

THE UNIVERSITY OF MICHIGAN
COLLEGE OF ENGINEERING
Department of Civil Engineering

Third Progress Report

METEOROLOGICAL INSTALLATION AND ANALYSIS

E. Wendell Hewson

Gerald C. Gill

UMRI Project 2459

under contract with:

PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA

administered by:

THE UNIVERSITY OF MICHIGAN RESEARCH INSTITUTE ANN ARBOR

December 1959

Enigm

UMR

2050

No. 3

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contributions made by Allen H. Murphy and Irwin Spickler in the analysis of data for this report. In addition, acknowledgment is made to Mrs. Sally A. Pugsley, Mrs. Lorraine Stanger, and Miss Louise Straus for preparation of tables; to Mrs. Katalin Racz, Mrs. Dolores Wells, and Robert M. Sawicki for abstraction of the data from the chart rolls, and Nobuhiro Yorsukura and Albert Stohrer for drafting the figures.

TABLE OF CONTENTS

	Page
LIST OF TABLES	vii
LIST OF FIGURES	ix
I. INTRODUCTION	1
A. Coverage	1
B. Additions to the Experimental Installation	1
II. ANALYSIS OF WIND-SPEED AND WIND-DIRECTION DATA	5
A. Wind Direction at Tower Site	6
B. Wind Speed at Tower Site	6
III. ANALYSIS OF TURBULENCE DATA	7
IV. ANALYSIS OF PRECIPITATION DATA	9
V. ANALYSIS OF SO ₂ DATA	11
A. Variation of SO ₂ with Wind Direction and Wind Speed	12
B. Variation of SO ₂ with Time of Day	14
C. Comments and Results of Background Study of SO ₂	14
VI. CONCLUSIONS	17
A. Wind	17
B. Turbulence	17
C. Precipitation	18
D. Sulphur Dioxide	18

LIST OF TABLES

<u>No.</u>	
I-IX	Percentage Frequency of Occurrence of Winds in Various Directions Grouped According to Wind Speeds
X-XIII	Percentage Frequency of Occurrence of Winds in Various Directions, All Speeds, Biased and Unbiased
XIII-XVII	Average Gust Count per Hour
XVIII-XXIV	The Association of Precipitation at Standiford Field, Louisville, Kentucky, with Winds at Public Service Company of Indiana, New Albany, Indiana
XXV-LIV	Sulphur Dioxide Concentrations
LV-LIX	Frequency of Occurrence and Average Concentration of SO ₂ with Various Wind Speeds Grouped According to Wind Direction
LX-LXIV	Frequency of Occurrence and Average Maximum Concentration of SO ₂ with Various Wind Speeds Grouped According to Wind Direction
LXV-LXIX	Frequency of Occurrence and Average Concentration of SO ₂ for All Wind Directions and Wind Speeds Grouped According to Time of Day
LXX-LXXIV	Frequency of Occurrence and Average Maximum Concentration of SO ₂ for All Wind Directions and Wind Speeds Grouped According to Time of Day
LXXV	Number of Hours During Twelve-Month Period (8760 hr) That Average Hourly SO ₂ Concentrations Fell Within Indicated Limits
LXXVI	Number of Hours During Twelve-Month Period (8760 hr) That Average Maximum Hourly SO ₂ Concentrations Fell Within Indicated Limits

LIST OF FIGURES

- No.
- 1 Topographic map of site and surroundings.
 - 2-5 Percentage frequency of occurrence of winds from 16 directions and corresponding wind speed in mph.
 - 6-10 Average gust count per hour by wind directions and wind-speed categories.
 - 11-12 Percentage frequency of occurrence of winds from 16 directions at New Albany plant site and corresponding precipitation from Standiford Field.
 - 13-27 Sulphur dioxide concentration in ppm vs. time of day average concentration and maximum concentration.
 - 28-32 Number of occurrences of SO₂ at Silver Hill for various wind directions in three wind-speed categories; and corresponding average SO₂ concentrations in ppm during such occurrences.
 - 33 Number of occurrences of measurable sulphur dioxide concentration vs. time of the day.
 - 34-35 Number of occurrences and average sulphur dioxide concentrations in ppm at Silver Hill vs. time of the day.
 - 36 Sulphur dioxide concentrations at Silver Hill.

I. INTRODUCTION

A. COVERAGE

This report contains meteorological and sulphur dioxide data obtained at or near the New Albany plant site for the following seasons:

2459-3-P:	winter '57-'58	(1 Dec. '57 - 28 Feb. '58)
	spring '58	(1 Mar. '58 - 31 May '58)
	summer '58	(1 June '58 - 31 Aug. '58)

The two previous reports covered the following seasons:

2459-1-P:	fall '56	(12 Oct. '56 - 30 Nov. '56)
	winter '56-'57	(1 Dec. '56 - 28 Feb. '57)
	spring '57	(1 Mar. '57 - 31 May '57)

(meteorological data and analysis only)

2459-2-P:	summer '57	(1 June '57 - 31 Aug. '57)
	fall '57	(1 Sept. '57 - 30 Nov. '57)

(meteorological and SO₂ data and analysis)

The analysis in this current report has been divided into four sections:

- (1) wind speed and direction
- (2) turbulence
- (3) precipitation
- (4) sulphur dioxide

All data have been analyzed according to season.

A topographic map, Fig. 1, of the plant site and surrounding area has again been included to facilitate comparisons.

B. ADDITIONS TO THE EXPERIMENTAL INSTALLATION

When the 100-ft meteorological tower was erected and instrumented in October, 1956, it was planned to obtain wind, turbulence, and lapse-rate data from it until the first stack was completed. The wind and turbulence measuring instruments were then to be transferred to near the top of the stack—to get more representative data on the air into which the stack gases were emitted—and the temperature measuring equipment was to be installed at selected levels between the ground and the top of the stack.

As the completion of the first stack approached, a meeting of PSCI and University representatives was held in Ann Arbor on January 30, 1958, to discuss the overall project. At that meeting Dr. Hewson pointed out the desirability of having an overlap of meteorological observations from the tower and the stack. He suggested that the University might lend a gust accelerometer and a wind vane to the Public Service Company of Indiana for a year so that wind and turbulence data could be obtained simultaneously from the two sites. At the end of the year, the University would remove its instruments from the stack and transfer the wind instruments belonging to PSCI from the tower to the stack. The need for accurate, reliable temperature-lapse-rate observation was emphasized, and it was proposed to install shielded and aspirated thermocouples at four levels from the ground to the top of the stack, all coupled to a suitable recorder. These proposals were accepted, and plans proceeded for the installation.

During the week of August 17, 1958, the following major additions were completed at the plant site under the direction of Mr. Gill:

- (1) A Hewson-Gill gust accelerometer, recording both gust count and wind speed, was located at 1000 ft M.S.L. (mean sea level) on Stack No. 1, 15 ft out from the wall of the stack and on the WSW side.
- (2) A flat-plate wind vane, recording wind direction, was located adjacent to the gust accelerometer, at a height of 999 ft M.S.L., and an azimuth angle of 248° relative to the center line of the stack.
- (3) Iron-constantan thermojunctions were located at the following levels:
 - (a) 475 ft M.S.L. - about 15 ft above grade level, on one of the support legs of the coal conveyor belt and located about 200 ft south of the plant building.
 - (b) 576 ft M.S.L. - on a boom projecting about 8 ft beyond the east wall of the plant and located about 5 ft above the plant roof near its SE corner.
 - (c) 728 ft M.S.L. - on a boom attached to the lowest walk-around platform of Stack No. 1, and projecting about 11 ft out from the stack wall on the SW side.
 - (d) 993 ft M.S.L. - on a boom attached to the topmost walk-around platform of Stack No. 1, and projecting about 11 ft out from the stack wall on the SSW side.

Each thermojunction was exposed inside of two concentric cylindrical brass radiation shields, chromium-plated and aspirated by a pair of small exhausters. The thermocouple and shields were located on the outer end of each boom; the exhausters (centrifugal blowers) inside a waterproof box on the inside end of the boom. The latter acted not only as a support for the junctions but also

as an air duct for ventilating the junctions. The thermocouple outputs record sequentially the temperature differences between 475 ft M.S.L. and the other three levels.

The recorders and power supplies were located on appropriate shelves mounted on the inside wall of the stack in the Chemical Treatment room at a height of 531 ft M.S.L. The location is dry, relatively free from vibration, and at a relatively constant temperature of about $75 \pm 5^{\circ}\text{F}$ the year around.

Meteorological data obtained from this new stack installation are not included in this current progress report as the installation was completed on August 21, 1958, and the period covered in this report is December 1, 1957, to August 31, 1958.

II. ANALYSIS OF WIND-SPEED AND WIND-DIRECTION DATA

The wind-speed and -direction data for the plant site for the three seasons, winter 1957-1958, spring 1958, and summer 1958 are presented in Tables I, II, III, and Fig. 2. The corresponding data for Standiford Field are presented in Tables IV, V, and VI. Tables VII, VIII, and IX contain eight-year means of Standiford Field wind measurements for the three seasons, winter, spring, and summer from 1 December 1949 - 31 August 1958. Tables X, XI, and XII are designed to remove the bias in wind directions from the previous three tables. Figures 3, 4, and 5 represent the data of Tables I to IX inclusive.

In the two previous reports the general plan of analysis was as follows: The winds for a given season at Standiford Field were compared with the five-year average, 1951-1955, for the same season and same location. If the season under consideration appeared typical at Standiford Field, then the wind distribution at the New Albany plant site was also considered typical. A statistical analysis of the data showed that a longer homogeneous record than five years was necessary to show up the long-term mean wind regime at Standiford Field. So for this report the records from the inception of the station in 1949 were analyzed, giving an eight-year mean for each of the three seasons. These data are presented in Tables VII to XII.

The addition of these three years of data modified the means by a surprisingly small amount. Comparing the eight-year means of Tables VII, VIII, and IX of Report 2459-2-P, we note that:

- (1) the maximum change in frequency of occurrence of wind from any of the 16 points for each of the three seasons was 2.0, 1.4, and 1.8% respectively;
- (2) the maximum change in the average wind speed from any direction was 0.9, 0.9, and 0.6 mph, respectively.

The slightly more accurate seasonal means would not significantly change the conclusions reached on wind in the two previous reports.

Examination of Tables IV to IX and Figs. 3, 4, and 5 shows that seasonal variations of wind direction at Standiford Field from the eight-year means are quite large. In view of this nonrepresentativeness of the individual seasonal means, and in view of the marked differences between Standiford Field winds at 71 ft and the tower winds at 104 ft, it was decided not to make direct comparisons of the data at the two sites at this time. When the wind data at the top of Stack No. 1 become available, comparisons between the three sites may be warranted.

Analysis of the wind observations at the tower site follows:

A. WIND DIRECTION AT TOWER SITE

A bimodal distribution resulting from the presence of the Ohio River Valley continues clearly to dominate the wind regime. Each of the three seasons (winter 1957-1958, and spring and summer 1958) exhibit this distribution, although variations among the seasons are evident.

The winter of 1957-1958 exhibits a strong mode centered on SSW, with approximately 35% of the total observations for the period included in the S-SW sector. However, while a moderate N-NNE mode is present, winds from the W-NW are observed with comparable frequency. This observation indicates that the persistence and intensity of a particular feature of the synoptic pattern during the winter has masked the valley effect.

During the spring of 1958, a strong bimodal distribution may be observed. Of the winds recorded, 48% are found in a NW-NE sector centered on NNE, and an additional 17% occurred in the S-SSW sector. All individual wind directions, other than those included in the two sectors, occurred less than 4% of the time.

The bimodal distribution is again clearly evident during the summer 1958. Thirty-six percent of the winds lie in a S-SW sector while an additional 21% are in the N-NNE sector. Winds with an easterly component (other than NNE) were particularly infrequent during the summer.

B. WIND SPEED AT TOWER SITE

The wind-speed data for the period 1 December 1957 to 31 August 1958 substantiate the conclusions drawn in the second progress report.

Mean wind speeds at the plant site average less than 65% of the speeds observed at Standiford Field during the three seasons. A considerably greater percentage of calm winds are observed at the plant site than at Standiford Field, varying from 10 times as many during the winter 1957-58 to 2-1/2 times as many in the summer 1958. The Ohio Valley is instrumental in reducing the mean wind speed and increasing the frequency of calm winds at the plant site. The high frequency of calm winds found at the plant site may also be partly the result of data-reduction methods which differ from those used by the United States Weather Bureau at Standiford Field.

In general, at the plant site wind speeds associated with a given wind direction are higher in the winter than in the spring and diminish still further in the summer. The wind-speed data also have a somewhat bimodal distribution; the strongest winds come from the NW-NE and S-SW sectors, and the lightest winds, from the E-SE sector.

III. ANALYSIS OF TURBULENCE DATA

Since wind speed and the roughness of topography play a major role in creating turbulence, the gust counts from the gust accelerometer at the meteorological tower site were correlated with wind direction for various wind speeds (Tables XIII-XVII and Figs. 6-10). The wind-speed data are divided into the following categories: 0-3, 4-12, 13-24, 25-31, and 32 and Over mph. These wind-speed categories are the same ones used in the wind-analysis section of this report.

The figures are similar to wind roses except that the lengths of rectangles refer to the magnitude of the average gust count and numbers at the end of each of the radial lines refer to the frequency of occurrence of each of the particular wind directions. There are four roses coinciding with the 0-3-, 4-12-, 13-24-, and 25-31-mph columns in the tables. The number at the center of the 0-3-mph graphs refers to the number of calm occurrences. Since the range of gust counts in each wind-speed category is different, it is necessary to have different scales in each of the graphs. This should be kept in mind when attempting to interpret the figures. The summaries are both seasonal and for the year 1 September 1957 - 31 August 1958.

The variation of gust count with wind direction agreed so closely with the results of the Second Progress Report that it was felt that a discussion of the variation of gust count with each wind direction would merely be a repetition of what was indicated in the Second Progress Report. For this detailed analysis the reader is referred to Report No. 2459-2-P, page 33. Only the general features will be discussed here.

An inspection of the gust count versus the wind-speed and wind-direction summaries reveals the dependence of the magnitude of the gust count upon the topography over which the wind has passed. The roughest topography in the area lies to the west of the meteorological tower: almost without exception the highest gust counts occur with winds from this direction for all wind speeds and all seasons. Winds from the south have gust counts which are consistently below the average value. The trajectory of the south winds is long and flat. The terrain in the southern quadrant is the smoothest in the area. In some respects this is unfortunate for the particular problem at hand as it minimizes the dispersal of SO_2 from the plant site. However, on occasions when there is a moderate inversion with the smoke plume leveled off at some height above Silver Hill and a steady southerly flow of wind, the low value of vertical turbulence will minimize chances of the SO_2 reaching Silver Hill for extended periods.

The location of centers of population seems to exert a marked effect on the gust count. A parcel of air passing over a densely populated area is

heated to some extent resulting in some vertical motion in the air parcel. The winds from the east are thus affected by their passage over Louisville, Kentucky.

Inspection of Table XVII, which summarizes one year, shows the large dependence of gust count on the wind speed. In going from the 0-3-mph to the 4-12-mph category, there is a 60-fold increase in the average gust count; and in going from the 4-12-mph to the 13-24-mph category, there is a 5-fold increase in the average gust count. These figures overemphasize the dependence of gustiness on the wind speed; and as pointed out in Progress Report No. 2459-2-P, this overemphasis is due to the dynamic characteristics of the gust accelerometer. In spite of this limitation, the instrument shows large fluctuations in the gustiness of the wind for various wind directions and average speeds. With high gust counts the turbulence is sure to be large and dispersion good, except when there is an inversion aloft, such as a slowly moving warm frontal inversion below which the stack gases may be trapped.

IV. ANALYSIS OF PRECIPITATION DATA

The role of precipitation in an air-pollution problem is as a scavenger of the atmosphere of particulate and gaseous matter. Thus an analysis of the precipitation regime was undertaken to obtain at least a qualitative picture of the relative importance of this effect. Details of the thinking behind this phase of the study are given on pages 54-55 of Report 2459-2-P.

In that report, wind direction at the tower site was correlated with precipitation measurements at Standiford Field for all measurable amounts of rainfall, excepting traces. In view of the great solubility of SO₂ in water, it was decided subsequently that it would have been better to study the wind data for all times when precipitation was reported, even if it was only a trace—less than .005 in. Accordingly all the new data was so analyzed, and the data from 1 December 1956 - 30 November 1957, reanalyzed to include traces of precipitation. Tables XVIII to XXIV contain the precipitation data for the seven seasons 1 December 1956 to 31 August 1958; and Figs. 11 and 12 are graphical representations of the same data. In these data traces of precipitation accounted for approximately one half of the hours of recorded precipitation in each season.

The following points may be noted:

(1) A tabulation of the frequency of occurrence (percent) of precipitation for the seven seasons is as follows:

<u>Year</u>	<u>Winter</u>	<u>Spring</u>	<u>Summer</u>	<u>Fall</u>
12/1/56-11/30/57	25.0	15.9	8.9	13.2
12/1/57- 8/31/58	25.9	16.2	10.4	

The low frequency of occurrence of precipitation in summer and the much higher frequency in winter were to be expected, but the similarity between the two winter seasons, the two spring seasons, and the two summer seasons was a little surprising.

(2) The two winter seasons each had almost the same number of hours of precipitation, but the similarity almost ends there. In the 1956-1957 valley effects seemed to predominate with high frequencies of wind in the N-NNE sector and the WSW sector. The following winter there was no significant peak in the N-NNE sector but rather in the NW and W sector, but with the WSW peak still remaining.

During the winter season, washout of SO₂ would have no significant effect on vegetation, as it is in the dormant condition; and

it is unlikely that there would be any other visible evidence of SO₂ washout to the untrained observer.

(3) As mentioned in Report 2459-2-P, it appears that in general young plants are less sensitive to SO₂ than are older plants. Middle-aged leaves have been found to be the most sensitive, and older leaves less sensitive. Plants that are susceptible to weak solutions of sulphuric acid will therefore likely suffer the most damage from this acid during the late spring and summer months. Since the frequency of occurrence of precipitation reaches a minimum in the summer, it follows that damage to vegetation on Silver Hill as a result of SO₂ washout is most likely during the late spring and early summer. If no damage due to washout occurs during this period, there is very small likelihood of it occurring during the rest of the year.

The graphs show that, in the spring, precipitation is often accompanied by winds from the N-NNE sector. This is advantageous for Silver Hill since generally the SO₂ would be downriver with these winds, and any washout would occur south of Silver Hill. Winds from the S-SSE which would carry SO₂ over Silver Hill were accompanied by precipitation only about 2% of the time in either spring season. The high peak of occurrence of winds from the WSW in the spring of 1957 (3% of the time) was not repeated in 1958. If the angular width of the plume were great enough and if the winds at the gas-carrying level were the same as at the tower, some of the washout from these conditions would land on Silver Hill. It is then likely that some washout of SO₂ over Silver Hill occurs about 3% of the hours in the spring.

(4) In both summer seasons, valley influences again seem to control the wind during periods of precipitation, with peaks both in the N-NNE and S-SSW sectors. Winds from the S-SSE with precipitation occur about 1% of the time. Assuming that some SO₂ will be carried over Silver Hill when the tower shows SSW winds, it is likely that SO₂ washout on Silver Hill will occur about 2% of the hours during the summer.

(5) As a further development of (3) and (4) above, it is unlikely that SO₂ washout will affect vegetation in the fall or winter if no effect is observed during the late spring and early summer.

(6) Excepting during the winter, vegetation is believed to be the most sensitive indicator of SO₂ washout. If the vegetation shows no evidence of SO₂ washout during the spring and summer, it is doubtful if the untrained observer will see any other evidence of it during these months. When the vegetation is dormant in the winter, severe cases of washout might be evidenced by staining of exposed copper or galvanized pipes and roofing. Significant damage to such metals is considered most improbable, and even staining is unlikely.

V. ANALYSIS OF SO₂ DATA

The complete record of the SO₂ concentrations taken on Silver Hill is presented in Tables XXV-LIV and Figs. 13-27. These cover the period 1 June 1957 to 31 August 1958. Reliable records of SO₂ concentrations were not available until the middle of May, 1957, so 1 June 1957 was selected as the starting date for analysis. In these tables average hourly concentrations are recorded as the upper figure, and peak concentrations as the lower figure, in brackets. In the figures the average hourly concentrations are indicated as the solid blocks and the peak concentrations as the horizontal barbs through the center of the solid blocks.

In Progress Report No. 2459-2-P some analysis of data for the period 1 June 1957 to 30 November 1957 was included, but the complete hourly records were not. These are included here for the sake of completeness. In the analysis that follows, the data for 1 September to 30 November 1957 are repeated to provide one full year of analyzed data—1 September 1957 to 31 August 1958.

In order to indicate the sources of SO₂, the complete year's data have been analyzed for the SO₂ concentration in relation to wind direction: the average SO₂ concentrations versus wind direction are presented in Tables LV-LIX and Figs. 28-32; the peak SO₂ concentrations versus wind direction are given in Tables LX-LXIV. The figures are similar to the wind roses except that the lengths of the rectangles refer to the number of occurrences and the heavy lines refer to the average SO₂ concentrations. The upper number in the center of the 0-3-mph graph is the number of occurrences of calm winds and the lower number in the brackets is the average SO₂ concentration for the calm wind occurrences. There is a separate graph for each of the first three wind-speed categories, 0-3 mph, 4-12 mph, and 13-24 mph. The data are summarized both by seasons and for the full year, 1 September 1957 to 31 August 1958.

To learn if there are periods during the day when SO₂ is more likely to be present at Silver Hill than at other times, each occurrence with its intensity has been tabulated into 48 one-half-hour categories. These are summarized for the four seasons and for the year in Tables LXV-LXIX, and Figs. 33-35. Data on peak concentrations for the same occurrences are tabulated in Tables LXX-LXXIV.

In Fig. 36 the following monthly summaries are illustrated: (1) the number of days per month SO₂ content in the air was recorded at Silver Hill; (2) the total number of hours per month that any SO₂ concentration was present at Silver Hill; and (3) the highest concentration of SO₂ for any one-hour period during the month, and the peak concentration for the month.

In Table LXXV the number of hourly periods when SO₂ concentrations fell

within consecutive categories is recorded. In Table LXXVI the number of hourly periods when the peak SO₂ concentration reached certain limits is recorded.

The tables and figures mentioned above will be discussed in greater detail later on in this section of the Progress Report. The records from the Thomas autometer located on Silver Hill were abstracted at half-hour intervals, using the convention that a concentration of 0.03 ppm or less is considered a "trace." A "trace" has been designated by "T" in the accompanying tables. Concentrations of SO₂ were read in parts per million (ppm), by volume. Abstractions were made of average half-hourly concentrations and also of the maximum half-hourly concentrations. The maximum half-hourly value was defined as the highest concentration that appeared, no matter how short the time, during the half-hour being considered.

A. VARIATION OF SO₂ WITH WIND DIRECTION AND WIND SPEED

There is known to be a definite SO₂ source to the south of Silver Hill in the Rubbertown area of Louisville, Kentucky. One of the purposes of this analysis is to determine if there is any evidence indicating other SO₂ sources than Rubbertown.

Examination of the SO₂ concentrations versus wind speed and wind direction (Tables LV-LXIV and Figs. 28-32) shows what we expected—a definite tendency for SO₂ concentration to occur with winds from the SSE to SSW. But SO₂ concentrations did occur with other wind directions and these occurrences will be discussed below. It should be remembered that the wind observations were taken on a meteorological tower about 2 miles SSW of Silver Hill. Although the instruments on this tower are 100 ft above the valley floor, they are still more than 100 ft below the SO₂ sampling site on Silver Hill.

Our examination of the variation of SO₂ concentration with wind direction indicates that there are two reasons for the occurrence of SO₂ with winds from a direction other than a southerly one.

(1) Trajectory Variations.—The usual chain of events preceding such an observation is as follows:* (a) the wind direction for several hours previous to such an occurrence has been from the S or SSE; (b) a sudden change in wind direction from S or SSE to the direction in question occurs; (c) the wind speed is very low and within the next hour there is not enough mixing taking place to dilute the already present concentration of SO₂; (d) the net result is a wind from the direction in question and a moderate concentration of SO₂ recorded by the autometer. The point to be emphasized is that even though the wind was from the direction in question, the SO₂ had in reality come from the south an hour or so before.

