georgia-Pacific
Durand, Georgia

Resco
Saugus, Massachusetts

by

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SECTION 1

INTRODUCTION

The air pollution control devices serving five nonfossil fueled boilers were observed for visible emissions by Monsanto Research Corporation (MRC) for the U.S. Environmental Protection Agency (EPA) under Contract No. 68-02-3547, Work Assignment No. 3.

The purpose of the opacity observations was to gather background information to support the setting of new source performance standards for opacity for the nonfossil fueled boiler industry. Accordingly, representative plants were chosen which had available particulate emission data and air pollution control devices.

The opacity reading performed by MRC was done by Thomas N. Malone and Charlie M. Clark, during the week of 7-12 November 1980 and on 21 January 1981. The method employed was EPA Method 9.

Quality assurance/quality control for opacity reading covered such activities as observer training, observer testing and certification, and protocols for the recording and reduction of data. Whenever a background interference, such as a steam plume, nullified an opacity observation, it was indicated on the field data sheets. In accordance with EPA Method 9, average opacity is determined as a set of 24 consecutive observations, nullified observations not counted.

SECTION 2

SUMMARY OF RESULTS

Visible emissions were read at the outlets of the air pollution control devices of five nonfossil fueled boilers. All readings extended for 3 hr durations. No problems were encountered with observer positioning.

On November 7, opacity was read at the Nashville Thermal Transfer Company, a municipal solid waste (MSW) boiler with electrostatic precipitator (ESP) located in Nashville, Tennessee. Weather conditions were clear initially, then changed to overcast. Table 1 presents the summarized results. The opacity fluctuated from less than 5% to bursts which were over 10% opacity, typical of a boiler with a variable MSW feed. The average opacity over 3 hrs reading time was 3.0%.

On November 10, readings were made at Georgia-Pacific in Emporia, Virginia, which had a wood-fired boiler with wet scrubber. Weather conditions were clear throughout the test, and opacity remained constant at 20-25%. The average opacity over three hours reading time was 22.9%. Table 2 contains the summarized results.

On November 11, in Corrigan, Texas, opacity was read at Champion International's wood-fired boiler with electrostatic precipitator. The weather was clear, and opacity was very low (0-5%) with occasional bursts to 30-40% when ESP rapping occurred. At the end of the test two observations of 70% opacity were made due to grate cleaning. Average opacity for the 3 hr test was 0.5%. Table 3 summarizes the results. Complete records of visible emissions are furnished in Appendix B.

On November 12, opacity was read at Georgia-Pacific's wood-fired boiler with wet scrubber in Durand, Georgia. Weather conditions were clear and calm. Opacity ranged from 15-20%, then two hours into the test the boiler load was increased as more fuel was added, the smoke changed from a blue-gray to light brown color, and the opacity increased to 25-30%. Table 4 summarizes the results; the average opacity was 17.1%.

On January 21, 1981 the Resco municipal solid waste boiler with ESP was read in Saugus, Massachusetts. The weather was clear, and the opacity was fairly constant at 0-10%. Table 5 summarizes the results; the average opacity was 3.9%.

