



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF ENFORCEMENT

*EPA-330/1-80-003*

OMEGA-1 LIDAR: DATA ANALYSIS REPORT

SOUTHERN INDIANA GAS & ELECTRIC COMPANY  
A. B. BROWN GENERATING STATION  
West Franklin, Indiana

October 1980

NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
Denver, Colorado

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## I. INTRODUCTION

The National Enforcement Investigations Center (NEIC) conducted an investigation of visible emissions from one stationary source at the A. B. Brown Generating Station operated by the Southern Indiana Gas and Electric Company (SIGECO), in West Franklin, Indiana, during the late morning and early afternoon hours of June 17, 1980. Opacities of observed visible emissions were measured remotely with a new instrumentation method\* using the NEIC Omega-1 Lidar. Figure 1 depicts the location of the lidar during the observations.

The A. B. Brown Station contains one coal-fired generating unit equipped with an electrostatic precipitator (ESP) for particulate emissions control, and a scrubber for SO<sub>2</sub> control. This unit has a generating capacity of 250 megawatts. The emissions from this unit are discharged through the Unit No. 1 Stack which is 600 ft high. Visible emissions from this source are alleged to have been in violation of the New Source Performance Standard (NSPS).

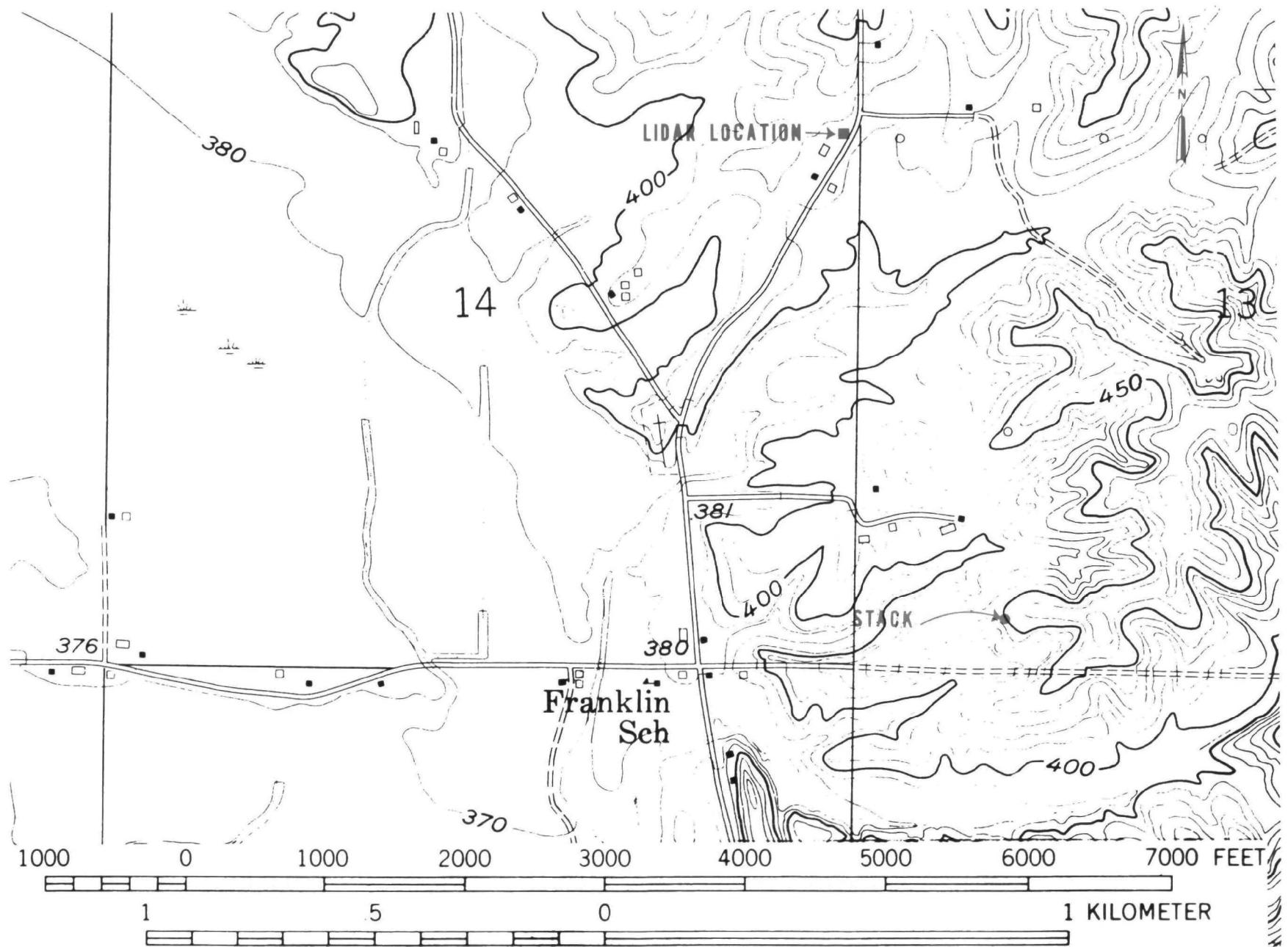
On April 21, 1980, the Enforcement Division of EPA, Region V, Chicago, Illinois, requested assistance from NEIC in documenting the opacity of emissions from the A. B. Brown Station during daytime hours.

To provide the requested assistance to Region V, NEIC conducted the investigation with the following objectives:

1. Document the opacity of visible emissions from the Unit No. 1 Stack.
2. Evaluate the compliance of the observed emissions with the NSPS.

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\* This method has been proposed in the Federal Register, Vol. 45, No. 128, Tuesday, July 1, 1980, pages 44329 through 44351, as an alternate method to Reference Method 9.



**Figure 1. Location Map**

## II. SUMMARY AND CONCLUSIONS

### SUMMARY OF INVESTIGATION

The opacity of visible emissions from the one stationary source within the A. B. Brown Generating Station, Southern Indiana Gas and Electric Company (SIGECO), West Franklin, Indiana, was measured during late morning and early afternoon hours on June 17, 1980. The source investigated was the Unit No. 1 Stack. All measurements were conducted remotely from off the plant site.

Opacities were measured remotely with the NEIC Omega-1 Lidar which is a new instrumentation method. This method has been proposed in the Federal Register as Alternate Method 1 to Reference Method 9.

Five sets of opacity measurements were made, the total of which was about 1.25 hours of observation and about 460 individual measurement. The sets of measurements were 15 minutes in length. Measurements were made at a temporal frequency range from once about every 8 to 10 seconds.

All opacity measurements were subsequently analyzed and reduced with the NEIC laboratory computer using the methods given in Alternate Method 1 (proposed).

The results of the lidar observations are summarized in Table 1 according to the official designation of the stack.

### CONCLUSIONS

The visible emissions from the Unit No. 1 Stack exceeded the maximum allowable limit of the New Source Performance Standards (20% for a 6-minute

Table 1  
SIGECO, A B BROWN GENERATING STATION  
West Franklin, Indiana

Source Designation	Applicable Opacity Limit (%)	Date June 1980	Time Interval (hr min sec)	Approx. length of Observation (min)	Approx Time Exceeding Limit (min)	% of Time in Excess of limit	± Max Lidar Calibration	
							Peak Opacity (6-min avg )	Error Mag (%) [From 0% to 80%]
Unit No 1 Stack	20	17	11 04 50 11 20 00	15	0	0	13	-0.15, +0.57
Unit No 1 Stack	20	17	11 25 35 11 40 36	15	0	0	17	-0.15, +0.57
Unit No 1 Stack	20	17	11 42.39 11 57 20	15	0	0	17	-0.15, +0.57
Unit No 1 Stack	20	17	12 02 13 12 16.49	15	9 75	65	29	-0.15, +0.57
Unit No 1 Stack	20	17	12 33 00 12 47:38	15	15	100	37	-0.15, +0.57

average) during the fourth and fifth runs (Table 1). The opacity of the emissions exceeded the limit for a total of 24.75 minutes or 83% of the combined observation times. The average opacity values were less than 20% throughout the first three data runs.

### III. METHODS

#### LIDAR OPACITY MEASUREMENTS

Alternate Method 1 (proposed) employs a lidar (lasar radar) which is an optical system installed in a truck-mounted van enclosure. This mobile lidar is specifically designed and fabricated for measuring the opacity of visible emissions from a given stationary source during both day and nighttime ambient lighting conditions. The laser transmitter within the lidar emits a short pulse of light. The lidar receiver collects the laser light backscattered from the atmospheric aerosols before and beyond the visible plume as well as that from the aerosols (particulates) within the plume. The lidar receiver converts the backscattered optical signals to electronic signals or data. The Lidar has an inherent data processing capability that calculates the opacity values from the backscatter data from just before and beyond the plume. It subsequently records these opacity values in hard copy form, and also records the original lidar receiver data (signal amplitude vs range) on magnetic tape for future reference or use.

The nominal data gathering rate of the lidar is an opacity measurement or determination once every 10 seconds. This data rate can be maintained in continuous operation for minutes or even hours. The lidar method is intended for use during nighttime, as well as during the day.

The Omega-1 Lidar is internally calibrated in the field periodically over the opacity values of 0, 10, 20, 40, 60, and 80%.

#### DATA ANALYSIS AND REDUCTION

The lidar data were analyzed in accordance with Section 2 of Alternate Method 1 (proposed) using the NEIC PDP-11-70 laboratory computer. The

individual opacity values were calculated using the backscatter data recorded on magnetic tape, with the opacity equation given in Section 2.4.1. The associated statistics which includes the standard deviation,  $S_o$ , of each individual opacity value, were calculated using the appropriate equations in Section 2.4.1. The running- or sliding-average,  $\bar{O}_p$ , of the individual opacity values was calculated over the 6-minute averaging interval, given in the New Source Performance Standards (NSPS), according to the requirements of Section 2.4.2.