(2) Mid-Morning Fumigation.—On clear nights the ground radiates its heat to outer space and therefore cools, with consequent cooling of the air adjacent

*Progress Report 2459-2-P. page 65.

to it. By the early morning hours the ground may have cooled as much as 25°F below the afternoon maximum and the lower layers of air may have cooled proportionately. Accordingly, as we ascend through such air the temperature rises with height to an elevation of several hundred feet, and then starts to decrease with height. This lower layer is known as the inversion layer and it is marked by its great stability and lack of up-and-down currents. During such periods when the inversion layer is a few hundred feet above the top of the stacks, the SO₂ will rise until its temperature equals that of the surrounding air, at which time it will cease to rise. With little or no vertical movement, the SO₂ forms a plume which fans out in the horizontal only. If southern winds prevail, this layer will move up valley, with no trace of SO₂ appearing at the surface. With a small horizontal atmospheric pressure gradient, the northerly flow of air during the night will often reverse to a light southerly flow during the early hours after dawn. The sun striking the dark ground warms it locally, and the ground heats the air adjacent to it. This locally heated warm air, being lighter than the cooler air surrounding it, rises and leads to low-level up-and-down currents, and mixing of this lower air. As the morning advances, ground-surface temperatures continue to rise; air temperatures near the ground rise correspondingly; and mixing continues to higher and higher levels, until finally the underside of the SO₂ layer is reached. At this time downward moving air currents will bring SO₂ to the ground surface. The maximum SO₂ ground concentration is reached when the whole SO₂ layer that has formed during the night is mixed with the air beneath it and brought to the ground. With continued ground heating the top of the turbulence (or mixing) layer continues to rise, the SO₂ concentration to decrease, until the complete inversion is "burnt off." This explanation of the normal morning "fumigation" was first given by Hewson and Gill. It is therefore not difficult to see why SO₂ could be brought down to Silver Hill with light northerly winds provided that southerly flow had prevailed during the early morning hours.

The relatively high number of occurrences and moderate concentrations of SO₂ associated with calm periods in all seasons may be accounted for by the following reasoning. The SO₂ has drifted into the area with a S or SSE wind, so it is already present at Silver Hill, and for hours thereafter it may be practically calm and therefore no turbulence to dilute the SO₂ content of the air. Thus there is recorded a moderate concentration of SO₂ for these hours at Silver Hill.

Tables LV-LXIV and Figs. 28-32 indicate that as the wind speed increases the only direction from which the SO₂ content increases is a southerly one—thus adding more evidence to the conclusion that the only significant SO₂ source region is to the south of Silver Hill.

The distribution of SO₂ concentrations with wind direction for the fall of 1947, winter of 1957-1958, spring of 1958, and summer of 1958 is in very close agreement with the data analyzed in Progress Report 2459-2-P. All our results point to the conclusion that the only source region is to the south of Silver Hill, in the vicinity of Louisville, Kentucky. There is no definite indication that there is a source associated with winds from any other direction.

B. VARIATION OF SO₂ WITH TIME OF DAY

Atmospheric pollutants usually follow a diurnal cycle in their pattern when viewed from a stationary point. To investigate this pattern, the average SO₂ concentration in ppm was tabulated versus the time of day in half-hour intervals. Tables LXV-LXIX show the frequency of occurrence and average concentration of SO₂ grouped according to the time of day. Figures 33-35 give the visual representations of the previously mentioned tables.

The typical pattern for the diurnal cycle of the concentrations of an atmospheric pollutant is first to rise slowly in the morning to a maximum in mid-morning, then to fall more slowly than it climbed to a minimum in the afternoon, then possibly to rise slightly to a secondary maximum in the early evening and finally to fall to its lowest value late in the evening and early morning.

Figures 33-35 indicate that a peak occurs at about noon at Silver Hill. Except for the winter season this peak in frequency coincided with the peak in concentration of SO₂. This diurnal periodicity for the SO₂ concentration at Silver Hill followed a somewhat typical pattern. In the fall of 1957 the peak occurred at 1100 E.S.T.; in the winter 1957-58 the peak occurred at 1200 to 1400; in the spring of 1958 it was found at 1000 and the summer of 1958 it occurred at 1030 to 1100. In each case the SO₂ concentration fell off from the peak to a relative minimum in the late afternoon. It then usually rose slightly to a secondary maximum in the early evening and finally fell gradually to a low point in the early morning.

The spring and summer of 1958 show an almost ideal pattern for the diurnal cycle of the concentration of an atmospheric pollutant. The fall of 1957 and the winter of 1957-58 differ from the theoretical expectations in the lateness of the arrival of the peak concentration period. The peak concentration period is caused by the breakup of the nocturnal inversion as described earlier in this section.

A possible explanation for the apparent lateness of the peak concentration of SO₂ during the mornings is given in Progress Report 2459-2-P, page 67. Further consideration to this observed phenomenon is being given and will be discussed in the final report.

C. COMMENTS AND RESULTS OF BACKGROUND STUDY OF SO₂

There definitely is SO₂ present in the air in the Silver Hill area but it is not present every day. When it does occur, it is usually in association with winds from the south. Referring to Fig. 35—the hourly occurrences of SO₂—the most frequent period of occurrence is in the midday hours, both seasonally and annually. Average hourly peak concentrations likewise generally occur at this period of day.

Referring to Tables LXV-LXXIV—the frequency of occurrence of average hourly SO₂ concentrations and the frequency of occurrence of maximum SO₂ concentrations—most of the time when SO₂ is present the average concentration is 0.10 ppm or less. It is to be noted, however, that for the year 1 September 1957 - 31 August 1958 the peak SO₂ concentration appearing at any time was 0.50 ppm. With only one year of records, it is probable that SO₂ concentrations exceeding 0.50 ppm have occurred in the past.

In conclusion, we can say that SO₂ has not been recorded continuously at Silver Hill but, rather, it occurs quite sporadically, depending mostly on the wind direction. Under adverse meteorological conditions and a southerly wind flow, SO₂ is recorded on Silver Hill in concentrations rarely exceeding 0.2 ppm with peak excursions up to 0.5 ppm.

Both of these values are below the detectable limits both for humans and plants as given in the tables on pages 63 and 64 of Progress Report 2459-2-P. Thus it is unlikely that any of the residents of Silver Hill were aware of the presence of SO₂ in the area during the 12-month period 1 September 1957 - 31 August 1958.

VI. CONCLUSIONS

A. WIND

Analysis of wind speed and direction observations at Standiford Field and the tower site have shown the following:

- (1) The wind-direction pattern at Standiford Field for the winter season (1 December 1957 - 28 February 1958) and for the spring season (1 March 1958 - 31 May 1958) differed markedly from 8-year means for these seasons. The wind-direction pattern for the summer season (1 June 1958 - 31 August 1958) compared favorably with the 8-year mean. These observations indicate that the wind-direction patterns for the winter and spring seasons were significantly abnormal.
- (2) The predominating influence of the Ohio River Valley in causing high percentages of both up valley and down valley winds at the tower site (104 ft above the valley floor) persisted during these three seasons. The marked differences in wind direction at the tower site and at Standiford Field continued. Mean wind speeds at the tower site (104 ft above ground) continued to be about one-third less than at Standiford Field (71 ft above ground), with the percentage of calms at the tower site being much higher than at Standiford Field.*

Although the tower anemometer is at a height of 104 ft above the relatively flat valley floor, and is located only five-eighths of a mile downriver from the plant site, the representativeness of its readings for winds at the height of the top of the stacks (about 550 ft above the valley floor) becomes more and more questionable. The need for wind observations at or above the top of the stacks became more and more apparent with this analysis.

B. TURBULENCE

Analysis of the gust accelerometer observations continued to show that cross valley winds at the top of the tower had considerably more turbulence than up valley or down valley winds. This is assuredly due to the much rougher terrain over which cross valley winds would pass. It is likely that this tendency will continue to the height of the top of the stacks, with southerly winds being significantly less turbulent than cross valley winds. This may be more advantageous

*Since the gust accelerometer readings substantiated the high frequency of calm conditions indicated by the aerovane, and since both instruments were in good operating condition, the high frequency of calms at the height of the top of the tower is a reliable conclusion.

than otherwise, by reducing the likelihood that mechanical turbulence will bring SO₂ to the ground over Silver Hill with normal south winds. The need for turbulence measurements at the height of the top of the stack continues.

C. PRECIPITATION

Analysis of the times of occurrence of rainfall at Standiford Field with simultaneous winds at the tower site show:

- (1) The most probable time of the year that rain-out or wash-out of SO₂ might possibly affect vegetation in the Silver Hill area is in the late spring or early summer months.
- (2) Southerly winds associated with precipitation that might affect Silver Hill occur only 2 to 3% of the time during the late spring and summer months.
- (3) Other possible indications of SO₂ wash-out or rain-out (such as visible staining of metal roofs) over the Silver Hill area are not likely to occur at any season of the year with the low concentration of SO₂ recorded to date at Silver Hill.

D. SULPHUR DIOXIDE

Analysis of the sulphur dioxide readings on Silver Hill and correlation of these with the wind observations at the top of the tower show the following:

- (1) Excluding calm conditions, over 75% of all occurrences of SO₂ at Silver Hill during the year correspond to wind directions from the S, SE, to SSW. In 85% of these cases the wind speed was 12 mph or less.
- (2) All occurrences of SO₂ at Silver Hill prior to plant operation may be satisfactorily explained as coming from the Rubbertown area. There is no evidence of any other significant source of SO₂ in the area.
- (3) Fall was the season of the year when SO₂ most frequently occurred at Silver Hill. Almost without exception there was a higher frequency of occurrence of SO₂ during the fall for all hours of the day and night; and average concentrations were usually higher than at other seasons of the year. (The single exception that occurred was the high concentration during a single evening fumigation on December 12, 1957, when the SO₂ concentration averaged 0.12 ppm for the three-hour period 1800 to 2100 C.S.T.—about three times the normal peak.)
- (4) The diurnal nature of fumigations was evident with the morning fumigation starting about 0800 C.S.T., reaching a maximum around noon,

and dissipating by mid-afternoon. In the spring and summer months a second fumigation starting in mid-afternoon and lasting until 1900 or 2000 C.S.T. was frequently evident.

- (5) SO₂ concentrations during the spring were the lowest of all four seasons; and the summer season was the next lowest in average concentration. This is favorable since the most sensitive period of vegetation to damage by SO₂ appears to be in the late spring and early summer. Likewise low peak concentration at this time of the year is most desirable since this is the period of the year when people are more likely to be outside their homes on the lawn or in the garden and hence exposed to SO₂.
- (6) These patterns of frequency of occurrence of SO₂ by season and by time of day are likely to continue after the new power plant is put into operation, and if the concentrations do not significantly exceed the concentrations measured to date, there are not likely to be many complaints by residents of Silver Hill.
- (7) With the close proximity of the new plant to Silver Hill, "looping" conditions are likely to occur on warm sunny days in summer, causing short-period high concentrations of SO₂ as individual "loops" of gas strike Silver Hill for a minute or two at a time. Estimations of this peak concentration will be made for the next progress report.
- (8) The peak short-period and the peak one-hour concentration of SO₂ so far measured on Silver Hill occurred on October 21, 1957, with values of 0.50 and 0.35 ppm respectively. Such concentrations may be detected by smell or taste by some individuals but not by others (see Progress Report 2459-2-P, page 63).

TABLE X

PERCENTAGE FREQUENCY OF OCCURRENCE OF WINDS IN VARIOUS DIRECTIONS,
ALL SPEEDS, BIASED AND UNBIASED

Louisville, Kentucky (Standiford Field)

8 Winter Seasons
(1949 - 1957)

Wind Direction	Total Observations			
	Biased Record		Unbiased Record	
	No.	%	No.	%
N	1265	7.2	967	5.6
NNE	597	3.5	932	5.4
NE	1115	6.5	804	4.6
ENE	312	1.8	436	2.5
E	512	2.9	351	2.0
ESE	373	2.2	459	2.6
SE	1564	9.0	1204	6.9
SSE	1297	7.4	1849	10.7
S	2039	11.8	1726	10.0
SSW	1155	6.6	1518	8.8
SW	1431	8.3	1208	7.0
WSW	823	4.8	836	4.8
W	881	5.0	787	4.5
WNW	1118	6.5	1298	7.5
NW	1725	10.0	1472	8.5
NNW	830	4.9	1190	6.9
Calm	<u>291</u>	<u>1.7</u>	<u>291</u>	<u>1.7</u>
Totals	17328	100.1	17328	100.0

TABLE XI

PERCENTAGE FREQUENCY OF OCCURRENCE OF WINDS IN VARIOUS DIRECTIONS,
ALL SPEEDS, BIASED AND UNBIASED

Louisville, Kentucky (Standiford Field)

8 Spring Seasons
(1950 - 1957)

Wind Direction	Total Observations			
	Biased Record		Unbiased Record	
	No.	%	No.	%
N	1338	7.5	982	5.6
NNE	604	3.4	982	5.6
NE	1215	6.9	907	5.1
ENE	472	2.6	639	3.6
E	638	3.6	458	2.6
ESE	416	2.3	555	3.1
SE	1664	9.4	1261	7.1
SSE	1121	6.5	1624	9.2
S	1693	9.6	1415	8.0
SSW	1129	6.3	1450	8.2
SW	1644	9.2	1444	8.2
WSW	1073	6.0	1126	6.4
W	927	5.3	884	5.0
WNW	1174	6.7	1275	7.2
NW	1470	8.2	1266	7.2
NNW	652	3.7	962	5.4
Calm	<u>434</u>	<u>2.5</u>	<u>434</u>	<u>2.5</u>
Totals	17664	99.7	17664	100.0

TABLE XII

PERCENTAGE FREQUENCY OF OCCURRENCE OF WINDS IN VARIOUS DIRECTIONS,
ALL SPEEDS, BIASED AND UNBIASED

Louisville, Kentucky (Standiford Field)

8 Summer Seasons
(1950 - 1957)

Wind Direction	Total Observations			
	Biased Record		Unbiased Record	
	No.	%	No.	%
N	1581	8.9	1242	7.0
NNE	820	4.6	1284	7.3
NE	1229	6.9	913	5.2
ENE	370	2.1	519	2.9
E	680	3.9	454	2.6
ESE	343	1.9	482	2.7
SE	1765	10.0	1331	7.5
SSE	1382	7.9	2024	11.5
S	2002	11.4	1637	9.3
SSW	980	5.6	1406	8.0
SW	1645	9.3	1331	7.5
WSW	812	4.6	944	5.3
W	682	3.8	565	3.2
WNW	531	2.9	572	3.2
NW	1048	5.8	832	4.7
NNW	734	4.1	1068	6.0
Calm	<u>1060</u>	<u>6.0</u>	<u>1060</u>	<u>6.0</u>
Totals	17664	99.7	17664	99.9

TABLE XV

AVERAGE GUST COUNT PER HOUR

New Albany Plant Site
New Albany, Indiana

1 March 1958 - 30 May 1958
(Spring)

Wind Direction	Speed, mph											
	0-3		4-12		13-24		25-31		32 and Over		Average G. C.	No. of Occur.
	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.		
N	1	47	138	105	1259	28						
NNE	5	62	351	210	1214	52						
NE	11	28	538	126	1359	11						
ENE	9	13	496	26	1480	2						
E	8	14	605	7								
ESE	14	12	451	7								
SE	11	18	249	25	2120	5						
SSE	16	27	84	30	1137	8						
S	6	41	116	69	1115	21		3231		5		
SSW	5	55	136	113								
SW	5	26	315	31	1991	9						
WSW	11	20	276	35	1652	3						
W	9	15	393	36	1010	1						
WNW	10	18	478	33	2385	4						
NW	5	16	278	60	1406	11						
NNW	4	18	238	62	990	24						
Calm	0	211										
Totals		641		975		179				5		
Average	5		297		1296			3231				

TABLE XVI

AVERAGE GUST COUNT PER HOUR

New Albany Plant Site
New Albany, Indiana

1 June 1958 - 31 August 1958
(Summer)

Wind Direction	Speed, mph													
	0-3			4-12			13-24			25-31			32 and Over	
	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.	Average G. C.	No. of Occur.		
N	3	96	174	93	1350	3								
NNE	5	90	282	140	980	1								
NE	10	29	411	18										
ENE	7	11	403	8										
E	24	5	411	3										
ESE	20	11	161	2										
SE	13	12	121	5										
SSE	12	27	164	14										
S	5	59	174	116	1024	13								
SSW	3	111	195	254	1351	48	3650	2						
SW	4	52	247	96	1714	9								
WSW	11	42	230	55	195	1								
W	12	24	228	48	1217	2								
WNW	14	34	234	45										
NW	15	23	290	68										
NNW	6	36	126	66	900	1								
Cal'm	0	301												
Totals		963		1031		78					2			
Average	5		217		1310		3650							

TABLE XVIII

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 December 1956 - 28 February 1957
(Winter)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	5.9	58	11.0	2.8
NNE	6.4	123	23.4	5.9
NE	5.2	29	5.5	1.4
ENE	3.6	5	1.0	0.2
E	4.0	1	0.2	0.1
ESE	3.7	7	1.3	0.3
SE	3.8	6	1.1	0.3
SSE	6.1	9	1.7	0.4
S	10.9	23	4.4	1.1
SSW	8.3	87	16.6	4.1
SW	6.4	30	5.7	1.4
WSW	6.1	23	4.4	1.1
W	5.9	18	3.4	0.9
WNW	7.5	19	3.6	0.9
NW	8.7	34	6.5	1.6
NNW	10.0	24	4.6	1.1
Calm	<u>0.0</u>	<u>29</u>	<u>5.5</u>	<u>1.4</u>
Totals		525	99.9	25.0
Average	6.7			

TABLE XIX

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 March 1957 - 31 May 1957
(Spring)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	9.5	35	10.9	1.7
NNE	7.9	48	14.9	2.4
NE	6.0	7	2.2	0.3
ENE	6.2	8	2.5	0.4
E	3.7	3	0.9	0.1
ESE	5.7	10	3.1	0.5
SE	5.6	9	2.8	0.4
SSE	6.2	11	3.4	0.5
S	7.3	25	7.8	1.2
SSW	9.7	60	18.6	3.0
SW	9.1	22	6.8	1.1
WSW	9.6	22	6.8	1.1
W	6.2	16	5.0	0.8
WNW	7.8	9	2.8	0.4
NW	7.0	8	2.5	0.4
NNW	13.3	15	4.7	0.7
Calm	<u>0.0</u>	<u>14</u>	<u>4.3</u>	<u>0.7</u>
Totals		322	100.0	15.9
Average	8.1			

TABLE XX

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 June 1957 - 31 August 1957
(Summer)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	6.0	20	12.0	1.1
NNE	7.4	18	10.8	1.0
NE	6.5	6	3.6	0.3
ENE	4.5	2	1.2	0.1
E	1.0	1	0.6	0.1
ESE		0		
SE	6.0	1	0.6	0.1
SSE	6.3	8	4.8	0.4
S	9.4	19	11.4	1.0
SSW	7.3	34	20.5	1.8
SW	5.0	13	7.8	0.7
WSW	6.7	9	5.4	0.5
W	8.0	6	3.6	0.3
WNW	4.7	7	4.2	0.4
NW	13.0	5	3.0	0.3
NNW	6.8	12	7.2	0.6
Calm	<u>0.0</u>	<u>5</u>	<u>3.0</u>	<u>0.3</u>
Totals		166	99.7	8.9
Average	6.8			

TABLE XXI

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 September 1957 - 30 November 1957
(Fall)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	6.3	7	2.8	0.4
NNE	6.0	10	4.0	0.5
NE	4.0	1	0.4	0.1
ENE		0		
E	5.0	1	0.4	0.1
ESE	4.1	10	4.0	0.5
SE	7.1	16	6.3	0.8
SSE	9.0	48	19.0	2.5
S	12.0	46	18.2	2.4
SSW	9.7	46	18.2	2.4
SW	6.9	18	7.1	0.9
WSW	8.7	15	5.9	0.8
W	8.8	11	4.3	0.6
WNW	8.9	11	4.3	0.6
NW	11.0	6	2.4	0.3
NNW	9.6	5	2.0	0.3
Calm	<u>0.0</u>	<u>2</u>	<u>0.8</u>	<u>0.1</u>
Totals		253	100.1	13.2
Average	8.9			

TABLE XXII

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 December 1957 - 28 February 1958
(Winter)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	10.5	27	5.5	1.4
NNE	7.7	35	7.2	1.9
NE	4.7	7	1.4	0.4
ENE	4.0	5	1.0	0.3
E	5.3	15	3.1	0.8
ESE	4.6	8	1.6	0.4
SE	3.8	5	1.0	0.3
SSE	8.0	12	2.5	0.6
S	15.3	44	9.0	2.3
SSW	11.0	72	14.8	3.8
SW	10.2	34	7.0	1.8
WSW	8.4	18	3.7	1.0
W	8.5	53	10.9	2.8
WNW	8.3	34	7.0	1.8
NW	11.7	70	14.3	3.7
NNW	11.5	30	6.1	1.6
Calm	<u>0.0</u>	<u>19</u>	<u>3.9</u>	<u>1.0</u>
Totals		488	100.0	25.9
Average	9.6			

TABLE XXIII

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 March 1958 - 31 May 1958
(Spring)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	12.5	42	14.5	2.3
NNE	9.2	56	19.3	3.1
NE	8.4	41	14.1	2.3
ENE	5.6	12	4.1	0.7
E	3.0	3	1.0	0.2
ESE	3.5	4	1.4	0.2
SE	4.9	7	2.4	0.4
SSE	7.4	5	1.7	0.3
S	6.9	14	4.8	0.8
SSW	7.0	16	5.5	0.9
SW	5.0	14	4.8	0.8
WSW	6.4	14	4.8	0.8
W	4.5	4	1.4	0.2
WNW	7.2	9	3.1	0.5
NW	5.4	10	3.4	0.6
NNW	11.2	17	5.9	0.9
Calm	<u>0.0</u>	<u>22</u>	<u>7.6</u>	<u>1.2</u>
Totals		290	99.8	16.2
Average	7.7			

TABLE XXIV

THE ASSOCIATION OF PRECIPITATION AT STANDIFORD FIELD, LOUISVILLE,
KENTUCKY, WITH WINDS AT PUBLIC SERVICE COMPANY OF INDIANA,
NEW ALBANY, INDIANA

1 June 1958 - 31 August 1958
(Summer)

Wind Direction	Average Wind Speed During Precipitation, mph	No. of Observations During Precipitation	Hours of Precipitation as Percentage of Total Hours of	
			Precipitation	Wind Observations
N	5.7	16	7.3	0.8
NNE	6.4	14	6.4	0.7
NE	3.2	5	2.3	0.2
ENE	1.7	3	1.4	0.1
E	6.0	1	0.5	0.0
ESE	2.5	2	0.9	0.1
SE	2.0	2	0.9	0.1
SSE	2.8	9	4.1	0.4
S	8.2	21	9.5	1.0
SSW	6.7	50	22.7	2.4
SW	4.6	16	7.3	0.8
WSW	6.2	13	5.9	0.6
W	5.7	9	4.1	0.4
WNW	5.1	12	5.5	0.6
NW	6.8	17	7.7	0.8
NNW	5.8	6	2.7	0.3
Calm	<u>0.0</u>	<u>24</u>	<u>10.9</u>	<u>1.1</u>
Totals		220	100.1	10.4
Average	5.3			

TABLE XXV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 June 1957 - 15 June 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900										T (.05)					
1000										T (.05)	T (.06)				
1100											.08 (.16)				T (.06)
1200											T (.04)				T (.06)
1300													T (.06)		T (.04)
1400													T (.04)		
1500													T (.04)		
1600															
1700															T (.04)
1800															T (.04)
1900											T (T)				
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXVI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 June 1957 - 30 June 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800												T (.05)				
0900						T (.07)	T (.04)					.08 (.13)	.04 (.07)			
1000						T (.07)	T (.04)					.10 (.23)				
1100							T (.05)					.08 (.21)	T (.06)			
1200							T (.06)					T (.05)	T (.06)			
1300							T (T)									
1400													.04 (.06)			
1500																
1600																
1700													T (.05)			
1800						T (.04)										
1900													T (.04)			
2000													.06 (.09)			
2100																
2200																
2300													.04 (.09)			
2400													.04 (.08)			

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXVII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 July 1957 - 15 July 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000			T (.09)												
1100			.13 (.24)												
1200			.16 (.25)									.04 (.09)			
1300			.06 (.12)									.04 (.06)			
1400			T (.11)									T (.05)			
1500												T (.06)			
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXVIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 July 1957 - 31 July 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900				.10 (.19)												
1000				.12 (.18)	T (.07)											
1100				.12 (.16)												
1200				.05 (.10)												
1300				.09 (.11)												
1400				.11 (.14)												
1500				.12 (.14)												
1600				.10 (.12)												
1700				.04 (.10)												
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXIX

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 August 1957 - 15 August 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000		T (.10)													T (.06)
1100		.08 (.11)									T (.07)				.04 (.06)
1200		T (.08)						.06 (.13)							T (.04)
1300								.04 .10							
1400								T (.10)							
1500															
1600															
1700															T (.04)
1800															T (.04)
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXX

