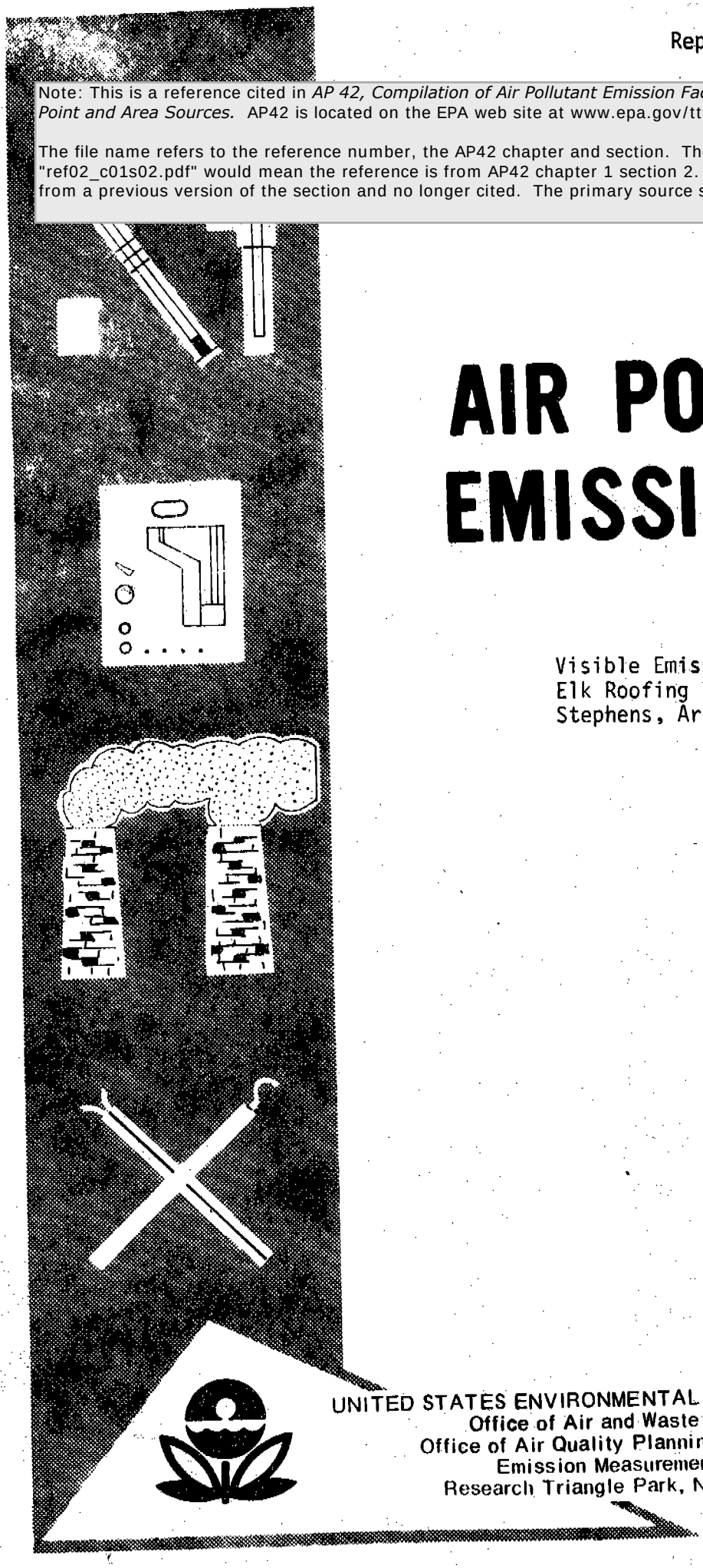
Report No. 76-ARM-11

JUN 4 1976

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.