The number of opacity values included in the running-average is nominally 36 (six measurements/minute for 6 minutes according to the NSPS). The 6-minute interval remains constant although the number of opacity values may vary above or below the nominal. In accordance with the Opacity Data Acceptance/Rejection Criterion in Section 2.4.3, if the standard deviation,  $S_o$ , for a given opacity value is greater than 8% (full scale) then that value is discarded from the running-average set decreasing the total number by one. The number of opacity values in the 6-minute interval may be greater than 36 which is caused by the lidar data rate being set faster than six opacity measurements/minute (one opacity measurement every 10 seconds).

#### DATA PRESENTATION

The opacity values are presented in two separate formats in Section IV of this data analysis report. For each data run the values are given in tabular form followed by graphic plots. An identification header is located across the top of the tabular form which provides the following information:

- EPA-NEIC identification block.
- EPA-NEIC Omega control number (evidentiary parameter).
- Official designation for the stationary source.
- Facility name.
- Facility location.
- Location of the lidar during tests.
- Length of the running average interval.

This tabular presentation provides the applicable data in columns identified as follows:

- Date of data run.
- Time of the opacity measurement (nearest second).
- Opacity values as calculated in %.
- Standard deviation SO ( $S_o$  in Alternate Method 1) in %.
- Individual violation flags, not applicable in Indiana.
- Average opacity (%) calculated over the running-average interval.
- Average standard deviation (%) calculated over the running-average interval.
- Average opacity violation flag, applicable in Indiana.
- Number of opacity values discarded due to the Opacity Data Acceptance/Rejection Criterion (§ 2.4.3 of the Alternate Method 1).

In the average opacity violation column, any violations that occurred over and above the respective 20% (NSPS) average opacity limit are indicated with a flag of four asterisks.

Referring to the first sheet of the tabular data output, Section IV, or the fifth data run, (Omega-0071), the average opacity violation flag (column 8 in the tabular format) does not show up until 6 minutes of data have been averaged. If the average opacity is greater than 20% then the first violation flag occurs at the end of the first 6-minute interval and continues until the average opacity drops below the regulation limit or the data run is completed. This data run began at 12:33:00 and the individual opacity values were nearly all above 20% (column 3). The average opacity (column 6) reads zero until 6 minutes of data have been recorded. At the end of the first 6-minute interval (12:33:00 to 12:38:54) the average opacity was calculated to be 24% and the first average opacity violation flag is indicated.

The running-average permits one to easily locate the 6-minute interval(s) which has the highest average opacity. In the example of the fifth

data run (Omega-0071), the highest average occurred for the 6-minute interval ending at 12:46:54 (sheet 2). However, the first violation occurred for the 6-minute time interval ending at 12:38:54. The next violation does not occur until 6 minutes after 12:38:54 or 12:44:58 which had an average opacity of 33%.

A note of explanation is provided for an occasional zero that may occur in the "Average Opacity" and the "Average SO" columns (column 6 and 7 in the tabular form) after the initial 6 minutes' worth of data required for the running-average has been recorded. The computer data analysis software is programmed so that the 6-minute interval must be maintained to within  $\pm 15$  seconds or the running-average is not calculated for that particular interval. An example is provided in the fourth data run (run beginning at 12:02:13). The running-average violation flag (column 8) is missing at 12:13:42, and the Average Opacity = 0 and Average So = 0. This occurred because the temporal spacing between successive opacity measurements (12:07:39 and 12:08:06) were 27 seconds rather than 15 seconds. During this particular run the lidar's laser was being manually fired (laser usually is fired automatically) and the operator missed activating the laser at the proper time. This can also occur when, in accordance with § 2.2.3 of Alternate Method 1, lidar operation is temporarily suspended to obtain another reference measurement. The computer software places zero for the two average parameters rather than performing the running-average with opacity values of zero for the missing data.

The computer graphical plots, located in Section IV immediately after each respective tabular data set, show the individual opacity values (column 3 of the tabular data set) along with their respective standard deviations as error bars (column 4 of the tabular data set). The standard deviation gives an indication of the magnitude of the error associated with each opacity value due to atmospheric noise along the lidar line-of-sight. The magnitude of the average opacity established in the NSPS is indicated on each plot by the dashed line at the 20% value. Each graphical plot is fixed in time along the horizontal axis, being 10 minutes in length.

The lidar internal calibration data are presented in Table 1 of Section II for each respective observation period as the extreme values that occurred throughout the opacity range given above. A negative value indicates that the lidar was determining opacity low or below the respective standard while a positive value indicates a high value with respect to the standard.

#### IV. DATA ANALYSIS PRESENTATION

OMEGA-0071  
SOUTHERN INDIANA GAS & ELECTRIC COMPANY  
A. B. BROWN STATION  
UNIT NO. 1 STACK  
June 17, 1980, 11:04:50 to 11:20:00