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 August 1957 - 31 August 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800												T (.04)				
0900								T (T)				T (.05)				
1000								.05 (.18)				.06 (.09)			T (.06)	
1100								.11 (.19)				.08 (.25)	T (.06)		.13 (.27)	
1200								T (.04)				.18 (.43)	.06 (.12)		.11 (.18)	
1300												.06 (.09)	.04 (.07)		T (T)	
1400												T (T)	T (.04)		T (T)	
1500												T (.05)	T (T)		T (T)	
1600								T (T)				.04 (.06)				
1700												.04 (.06)				
1800												T (T)				
1900												T (T)				
2000												T (T)				
2100												T (T)				
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 September 1957 - 15 September 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000															
1100															
1200															
1300															
1400															
1500	^T (T)														
1600	^T (T)														
1700	^T (.04)														
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 September 1957 - 30 September 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900																
1000																
1100																
1200																
1300																
1400																
1500																
1600																
1700																
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 October 1957 - 15 October 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900													T (.04)	T (.05)	
1000									T (T)				.05 (.07)	T (.04)	
1100								T (.05)	T (.05)	T (T)			.10 (.14)		
1200								T (.05)		T (.04)			T (.05)	.08 (.11)	
1300													T (.07)	T (.05)	
1400													T (T)		
1500															
1600															T (.05)
1700															T (.04)
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXIV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 October 1957 - 31 October 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300								T (.05)								
0400						T (.05)		.04 (.05)								
0500						T (T)		.04 (.10)								
0600	T (.10)					T (.05)										
0700						.04 (.05)										
0800						.06 (.09)										
0900						.06 (.11)	T (.07)	.04 (.10)								
1000						.10 (.13)	T (.07)	.07 (.12)								
1100						.12 (.22)	.05 (.08)	.06 (.10)					T (.05)			
1200						.35 (.50)	.07 (.15)	T (.05)					.06 (.07)			
1300						.32 (.48)	T (T)						T (.05)			
1400						.11 (.20)										
1500						.13 (.17)										
1600						.08 (.15)										
1700						.04 (.10)	T (.05)									
1800							.04 (.06)									
1900							T (T)								T (T)	
2000							.05 (.12)						T (T)			
2100							T (.08)						T (.07)			
2200																
2300						T (T)		.06 (.10)								
2400								T (.05)								

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 November 1957 - 15 November 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100											T (.06)	.08 (.10)	T (.05)		
0200											T (.05)	.08 (.11)			
0300											.06 (.06)	.05 (.10)	T (.05)		
0400		T (.04)									.04 (.08)	T (.07)	.04 (.07)		
0500												T (T)	.04 (.05)		
0600												.04 (.06)	T (.04)		
0700												T (.05)	T (.04)		
0800							T (.04)					T (.06)	T (.04)		
0900						T (.05)	.07 (.11)				.06 (.10)	.04 (.06)			
1000		.04 (.08)				.04 (.06)	.11 (.15)				.06 (.08)	T (.06)			
1100		.10 (.14)				.06 (.11)	.10 (.14)				.04 (.06)	.04 (.13)			
1200		.08 (.11)				.10 (.16)	.08 (.16)				T (.05)	.14 (.21)			
1300		T (.08)				.04 (.08)	.04 (.11)					.11 (.16)			
1400						.06 (.08)	T (T)				T (.04)	.06 (.10)			
1500						T (.06)									
1600						.06 (.06)									
1700						.05 (.07)	.05 (.06)								
1800						T (.06)	T (.06)								
1900											T (.05)				
2000						T (T)					T (.07)				
2100						T (.05)					.07 (.08)	T (.08)			
2200											.06 (.08)	.08 (.11)			
2300										.04 (.05)	.08 (.10)	T (.05)			
2400										.04 (.05)	.07 (.08)	T (.05)			

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXVI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 November 1957 - 30 November 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900								.04 (.12)			.06 (.12)					
1000								.09 (.13)			.08 (.13)					
1100								.05 (.08)			.06 (.09)	.06 (.10)				
1200								T (.05)			.15 (.23)	.06 (.10)				
1300											.14 (.19)	T (.05)				
1400											.04 (.13)					
1500											.08 (.11)					
1600											.08 (.10)	T (.04)				
1700											.06 (.08)	T (.04)				
1800											.07 (.08)					
1900											.04 (.05)	T (.05)				
2000			T (.05)									T (T)				
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXVII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 December 1957 - 15 December 1957

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800						T (.08)									
0900															
1000															
1100						.09 (.15)									
1200		T (T)				.08 (.15)									
1300		.05 (.06)				.10 (.17)									
1400		.07 (.10)				T (.09)									
1500		.08 (.10)				T (.10)									
1600		.06 (.10)				.06 (.09)									
1700						.04 (.08)									
1800												.04 (.13)			
1900												.12 (.18)			
2000												.12 (.15)			
2100												.12 (.14)			
2200												T (.10)			
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXVIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 December 1957 - 31 December 1957

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																T
0300																(T)
0400																T
0500																(T)
0600																T
0700																
0800																
0900																
1000							T (.04)								.04 (.12)	
1100							T (.05)								.12 (.15)	
1200							.09 (.16)						T (.07)		.08 (.13)	
1300							.12 (.15)						T (.04)		.16 (.40)	
1400							.06 (.08)						T (T)		.18 (.41)	
1500							T (.06)									
1600																
1700																
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XXXIX

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 January 1958 - 15 January 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000															
1100															
1200															
1300															
1400															
1500															
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XL

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 January 1958 - 31 January 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300					T (.05)											
0400					T (.06)											
0500					T (.05)											
0600																
0700																
0800					T (T)											
0900					T (T)											
1000					T (.05)											
1100					.08 (.15)						.07 (.15)					
1200					.16 (.22)						.05 (.10)					
1300					.04 (.11)						T (.07)					
1400					T (.06)						T (.05)					
1500					.05 (.08)						T (T)					
1600					T (.05)											
1700					T (.05)											
1800					T (.09)											
1900																
2000					T (T)	T (.04)										
2100						T (.06)										
2200																
2300					T (.05)											
2400					T (T)											

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 February 1958 - 15 February 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900														T (.06)	
1000														T (.07)	
1100														.04 (.08)	
1200															
1300															
1400														T (.04)	
1500														.04 (.06)	
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 February 1958 - 28 February 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900												T (.04)				
1000												.06 (.07)				
1100												.06 (.07)				
1200									T (T)			T (.08)				
1300												.07 (.09)				
1400												.04 (.07)				
1500												T (.04)				
1600																
1700																
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 March 1958 - 15 March 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000															
1100															
1200															
1300															
1400															
1500															
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLIV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 March 1958 - 31 March 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500				T (.04)												
0600				T (T)												
0700				T (T)												
0800				T (.04)												
0900				T (.04)												
1000																
1100			T (T)													
1200			T (T)													
1300																
1400																
1500																
1600																
1700																
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 April 1958 - 15 April 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100		T (.04)													
0200		T (T)													
0300		T (.05)													
0400		T (.05)												T (.10)	
0500		T (T)												T (.04)	
0600															
0700															
0800														T (.06)	T (T)
0900		T (.04)											T (.05)	.04 (.07)	T (.06)
1000		T (.06)											T (.06)	T (.07)	
1100		.09 (.18)												T (.05)	
1200		.06 (.10)													
1300		.04 (.08)													
1400															
1500															
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLVI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 April 1958 - 30 April 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100									T (.04)							
0200									.04 (.06)							
0300									T (.05)							
0400									T (.04)							
0500									T (T)							
0600																
0700							T (T)									
0800							T (T)									
0900							T (.05)	T (T)								
1000			T (T)				T (.05)	T (.05)								
1100			T (.05)					T (.04)								
1200			T (.04)													
1300			T (T)													
1400						T (T)										
1500		T (T)									T (T)					
1600		T (T)														
1700		T (T)						T (T)								
1800								T (.05)								
1900								.05 (.06)								
2000								.05 (.05)								
2100								.04 (.05)								
2200								T (.05)								
2300								T (T)								
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLVII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 May 1958 - 15 May 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900	T (.09)														T (.09)
1000	.08 (.12)													T (.05)	.04 (.08)
1100	T (.09)														
1200											T (.05)				
1300											T (.04)	T (.05)			
1400											T (T)	.06 (.07)			
1500			T (T)								T (T)	.06 (.07)			
1600			T (T)												
1700			T (T)												
1800															
1900		T (T)													
2000		T (T)													
2100			T (T)												
2200		T (.04)													
2300		T (T)													
2400		T (T)													

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLVIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 May 1958 - 31 May 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800												T (.05)				
0900												.06 (.10)				
1000												.10 (.13)			T (T)	
1100												.04 (.08)			T (T)	
1200																
1300		T (.04)								T (T)						
1400	T (T)	.04 (.05)						T (T)		T (.04)					T (T)	
1500	T (.04)	.04 (.05)						.04 (.04)		.04 (.04)					T (T)	T (T)
1600	T (.04)	.04 (.05)						.04 (.04)		T (T)					T (T)	T (T)
1700	T (T)	.05 (.05)						T (T)							T (T)	T (T)
1800	T (T)	.04 (.04)						T (T)								
1900		T (.04)						T (T)								
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE XLIX

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 June 1958 - 15 June 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800												T (.04)			
0900				T (.06)								T (.05)			
1000				.10 (.17)								.06 (.08)			
1100				.15 (.18)								.10 (.13)			
1200				.08 (.14)								.10 (.12)			
1300				.05 (.05)	T (T)	T (T)	T (T)	T (T)				.07 (.08)			
1400		T (.04)		.06 (.08)	T (.04)	T (T)	T (T)	T (T)				.05 (.08)			
1500		T (.04)		.04 (.05)	T (.04)			T (T)	.04 (.04)			.05 (.06)			
1600		T (T)		.05 (.05)	.04 (.05)			T (.04)	.04 (.04)						
1700				.04 (.05)	.04 (.05)			T (T)	.04 (.04)						
1800				.04 (.04)	.04 (.05)			T (.04)	T (.04)						
1900				T (.04)	T (T)			T (T)	T (T)	T (T)					
2000								T (T)	T (.04)						
2100								T (T)	T (.05)						
2200									T (T)						
2300									T (.04)						
2400									T (T)						

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE L

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 June 1958 - 30 June 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600										T (T)						
0700										T (.04)						
0800										T (.04)						
0900										T (.05)						
1000										T (.04)						
1100				T (.04)												
1200				T (.04)												
1300																
1400									T (.04)							
1500									T (.04)							
1600									T (.04)	.05 (.07)						
1700										.07 (.07)						
1800										.04 (.10)						
1900									T (.05)							
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE LI

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 July 1958 - 15 July 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500	T (T)														
0600	T (T)														
0700			T (.04)												
0800															
0900															
1000															T (.11)
1100															T (T)
1200			T (T)												
1300			T (.04)												
1400									T (.04)						
1500															
1600															
1700															
1800															
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE LII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 July 1958 - 31 July 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900																
1000															.04	
1100						T (.05)				T (.05)					.04 (.05)	
1200						.04 (.05)				T (.04)						
1300						T (T)										
1400																
1500									T (T)							
1600																
1700																
1800																
1900										T (.07)						
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE LIII

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

1 August 1958 - 15 August 1958

Hour Ending	Day of Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0100															
0200															
0300															
0400															
0500															
0600															
0700															
0800															
0900															
1000						T (.05)									
1100						T (T)			T (.04)						
1200									T (T)						
1300															
1400															
1500															
1600													.04 (.06)		
1700													.06 (.07)		
1800													T (.05)		
1900															
2000															
2100															
2200															
2300															
2400															

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE LIV

SULPHUR DIOXIDE CONCENTRATIONS*
(parts per million)

Public Service Company of Indiana,
Silver Hill, New Albany, Indiana

16 August 1958 - 31 August 1958

Hour Ending	Day of Month															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0100																
0200																
0300																
0400																
0500																
0600																
0700																
0800																
0900																
1000													T (.04)	T (T)		
1100													T (.05)	.05 (.08)		
1200													.08 (.13)			
1300							.06 (.11)						T (.05)			
1400		T (T)					T (T)									
1500																
1600																
1700																
1800																
1900																
2000																
2100																
2200																
2300																
2400																

*Upper figure is the average concentration for the hour; lower figure is the maximum concentration during the hour.

TABLE LVI

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ WITH VARIOUS WIND SPEEDS
 GROUPED ACCORDING TO WIND DIRECTION

Public Service Company of Indiana
 New Albany, Indiana

1 December 1957 - 28 February 1958
 (Winter)

Wind Direction	Speed, mph					
	0-3	4-12	13-24	25-31	32 and Over	
	Average Conc., ppm	Average Conc., ppm	Average Conc., ppm	Average Conc., ppm	Average Conc., ppm	No. of Occur.
N	T					
NNE	1					
NE	.04					
ENE	T					
E	T					
ESE	T					
SE	.04					
SSE	.08					
S	.05	T	3			
SSW	.06	.06	13			5
SW		.05	2			1
WSW						
W						
WNW						
NW						
NNW						
Calm	T					14

TABLE LXV

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS
 GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
 New Albany, Indiana

1 September 1957 - 30 November 1957
 (Fall)

Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence
0030	.06	3	1230	.08	11
0100	.04	3	1300	.07	9
0130	.04	3	1330	.06	6
0200	.06	2	1400	.04	6
0230	.04	3	1430	.06	4
0300	T	4	1500	.07	4
0330	.04	4	1530	.06	4
0400	T	6	1600	.04	6
0430	.04	4	1630	.04	8
0500	T	3	1700	.04	6
0530	.04	3	1730	.04	4
0600	T	3	1800	.04	2
0630	T	3	1830	.06	2
0700	T	3	1900	T	5
0730	.04	3	1930	T	3
0800	.04	3	2000	T	4
0830	T	7	2030	.04	4
0900	.06	11	2100	.06	2
0930	.07	11	2130	.08	2
1000	.06	12	2200	.05	3
1030	.06	14	2230	.05	4
1100	.06	16	2300	.05	5
1130	.09	15	2330	.04	4
1200	.09	13	2400	.04	3

TABLE LXVI

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS
 GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
 New Albany, Indiana

1 December 1957 - 28 February 1958
 (Winter)

Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence
0030			1230	.06	8
0100			1300	.10	7
0130			1330	.07	8
0200	T	1	1400	.04	8
0230	T	1	1430	.05	6
0300	T	1	1500	.06	4
0330	T	1	1530	.05	3
0400	T	2	1600	.04	3
0430	T	2	1630	.04	2
0500	T	1	1700	T	2
0530			1730	T	1
0600			1800	.08	1
0630			1830	.07	1
0700			1900	.16	1
0730	T	1	1930	.07	2
0800	T	2	2000	.06	2
0830			2030	.07	2
0900	T	3	2100	.07	2
0930	.04	2	2130	.04	1
1000	.04	5	2200		
1030	.06	7	2230	T	1
1100	.08	6	2300	T	1
1130	.08	6	2330	T	1
1200	.07	8	2400	T	1

TABLE LXVII

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS
GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 March 1958 - 31 May 1958
(Spring)

Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence
0030			1230	T	5
0100	T	2	1300	T	6
0130	T	2	1330	T	6
0200	T	2	1400	T	7
0230	T	2	1430	T	9
0300	T	2	1500	T	10
0330	T	2	1530	T	8
0400	T	3	1600	T	8
0430	T	3	1630	T	8
0500	T	1	1700	T	5
0530	T	1	1730	T	4
0600	T	1	1800	T	3
0630	T	1	1830	T	4
0700	T	2	1900	T	3
0730	T	4	1930	T	2
0800	T	5	2000	.05	1
0830	.04	4	2030	T	2
0900	.04	8	2100	T	2
0930	.05	8	2130	T	2
1000	.04	10	2200	T	2
1030	.04	8	2230	T	3
1100	T	8	2300	T	2
1130	T	5	2330	T	2
1200	T	6	2400	T	1

TABLE LXVIII

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS
GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 June 1958 - 31 August 1958
(Summer)

Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence
0030			1230	.04	7
0100			1300	T	9
0130			1330	T	9
0200			1400	T	8
0230			1430	T	8
0300			1500	T	7
0330			1530	T	8
0400			1600	.04	6
0430		1	1630	.05	6
0500	T	1	1700	.04	6
0530	T	2	1730	.04	6
0600	T	1	1800	T	5
0630	T	2	1830	T	6
0700	T	1	1900	T	7
0730	T	1	1930	T	2
0800	T	2	2000	T	2
0830	T	3	2030	T	2
0900	T	3	2100	T	2
0930	.04	5	2130	T	1
1000	.04	8	2200	T	1
1030	.05	9	2230	T	1
1100	.05	9	2300	T	1
1130	.06	7	2330	T	1
1200	.06	5	2400	T	1

TABLE LXIX

FREQUENCY OF OCCURRENCE AND AVERAGE CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS
GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 September 1957 - 31 August 1958
(One-Year Summary)

Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Concentration, ppm	Frequency of Occurrence
0030	.06	3	1230	.05	31
0100	T	5	1300	.05	31
0130	T	5	1330	.04	29
0200	T	5	1400	T	29
0230	T	6	1430	T	27
0300	T	7	1500	T	25
0330	T	7	1530	T	23
0400	T	11	1600	T	23
0430	T	10	1630	T	24
0500	T	6	1700	T	19
0530	T	6	1730	T	15
0600	T	5	1800	T	11
0630	T	6	1830	T	13
0700	T	6	1900	T	16
0730	T	9	1930	T	9
0800	T	12	2000	.04	9
0830	T	14	2030	.04	10
0900	.04	25	2100	.04	8
0930	.06	26	2130	.04	6
1000	.05	35	2200	T	6
1030	.05	38	2230	T	9
1100	.05	39	2300	T	9
1130	.07	33	2330	T	7
1200	.07	32	2400	T	5

TABLE LXX

FREQUENCY OF OCCURRENCE AND AVERAGE MAXIMUM CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS
AND WIND SPEEDS GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 September 1957 - 30 November 1957
(Fall)

Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence
0030	.07	3	1230	.12	11
0100	.07	3	1300	.11	9
0130	.06	3	1330	.09	6
0200	.08	2	1400	.07	6
0230	.07	3	1430	.09	4
0300	.06	4	1500	.08	4
0330	.06	4	1530	.08	4
0400	.05	6	1600	.06	6
0430	.05	4	1630	.06	8
0500	T	3	1700	.04	6
0530	.07	3	1730	.06	4
0600	.05	3	1800	.07	2
0630	.05	3	1830	.03	2
0700	.04	3	1900	.04	5
0730	.06	3	1930	.05	3
0800	.06	3	2000	.05	4
0830	.06	7	2030	.07	4
0900	.08	11	2100	.08	2
0930	.10	11	2130	.09	2
1000	.07	12	2200	.06	3
1030	.08	14	2230	.07	4
1100	.09	16	2300	.06	5
1130	.13	15	2330	.06	4
1200	.13	13	2400	.06	3

TABLE LXXI

FREQUENCY OF OCCURRENCE AND AVERAGE MAXIMUM CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS
AND WIND SPEEDS GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 December 1957 - 28 February 1958
(Winter)

Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence
0030			1230	.10	8
0100			1300	.13	7
0130			1330	.11	8
0200	T	1	1400	.07	8
0230	T	1	1430	.07	6
0300	.05	1	1500	.07	4
0330	.04	1	1530	.08	3
0400	.04	2	1600	.06	3
0430	T	2	1630	.06	2
0500	.04	1	1700	.05	2
0530			1730	.09	1
0600			1800	.13	1
0630			1830	.10	1
0700			1900	.18	1
0730	T	1	1930	.08	2
0800	.05	2	2000	.09	2
0830			2030	.10	2
0900	.04	3	2100	.10	2
0930	.07	2	2130	.10	1
1000	.07	5	2200		
1030	.09	7	2230	.04	1
1100	.11	6	2300	.05	1
1130	.11	6	2330	T	1
1200	.11	8	2400	T	1

TABLE LXXII

FREQUENCY OF OCCURRENCE AND AVERAGE MAXIMUM CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS
AND WIND SPEEDS GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 March 1958 - 31 May 1958
(Spring)

Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence
0030			1230	T	5
0100	.04	2	1300	T	6
0130	.04	2	1330	.04	6
0200	T	2	1400	T	7
0230	.04	2	1430	T	9
0300	.05	2	1500	T	10
0330	.04	2	1530	T	8
0400	.06	3	1600	T	8
0430	T	3	1630	T	8
0500	.04	1	1700	T	5
0530	T	1	1730	T	4
0600	T	1	1800	.04	3
0630	T	1	1830	T	4
0700	T	2	1900	T	3
0730	T	4	1930	T	2
0800	.04	5	2000	.05	1
0830	.06	4	2030	T	2
0900	.06	8	2100	T	2
0930	.07	8	2130	T	2
1000	.06	10	2200	.04	2
1030	.07	8	2230	T	3
1100	.04	8	2300	T	2
1130	.05	5	2330	T	1
1200	.04	6	2400		

TABLE LXXIII

FREQUENCY OF OCCURRENCE AND AVERAGE MAXIMUM CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS
AND WIND SPEEDS GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 June 1958 - 31 August 1958
(Summer)

Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence
0030			1230	.05	7
0100			1300	.04	9
0130			1330	T	9
0200			1400	.04	8
0230			1430	T	8
0300			1500	.04	7
0330			1530	.04	8
0400			1600	.05	6
0430			1630	.05	6
0500			1700	.04	6
0530			1730	.05	6
0600			1800	.04	5
0630			1830	T	6
0700			1900	T	7
0730			1930	T	2
0800			2000	T	2
0830			2030	T	2
0900			2100	T	2
0930			2130	T	1
1000			2200	T	1
1030			2230	.04	1
1100			2300	.04	1
1130			2330	T	1
1200			2400	T	1
	T	1			
	T	1			
	T	2			
	T	1			
	T	2			
	T	1			
	T	1			
	.04	2			
	.04	1			
	T	2			
	.04	3			
	.04	3			
	.06	5			
	.06	8			
	.07	9			
	.07	9			
	.08	7			
	.07	5			

TABLE LXXIV

FREQUENCY OF OCCURRENCE AND AVERAGE MAXIMUM CONCENTRATION OF SO₂ FOR ALL WIND DIRECTIONS AND WIND SPEEDS GROUPED ACCORDING TO TIME OF DAY

Public Service Company of Indiana
New Albany, Indiana

1 September 1957 - 31 August 1958
(One-Year Summary)

Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence	Time (half hour period ending)	Average Maximum Concentration, ppm	Frequency of Occurrence
0030	.07	3	1230	.08	31
0100	.06	5	1300	.08	31
0130	.05	5	1330	.06	29
0200	.04	5	1400	.05	29
0230	.05	6	1430	.04	27
0300	.06	7	1500	.04	25
0330	.05	7	1530	.04	23
0400	.05	11	1600	.04	23
0430	T	10	1630	.04	24
0500	T	6	1700	T	19
0530	.04	6	1730	.05	15
0600	.04	5	1800	.05	11
0630	.04	6	1830	T	13
0700	T	6	1900	T	16
0730	T	9	1930	.04	9
0800	.05	12	2000	.05	9
0830	.06	14	2030	.05	10
0900	.06	25	2100	.05	8
0930	.08	26	2130	.05	6
1000	.06	35	2200	.05	6
1030	.08	38	2230	.05	9
1100	.08	39	2300	.05	9
1130	.10	33	2330	.04	7
1200	.10	32	2400	.04	5

TABLE LXXV

NUMBER OF HOURS DURING TWELVE-MONTH PERIOD (8760 HR) THAT AVERAGE
HOURLY SO₂ CONCENTRATIONS FELL WITHIN INDICATED LIMITS

Public Service Company of Indiana
New Albany, Indiana

1 September 1957 - 31 August 1958
(One-Year Summary)

<u>ppm</u>	
T -.05	343
.05-.10	74
.11-.20	
.21-.30	2
.31-.40	
.41-.50	—
Total	436

TABLE LXXVI

NUMBER OF HOURS DURING TWELVE-MONTH PERIOD (8760 HR) THAT AVERAGE
MAXIMUM HOURLY SO₂ CONCENTRATIONS FELL WITHIN INDICATED LIMITS

Public Service Company of Indiana
New Albany, Indiana

1 September 1957 - 31 August 1958
(One-Year Summary)

<u>ppm</u>	
T -.05	255
.05-.10	117
.11-.20	56
.21-.30	4
.31-.40	1
.41-.50	<u>3</u>
Total	436