TABLE 1. VISIBLE EMISSIONS SUMMARY AT NASHVILLE THERMAL
TRANSFER CO., NASHVILLE, TN, NOVEMBER 7, 1980

Date: 11-7-80

Type of Discharge: Stack

Height of Point of Discharge: 100 ft

Wind Direction: NW

Color of Plume: White

Observer Name: Thomas Malone

Distance from Observer
to Discharge Point: 110 ft

Height of Observation
Point: Ground Level

Type of Plant: MSW

Location of Dis-
charge: ESP Outlet

Description of Sky: Clear

Wind Velocity: 2-3 mph

Detached Plume: Yes

Duration of Observation: 3 hrs

Direction of Observer
from Discharge Point: SE

Description of Back-
ground: Blue sky

Summary of average opacity				
Set number	Time		Opacity	
	Start	End	Sum	Average
1	9:20	9:25	5	0.2
2	9:26	9:31	40	1.7
3	9:32	9:37	285	11.9
4	9:38	9:43	255	10.6
5	9:44	9:49	100	4.2
6	9:50	9:55	0	0
7	9:56	10:01	45	1.9
8	10:02	10:07	10	0.4
9	10:08	10:13	40	1.7
10	10:14	10:19	5	0.2
11	10:20	10:25	55	2.3
12	10:26	10:31	110	4.6
13	10:32	10:37	270	11.3
14	10:38	10:43	255	10.6
15	10:44	10:49	165	6.9
16	10:50	10:55	345	14.4
17	10:56	11:01	10	0.4
18	11:02	11:07	0	0
19	11:08	11:13	0	0
20	11:14	11:19	0	0
21	11:20	11:25	0	0
22	11:26	11:31	0	0
23	11:32	11:37	0	0
24	11:38	11:43	0	0
25	11:44	11:49	0	0
26	11:50	11:55	0	0
27	11:56	12:01	0	0
28	12:02	12:07	0	0
29	12:08	12:13	100	4.2
30	12:14	12:19	45	1.9
Average, all sets				3.0%

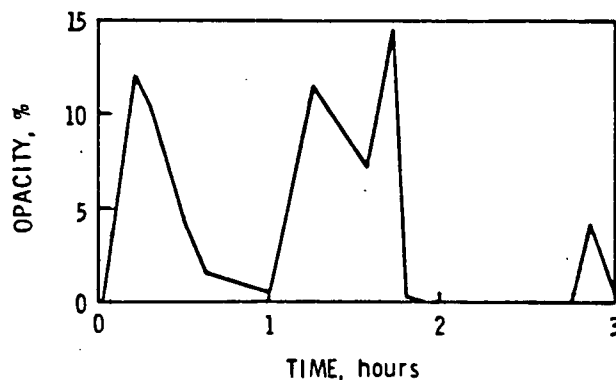


TABLE 2. VISIBLE EMISSIONS SUMMARY AT GEORGIA-PACIFIC,
EMPORIA, VA, NOVEMBER 10, 1980

Date: 11-10-80

Type of Discharge: Stack

Height of Point of Discharge: 60 ft

Wind Direction: NE

Color of Plume: White

Observer Name: Thomas Malone

Distance from Observer

to Discharge Point: 220 ft

Height of Observation

Point: Ground Level

Type of Plant: Plywood

Location of Dis-

charge: Scrubber Outlet

Description of Sky: Clear

Wind Velocity: 4-7 mph

Detached Plume: Yes

Duration of Observer: 3 hrs

Direction of Observer

from Discharge Point: SW

Description of Back-

ground: Blue Sky

Summary of average opacity				
Set number	Time		Opacity	
	Start	End	Sum	Average
1	9:35	9:40	600	25.0
2	9:41	9:46	590	24.6
3	9:47	9:52	565	23.5
4	9:53	9:58	545	22.7
5	9:59	10:04	595	24.8
6	10:05	10:10	600	25.0
7	10:11	10:16	580	24.2
8	10:17	10:22	580	24.2
9	10:23	10:28	475	19.8
10	10:29	10:34	465	19.4
11	10:35	10:40	460	19.2
12	10:41	10:46	475	19.8
13	10:47	10:52	465	19.4
14	10:53	10:58	465	19.4
15	10:59	11:04	480	20.0
16	11:05	11:10	575	24.0
17	11:11	11:16	600	25.0
18	11:17	11:22	645	26.9
19	11:23	11:28	595	24.8
20	11:29	11:34	575	24.0
21	11:35	11:40	585	24.4
22	11:41	11:46	585	24.4
23	11:47	11:52	545	22.7
24	11:53	11:58	485	20.2
25	11:59	12:04	615	25.6
26	12:05	12:10	590	24.6
27	12:11	12:16	595	24.8
28	12:17	12:22	530	22.1
29	12:23	12:28	500	20.8
30	12:29	12:34	510	21.3
Average, all sets				22.9%