AIR POLLUTION EMISSION TEST

Visible Emissions
Elk Roofing Corp.
Stephens, Arkansas

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Emission Measurement Branch
Research Triangle Park, North Carolina

VISIBLE EMISSION MEASUREMENT AT ASPHALT ROOFING PLANTS

EMB Project Report No. 76-ARM-11

Plant Tested

Elk Roofing Corporation
Stephens, Arkansas

August 19 - 21, 1975

Prepared for

Environmental Protection Agency
Emission Measurement Branch
Research Triangle Park
North Carolina 27711

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Contract No. 68-02-1404, Task No. 14

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I. INTRODUCTION

Under the Clean Air Act, as amended, the Environmental Protection Agency is charged with the establishment of performance standards for new installations or modifications of existing installations in stationary source categories which may contribute significantly to air pollution. A performance standard is a standard for emissions of air pollutants which reflects the best emission reduction systems that have been adequately demonstrated (taking into account economic considerations).

The development of realistic performance standards requires accurate data on pollutant emissions within the various source categories. This report presents the results of the testing which was performed at the Elk Roofing Corporation Plant in Stephens, Arkansas on August 19-21, 1975.

Monsanto Research Corporation as a contractor to the Environmental Protection Agency under the "Field Sampling of Atmospheric Emissions" program was requested to provide visible emission data from the Elk Roofing Corporation.

The field testing program was under the direction of John W. Brown, Field Testing Section, Emission Measurement Branch, EPA. The visible emissions were observed and recorded by Tommy L. Stewart, observer #1, and Charles F. Duncan, observer #2, of Monsanto Research Corporation.

There are two blowing stills at this plant. Each still has a knockout box to remove heavy materials. The emissions from the knockout boxes are combined and ducted to an afterburner and heat exchanger and are then ducted to the atmosphere through a 30 foot stack. Visible emission data were recorded on the effluent from this stack, for a period of about fourteen and one half hours. During the observation period there were no major mechanical problems and the process was considered to be typical of normal operation.

The visible emissions were determined as prescribed by EPA Method 9 as given in the Federal Register, Vol. 39, No. 219, November 12, 1974. Opacity readings were made from three locations within the plant site so that the angle with the line of observation and the sun would be no more than seventy degrees. This report presents a summary of the visible emission data and all field data sheets are included in the appendix.

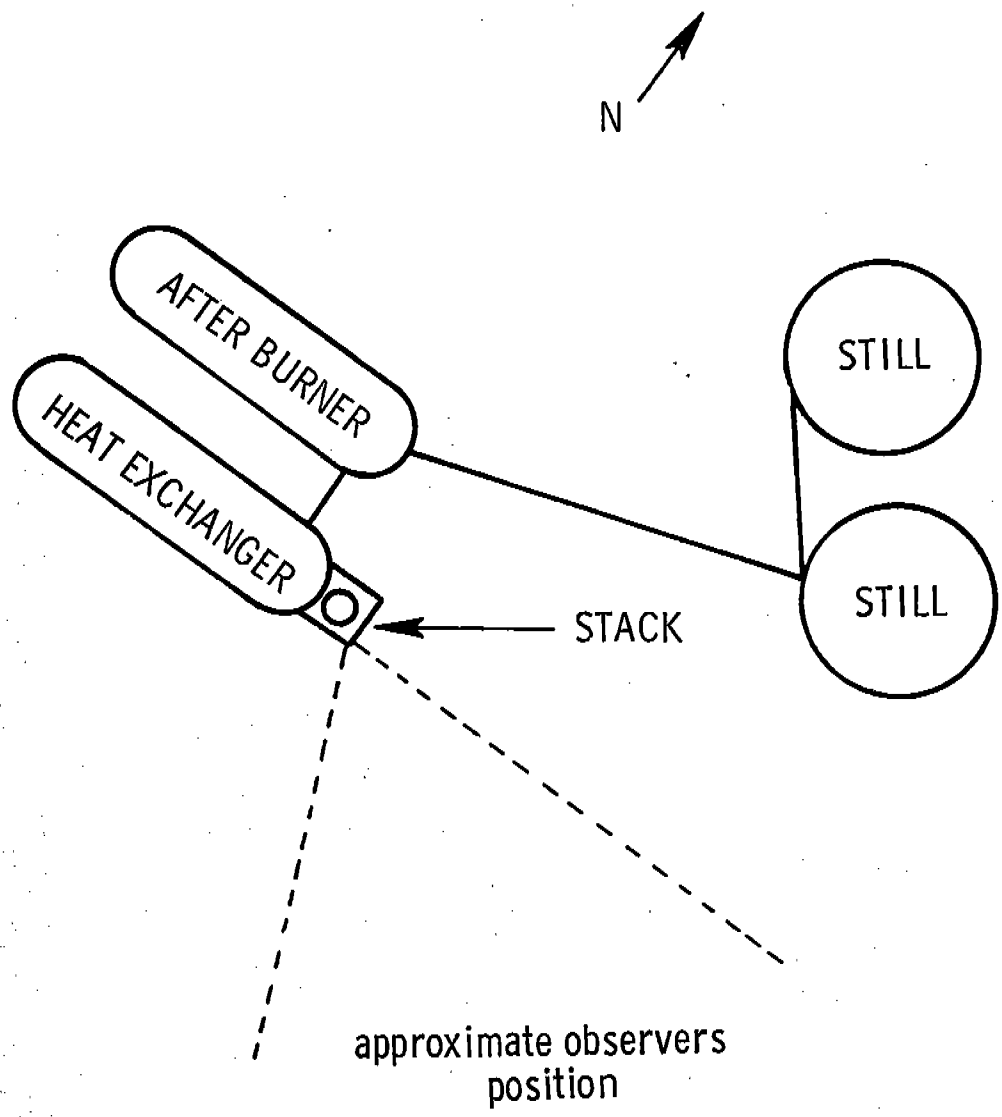
During the same periods in which visible emissions were being observed, personnel from Battelle Memorial Institute (Columbus, Ohio) were conducting sampling of the emissions of particulate (Method 5), SO_2 (Method 6), gaseous hydrocarbons, and polycyclic organic materials. This information is presented in a separate report under the same EMB Project Report No. (76-ARM-11).