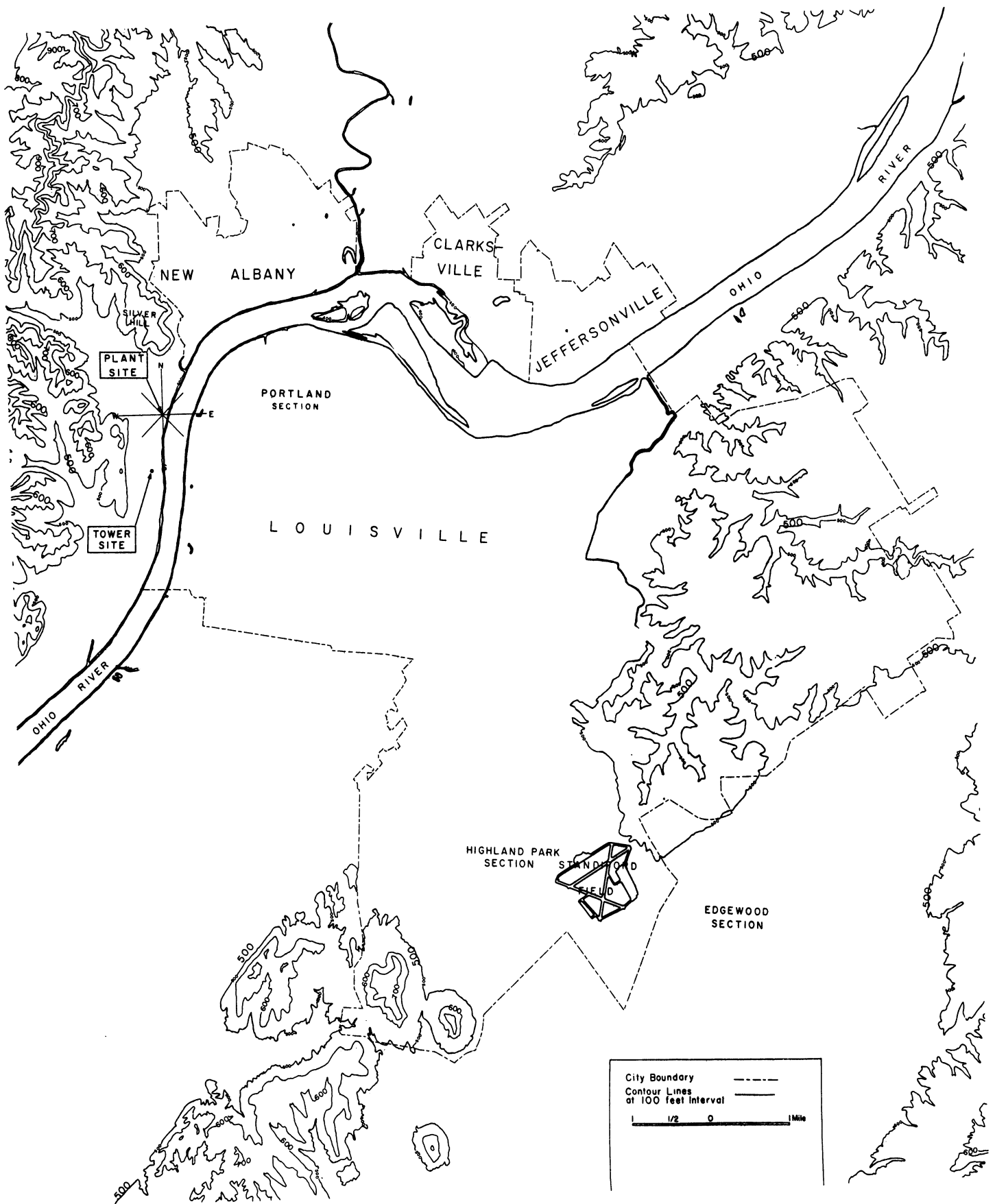
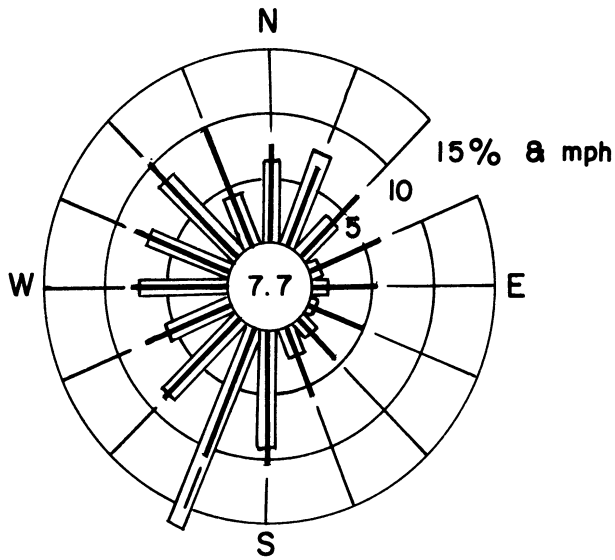
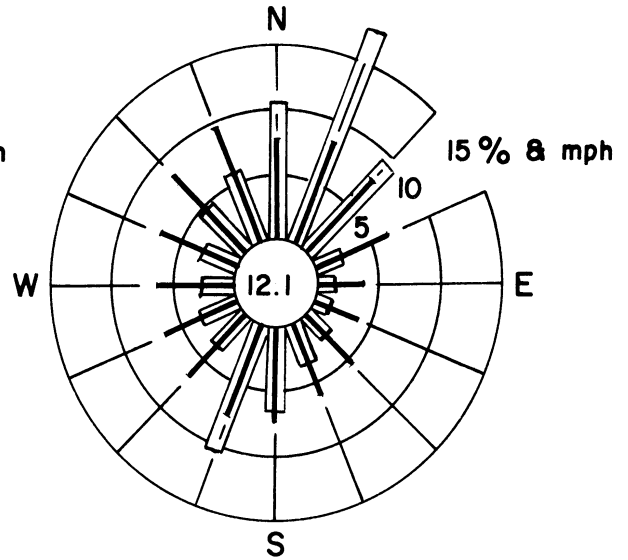


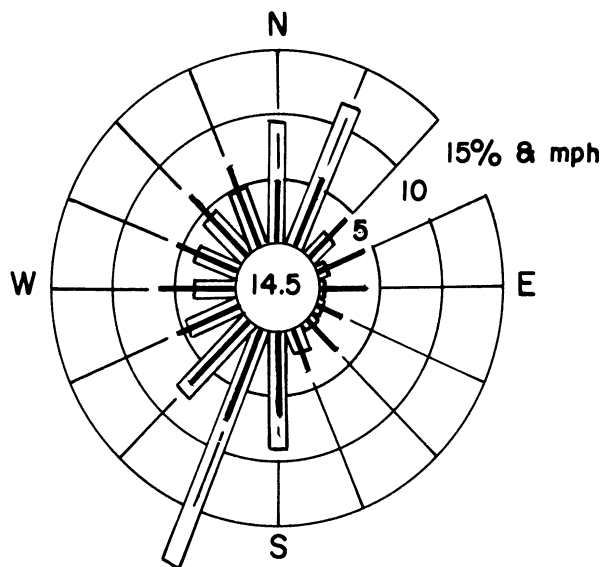
Fig. 1. Topographic map of site and surroundings.



1 December 1957 - 28 February 1958
(Winter)



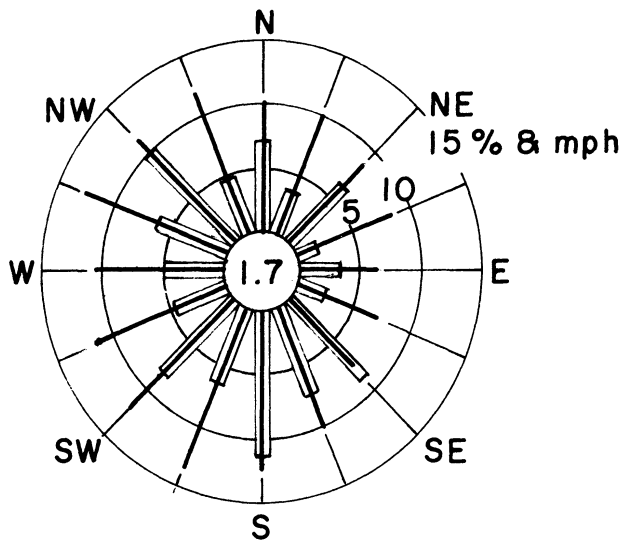
1 March 1958 - 31 May 1958
(Spring)



1 June 1958 - 31 August 1958
(Summer)

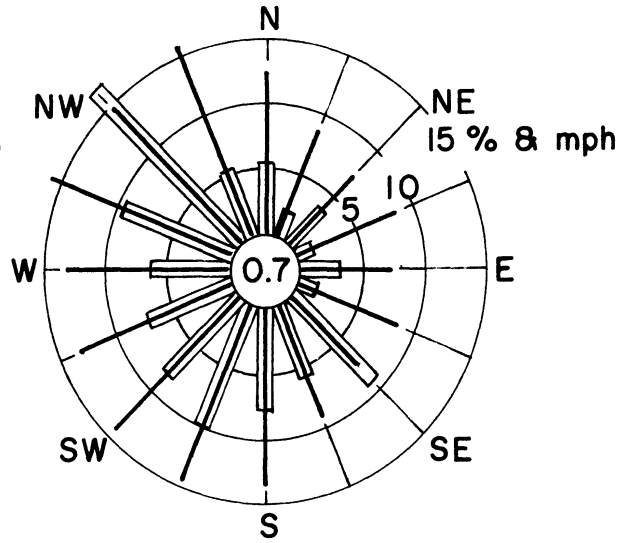
PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA
Aerovane at Height of 104 ft.

Fig. 2. Percentage frequency of occurrence of winds from 16 directions (rectangles) and corresponding wind speed in mph (heavy lines) at New Albany plant site, 1957 - 1958 (Winter); 1958 (Spring); and 1958 (Summer). Percent of calms in center.



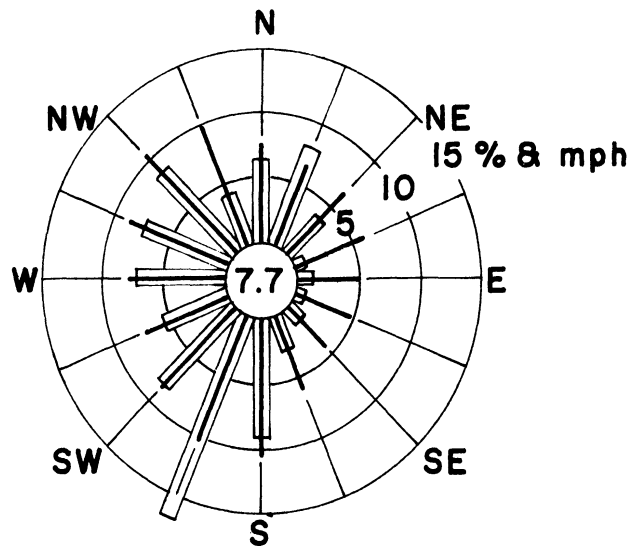
STANDIFORD FIELD
LOUISVILLE , KENTUCKY

Wind Instrument at Height of 71 ft.
Winter (1 Dec.-28 Feb.) 1949-1957



STANDIFORD FIELD
LOUISVILLE , KENTUCKY

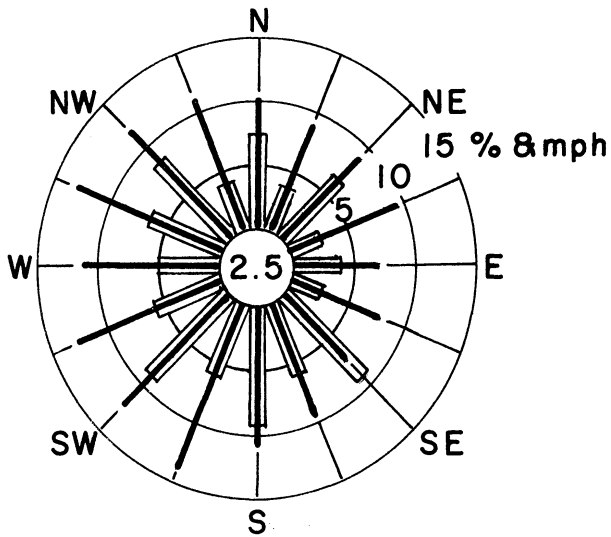
Wind Instrument at Height of 71 ft.
Winter (1 Dec.-28 Feb.) 1957-1958



PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY , INDIANA

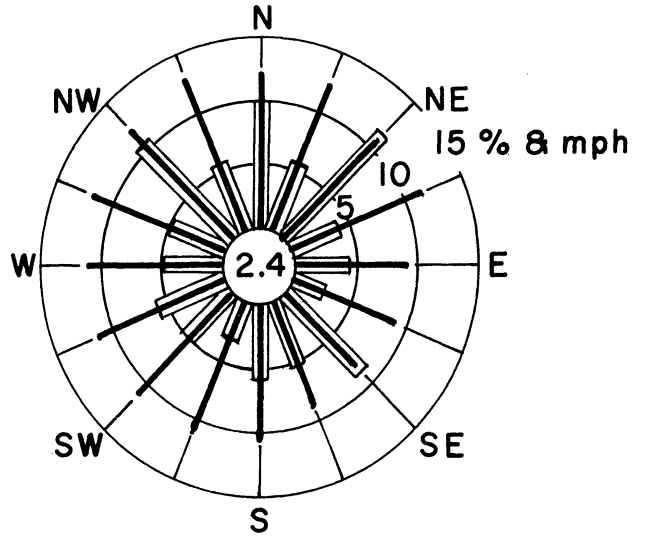
Aerovane at Height of 104 ft.
Winter (1 Dec.-28 Feb.) 1957-1958

Fig. 3. Percentage frequency of occurrence of winds from 16 directions (rectangles) and corresponding wind speed in mph (heavy lines) at Standiford Field, 1949 - 1957; Standiford Field, 1957 - 1958; and New Albany plant site, 1957 - 1958: Winter. Percent of calms in center.



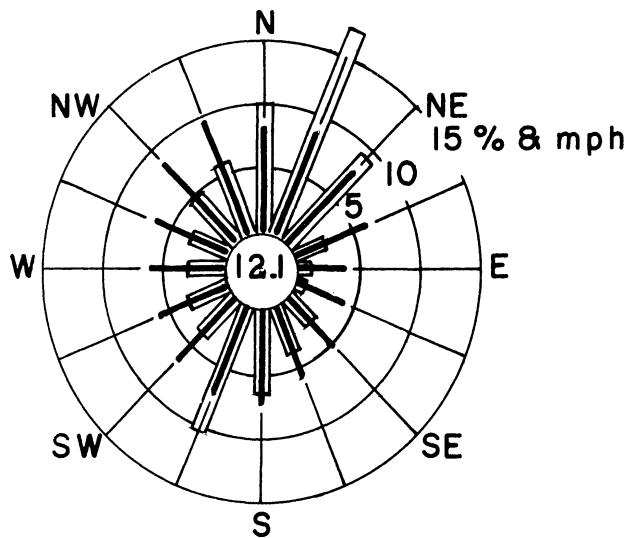
STANDIFORD FIELD
LOUISVILLE , KENTUCKY

Wind Instrument at Height of 71ft.
Spring (1 Mar.-31 May) 1950-1957



STANDIFORD FIELD
LOUISVILLE , KENTUCKY

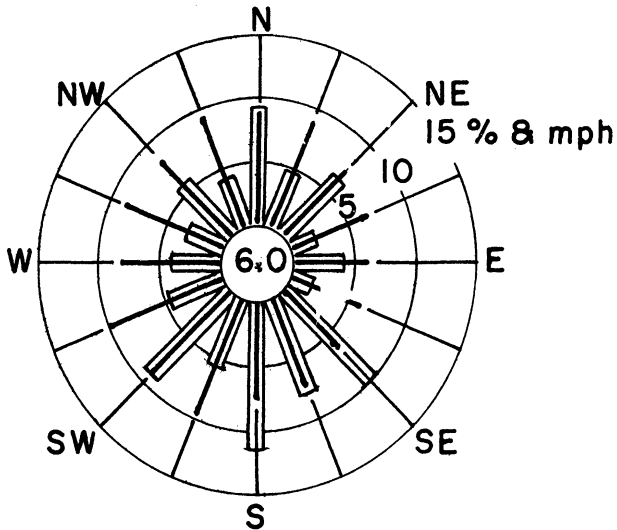
Wind Instrument at Height of 71ft.
Spring (1 Mar.-31 May) 1958



PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY , INDIANA

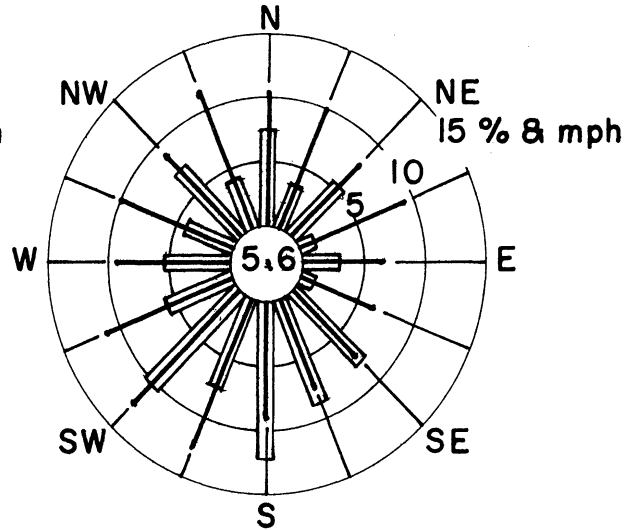
Aerovane at Height of 104 ft.
Spring (1 Mar.-31 May) 1958

Fig. 4. Percentage frequency of occurrence of winds from 16 directions (rectangles) and corresponding wind speed in mph (heavy lines) at Standiford Field, 1950 - 1957; Standiford Field, 1958; and New Albany plant site, 1958: Spring. Percent of calms in center.



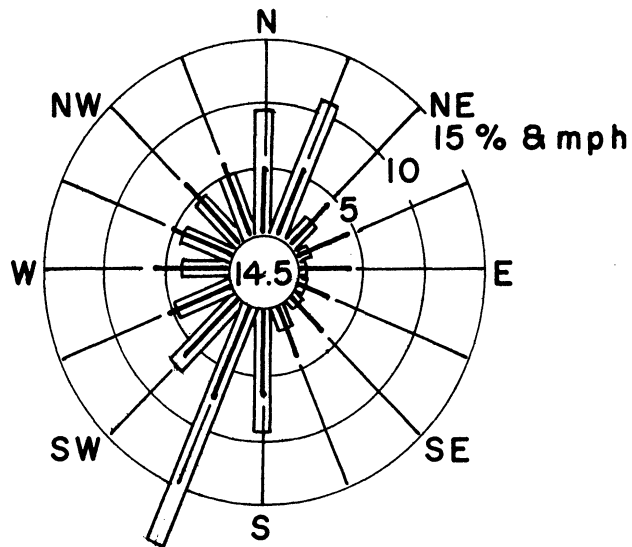
STANDIFORD FIELD
LOUISVILLE , KENTUCKY

Wind Instrument at Height of 71 ft.
Summer (1 June-31 Aug.) 1950-1957



STANDIFORD FIELD
LOUISVILLE , KENTUCKY

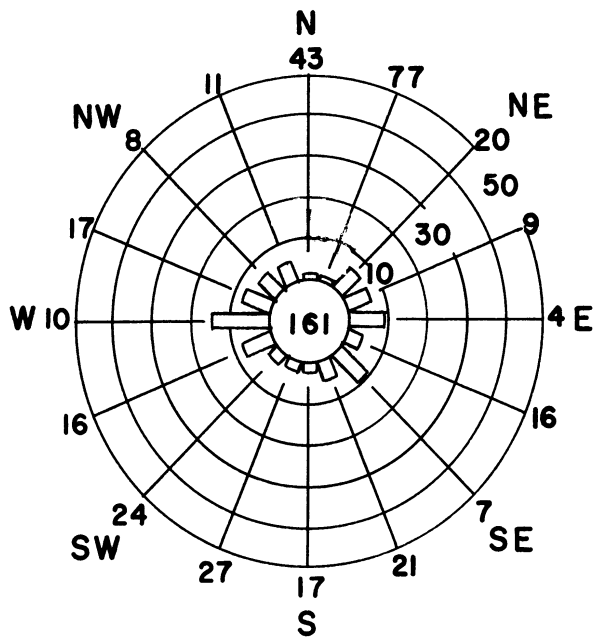
Wind Instrument at Height of 71 ft.
Summer (1 June-31 Aug.) 1958



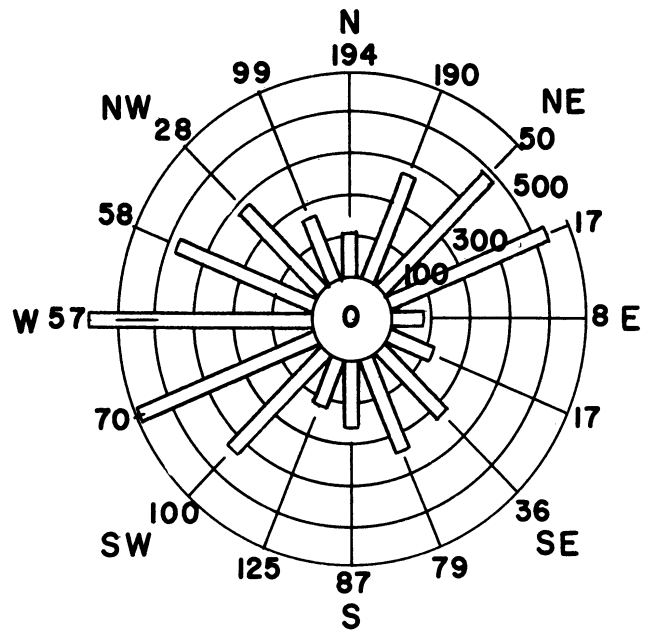
PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY , INDIANA

Aerovane at Height of 104 ft.
Summer (1 June-31 Aug.) 1958

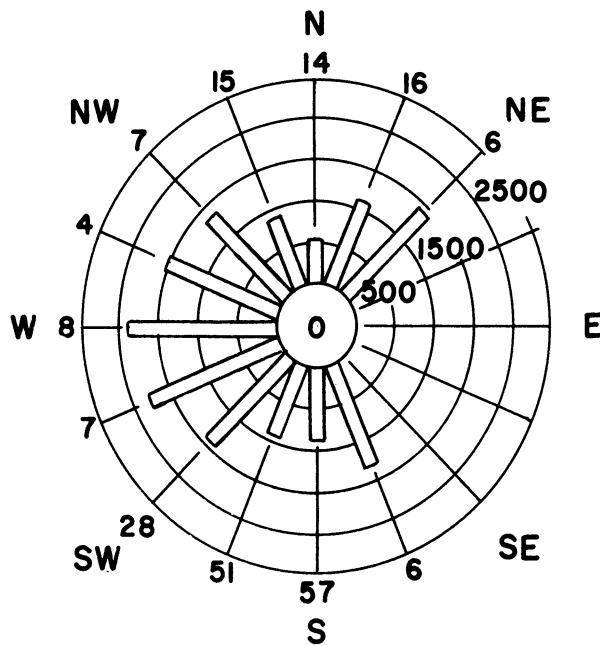
Fig. 5. Percentage frequency of occurrence of winds from 16 directions (rectangles) and corresponding wind speed in mph (heavy lines) at Standiford Field, 1950 - 1957; Standiford Field, 1958; and New Albany plant site, 1958: Summer. Percent of calms in center.



0-3 mph



4-12 mph

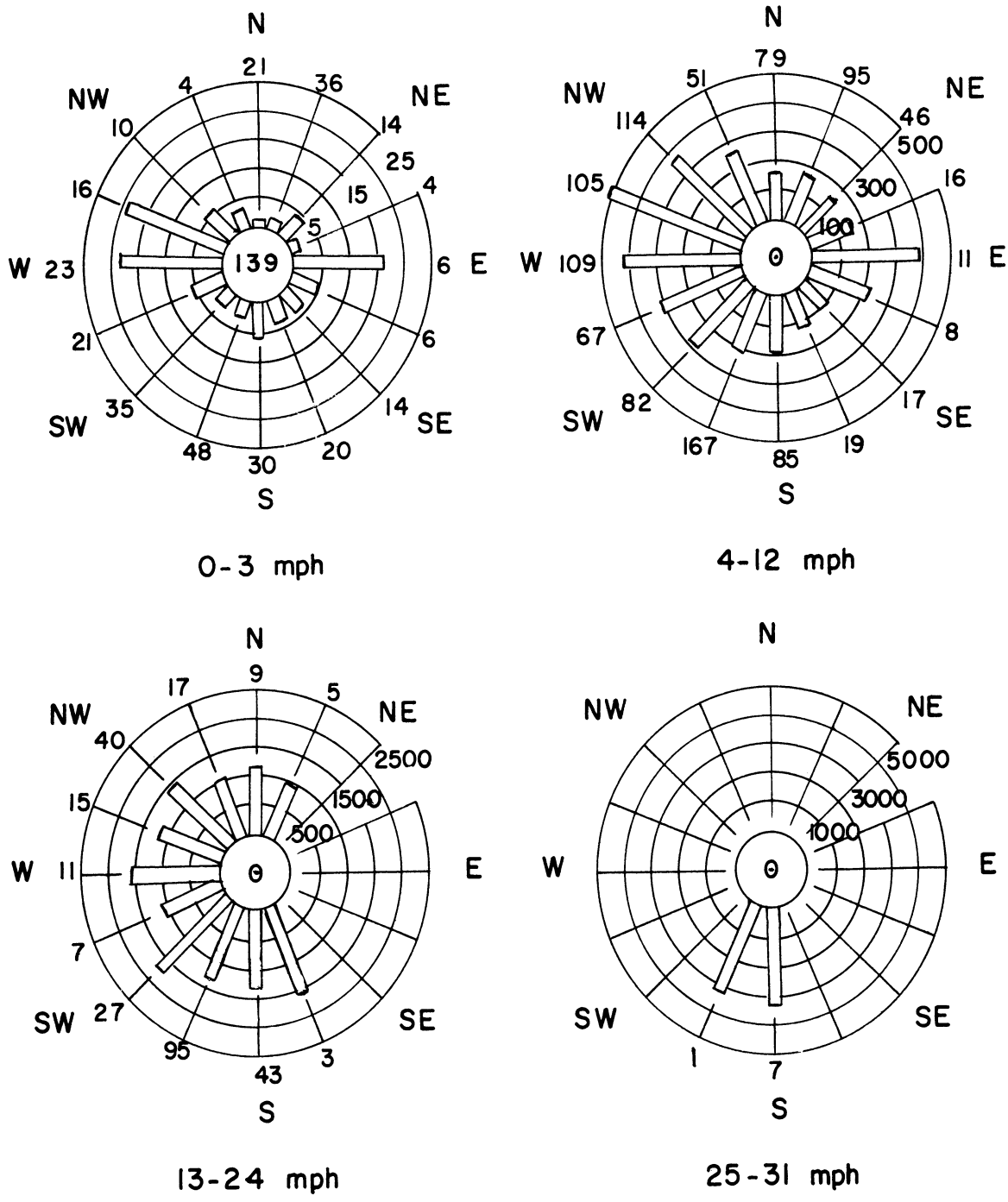


13-24 mph

**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA**

Fall (Sept., Oct., Nov.) 1957

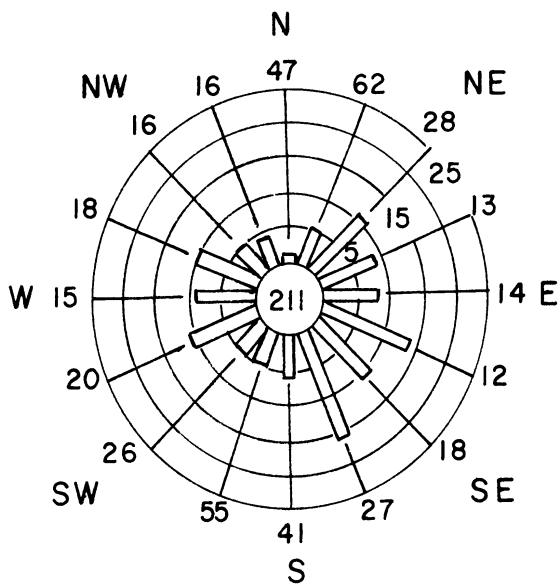
Fig. 6. Average gust count per hour by wind directions and wind-speed categories. New Albany plant site, 1957: Fall.