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DENVER, COLORADO 80225

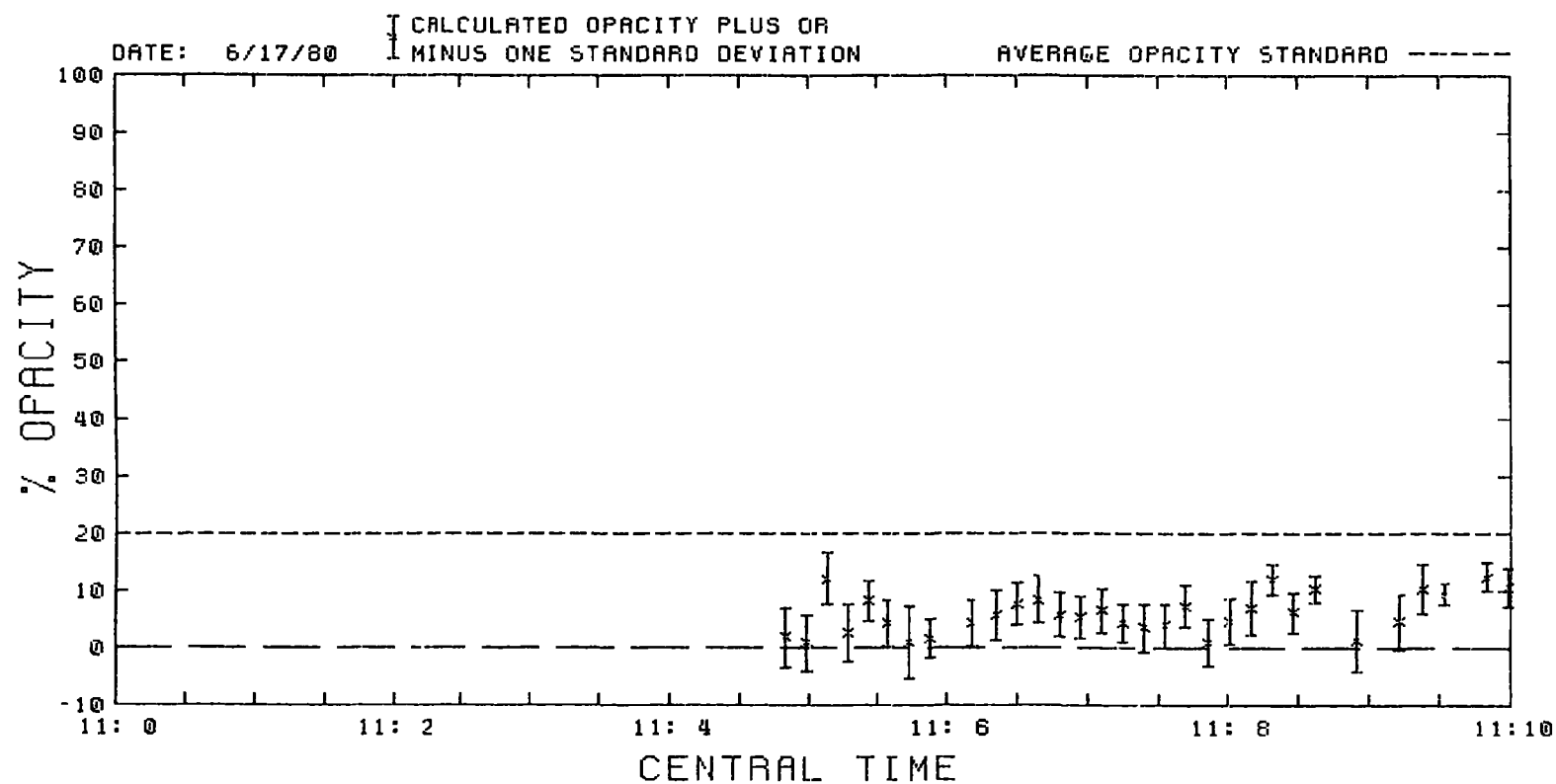
OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	11	4 50	2	5	0	0	0	0F	0
6/17/80	11	4 59	1	5	0	0	0	0F	0
6/17/80	11	5 8	12	5	0	0	0	0F	0
6/17/80	11	5 17	3	5	0	0	0	0F	0
6/17/80	11	5 26	8	4	0	0	0	0F	0
6/17/80	11	5 35	4	4	0	0	0	0F	0
6/17/80	11	5 44	1	6	0	0	0	0F	0
6/17/80	11	5 53	2	3	0	0	0	0F	0
6/17/80	11	6 11	4	4	0	0	0	0F	0
6/17/80	11	6 21	6	4	0	0	0	0F	0
6/17/80	11	6 30	8	4	0	0	0	0F	0
6/17/80	11	6 39	8	4	0	0	0	0F	0
6/17/80	11	6 48	6	4	0	0	0	0F	0
6/17/80	11	6 57	5	4	0	0	0	0F	0
6/17/80	11	7 6	7	4	0	0	0	0F	0
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6/17/80	11	10 8	9	2	0	0	0	0F	0
6/17/80	11	10 17	8	4	0	0	0	0F	0
6/17/80	11	10 26	11	4	0	0	0	0F	0
6/17/80	11	10 36	9	5	6	4	0	0F	35
6/17/80	11	10 45	6	5	6	4	0	0F	36
6/17/80	11	10 54	12	4	7	4	0	0F	36
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6/17/80	11	11 12	7	4	7	4	0	0F	36
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6/17/80	11	12 16	6	4	7	4	0	0F	34
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6/17/80	11	12 43	5	4	7	4	0	0F	34
6/17/80	11	12 52	3	4	7	4	0	0F	34
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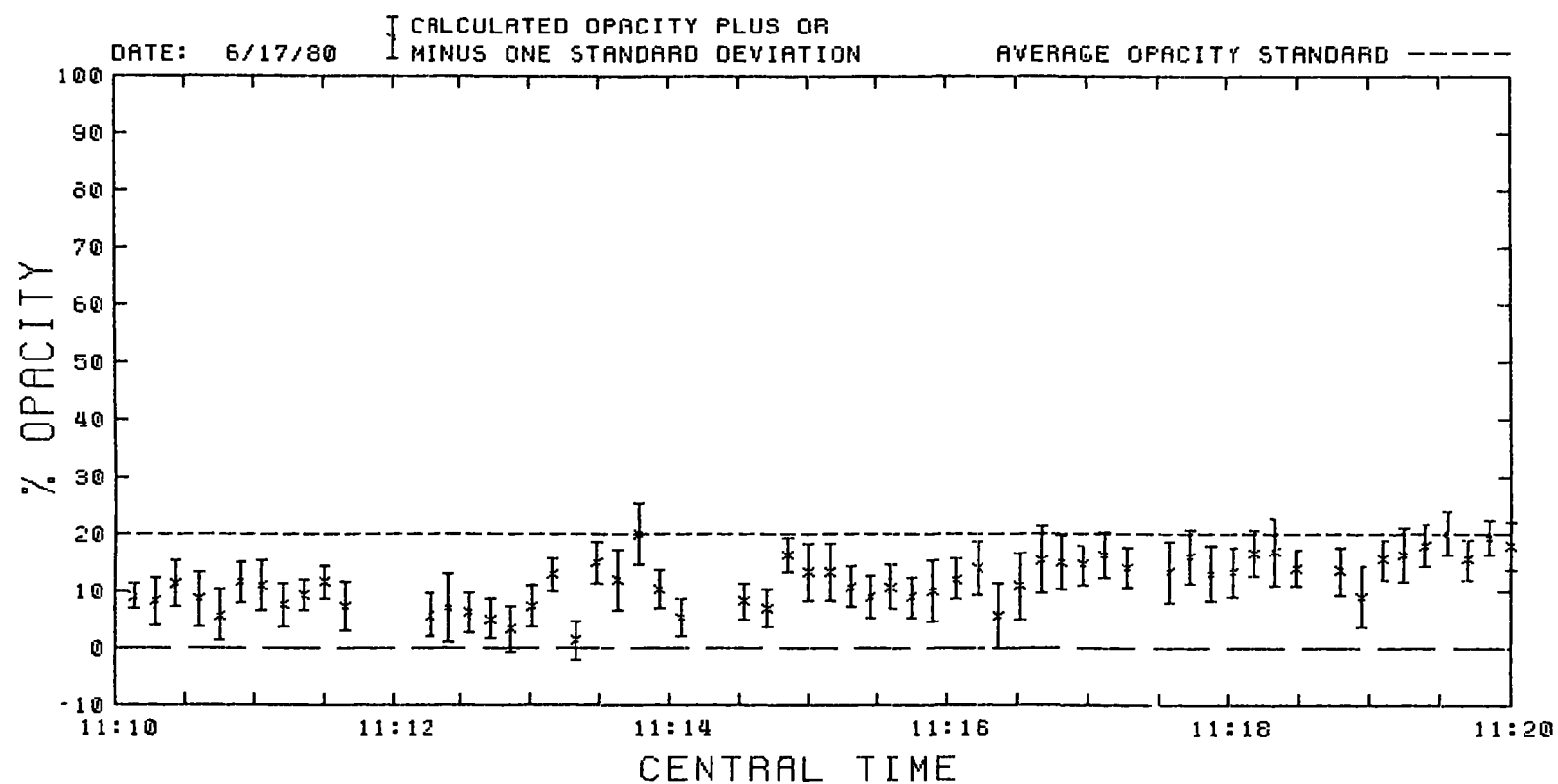
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OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	11 13 29	15	4	8	4	0 OF 34
6/17/80	11 13 38	12	5	8	4	0 OF 34
6/17/80	11 13 47	20	5	8	4	0 OF 34
6/17/80	11 13 56	10	3	9	4	0 OF 34
6/17/80	11 14 5	5	3	9	4	0 OF 34
6/17/80	11 14 32	8	3	9	4	0 OF 32
6/17/80	11 14 42	7	3	9	4	0 OF 32
6/17/80	11 14 51	16	3	9	4	0 OF 33
6/17/80	11 15 0	13	5	9	4	0 OF 33
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6/17/80	11 15 18	11	3	10	4	0 OF 34
6/17/80	11 15 27	9	4	10	4	0 OF 34
6/17/80	11 15 36	11	4	10	4	0 OF 34
6/17/80	11 15 45	9	4	10	4	0 OF 35
6/17/80	11 15 54	10	5	9	4	0 OF 35
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6/17/80	11 16 22	6	6	10	4	0 OF 35
6/17/80	11 16 31	11	6	10	4	0 OF 35
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6/17/80	11 18 11	17	4	11	4	0 OF 37
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6/17/80	11 18 29	14	3	12	4	0 OF 37
6/17/80	11 18 48	14	4	12	4	0 OF 36
6/17/80	11 18 57	9	5	12	4	0 OF 36
6/17/80	11 19 6	16	4	12	4	0 OF 36
6/17/80	11 19 15	16	5	12	4	0 OF 36
6/17/80	11 19 24	18	4	13	4	0 OF 36
6/17/80	11 19 33	20	4	13	4	0 OF 36
6/17/80	11 19 42	16	4	13	4	0 OF 36
6/17/80	11 19 51	19	3	13	4	0 OF 36
6/17/80	11 20 0	18	4	13	4	0 OF 36



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA

OMEGA-0071  
SOUTHERN INDIANA GAS & ELECTRIC COMPANY  
A. B. BROWN STATION  
UNIT NO. 1 STACK  
June 17, 1980, 11:25:35 to 11:40:36

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DENVER, COLORADO 80225

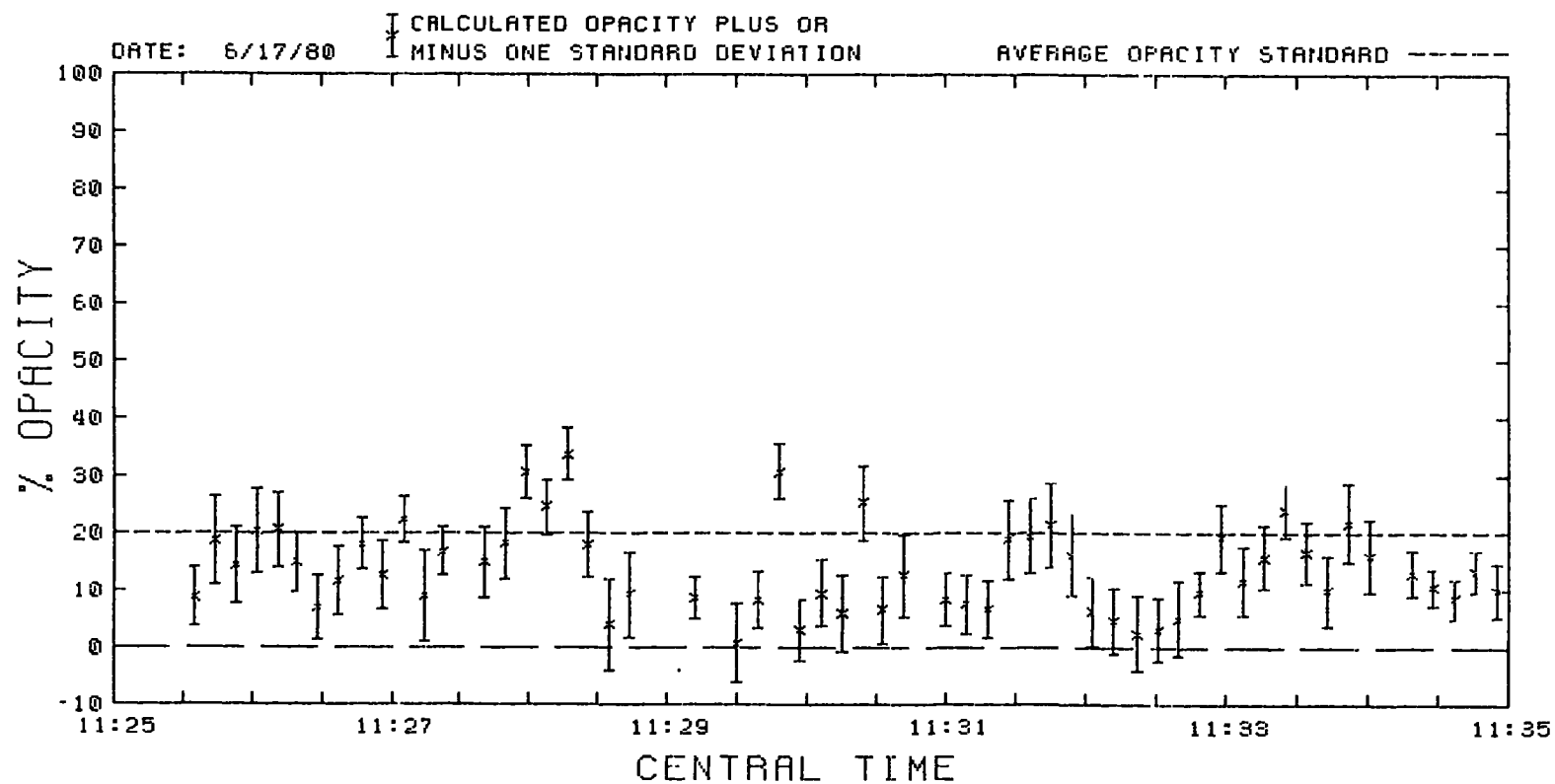
OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