II. SUMMARY AND DISCUSSION OF RESULTS

The visible emission data was recorded for a total of about fourteen and one half hours over a three day period, at fifteen second intervals as specified by Method 9. Observer Tommy L. Stewart was certified by the Environmental Protection Agency of the State of Ohio in Columbus, Ohio on March 27, 1975. Observer Charles F. Duncan was recertified at the EPA Air Pollution Training Institute Visible Emissions Recertification course given in Kansas City, Missouri on August 4-6, 1975.

During the entire observation period, the percent opacity was recorded at 0%, that is, no visible emission could be detected.

The physical layout of the plant showing the location of the stills, afterburner and heat exchanger as well as the location of observation points and direction of observation are shown in Figure 1. A summary of the time of observation, observation point used, pertinent distances, weather conditions and opacity is presented in Table 1. The plot of observed opacity against elapsed observation time is given in Figure 2. The summaries of visible emissions for each observer's readings are included following Figure 2.



Observers #1 and #2 positions were between these points, 50-80 feet from the stack. For exact locations, see Table 1.

Figure 1. Position of Observers Reading Visible Emissions

Table 1. SUMMARY OF VISIBLE EMISSION DATA
ELK ROOFING CO., STEPHENS, ARKANSAS

Date	24 Hr. Clock Time	Observer	Dist. to Source (ft)	Direction from Source	Wind Direction	Wind Velocity MPH	Weather	Background	Time-Opacity
8-19	12:47-17:02	1	50 - 60	E - S.E.	E - S	5-10	Part Cloudy (30%)	Sky	243 min 30 sec-0%
8-19	12:47-17:02	2	50 - 60	E - S.E.	S	8-12	Part Cloudy	Sky	245 min 30 sec-0%
8-19	17:12-18:29	1	50 - 60	E	S - N.E.	5-10	Part Cloudy	Sky	78 min - 0%
8-19	17:12-18:29	2	50	S.E.	S - N	5-10	Part Cloudy	Sky	78 min - 0%
8-20	13:33-15:09	1	50 - 60	S.E.	S - S.W.	8-20	Part Cloudy	Sky	97 min - 0%
8-20	13:33-15:09	2	50	S.E.	N - S	8-15	Part Cloudy	Sky	97 min - 0%
8-20	15:56-17:28	1	60	E	S	5-10	Part Cloudy	Sky	93 min - 0%
8-20	15:56-17:28	2	50	S.E.	S.W. - N.E.	8-12	Part Cloudy	Sky	93 min - 0%
8-21	10:08-11:48	1	60	E	N - E	8-12	Clear	Sky	100 min 30 sec-0%
8-21	10:08-11:48	2	60	E	N.E. - S.W.	8-12	Clear-Part Cloudy	Sky	100 min 30 sec-0%
8-21	13:14-17:52	1	50 - 80	E - S.E.	N.E.	8-12	Part Cloudy	Sky	258 min - 0%
8-21	13:14-17:52	2	45 - 80	S.E. - S.S.E.	N.E. - S.W.	5-12	Part Cloudy	Sky	258 min - 0%