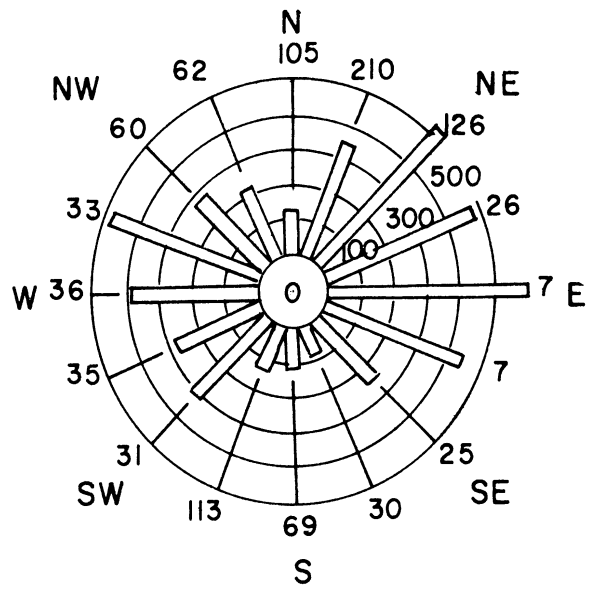
**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA**

1 December 1957 - 28 February 1958
(Winter)

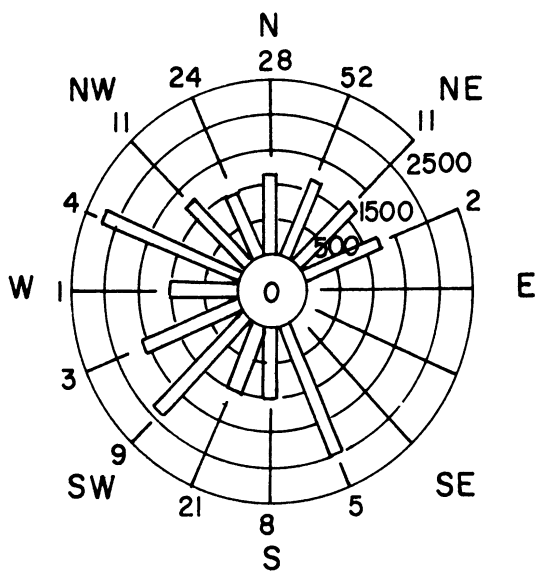
Fig. 7. Average gust count per hour by wind directions and wind-speed categories. New Albany plant site, 1957 - 1958: Winter.



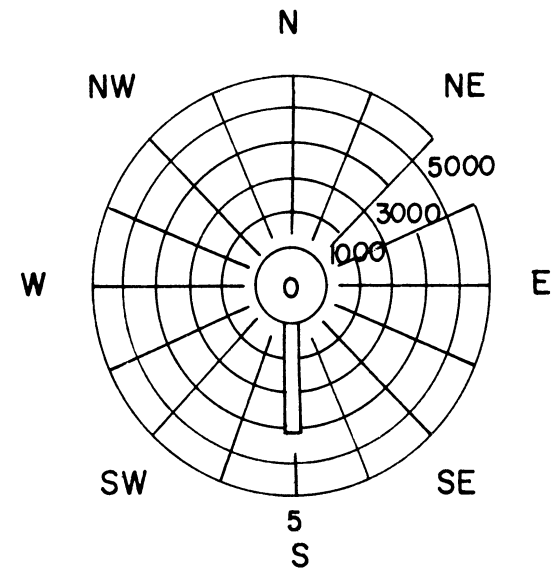
0-3 mph



4-12 mph



13-24 mph

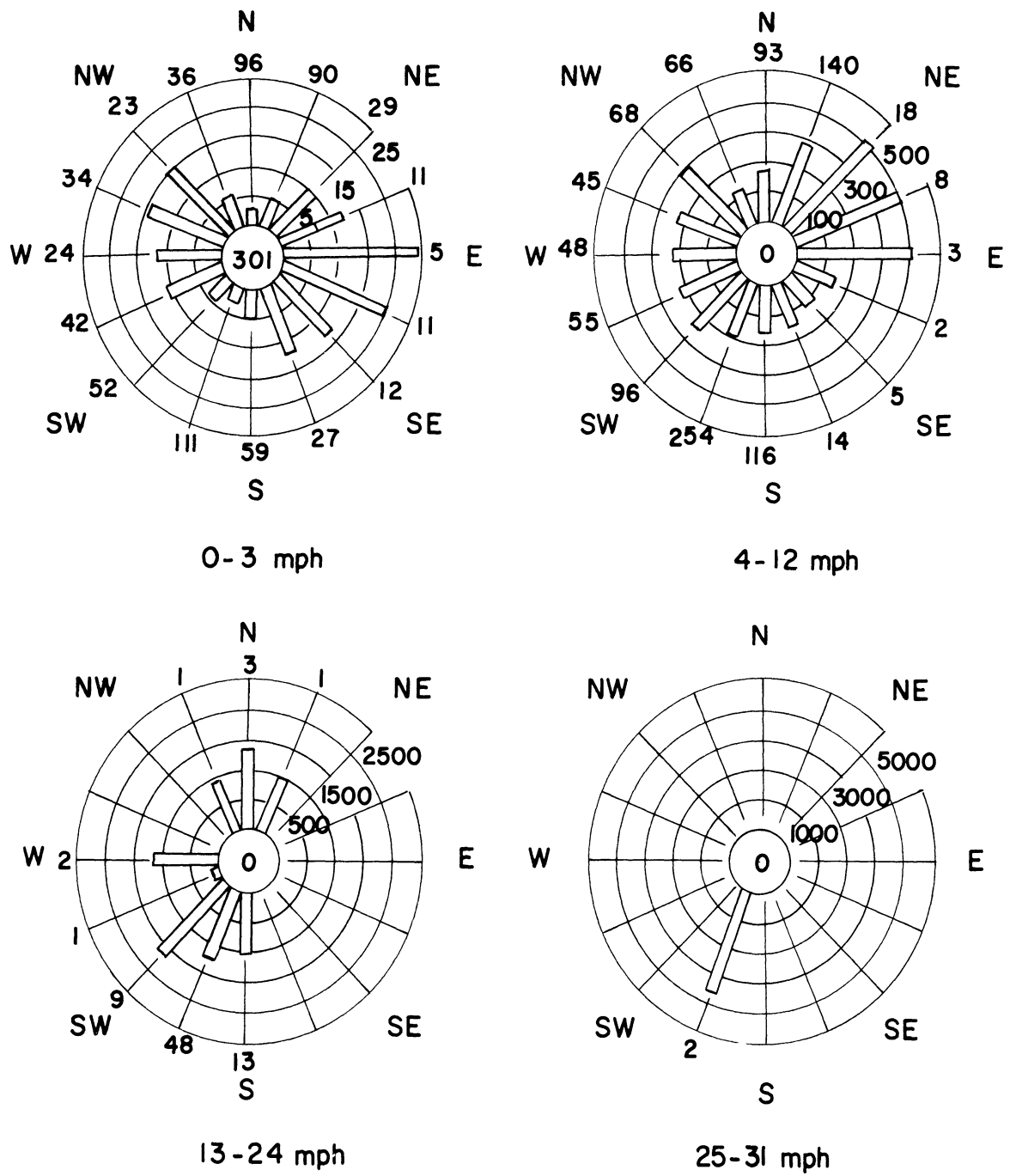


25-31 mph

PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA

1 March 1958 - 31 May 1958
(Spring)

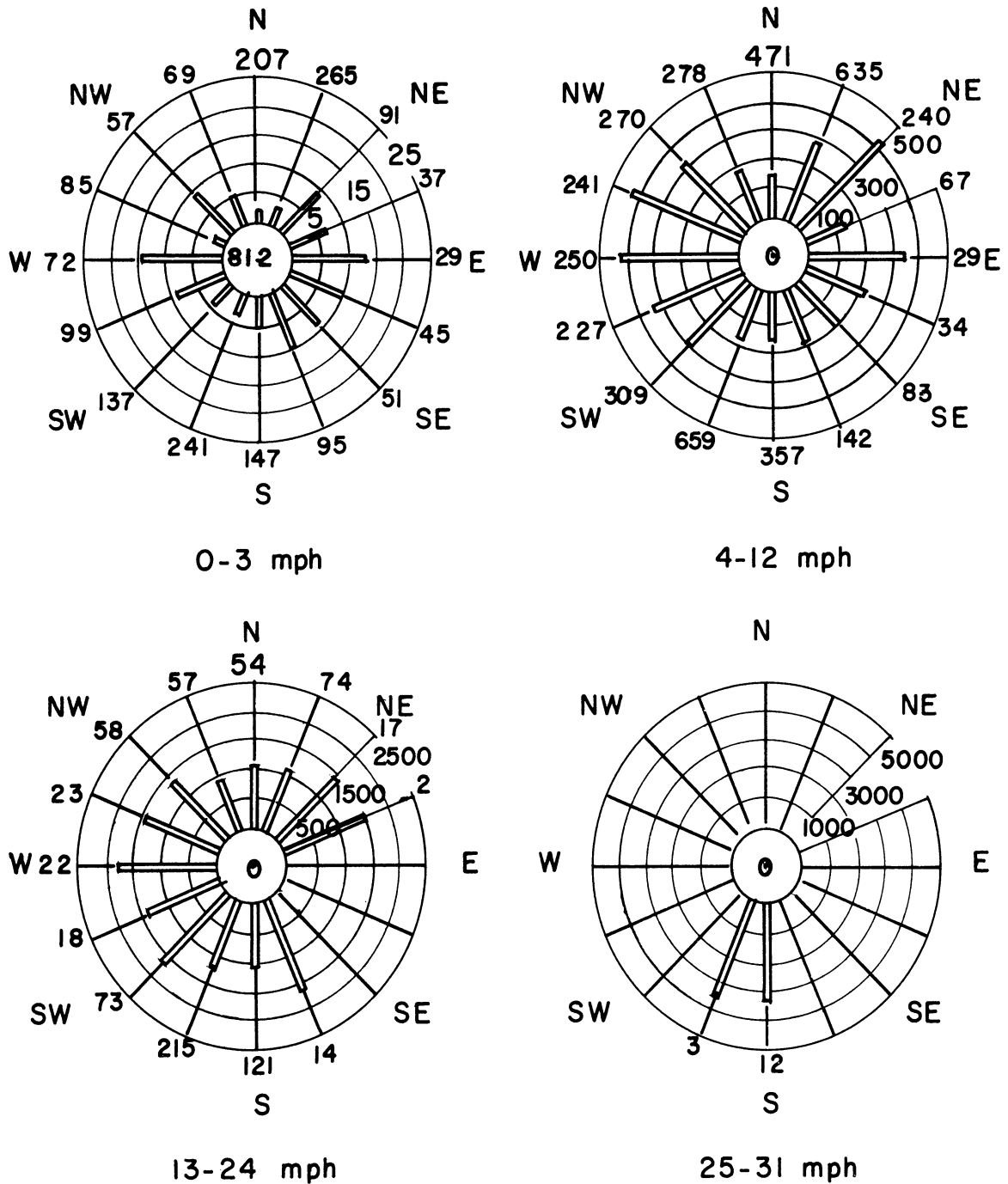
Fig. 8. Average gust count per hour by wind directions and wind-speed categories. New Albany plant site, 1958: Spring.



PUBLIC SERVICE COMPANY OF INDIANA
 NEW ALBANY, INDIANA

1 June 1958 - 31 August 1958
 (Summer)

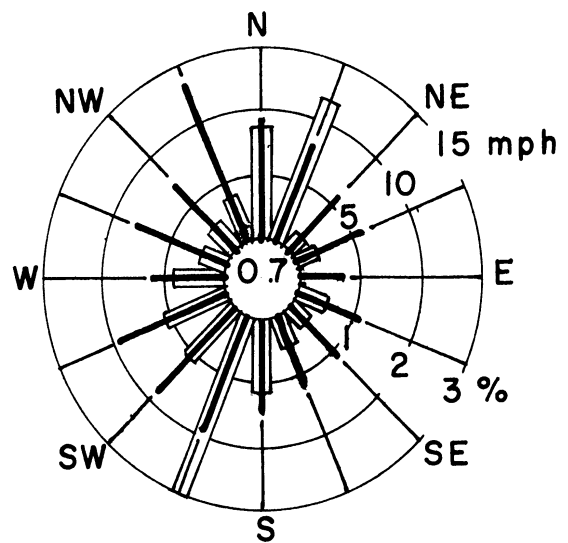
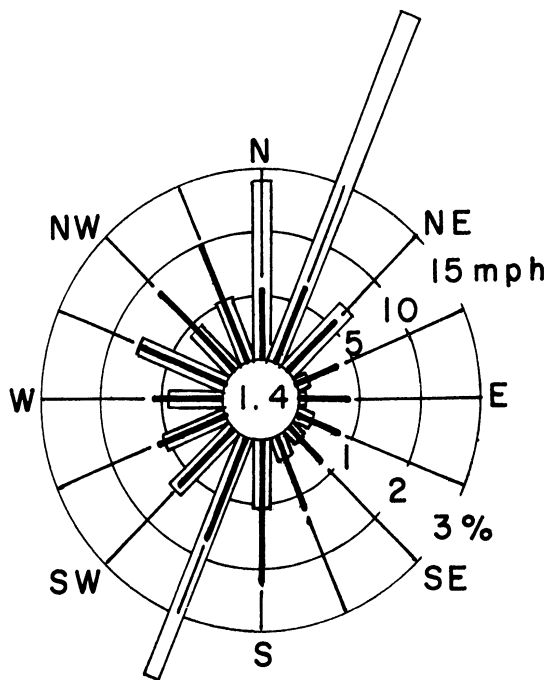
Fig. 9. Average gust count per hour by wind directions and wind-speed categories. New Albany plant site, 1958: Summer.



PUBLIC SERVICE COMPANY OF INDIANA
 NEW ALBANY, INDIANA

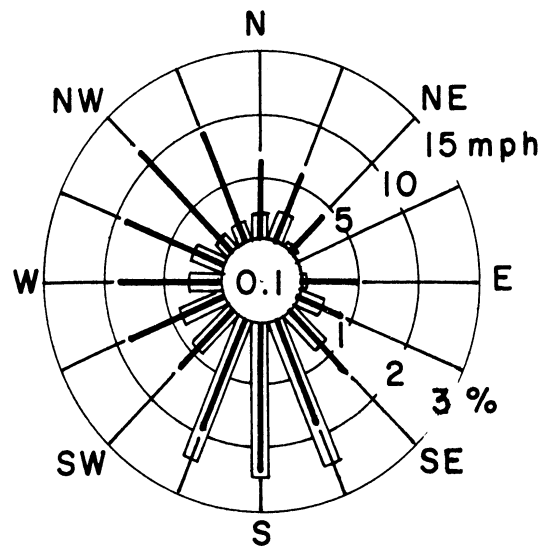
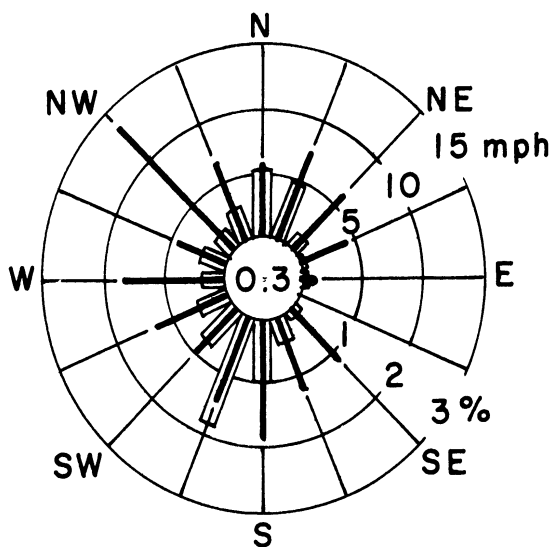
1 September 1957 - 31 August 1958

Fig. 10. Average gust count per hour by wind directions and wind-speed categories. New Albany plant site, 1957 - 1958: year summary.



Winter (1 Dec.-28 Feb.) 1956-1957 Spring (1 Mar.-31 May) 1957

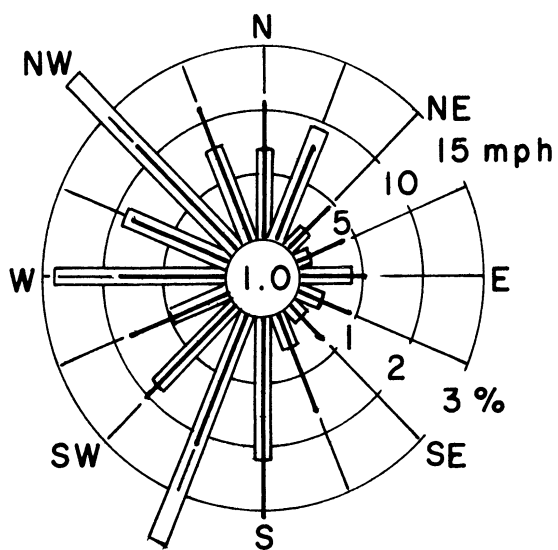
PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA



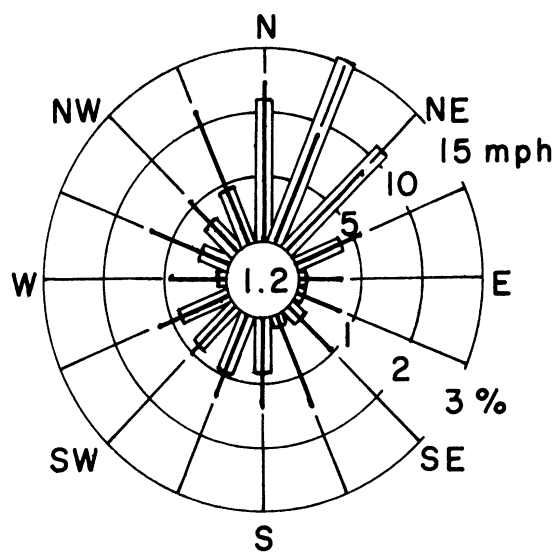
Summer (1 June-31 Aug.) 1957 Fall (1 Sep.-30 Nov.) 1957

PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA

Fig. 11. Percentage frequency of occurrence of winds from 16 directions (rectangles) at New Albany plant site and corresponding precipitation from Standiford Field, 1956 - 1957 (Winter); 1957 (Summer); and 1957 (Fall). Average wind speed (heavy lines). Percent of calms in center.

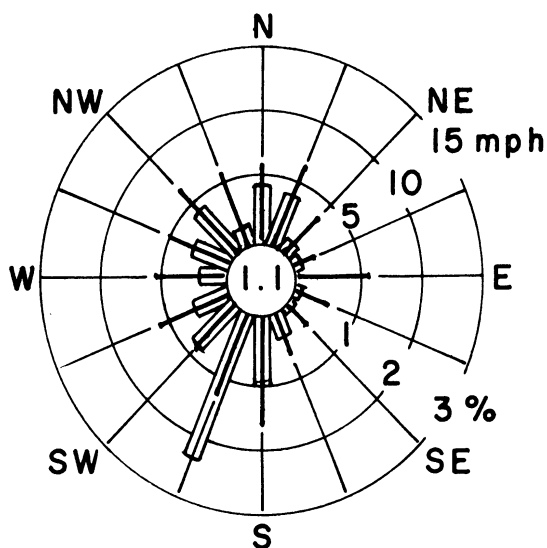


Winter (1 Dec.-28 Feb.) 1958



Spring (1 Mar.-31 May) 1958

PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA



Summer (1 June - 31 Aug.) 1958

PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA

Fig. 12. Percentage frequency of occurrence of winds from 16 directions (rectangles) at New Albany plant site and corresponding precipitation from Standiford Field, 1957 - 1958 (Winter); 1958 (Spring); and 1958 (Summer). Average wind speed (heavy lines). Percent of calms in center.

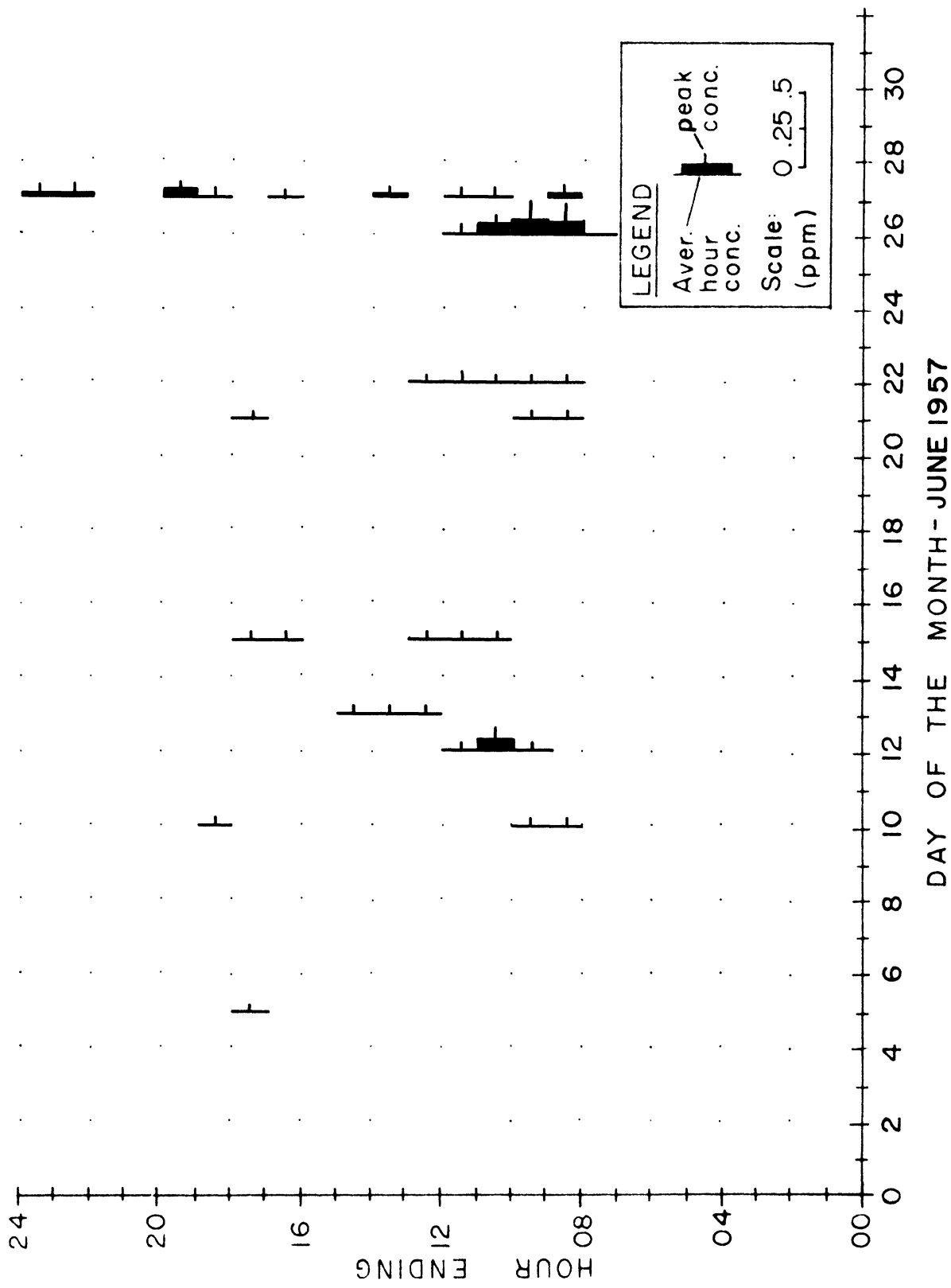


Fig. 13. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): June, 1957.