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6/17/80	11 28 8	25	5	0	0	0	0F	0
6/17/80	11 28 17	34	5	0	0	0	0F	0
6/17/80	11 28 26	18	6	0	0	0	0F	0
6/17/80	11 28 35	4	8	0	0	0	0F	0
6/17/80	11 28 44	9	7	0	0	0	0F	0
6/17/80	11 29 12	9	4	0	0	0	0F	0
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6/17/80	11 29 39	8	5	0	0	0	0F	0
6/17/80	11 29 48	31	5	0	0	0	0F	0
6/17/80	11 29 57	3	5	0	0	0	0F	0
6/17/80	11 30 6	9	6	0	0	0	0F	0
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6/17/80	11 30 42	12	7	0	0	0	0F	0
6/17/80	11 31 0	8	5	0	0	0	0F	0
6/17/80	11 31 9	7	5	0	0	0	0F	0
6/17/80	11 31 18	7	5	14	6	0	0F	34
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6/17/80	11 31 45	21	7	15	6	0	0F	35
6/17/80	11 31 54	16	7	15	6	0	0F	35
6/17/80	11 32 3	6	6	14	6	0	0F	35
6/17/80	11 32 12	5	6	14	6	0	0F	35
6/17/80	11 32 22	2	7	14	6	0	0F	35
6/17/80	11 32 31	3	6	13	6	0	0F	35
6/17/80	11 32 40	5	6	13	6	0	0F	35
6/17/80	11 32 49	10	4	13	6	0	0F	35
6/17/80	11 32 58	19	6	13	6	0	0F	35
6/17/80	11 33 7	12	6	13	6	0	0F	35
6/17/80	11 33 16	16	6	13	6	0	0F	35
6/17/80	11 33 25	24	5	13	6	0	0F	35
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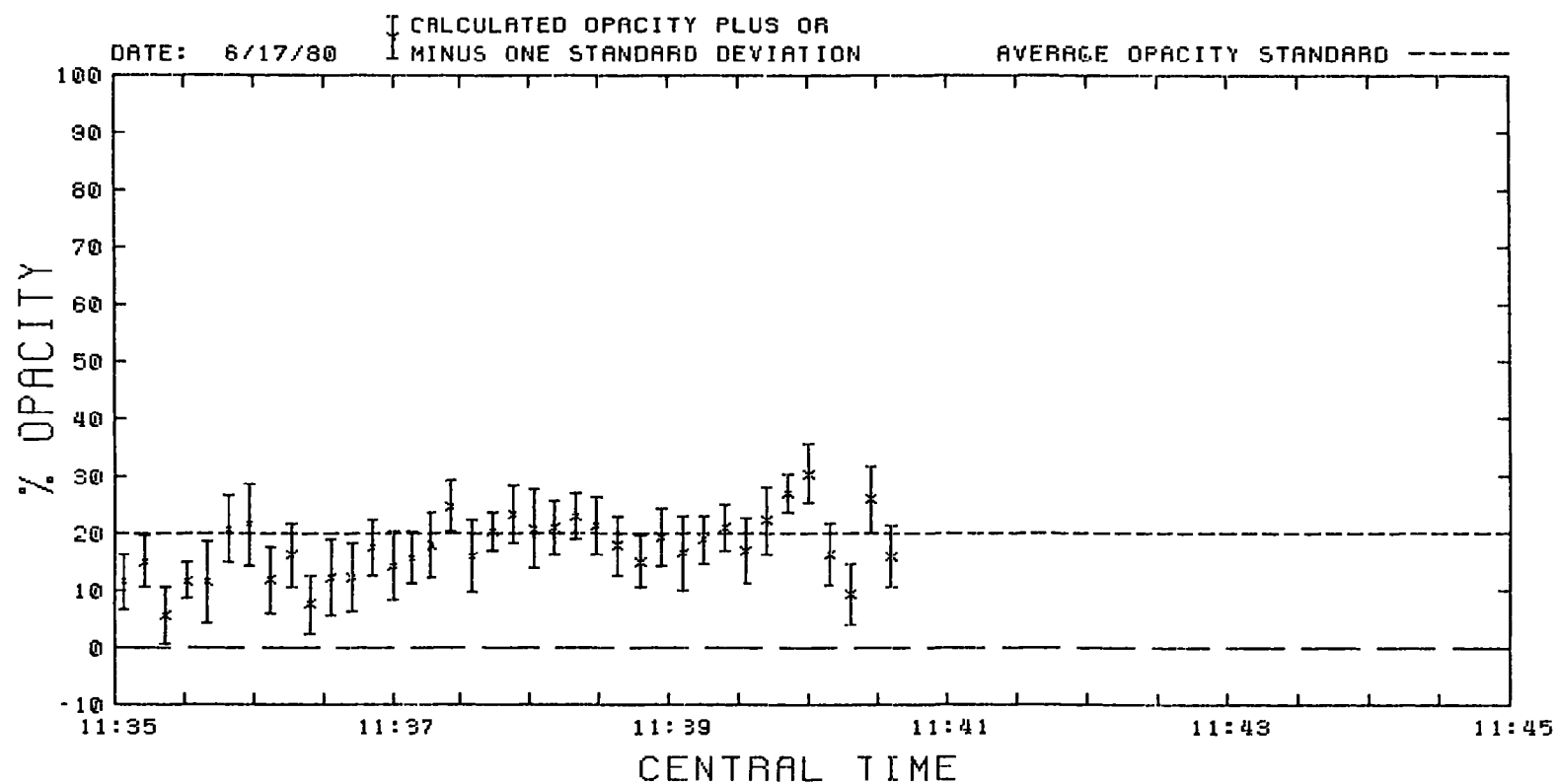
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NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES

DATE	TIME	OPACITY	SO VIOLATION	AVERAGE OPACITY	AVERAGE SO VIOLATION	NUMBER DISCARDED
6/17/80	11 33 52	22	7	13	6	0 OF 36
6/17/80	11 34 1	16	6	13	6	0 OF 36
6/17/80	11 34 19	13	4	12	6	0 OF 35
6/17/80	11 34 28	11	3	12	6	0 OF 35
6/17/80	11 34 37	9	4	12	6	0 OF 35
6/17/80	11 34 46	13	4	0	0	0 OF 0
6/17/80	11 34 55	10	5	12	6	0 OF 36
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6/17/80	11 35 13	15	5	12	6	0 OF 37
6/17/80	11 35 22	6	5	12	6	0 OF 38
6/17/80	11 35 31	12	3	12	5	0 OF 38
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6/17/80	11 35 49	21	6	12	6	0 OF 38
6/17/80	11 35 58	22	7	12	6	0 OF 38
6/17/80	11 36 7	12	6	13	6	0 OF 38
6/17/80	11 36 16	16	6	13	6	0 OF 38
6/17/80	11 36 24	7	5	13	6	0 OF 39
6/17/80	11 36 33	12	7	12	6	0 OF 39
6/17/80	11 36 42	12	6	13	6	0 OF 39
6/17/80	11 36 51	18	5	13	6	0 OF 39
6/17/80	11 37 0	14	6	13	6	0 OF 40
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6/17/80	11 37 17	18	6	13	6	0 OF 40
6/17/80	11 37 26	25	4	14	6	0 OF 40
6/17/80	11 37 35	16	6	14	6	0 OF 40
6/17/80	11 37 44	20	3	14	5	0 OF 40
6/17/80	11 37 53	23	5	14	5	0 OF 40
6/17/80	11 38 2	21	7	14	5	0 OF 40
6/17/80	11 38 11	21	5	14	5	0 OF 40
6/17/80	11 38 20	23	4	15	5	0 OF 40
6/17/80	11 38 29	21	5	15	5	0 OF 40
6/17/80	11 38 38	18	5	15	5	0 OF 40
6/17/80	11 38 48	15	5	16	5	0 OF 40
6/17/80	11 38 57	19	5	16	5	0 OF 40
6/17/80	11 39 6	17	7	16	5	0 OF 40
6/17/80	11 39 15	19	4	16	5	0 OF 40
6/17/80	11 39 24	21	4	16	5	0 OF 40
6/17/80	11 39 33	17	6	16	5	0 OF 40
6/17/80	11 39 42	22	6	16	5	0 OF 40
6/17/80	11 39 51	27	3	17	5	0 OF 40
6/17/80	11 40 0	30	5	17	5	0 OF 40
6/17/80	11 40 9	16	5	17	5	0 OF 40
6/17/80	11 40 18	9	5	17	5	0 OF 41
6/17/80	11 40 27	26	6	17	5	0 OF 41
6/17/80	11 40 36	16	5	17	5	0 OF 41