Observer #1 - Tommy Stewart

Observer #2 - Chuck Duncan

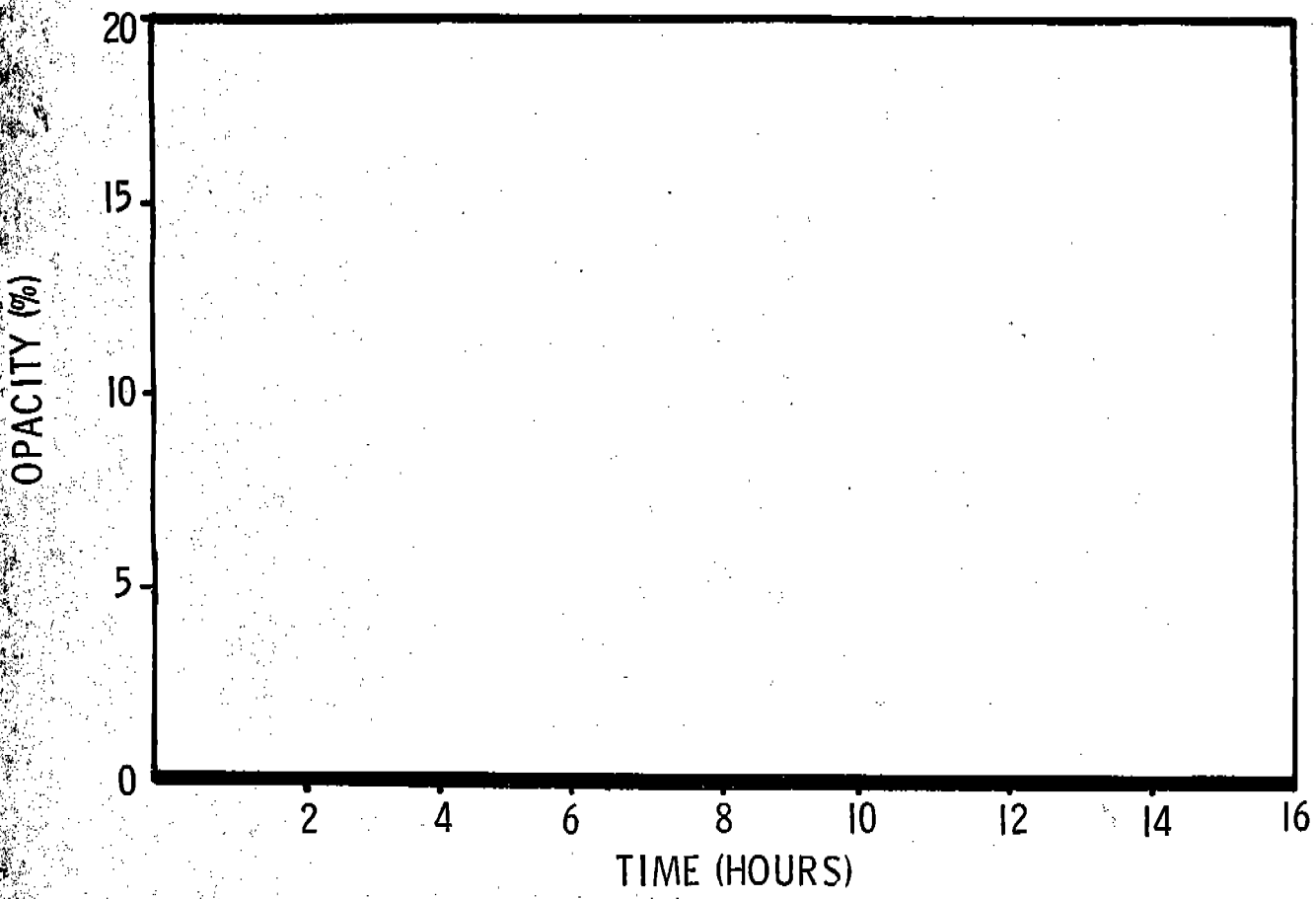


Figure 2. Opacity Plot

Date: 8/19/75 OBSERVER #1 * Run # 1 Casting ~~Start # 14 12~~

Type of Plant: Asphalt Roofing

Type of Discharge: Stack

Distance from Observer to Discharge Point: 50'-60' S.

Location of Discharge: Blowing Still outlet

Height of Observation Point: ground level

Height of Point of Discharge: ~30'

Direction of Observer from Discharge Point: E-SE.

Description of Background: ~~Cloudy~~ Sky - white clouds - gray clouds

Description of Sky: Partly Cloudy

Wind Direction: East - South

Wind Velocity: 5 - 10 mi/hr.

Color of Plume: not visible

Detached Plume:

Duration of Observation: 4 hrs + 14 min.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	12:47	12:53	0	0
2	12:53	12:59	↓	↓
3	12:59	13:05		
4	13:05	13:11		
5	13:11	13:17		
6	13:17	13:23		
7	13:23	13:29		
8	13:29	13:35		
9	13:35	13:41		
10	13:41	13:47		
11	13:47	13:53		
12	13:53	13:59		
13	13:59	14:05		
14	14:05	14:11		
15	14:11	14:17		
16	14:17	14:23		
17	14:23	14:29		
18	14:29	14:35		
19	14:35	14:41		
20	14:41	14:47		

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	14:47	14:53	0	0
22	14:53	14:59	↓	↓
23	14:59	15:05		
24	15:05	15:11		
25	BREAK			
26				
27	15:23	15:29		
28	15:29	15:35		
29	15:35	15:41		
30	15:41	15:47		
31	15:47	15:53		
32	15:53	15:59		
33	15:59	16:05		
34	16:05	16:11		
35	16:11	16:17		
36	16:17	16:23		
37	16:23	16:29		
38	16:29	16:35		
39	16:35	16:41		
40	16:41	16:47		
41	16:47	16:53		
42	16:53	16:59		
43	16:59	17:02		

Summary of Visible Emissions

SH 1A
Run 1

Date: Aug 19, 1975 OBSERVER #2