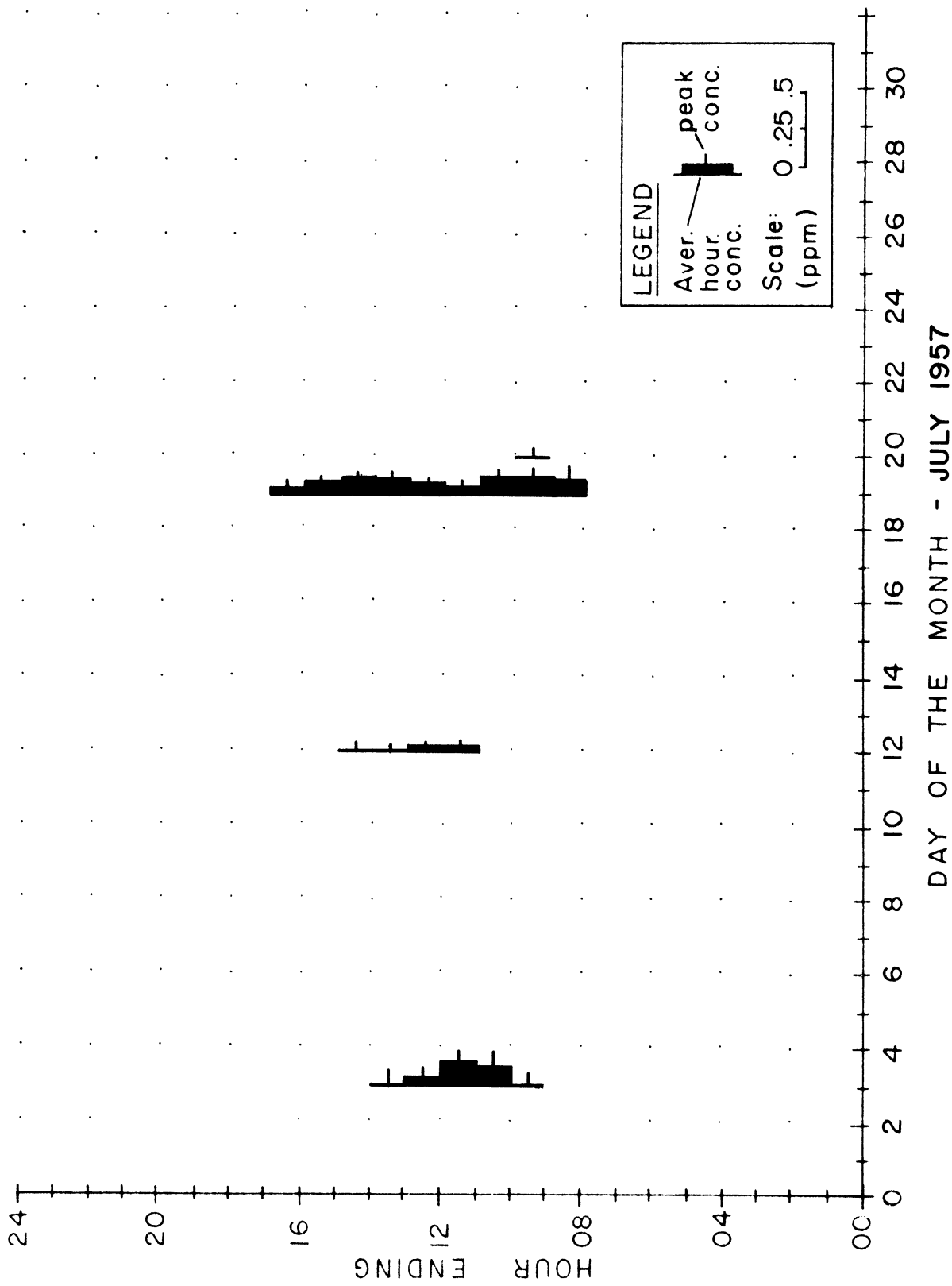


Fig. 14. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): July, 1957.

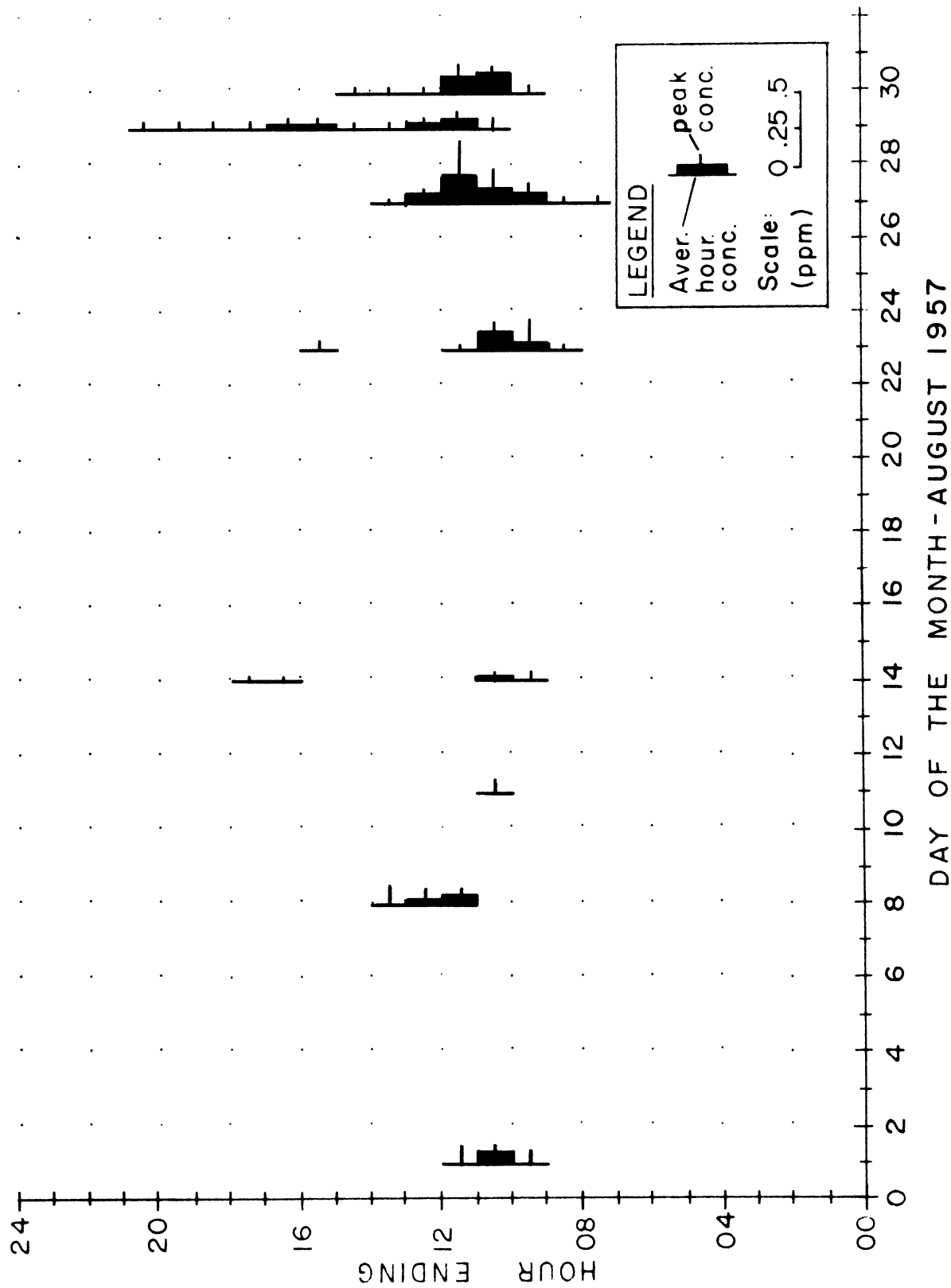


Fig. 15. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): August, 1957.

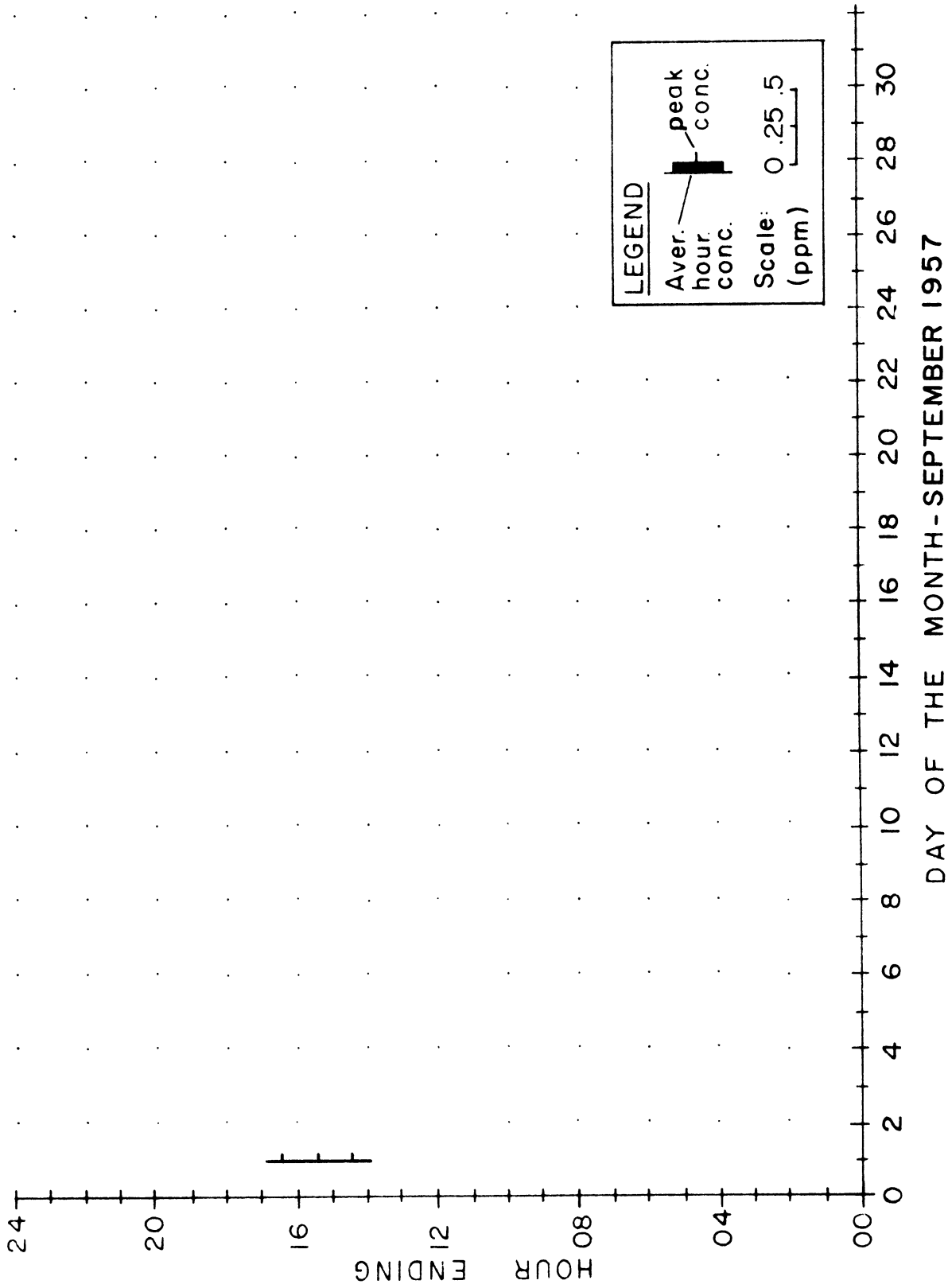


Fig. 16. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): September, 1957.

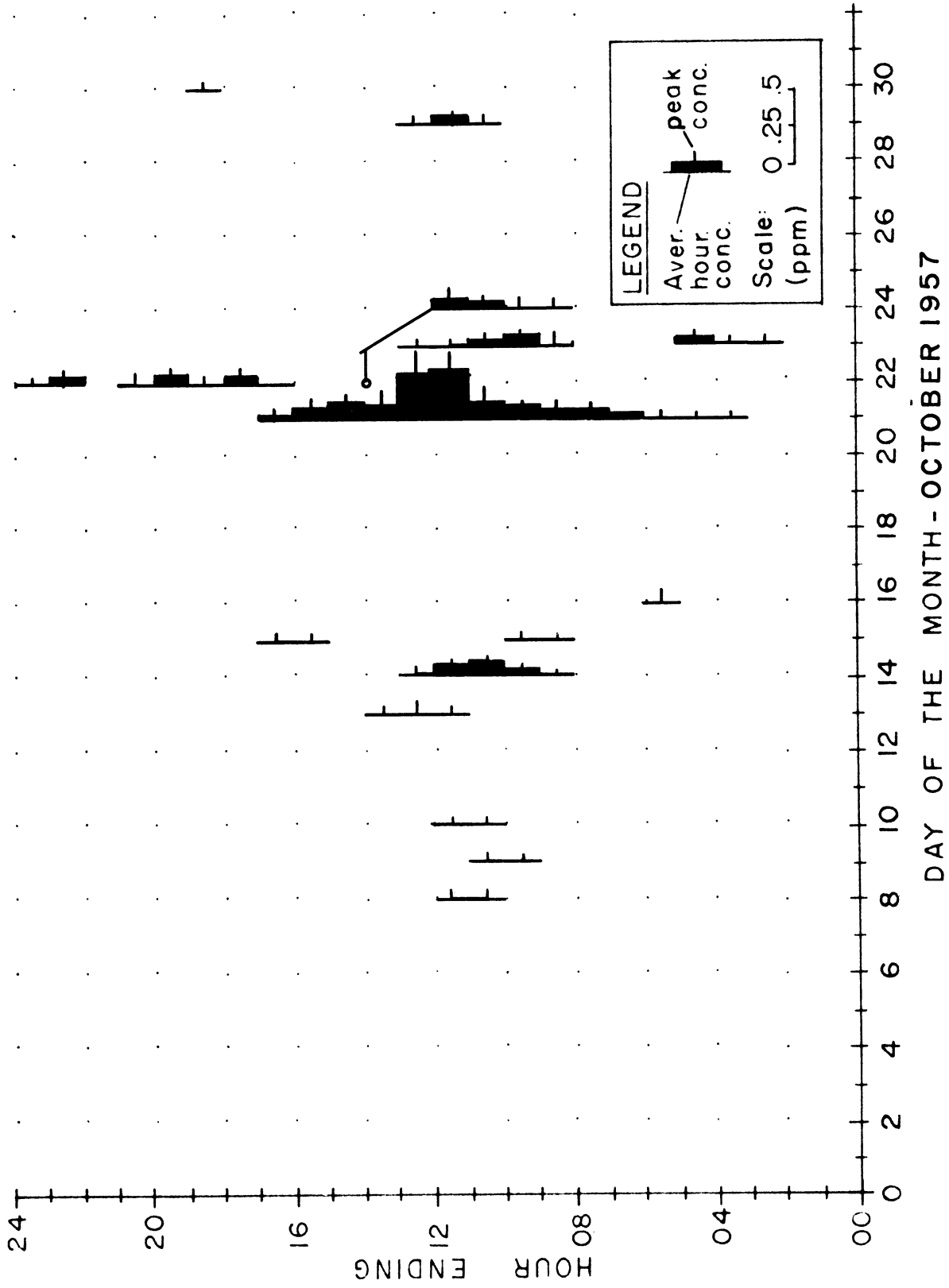


Fig. 17. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): October, 1957.

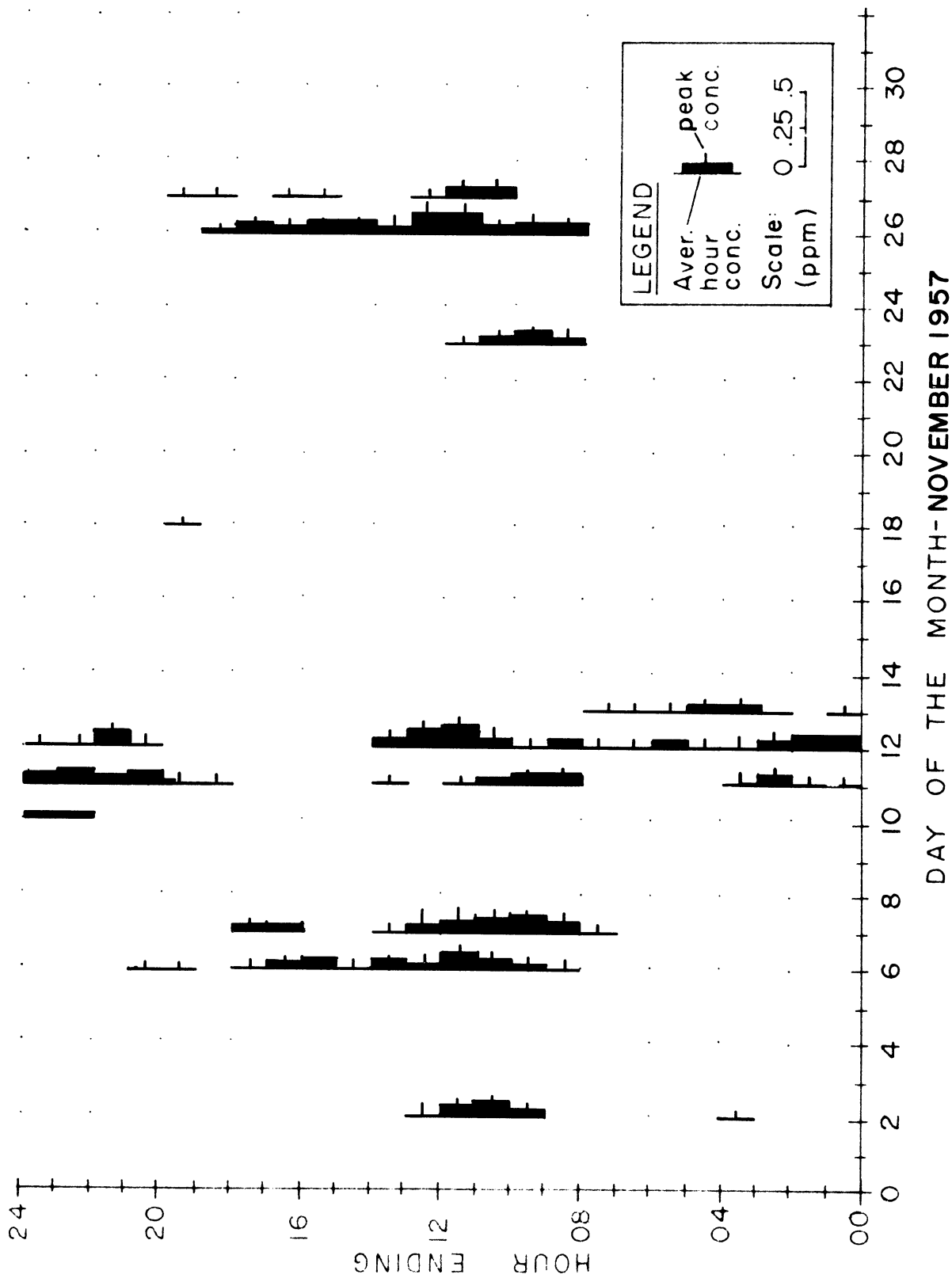


Fig. 18. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): November, 1957.

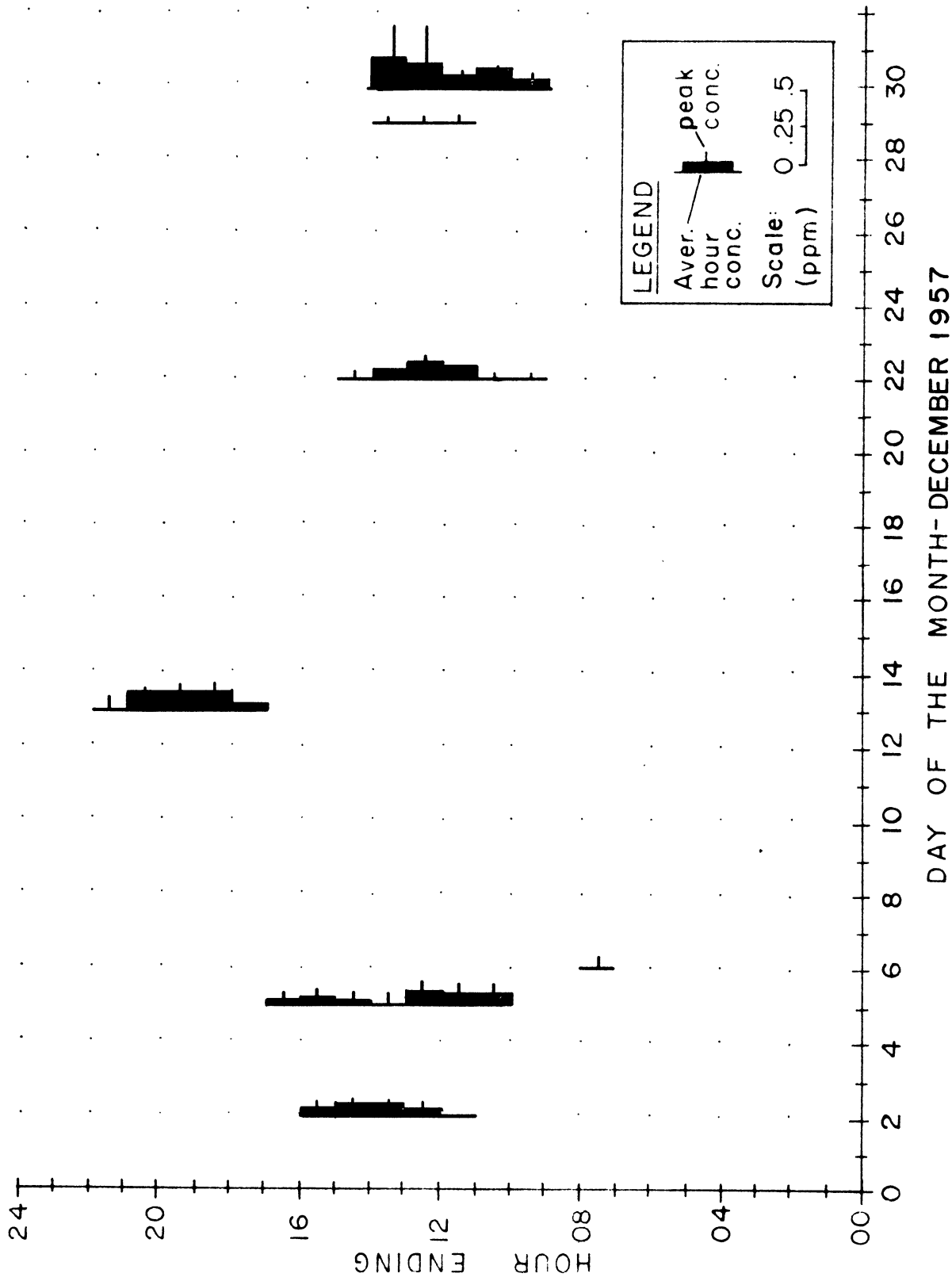


Fig. 19. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): December, 1957.