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA

OMEGA-0071

SOUTHERN INDIANA GAS & ELECTRIC COMPANY

A. B. BROWN STATION

UNIT NO. 1 STACK

June 17, 1980, 11:42:39 to 11:57:20

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

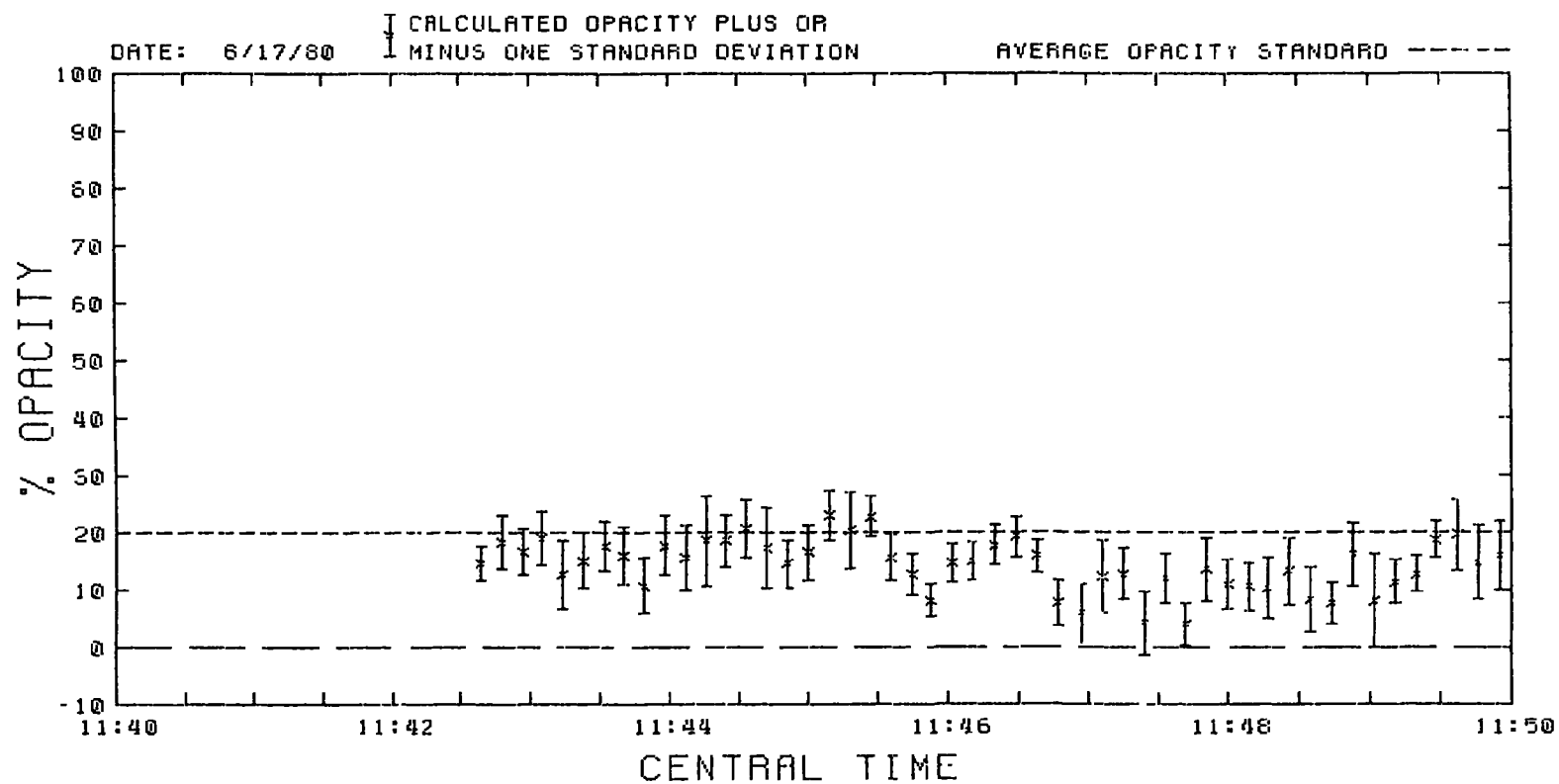
OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES

DATE	TIME	OPACITY	SO VIOLATION	AVERAGE OPACITY	AVERAGE SO VIOLATION	NUMBER DISCARDED
6/17/80	11 42 39	15	3	0	0	0 OF 0
6/17/80	11 42 48	18	5	0	0	0 OF 0
6/17/80	11 42 57	17	4	0	0	0 OF 0
6/17/80	11 43 5	19	5	0	0	0 OF 0
6/17/80	11 43 14	12	6	0	0	0 OF 0
6/17/80	11 43 23	15	5	0	0	0 OF 0
6/17/80	11 43 32	18	4	0	0	0 OF 0
6/17/80	11 43 40	16	5	0	0	0 OF 0
6/17/80	11 43 49	11	5	0	0	0 OF 0
6/17/80	11 43 58	18	5	0	0	0 OF 0
6/17/80	11 44 7	16	6	0	0	0 OF 0
6/17/80	11 44 16	19	8	0	0	0 OF 0
6/17/80	11 44 24	19	4	0	0	0 OF 0
6/17/80	11 44 33	21	5	0	0	0 OF 0
6/17/80	11 44 42	17	7	0	0	0 OF 0
6/17/80	11 44 51	15	4	0	0	0 OF 0
6/17/80	11 45 0	17	5	0	0	0 OF 0
6/17/80	11 45 9	23	4	0	0	0 OF 0
6/17/80	11 45 18	20	7	0	0	0 OF 0
6/17/80	11 45 27	23	4	0	0	0 OF 0
6/17/80	11 45 36	16	4	0	0	0 OF 0
6/17/80	11 45 45	13	4	0	0	0 OF 0
6/17/80	11 45 53	8	3	0	0	0 OF 0
6/17/80	11 46 2	15	3	0	0	0 OF 0
6/17/80	11 46 11	15	3	0	0	0 OF 0
6/17/80	11 46 20	18	3	0	0	0 OF 0
6/17/80	11 46 29	19	3	0	0	0 OF 0
6/17/80	11 46 38	16	3	0	0	0 OF 0
6/17/80	11 46 47	7	4	0	0	0 OF 0
6/17/80	11 46 57	6	5	0	0	0 OF 0
6/17/80	11 47 6	12	6	0	0	0 OF 0
6/17/80	11 47 15	13	5	0	0	0 OF 0
6/17/80	11 47 24	4	6	0	0	0 OF 0
6/17/80	11 47 33	12	4	0	0	0 OF 0
6/17/80	11 47 42	4	4	0	0	0 OF 0
6/17/80	11 47 51	14	6	0	0	0 OF 0
6/17/80	11 48 0	11	4	0	0	0 OF 0
6/17/80	11 48 9	11	4	0	0	0 OF 0
6/17/80	11 48 17	10	5	0	0	0 OF 0
6/17/80	11 48 26	13	6	15	5	0 OF 40
6/17/80	11 48 35	8	6	14	5	0 OF 41
6/17/80	11 48 44	8	4	14	5	0 OF 41
6/17/80	11 48 53	16	5	14	5	0 OF 41
6/17/80	11 49 2	8	8	14	5	0 OF 41
6/17/80	11 49 11	11	4	14	5	0 OF 41
6/17/80	11 49 20	13	3	14	5	0 OF 41
6/17/80	11 49 28	19	3	14	5	0 OF 41
6/17/80	11 49 37	20	6	14	5	0 OF 41
6/17/80	11 49 46	15	6	14	5	0 OF 41
6/17/80	11 49 55	16	6	14	5	0 OF 41