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 50-60 FT

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRD LEVEL

Height of Point of Discharge: ~30 FT

Direction of Observer from Discharge Point: "E" - "SE"

Description of Background: WHITE & GRAY CLOUDS, BLUE SKY

Description of Sky: PARTLY CLOUDY

Wind Direction: "S"

Wind Velocity: 8-12

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1247-1702

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1247	1253	0	0
2	1253	1259		
3	1259	1305		
4	1305	1311		
5	1311	1317		
6	1317	1323		
7	1323	1329		
8	1329	1335		
9	1335	1341		
10	1341	1347		
11	1347	1353		
12	1353	1359		
13	1359	1405		
14	1405	1411		
15	1411	1417		
16	1417	1423		
17	1423	1429		
18	1429	1435		
19	1435	1441		
20	1441	1447	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1447	1453	0	0
22	1453	1459		
23	1459	1505		
24	1505	1511		
25	1511	1517		
26	1517	1523		
27	1523	1529		
28	1529	1545		
29	1545	1551		
30	1551	1557		
31	1557	1603		
32	1603	1609		
33	1609	1615		
34	1615	1621		
35	1621	1627		
36	1627	1633		
37	1633	1639		
38	1639	1645		
39	1645	1651		
40	1651	1657		
	1657	1703	0	0
	17			

(2) Summary of Visible Emissions

Date: 8/19/75 OBSERVER #1 Run #2

Type of Plant: Asphalt

Type of Discharge: Stack

Distance from Observer to Discharge Point: ~60

Location of Discharge: blowing still outlet

Height of Observation Point: ground level

Height of Point of Discharge: ~30'

Direction of Observer from Discharge Point: E

Description of Background: sky

Description of Sky: partly cloudy - gray clouds - white clouds

Wind Direction: ~~East~~ S-W-+N,E.