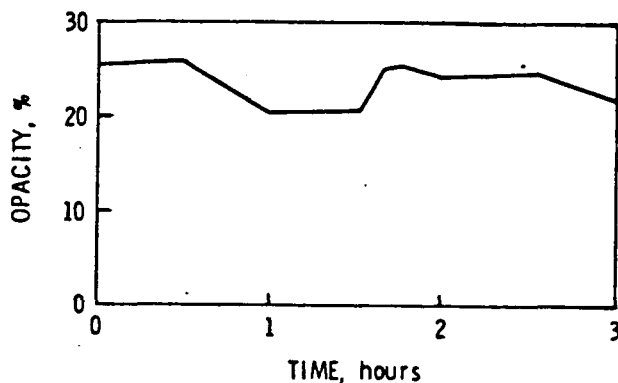


TABLE 3. VISIBLE EMISSIONS SUMMARY AT CHAMPION INTERNATIONAL,
CORRIGAN, TX, NOVEMBER 11, 1980

Date: 11-11-80
Type of Discharge: Stack

Height of Point of Discharge: 96 ft
Wind Direction: SW
Color of Plume: White
Observer Name: Thomas Malone
Distance from Observer
to Discharge Point: 125 ft
Height of Observation
Point: Ground Level

Type of Plant: Wood Products
Location of Dis-
charge: ESP Outlet
Description of Sky: Clear
Wind Velocity: 1-3 mph
Detached Plume: No
Duration of Observation: 3 hrs
Direction of Observer
from Discharge Point: SE
Description of Back-
ground: Blue sky

Summary of average opacity				
Set number	Time		Opacity	
	Start	End	Sum	Average
1	10:35	10:40	0	0
2	10:41	10:46	0	0
3	10:47	10:52	0	0
4	10:53	10:58	0	0
5	10:59	11:04	0	0
6	11:05	11:10	0	0
7	11:11	11:16	0	0
8	11:17	11:22	0	0
9	11:23	11:28	15	0.6
10	11:29	11:34	0	0
11	11:35	11:40	0	0
12	11:41	11:46	0	0
13	11:47	11:52	80	3.3
14	11:53	11:58	0	0
15	11:59	12:04	85	3.5
16	12:05	12:10	0	0
17	12:11	12:16	20	0.8
18	12:17	12:22	30	1.3
19	12:23	12:28	40	1.7
20	12:29	12:34	15	0.6
21	12:35	12:40	0	0
22	12:41	12:46	0	0
23	12:47	12:52	0	0
24	12:53	12:58	10	0.4
25	12:59	13:04	80	3.3
26	13:05	13:10	0	0
27	13:11	13:16	0	0
28	13:17	13:22	0	0
29	13:23	13:28	0	0
30	13:29	13:34	155	6.5
Average, all sets				0.5%