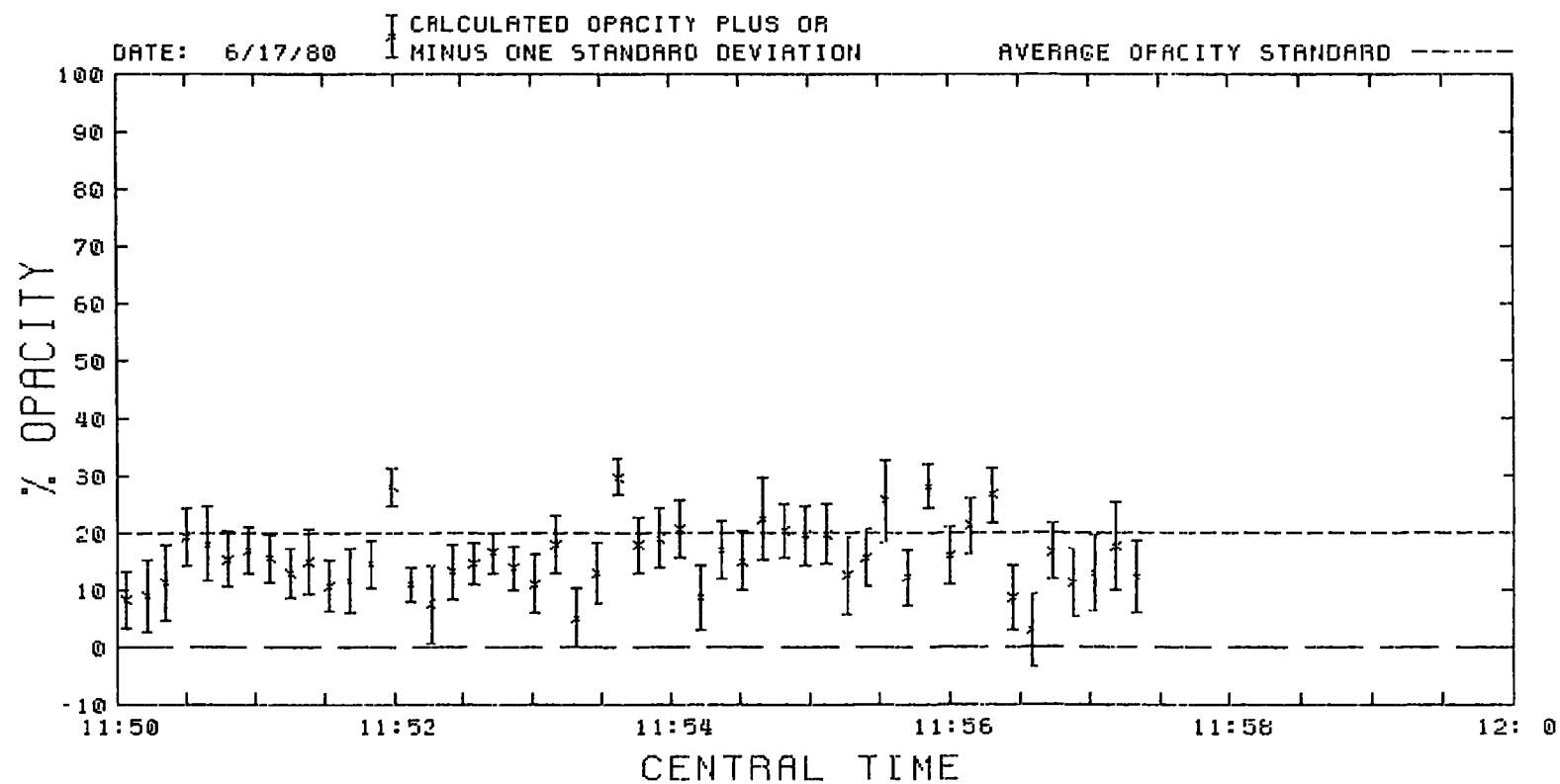
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	11 50 4	8	5	14	5	0 OF	41
6/17/80	11 50 13	9	6	14	5	0 OF	41
6/17/80	11 50 21	11	7	14	5	0 OF	41
6/17/80	11 50 30	19	5	14	5	0 OF	41
6/17/80	11 50 39	18	6	13	5	0 OF	41
6/17/80	11 50 48	15	5	13	5	0 OF	41
6/17/80	11 50 57	17	4	13	5	0 OF	41
6/17/80	11 51 6	16	4	13	5	0 OF	41
6/17/80	11 51 15	13	4	13	5	0 OF	41
6/17/80	11 51 23	15	6	13	5	0 OF	41
6/17/80	11 51 32	11	5	13	5	0 OF	41
6/17/80	11 51 41	12	6	13	5	0 OF	41
6/17/80	11 51 50	15	4	13	5	0 OF	41
6/17/80	11 51 59	28	3	13	5	0 OF	41
6/17/80	11 52 7	11	3	13	5	0 OF	41
6/17/80	11 52 16	7	7	13	5	0 OF	41
6/17/80	11 52 26	13	5	13	5	0 OF	41
6/17/80	11 52 35	15	4	13	5	0 OF	41
6/17/80	11 52 43	17	3	13	5	0 OF	41
6/17/80	11 52 52	14	4	13	5	0 OF	41
6/17/80	11 53 1	11	5	13	5	0 OF	41
6/17/80	11 53 10	18	5	13	5	0 OF	41
6/17/80	11 53 19	5	5	13	5	0 OF	41
6/17/80	11 53 28	13	5	13	5	0 OF	41
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6/17/80	11 53 46	18	5	14	5	0 OF	41
6/17/80	11 53 55	19	5	14	5	0 OF	41
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6/17/80	11 54 13	9	6	14	5	0 OF	41
6/17/80	11 54 22	17	5	14	5	0 OF	41
6/17/80	11 54 31	15	5	15	5	0 OF	41
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6/17/80	11 54 49	20	5	15	5	0 OF	41
6/17/80	11 54 58	20	5	15	5	0 OF	41
6/17/80	11 55 7	20	5	16	5	0 OF	41
6/17/80	11 55 16	12	7	16	5	0 OF	41
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6/17/80	11 55 42	12	5	16	5	0 OF	41
6/17/80	11 55 51	28	4	16	5	0 OF	41
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6/17/80	11 56 27	9	6	17	5	0 OF	41
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6/17/80	11 56 44	17	5	16	5	0 OF	41
6/17/80	11 56 53	11	6	16	5	0 OF	41
6/17/80	11 57 2	13	7	16	5	0 OF	41
6/17/80	11 57 11	18	8	16	5	0 OF	41
6/17/80	11 57 20	12	6	16	5	0 OF	41



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA

OMEGA-0071  
SOUTHERN INDIANA GAS & ELECTRIC COMPANY  
A. B. BROWN STATION  
UNIT NO. 1 STACK  
June 17, 1980, 12:02:13 to 12:16:49

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

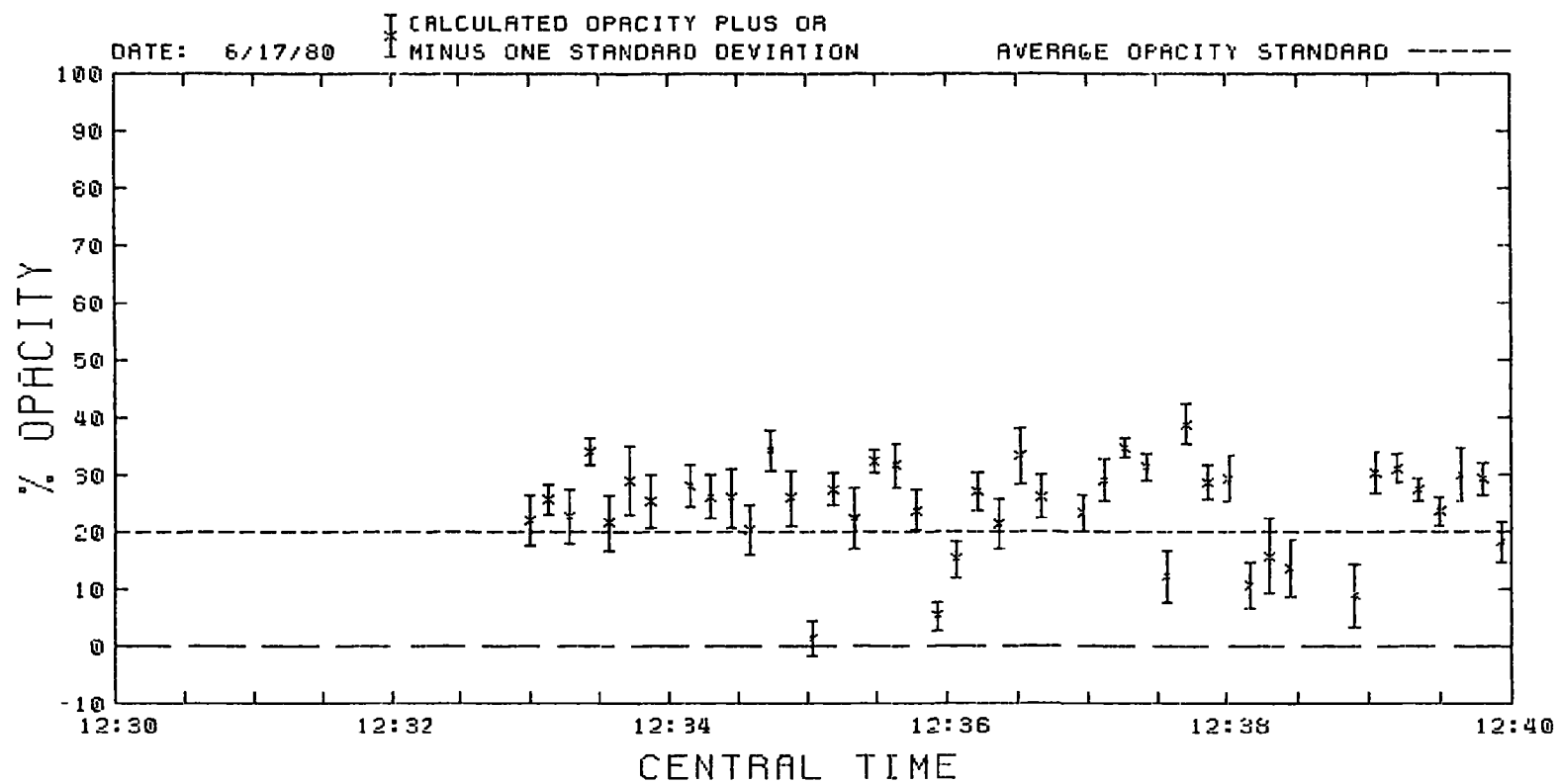
OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

DATE	TIME	OPACITY	SO	VIOLATION	AVERAGE OPACITY	AVERAGE SO	VIOLATION	NUMBER DISCARDED
6/17/80	12 33 0	22	4		0	0		0 OF 0
6/17/80	12 33 8	26	3		0	0		0 OF 0
6/17/80	12 33 17	23	5		0	0		0 OF 0
6/17/80	12 33 26	34	2		0	0		0 OF 0
6/17/80	12 33 34	22	5		0	0		0 OF 0
6/17/80	12 33 43	29	6		0	0		0 OF 0
6/17/80	12 33 52	25	5		0	0		0 OF 0
6/17/80	12 34 9	28	4		0	0		0 OF 0
6/17/80	12 34 18	26	4		0	0		0 OF 0
6/17/80	12 34 27	26	5		0	0		0 OF 0
6/17/80	12 34 35	20	4		0	0		0 OF 0
6/17/80	12 34 44	34	4		0	0		0 OF 0
6/17/80	12 34 53	26	5		0	0		0 OF 0
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6/17/80	12 35 11	27	3		0	0		0 OF 0
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6/17/80	12 35 29	32	2		0	0		0 OF 0
6/17/80	12 35 38	32	4		0	0		0 OF 0
6/17/80	12 35 47	24	4		0	0		0 OF 0
6/17/80	12 35 56	5	2		0	0		0 OF 0
6/17/80	12 36 4	15	3		0	0		0 OF 0
6/17/80	12 36 13	27	3		0	0		0 OF 0
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6/17/80	12 38 18	16	7		0	0		0 OF 0
6/17/80	12 38 27	14	5		0	0		0 OF 0
6/17/80	12 38 54	9	6		24	4	****	0 OF 37
6/17/80	12 39 3	30	4		24	4	****	0 OF 37
6/17/80	12 39 12	31	3		24	4	****	0 OF 37
6/17/80	12 39 21	27	2		24	4	****	0 OF 37
6/17/80	12 39 30	24	2		24	4	****	0 OF 37
6/17/80	12 39 39	30	5		24	4	****	0 OF 37
6/17/80	12 39 48	29	3		24	4	****	0 OF 37
6/17/80	12 39 56	18	4		24	4	****	0 OF 37
6/17/80	12 40 5	27	4		24	4	****	0 OF 38
6/17/80	12 40 14	1	7		24	4	****	0 OF 38
6/17/80	12 40 23	33	3		24	4	****	0 OF 38
6/17/80	12 40 32	29	4		24	4	****	0 OF 38
6/17/80	12 40 40	30	5		24	4	****	0 OF 38
6/17/80	12 40 49	27	5		24	4	****	0 OF 38