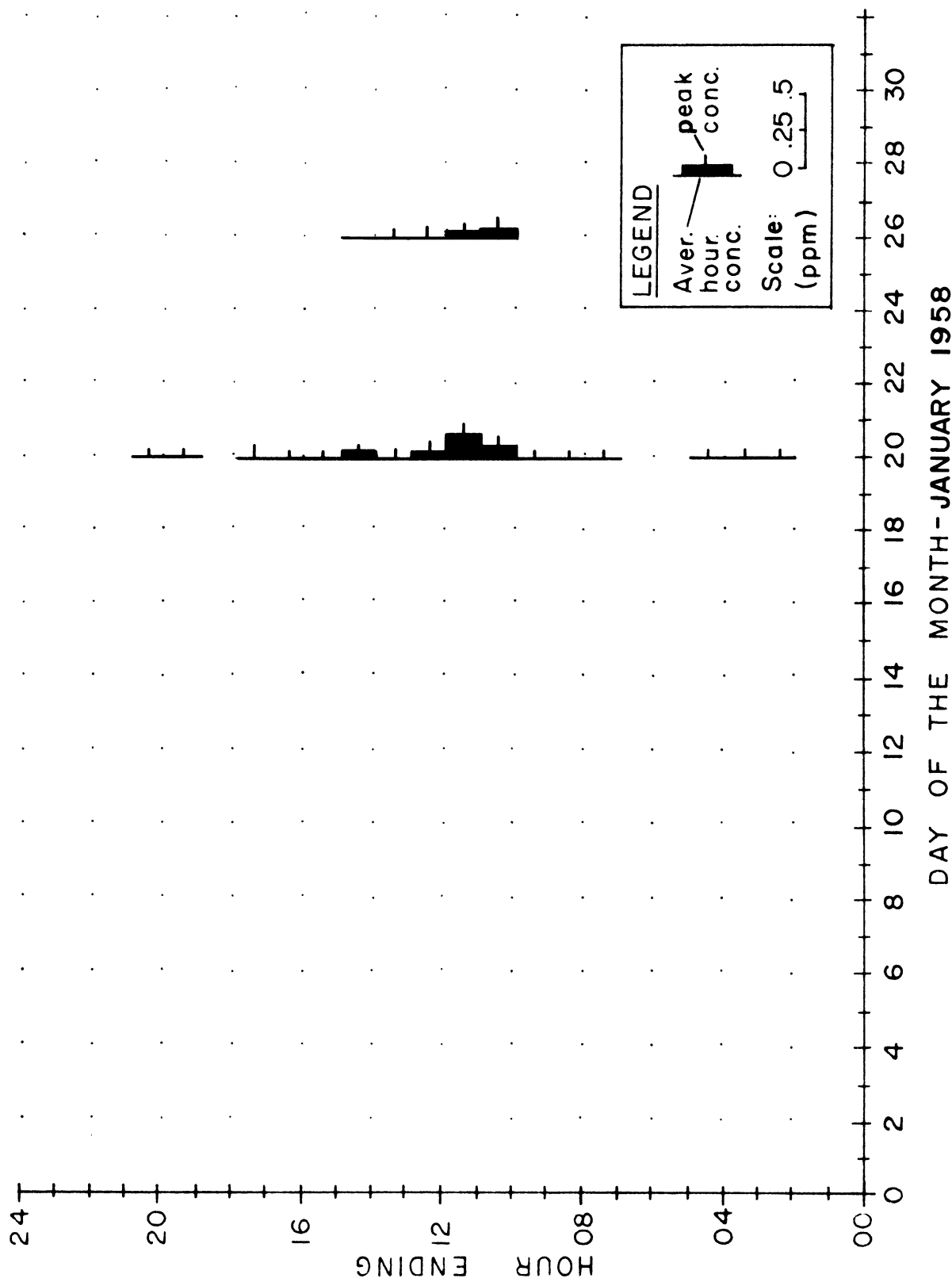


Fig. 20. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): January, 1958.

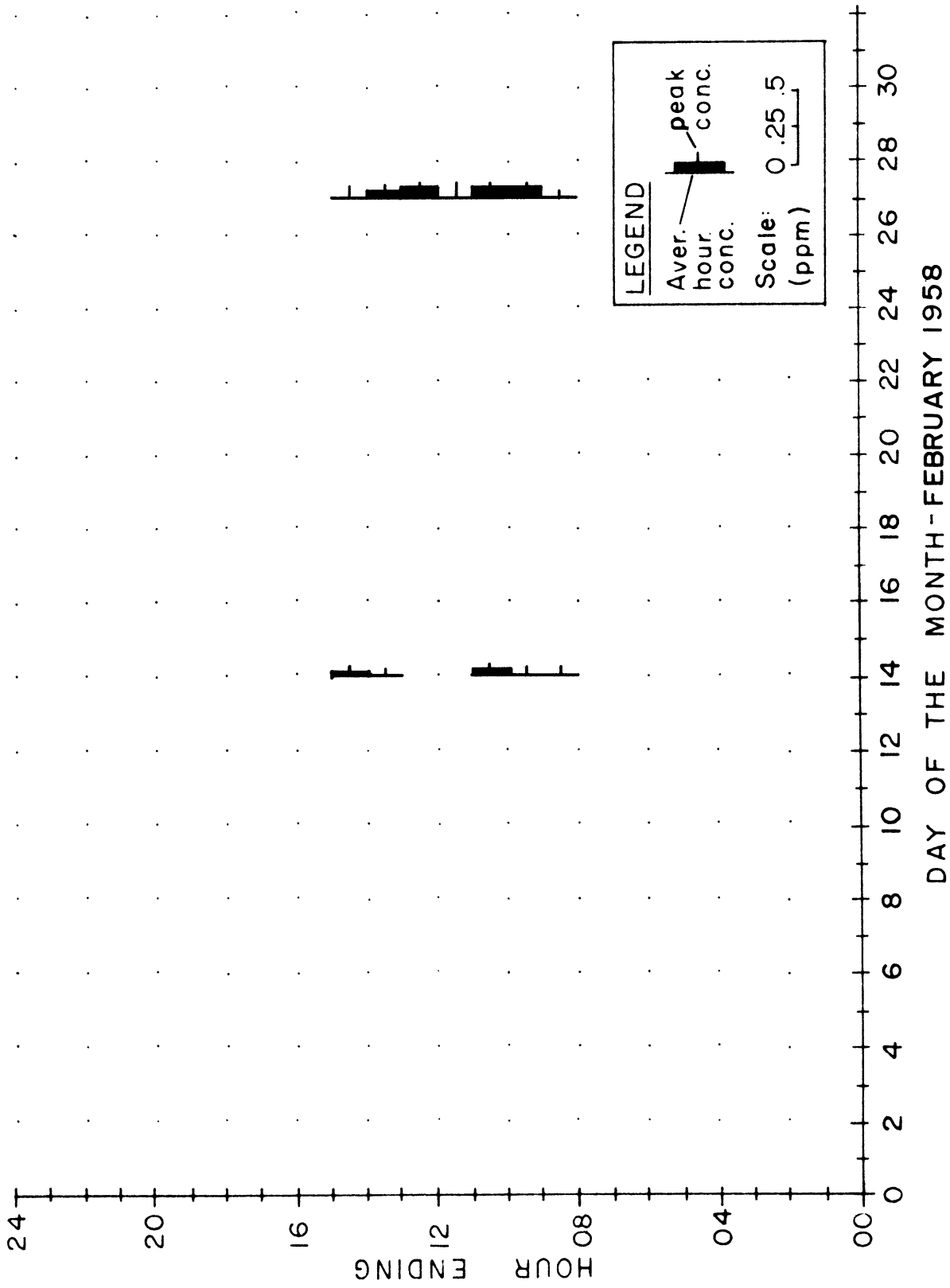


Fig. 21. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): February, 1958.

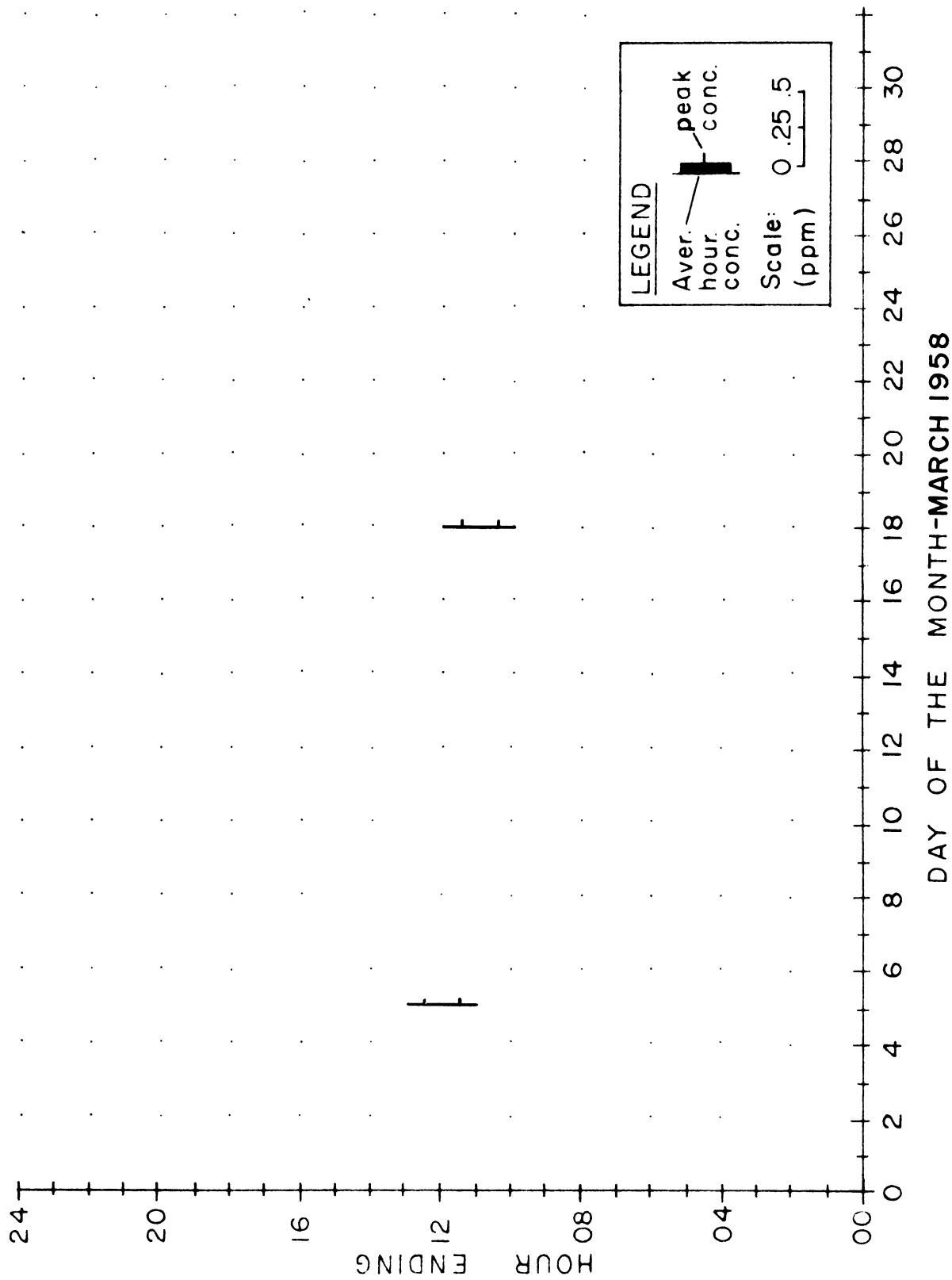


Fig. 22. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): March, 1958.

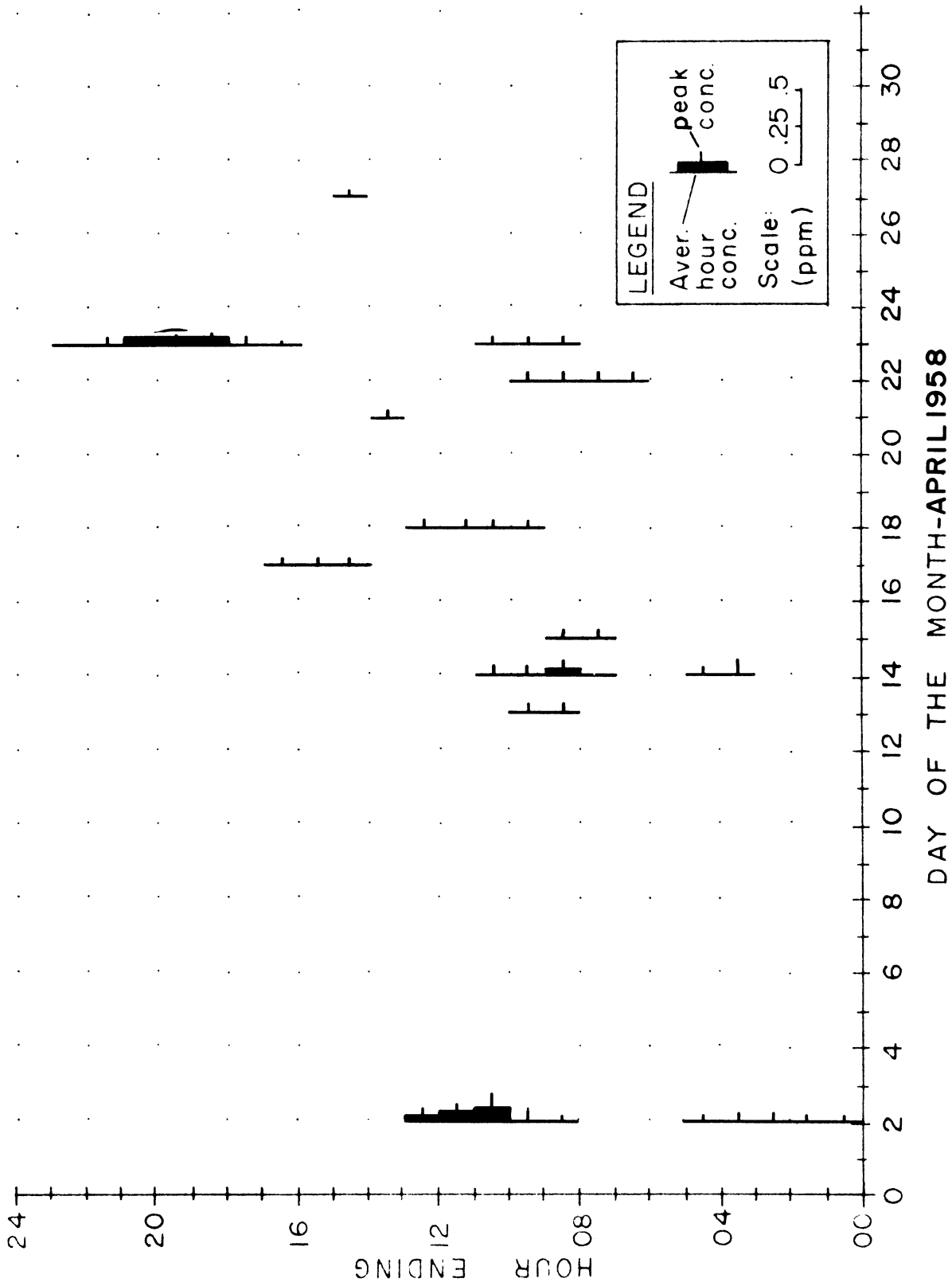
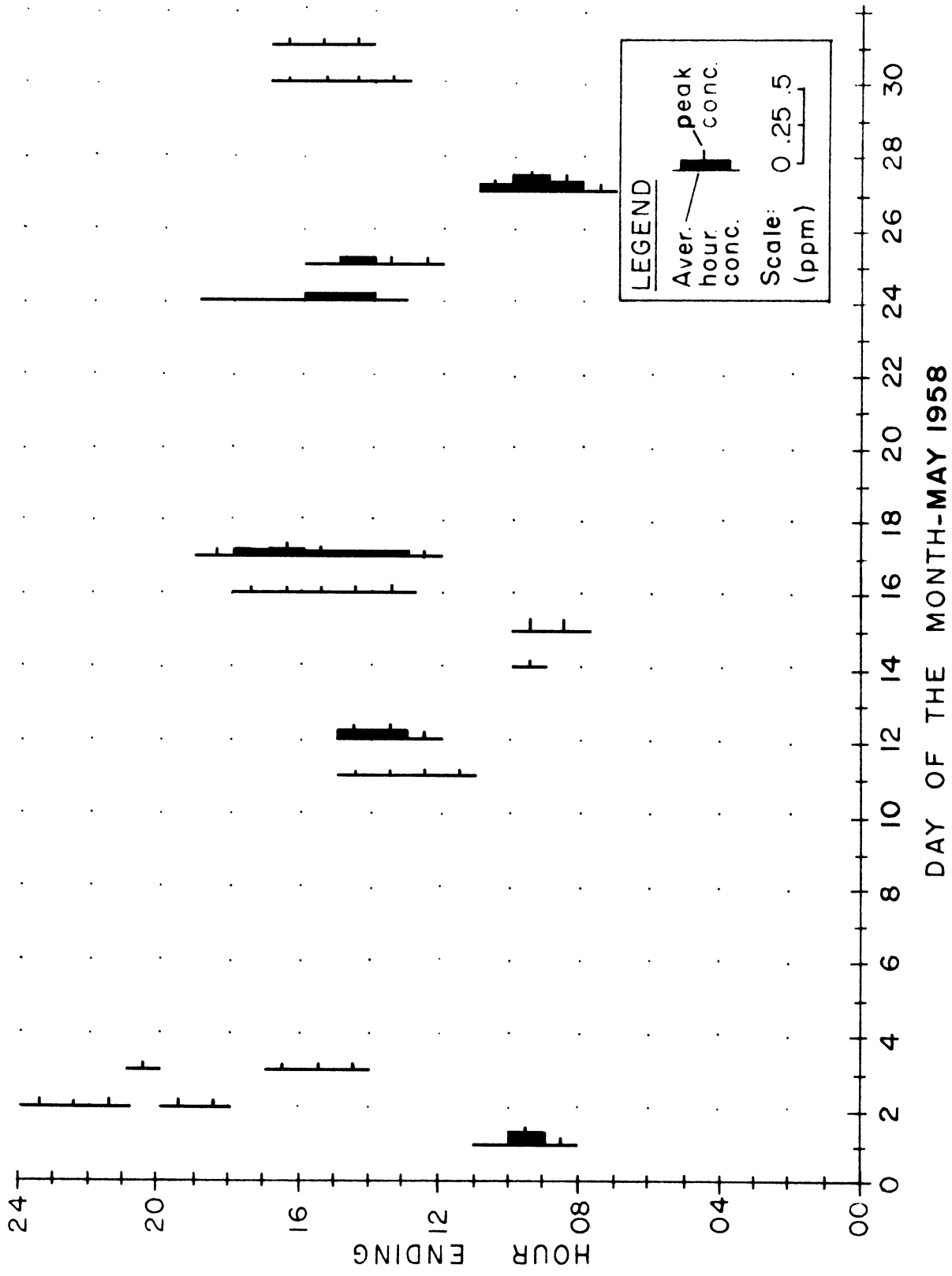


Fig. 23. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): April, 1958.



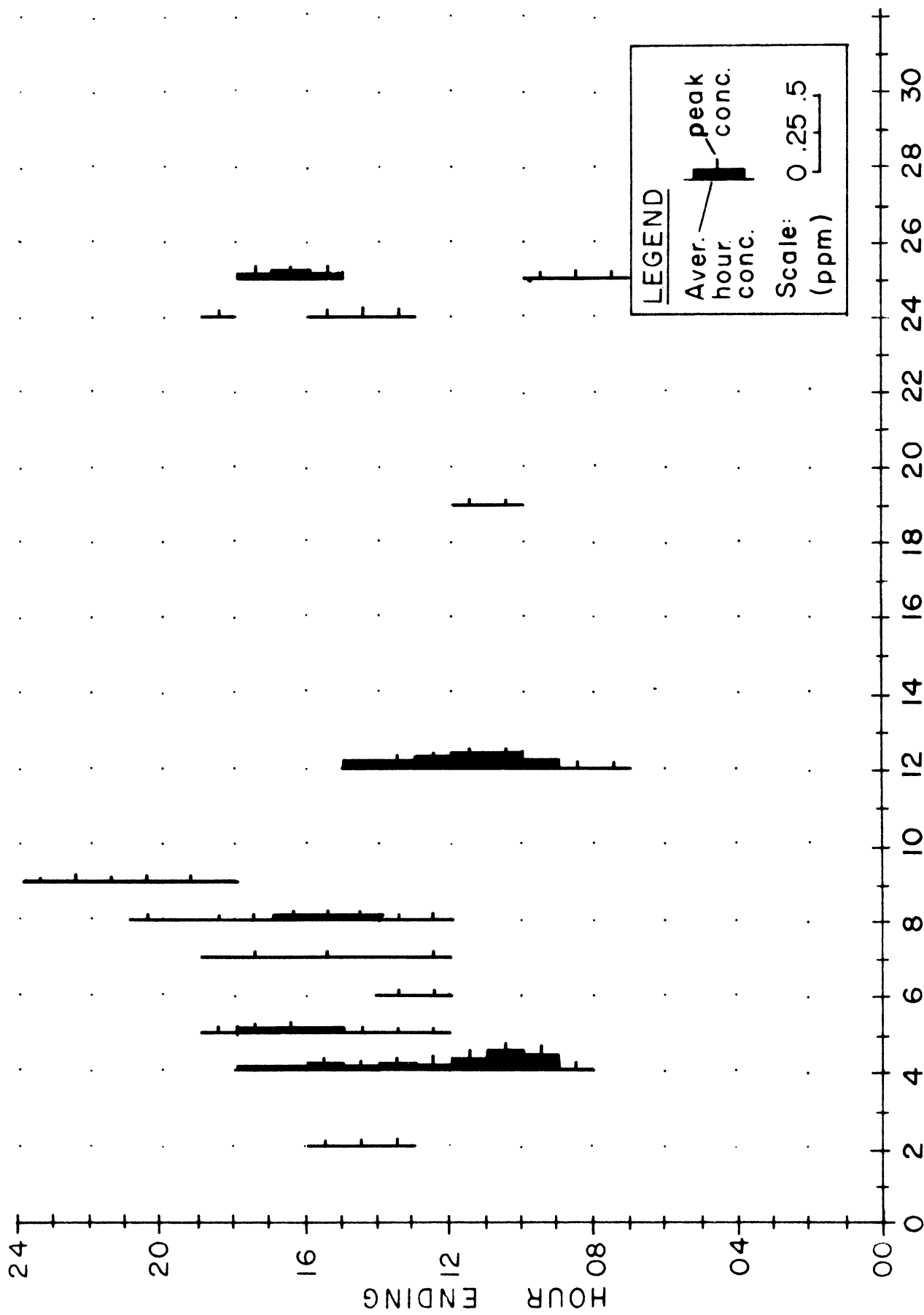
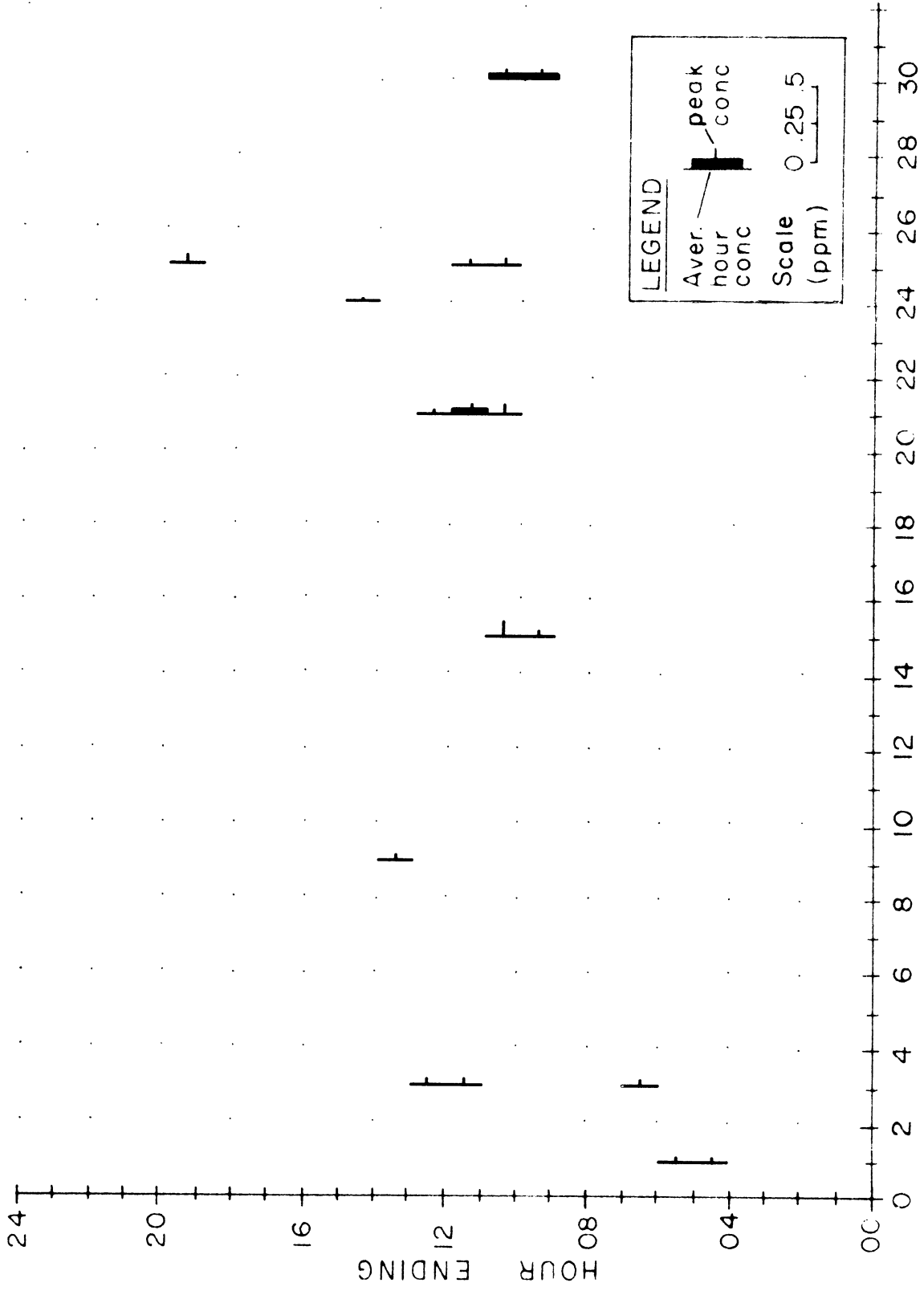
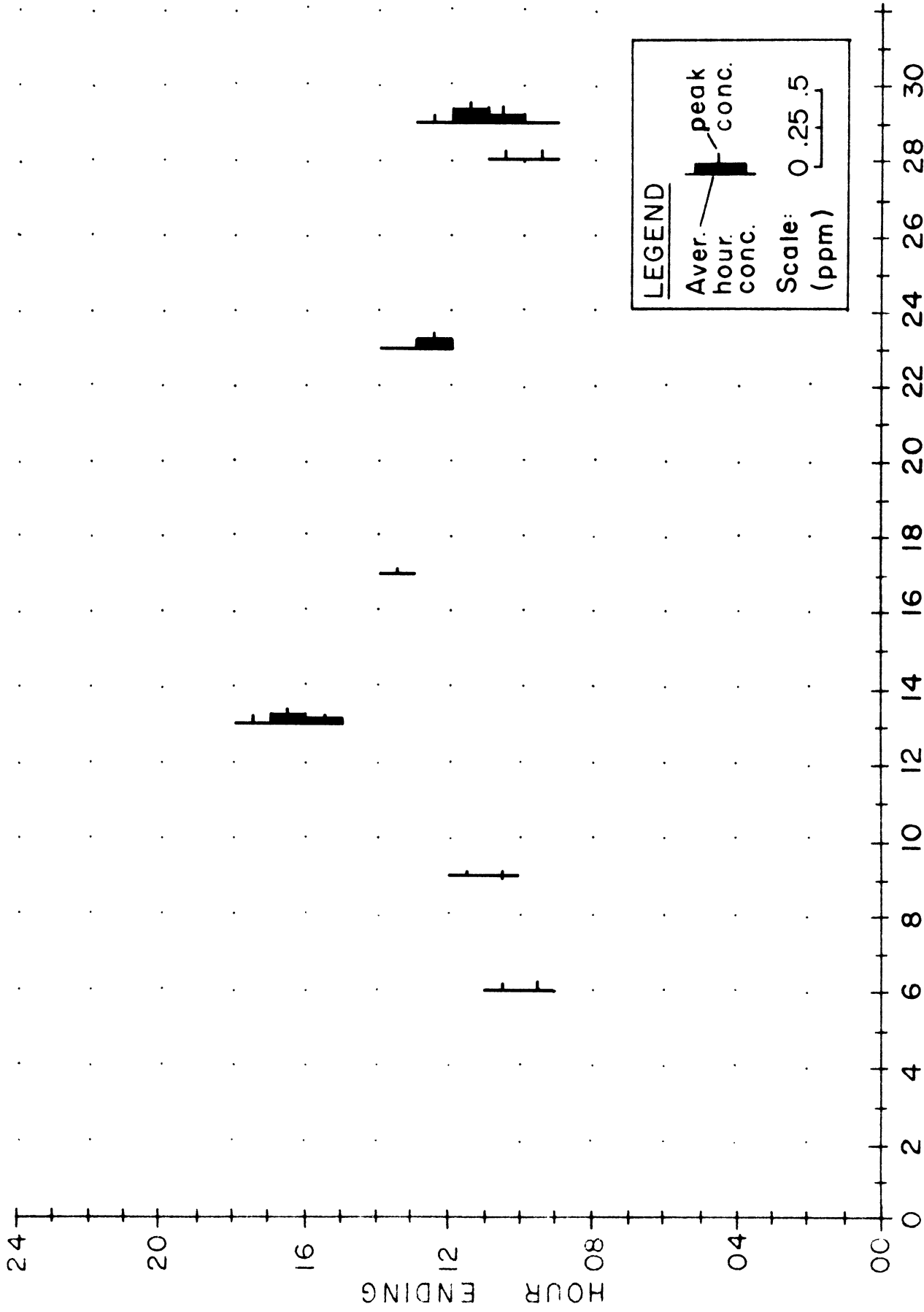


Fig. 25. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal bars): June, 1958.