Wind Velocity: 5-10 mi/hr

Color of Plume: not visible

Detached Plume:

Duration of Observation: 1hr + 18min

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	17:12	17:18	0	0
2	17:18	17:24	"	"
3	17:24	17:30	"	"
4	17:30	17:36	"	"
5	17:36	17:42	"	"
6	17:42	17:48	"	"
7	17:48	17:54	"	"
8	17:54	18:00	"	"
9	18:00	18:06	"	"
10	18:06	18:12	"	"
11	18:12	18:18	"	"
12	18:18	18:24	"	"
13	18:24	~~18:30~~ 18:29	"	"
14	~~18:30~~	~~18:36~~		
15	~~18:36~~	~~18:42~~		
16	~~18:~~			
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Summary of Visible Emissions

OBERVER #2

SH 1A
RUN 2

Date: AUG 19, 1975

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 50'

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRAD LEVEL

Height of Point of Discharge: ~30 FT

Direction of Observer from Discharge Point: SE

Description of Background: WHITE CLOUDS, GRAY CLOUDS, BLUE SKY

Description of Sky: PARTLY CLOUDY

Wind Direction: "S"

Wind Velocity: 5-10

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1712-1830

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1712	1718	0	0
2	1718	1724	0	0
3	1724	1730	0	0
4	1730	1736	0	0
5	1736	1742	0	0
6	1742	1748	0	0
7	1748	1754	0	0
8	1754	1800	0	0
9	1800	1806	0	0
10	1806	1812	0	0
11	1812	1818	0	0
12	1818	1824	0	0
13	1824	1830	0	0
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

01

Summary of Visible Emissions

OBSERVER #1 Run #3

Date: 8/20/75

Type of Plant: Asphalt Roofing

Type of Discharge: stack

Distance from Observer to Discharge Point: 50' 60'

Location of Discharge: blowing still outlet

Height of Observation Point: ground level

Height of Point of Discharge: 30'

Direction of Observer from Discharge Point: S.E.

Description of Background: sky

Description of Sky: partly cloudy - gray clouds - white clouds - blue sky

Wind Direction: S-SW. - S.

Wind Velocity: 8-20 mi/hr

Color of Plume: not visible

Detached Plume:

Duration of Observation: 1 hr, 1 40 min

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	13:33	13:39	0	0
2	13:39	13:45		
3	13:45	13:51		
4	13:51	13:57		
5	13:57	14:03		
6	14:03	14:09		
7	14:09	14:15		
8	14:15	14:21		
9	14:21	14:27		
10	14:27	14:33		
11	14:33	14:39		
12	14:39	14:45		
13	14:45	14:51		
14	14:51	14:57		
15	14:57	15:03		
16	15:03	15:09		
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

FACILITY

Summary of Visible Emissions
OBSERVER # 2

SH 1A
RUN 3

Date: AUG 20, 1975

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 50'

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRD LEVEL

Height of Point of Discharge: ~ 30 FT

Direction of Observer from Discharge Point: SE

Description of Background: LIGHT BLUE SKY, WHITE CLOUDS, GRAY CLOUDS

Description of Sky: PARTLY CLOUDY

Wind Direction: "N"

Wind Velocity: 8-15 MPH

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1333-1509

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1333	1339	0	0
2	1339	1345	0	0
3	1345	1351	0	0
4	1351	1357	0	0
5	1357	1403	0	0
6	1403	1409	0	0
7	1409	1415	0	0
8	1415	1421	0	0
9	1421	1427	0	0
10	1427	1433	0	0
11	1433	1439	0	0
12	1439	1445	0	0
13	1445	1451	0	0
14	1451	1457	0	0
15	1457	1503	0	0
16	1503	1510	0	0
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
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31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

1.)