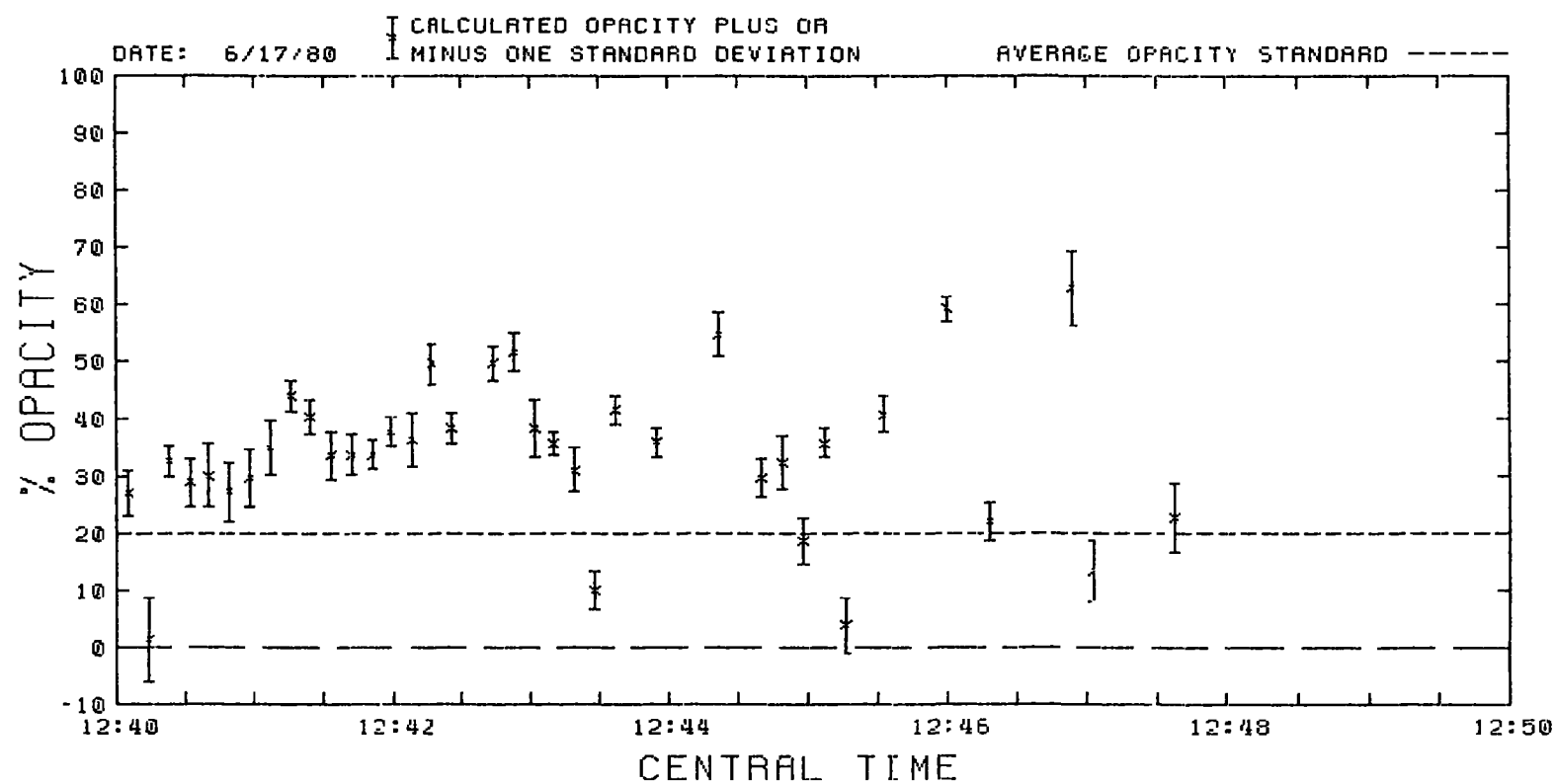
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	12 40 58	30	5	24	4	****	0 OF 38
6/17/80	12 41 7	35	5	25	4	****	0 OF 38
6/17/80	12 41 16	44	3	25	4	****	0 OF 38
6/17/80	12 41 24	40	3	26	4	****	0 OF 38
6/17/80	12 41 33	34	4	26	4	****	0 OF 38
6/17/80	12 41 42	34	3	26	4	****	0 OF 38
6/17/80	12 41 51	34	2	26	4	****	0 OF 38
6/17/80	12 41 59	38	3	27	4	****	0 OF 38
6/17/80	12 42 8	36	5	28	4	****	0 OF 38
6/17/80	12 42 17	50	4	28	4	****	0 OF 38
6/17/80	12 42 26	38	3	29	4	****	0 OF 38
6/17/80	12 42 44	50	3	29	4	****	0 OF 37
6/17/80	12 42 53	52	3	30	4	****	0 OF 38
6/17/80	12 43 2	38	5	30	4	****	0 OF 38
6/17/80	12 43 10	36	2	30	4	****	0 OF 38
6/17/80	12 43 19	31	4	30	4	****	0 OF 38
6/17/80	12 43 28	10	3	30	4	****	0 OF 38
6/17/80	12 43 37	42	2	30	4	****	0 OF 38
6/17/80	12 43 55	36	2	30	4	****	0 OF 37
6/17/80	12 44 22	55	4	32	4	****	0 OF 35
6/17/80	12 44 40	30	3	33	4	****	0 OF 35
6/17/80	12 44 49	32	5	33	4	****	0 OF 36
6/17/80	12 44 58	19	4	33	4	****	0 OF 36
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6/17/80	12 45 33	41	3	33	4	****	0 OF 35
6/17/80	12 46 0	59	2	34	4	****	0 OF 33
6/17/80	12 46 18	22	3	35	4	****	0 OF 32
6/17/80	12 46 54	63	7	37	4	****	0 OF 29
6/17/80	12 47 3	13	5	36	4	****	0 OF 29
6/17/80	12 47 38	23	6	35	4	****	0 OF 26



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA



SIGECO A. B. BROWN STATION, WEST FRANKLIN, INDIANA

OMEGA-0071

SOUTHERN INDIANA GAS & ELECTRIC COMPANY

A. B. BROWN STATION

UNIT NO. 1 STACK

June 17, 1980, 12:33:00 to 12:47:38

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

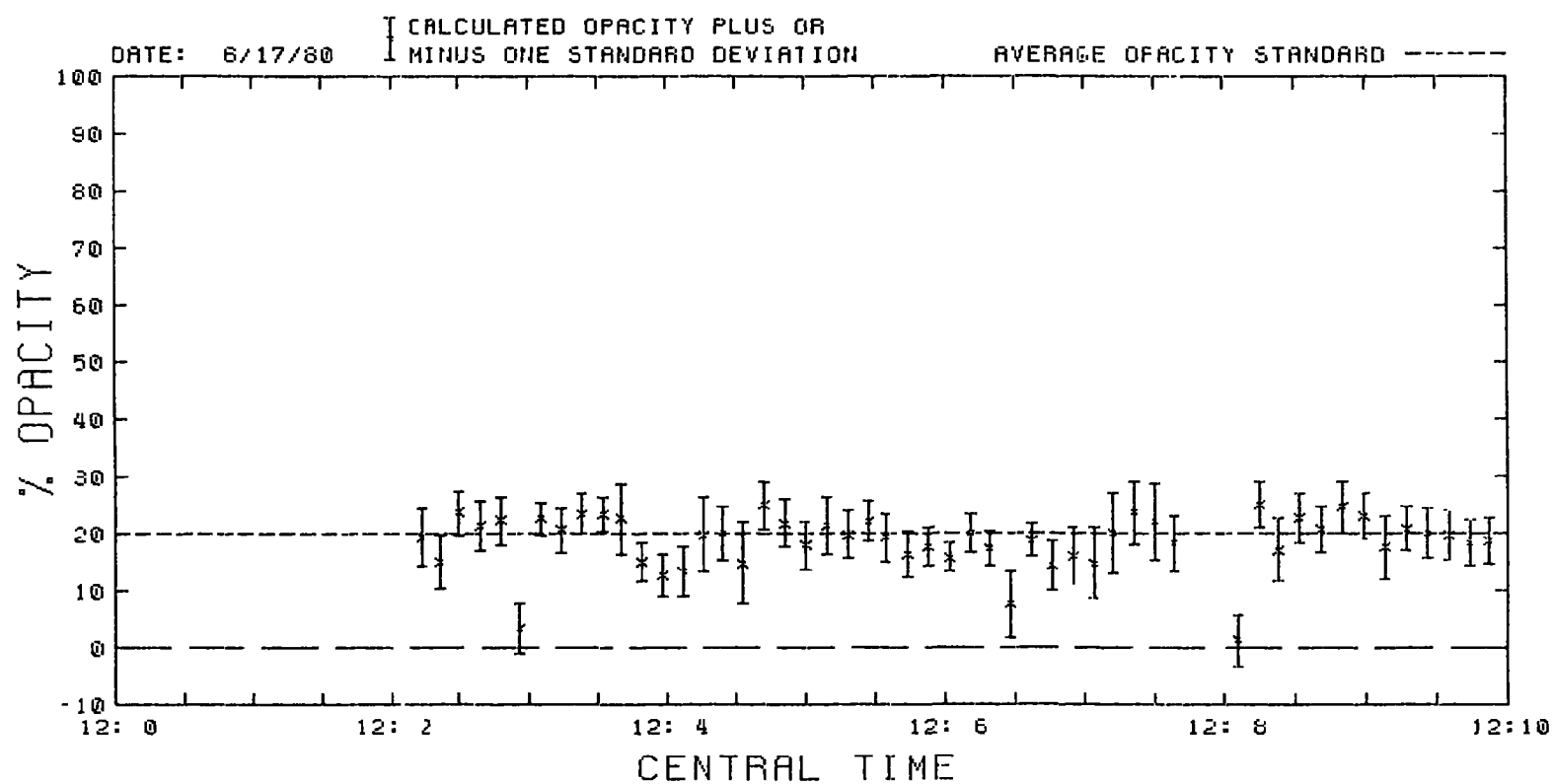
OMEGA-0071, SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	12	2 13	19	5	0	0	0	0	0
6/17/80	12	2 22	15	5	0	0	0	0	0
6/17/80	12	2 30	24	4	0	0	0	0	0
6/17/80	12	2 39	21	4	0	0	0	0	0
6/17/80	12	2 48	22	4	0	0	0	0	0
6/17/80	12	2 56	3	4	0	0	0	0	0
6/17/80	12	3 5	23	3	0	0	0	0	0
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6/17/80	12	3 58	13	4	0	0	0	0	0
6/17/80	12	4 7	13	4	0	0	0	0	0
6/17/80	12	4 16	20	7	0	0	0	0	0
6/17/80	12	4 24	20	5	0	0	0	0	0
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6/17/80	12	6 28	8	6	0	0	0	0	0
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6/17/80	12	6 46	14	4	0	0	0	0	0
6/17/80	12	6 55	16	5	0	0	0	0	0
6/17/80	12	7 4	15	6	0	0	0	0	0
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6/17/80	12	7 39	18	5	0	0	0	0	0
6/17/80	12	8 6	1	5	18	4	0	0	39
6/17/80	12	8 15	25	4	18	4	0	0	39
6/17/80	12	8 23	17	6	18	4	0	0	39
6/17/80	12	8 32	23	4	18	5	0	0	39
6/17/80	12	8 41	21	4	18	4	0	0	39
6/17/80	12	8 50	25	5	18	5	0	0	39
6/17/80	12	8 59	23	4	19	4	0	0	39
6/17/80	12	9 8	18	6	19	5	0	0	39
6/17/80	12	9 17	21	4	19	5	0	0	39
6/17/80	12	9 26	20	4	19	5	0	0	39
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6/17/80	12	9 44	18	4	18	5	0	0	39