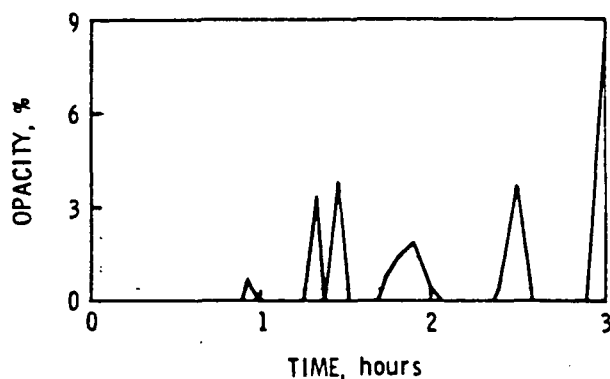


TABLE 4. VISIBLE EMISSIONS SUMMARY AT GEORGIA-PACIFIC,
DURAND, GA, NOVEMBER 12, 1980

Date: 11-12-80

Type of Discharge: Stack

Height of Point of Discharge: 85 ft

Wind Direction: SE

Color of Plume: Blue-gray

Observer Name: Thomas Malone

Distance from Observer

to Discharge Point: 105-180 ft

Height of Observation

Point: Ground Level

Type of Plant: Plywood

Location of Dis-

charge: Scrubber Outlet

Description of Sky: Clear

Wind Velocity: 2-4 mph

Detached Plume: Yes

Duration of Observation: 3 hrs

Direction of Observer

from Discharge Point: NW

Description of Back-

ground: Blue sky

Summary of average opacity				
Set number	Time		Opacity	
	Start	End	Sum	Average
1	13:25	13:30	330	13.8
2	13:31	13:36	355	14.8
3	13:37	13:42	360	15.0
4	13:43	13:48	370	15.4
5	13:49	13:54	395	16.5
6	13:55	14:00	375	15.6
7	14:01	14:06	385	16.0
8	14:07	14:12	400	16.7
9	14:13	14:18	425	17.7
10	14:19	14:24	430	17.9
11	14:25	14:30	415	17.3
12	14:31	14:36	390	16.3
13	14:37	14:42	430	17.9
14	14:43	14:48	440	18.3
15	14:49	14:54	375	15.6
16	14:55	15:00	390	16.3
17	15:01	15:06	425	17.7
18	15:07	15:12	415	17.3
19	15:13	15:18	370	15.4
20	15:19	15:24	360	15.0
21	15:25	15:30	455	19.0
22	15:31	15:36	530	22.1
23	15:37	15:42	470	19.6
24	15:43	15:48	405	16.9
25	15:49	15:54	390	16.3
26	15:55	16:00	420	17.5
27	16:01	16:06	390	16.3
28	16:07	16:12	480	20.0
29	16:13	16:18	425	17.7
30	16:19	16:24	480	20.0
Average, all sets				17.1%

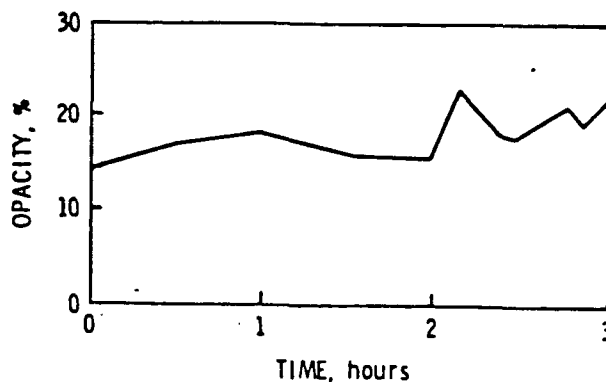


TABLE 5. VISIBLE EMISSIONS SUMMARY AT RESCO,
SAUGUS, MA, JANUARY 21, 1981

Date: 1-21-81
 Type of Discharge: Stack
 Height of Point of Discharge: 150 ft
 Wind Direction: South
 Color of Plume: White
 Observer Name: Charlie M. Clark
 Distance from Observer
 to Discharge Point: 200 ft
 Direction of Observer
 from Discharge Point: NW
 Description of Background: Blue sky

Type of Plant: Municipal
 Solid Waste
 Location of Discharge:
 ESP Outlet
 Description of Sky: Clear
 Wind Velocity: 2-6 mph
 Detached Plume: No
 Duration of Observation: 3 hrs
 Height of Observation
 Point: Ground Level

Summary of average opacity				
Set number	Time		Opacity	
	Start	End	Sum	Average
1	13:24	13:29	100	4.2
2	13:30	13:36	110	4.6
3	13:36	13:43	120	5.0
4	13:43	13:49	115	4.8
5	13:49	13:55	125	5.2
6	13:55	14:01	150	6.3
7	14:01	14:07	125	5.2
8	14:08	14:13	120	5.0
9	14:14	14:19	105	4.4
10	14:20	14:25	120	5.0
11	14:26	14:31	65	2.7
12	14:32	14:37	80	3.3
13	14:38	14:43	70	2.9
14	14:44	14:49	85	3.5
15	14:50	14:55	105	4.4
16	14:56	15:01	80	3.3
17	15:02	15:07	135	5.6
18	15:08	15:13	110	4.6
19	15:14	15:19	55	2.3
20	15:20	15:25	75	3.1
21	15:26	15:31	125	5.2
22	15:32	15:37	100	4.2
23	15:38	15:43	55	2.3
24	15:44	15:49	30	1.3
25	15:50	15:55	45	1.9
26	15:56	16:01	40	1.7
27	16:02	16:07	80	3.3
28	16:08	16:14	140	5.8
29	16:14	16:21	110	4.6
30	16:21	16:27	40	1.7
Average, all sets				3.9%