Summary of Visible Emissions
OBSERVER #1

Run #4

Date: 8/20/75

Type of Plant: Asphalt Roofing

Type of Discharge: Stack

Distance from Observer to Discharge Point: ~60'

Location of Discharge: blowing still Outlet

Height of Observation Point: ground level

Height of Point of Discharge: ~30'

Direction of Observer from Discharge Point: E.

Description of Background: Sky – scattered white gray clouds

Description of Sky: partly Cloudy

Wind Direction: ~~NE.~~ S.

Wind Velocity: 5-15 mi/hr.

Color of Plume: not visible

Detached Plume:

Duration of Observation: 1hr + 32 min.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	15:56	16:02	0	0
2	16:02	16:08		
3	16:08	16:14		
4	16:14	16:20		
5	16:20	16:26		
6	16:26	16:32		
7	16:32	16:38		
8	16:38	16:44		
9	16:44	16:50		
10	16:50	16:56		
11	16:56	17:02		
12	17:02	17:08		
13	17:08	17:14		
14	17:14	17:20		
15	17:20	17:26		
16	17:26	17:28		
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Summary of Visible Emissions
OBSERVER #2

RUN 4

Date: AUG 20, 1975

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 50'

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRD LEVEL

Height of Point of Discharge: ~ 30 FT

Direction of Observer from Discharge Point: SE

Description of Background: GRAY CLOUDS

Description of Sky: OVERCAST, PARTLY CLOUDY

Wind Direction: SW

Wind Velocity: 8-12

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1556 - 1728

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1556	1602	0	0
2	1602	1608	0	0
3	1608	1614	0	0
4	1614	1620	0	0
5	1620	1626	0	0
6	1626	1632	0	0
7	1632	1638	0	0
8	1638	1644	0	0
9	1644	1650	0	0
10	1650	1656	0	0
11	1656	1702	0	0
12	1702	1708	0	0
13	1708	1714	0	0
14	1714	1720	0	0
15	1720	1726	0	0
16	1726	1729	0	0
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Summary of Visible Emissions
OBSERVER #1 Run #5

Date: 8/21/75

Type of Plant: Asphalt Roofing

Type of Discharge: Stack

Distance from Observer to Discharge Point: 60'

Location of Discharge: blowing still outlet

Height of Observation Point: ground level

Height of Point of Discharge: ~30'

Direction of Observer from Discharge Point: E.

Description of Background: sky

Description of Sky: blue sky

Wind Direction: N.E

Wind Velocity: 8-12 mi/hr

Color of Plume: not visible

Detached Plume:

Duration of Observation: 1 hr + 42 min

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	10:08	10:14	0	0
2	10:14	10:20		
3	10:20	10:26		
4	10:26	10:32		
5	10:32	10:38		
6	10:38	10:44		
7	10:44	10:50		
8	10:50	10:56		
9	10:56	11:02		
10	11:02	11:08		
11	11:08	11:14		
12	11:14	11:20		
13	11:20	11:26		
14	11:26	11:32		
15	11:32	11:38		
16	11:38	11:44		
17	11:44	11:48		
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Summary of Visible Emissions

OBSERVER #2

RUN 5

Date: AUG 21, 1975

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 60'

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRD LEVEL

Height of Point of Discharge: ~ 30 FT

Direction of Observer from Discharge Point: "E

Description of Background: BLUE SKY, GRAY CLOUDS, WHITE CLOUDS

Description of Sky: CLEAR.

Wind Direction: "NE"

Wind Velocity: 8-12

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1008-1148

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1008	1014	0	0
2	1014	1020	0	0
3	1020	1026	0	0
4	1026	1032	0	0
5	1032	1038	0	0
6	1038	1044	0	0
7	1044	1050	0	0
8	1050	1056	0	0
9	1056	1102	0	0
10	1102	1108	0	0
11	1108	1114	0	0
12	1114	1120	0	0
13	1120	1126	0	0
14	1126	1132	0	0
15	1132	1138	0	0
16	1138	1144	0	0
17	1144	1148	0	0
18	#			
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

6) OBSERVER #1

Date: 8/21/75

Type of Plant: Asphalt Roofing

Type of Discharge: Stack

Location of Discharge: blowing still Outlet

Height of Point of Discharge: ~30'

Description of Background: Sky

Description of Sky: Partly Cloudy

Wind Direction: N-E.