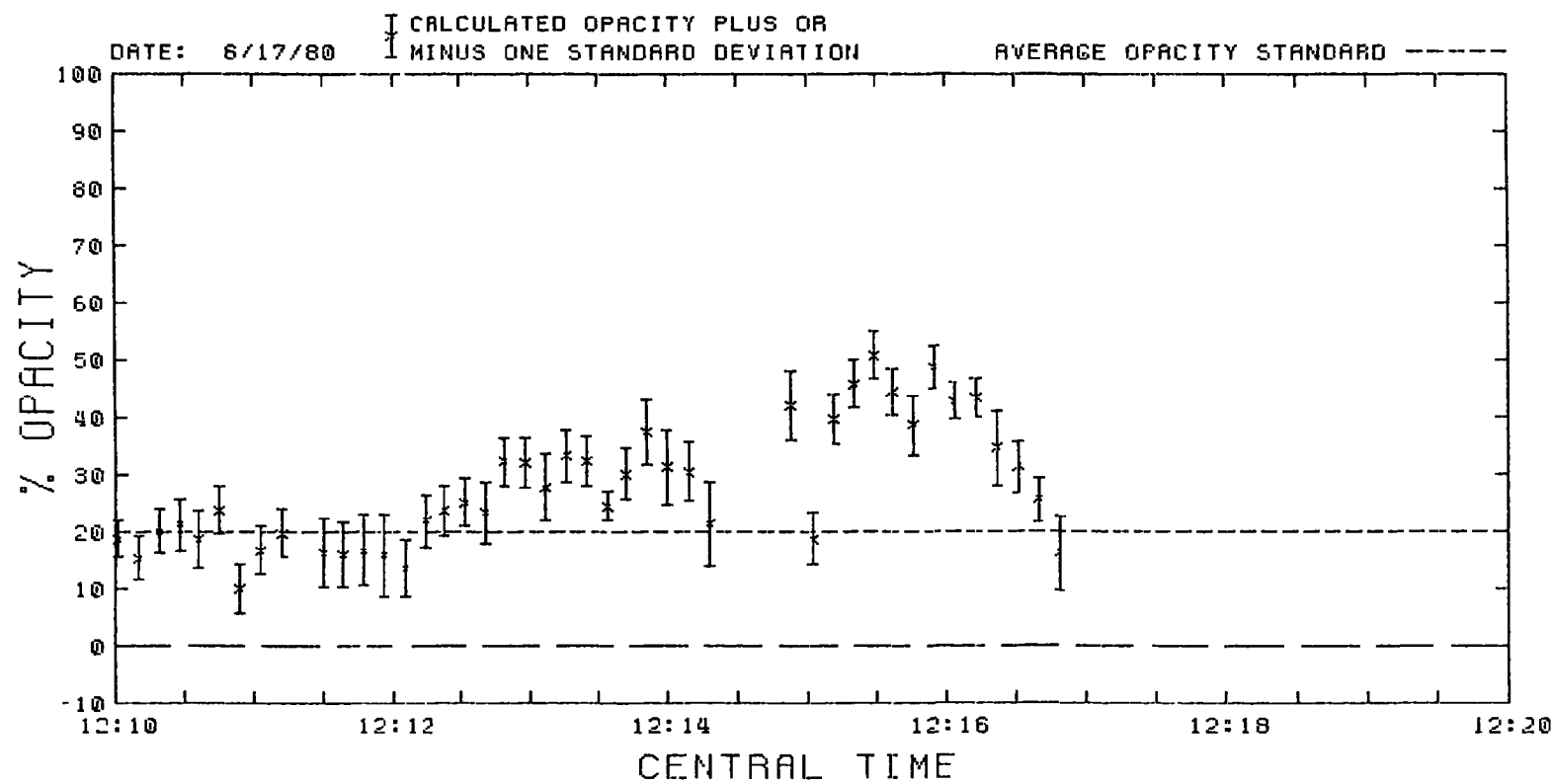
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER  
DENVER, COLORADO 80225

OMEGA-0071. SIGECO A B BROWN STATION, WEST FRANKLIN, IN FROM NORTH OF PLANT SIX MINUTE AVERAGES  
DATE TIME OPACITY SO VIOLATION AVERAGE OPACITY AVERAGE SO VIOLATION NUMBER DISCARDED

6/17/80	12 9 52	19	4		18	5		0 OF 39
6/17/80	12 10 1	19	3		19	5		0 OF 39
6/17/80	12 10 10	15	4		19	5		0 OF 39
6/17/80	12 10 19	20	4		19	4		0 OF 39
6/17/80	12 10 28	21	5		19	4		0 OF 39
6/17/80	12 10 36	19	5		19	4		0 OF 39
6/17/80	12 10 45	24	4		19	4		0 OF 39
6/17/80	12 10 54	10	4		18	4		0 OF 39
6/17/80	12 11 3	17	4		18	4		0 OF 39
6/17/80	12 11 12	20	4		18	4		0 OF 39
6/17/80	12 11 30	16	6		18	4		0 OF 38
6/17/80	12 11 38	16	6		18	5		0 OF 38
6/17/80	12 11 47	17	6		18	5		0 OF 38
6/17/80	12 11 56	16	7		18	5		0 OF 38
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6/17/80	12 12 14	22	5		18	5		0 OF 38
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6/17/80	12 12 32	25	4		19	5		0 OF 38
6/17/80	12 12 41	23	5		19	5		0 OF 38
6/17/80	12 12 49	32	4		19	5		0 OF 38
6/17/80	12 12 58	32	4		20	5		0 OF 38
6/17/80	12 13 7	28	6		20	5	****	0 OF 38
6/17/80	12 13 16	33	5		20	5	****	0 OF 38
6/17/80	12 13 25	32	4		21	5	****	0 OF 38
6/17/80	12 13 34	24	2		21	5	****	0 OF 38
6/17/80	12 13 42	30	5		0	0		0 OF 0
6/17/80	12 13 51	37	6		21	5	****	0 OF 39
6/17/80	12 14 0	31	7		22	5	****	0 OF 40
6/17/80	12 14 9	30	5		22	5	****	0 OF 40
6/17/80	12 14 18	21	7		22	5	****	0 OF 40
6/17/80	12 14 53	42	6		23	5	****	0 OF 37
6/17/80	12 15 2	19	5		23	5	****	0 OF 37
6/17/80	12 15 11	40	4		23	5	****	0 OF 37
6/17/80	12 15 20	46	4		24	5	****	0 OF 37
6/17/80	12 15 29	51	4		25	5	****	0 OF 37
6/17/80	12 15 37	44	4		26	5	****	0 OF 37
6/17/80	12 15 46	39	5		26	5	****	0 OF 37
6/17/80	12 15 55	49	4		27	5	****	0 OF 37
6/17/80	12 16 4	43	3		28	5	****	0 OF 37
6/17/80	12 16 13	43	3		28	5	****	0 OF 37
6/17/80	12 16 22	35	7		29	5	****	0 OF 37
6/17/80	12 16 31	31	5		29	5	****	0 OF 37
6/17/80	12 16 40	26	4		29	5	****	0 OF 37
6/17/80	12 16 49	16	7		29	5	****	0 OF 37



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