Color of Plume: Not Visible

Duration of Observation: 4 hrs, + 89 min

Distance from Observer to Discharge Point: ~50'-80'

Height of Observation Point: ground level

Direction of Observer from Discharge Point: E-S-E

Wind Velocity: 8-12 mi/hr

Detached Plume:

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	13:14	13:20	0	0
2	13:20	13:26		
3	13:26	13:32		
4	13:32	13:38		
5	13:38	13:44		
6	13:44	13:50		
7	13:50	13:56		
8	13:56	14:02		
9	14:02	14:08		
10	14:08	14:14		
11	14:14	14:20		
12	14:20	14:26		
13	14:26	14:32		
14	14:32	14:38		
15	14:38	14:44		
16	14:44	14:50		
17	14:50	14:56		
18	14:56	15:02		
19	15:02	15:08		
20	15:08	15:14		

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	15:14	15:20	0	0
22	15:20	15:26		
23	15:26	15:32		
24				
25	*BREAK			
26				
27	15:50	15:56		
28	15:56	16:02		
29	16:02	16:08		
30	16:08	16:14		
31	16:14	16:20		
32	16:20	16:26		
33	16:26	16:32		
34	16:32	16:38		
35	16:38	16:44		
36	16:44	16:50		
37	16:50	16:56		
38	16:56	17:02		
39	*BREAK			
40	17:08	17:14		
41	17:14	17:20		
42	17:20	17:26		
43	17:26	17:32		
44	1732	17:38		
45	17:38	17:44		
46	17:44	17:50		
47	17:50	17:52		

Summary of Visible Emissions
OBSERVER #2

RUN 6

Date: AUG 21, 1975

Type of Plant: ASPHALT ROOFING

Type of Discharge: STACK

Distance from Observer to Discharge Point: 45' - 80'

Location of Discharge: BLOWING STILL OUTLET

Height of Observation Point: GRD LEVEL

Height of Point of Discharge: ~30 FT

Direction of Observer from Discharge Point: "SE" - "SSE"

Description of Background: BLUE SKY, WHITE CLOUDS, GRAY CLOUDS

Description of Sky: PARTLY CLOUDY

Wind Direction: "NE" TO "SW"

Wind Velocity: 5-12

Color of Plume: NOT VISIBLE

Detached Plume: NOT VISIBLE

Duration of Observation: 1314 - 1752

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1314	1320	0	0
2	1320	1326	0	0
3	1326	1332	0	0
4	1332	1338	0	
5	1338	1344	0	0
6	1344	1350	0	0
7	1350	1356	0	0
8	1356	1402	0	0
9	1402	1408	0	0
10	1408	1414	0	0
11	1414	1420	0	0
12	1420	1426	0	0
13	1426	1432	0	0
14	1432	1438	0	0
15	1438	1444	0	0
16	1444	1450	0	0
17	1450	1456	0	0
18	1456	1502	0	0
19	1502	1521	0	0
20	1521	1527	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1527	1533	0	0
22	1533	1539	0	0
23	1539	1545	0	0
24	1545	1551	0	0
25	1551	1557	0	0
26	1557	1603	0	0
27	1603	1609	0	0
28	1609	1615	0	0
29	1615	1621	0	0
30	1621	1627	0	0
31	1627	1633	0	0
32	1633	1639	0	0
33	1639	1645	0	0
34	1645	1651	0	0
35	1651	1657	0	0
36	1657	1703	0	0
37	1703	1709	0	0
38	1709	1715	0	0
39	1715	1729	0	0
40	1729	1735	0	0
41	1735	1741	0	0
42	1741	1747	0	0
43	1747	1753	0	0
44				