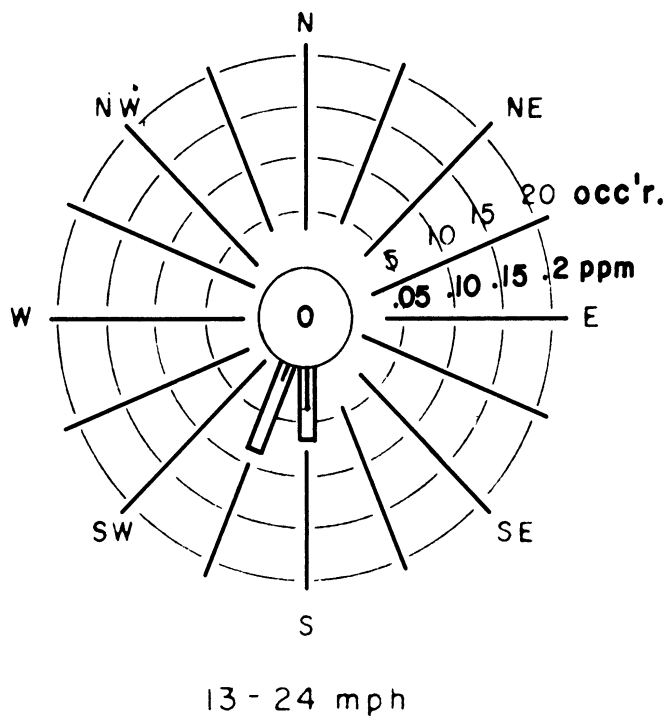
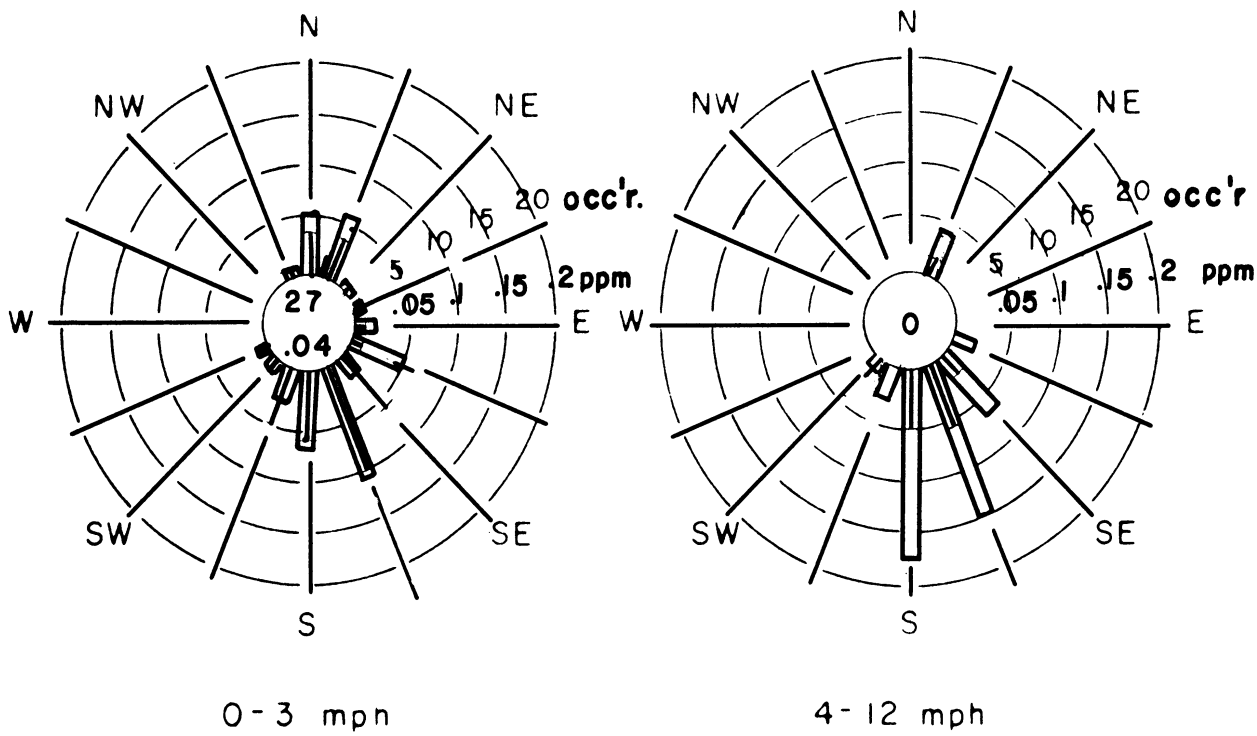
DAY OF THE MONTH-JULY 1958

Fig. 26. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): July, 1958.



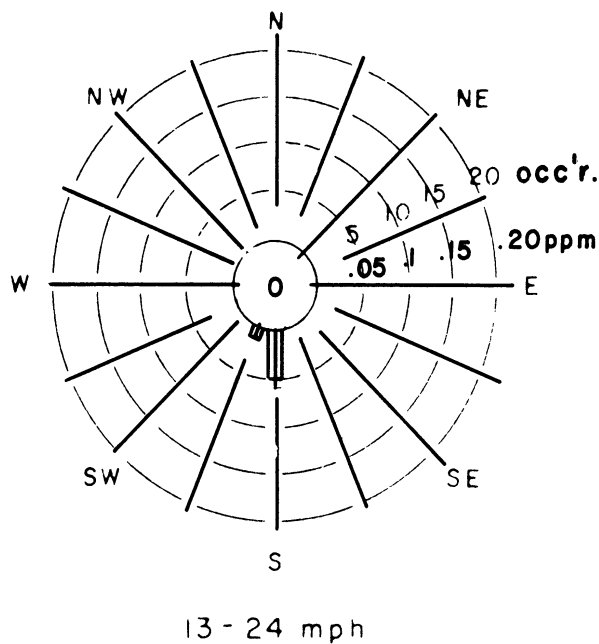
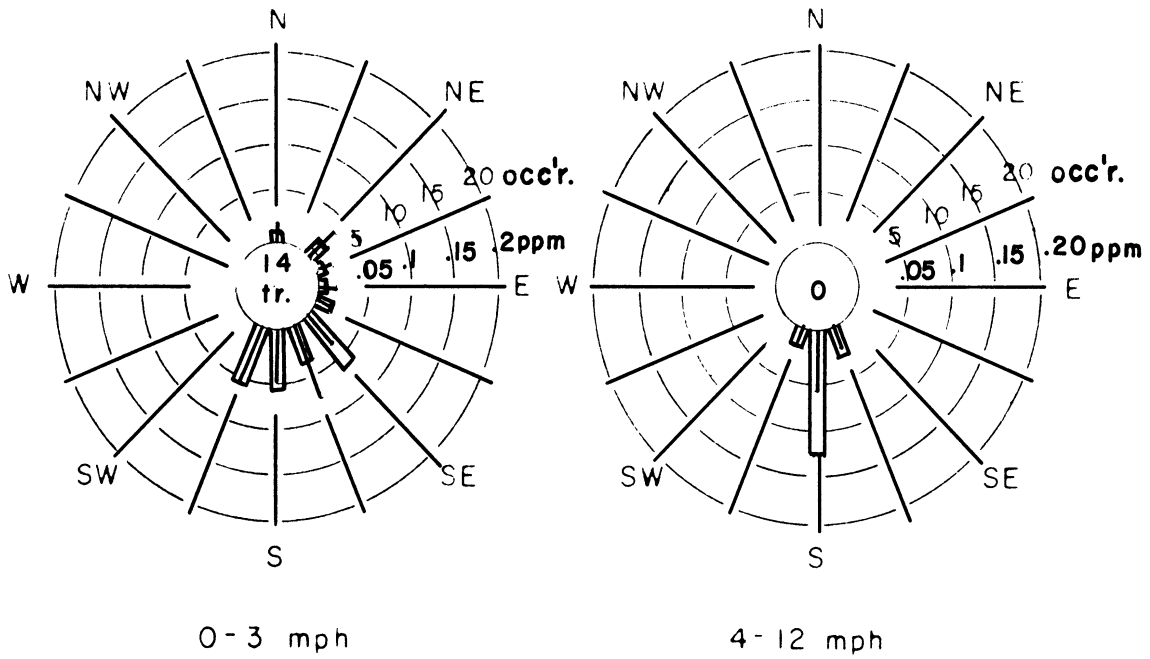
DAY OF THE MONTH - AUGUST 1958

Fig. 27. Sulphur dioxide concentration in ppm vs. time of day average concentration (vertical solid blocks) and maximum concentration (horizontal barbs): August, 1958.



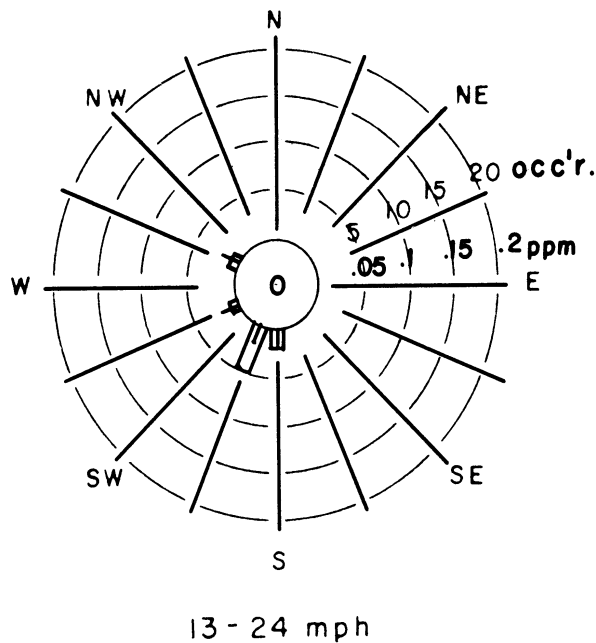
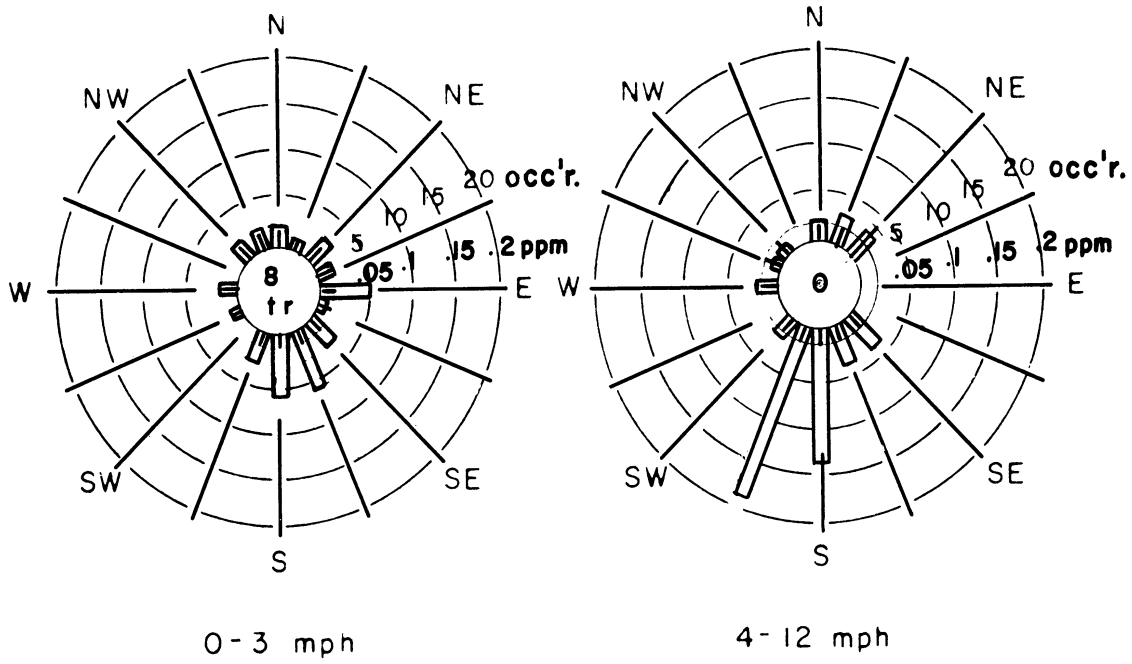
**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA
FALL (Sept, Oct., Nov.) 1957**

Fig. 28. Number of occurrences of SO₂ at Silver Hill for various wind directions (rectangles) in three wind-speed categories; and corresponding average SO₂ concentrations in ppm (heavy lines) during such occurrences. Number of occurrences of calm (upper number) and average sulphur dioxide concentration (lower number) in center. Tower wind data used. Period: Fall, 1957.



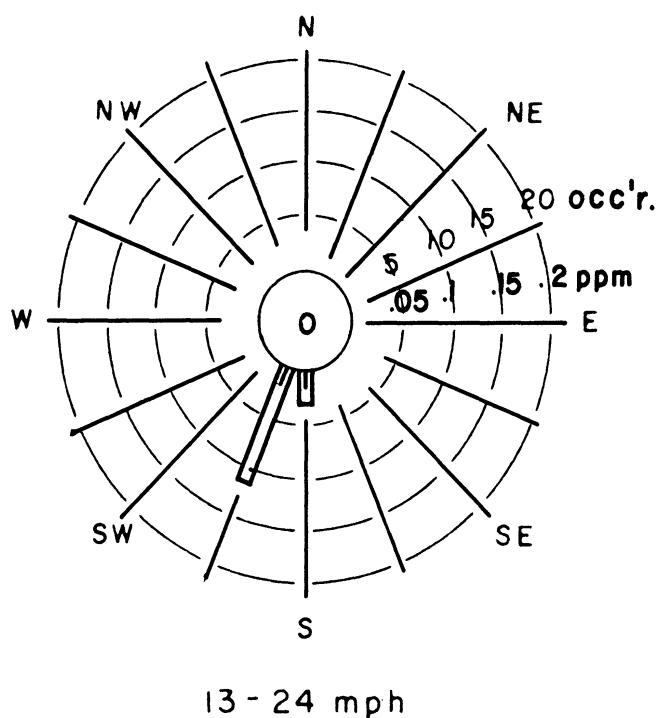
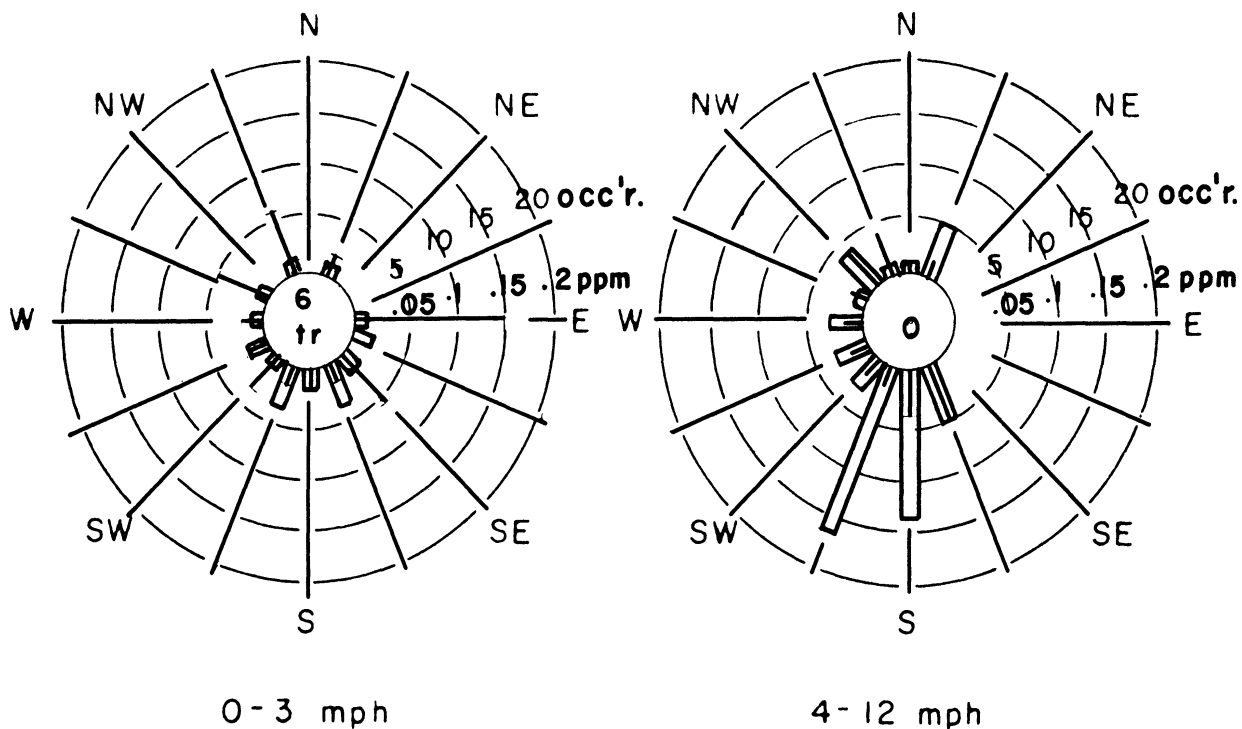
**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA
WINTER (Dec., Jan., Feb.) 1957 - '58**

Fig. 29. Number of occurrences of SO_2 at Silver Hill for various wind directions (rectangles) in three wind-speed categories; and corresponding average SO_2 concentrations in ppm (heavy lines) during such occurrences. Number of occurrences of calm (upper number) and average sulphur dioxide concentration (lower number) in center. Tower wind data used. Period: Winter, 1957 - 1958.



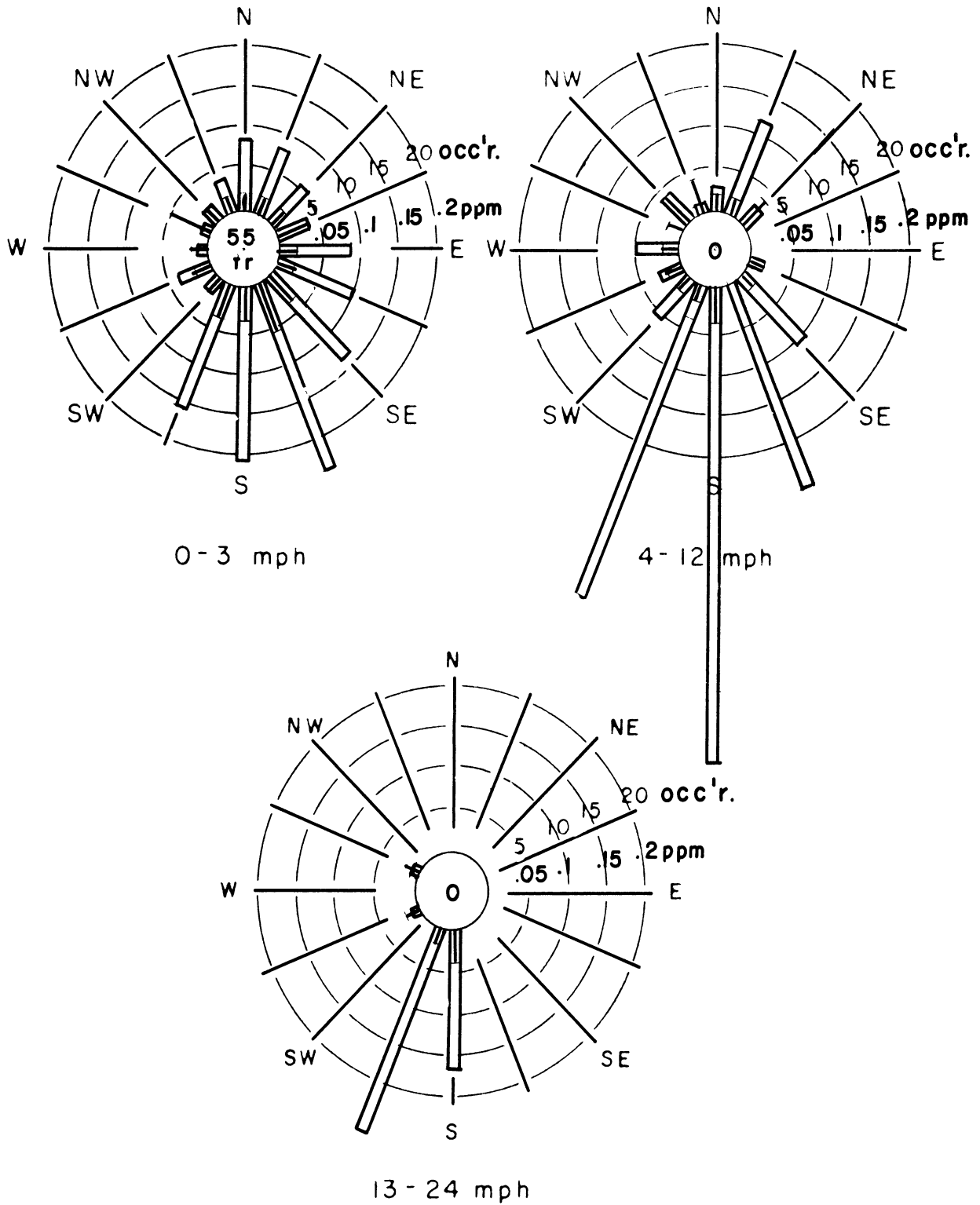
**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA
SPRING (Mar., Apr., May) 1958**

Fig. 30. Number of occurrences of SO_2 at Silver Hill for various wind directions (rectangles) in three wind-speed categories; and corresponding average SO_2 concentrations in ppm (heavy lines) during such occurrences. Number of occurrences of calm (upper number) and average sulphur dioxide concentration (lower number) in center. Tower wind data used. Period: Spring, 1958.



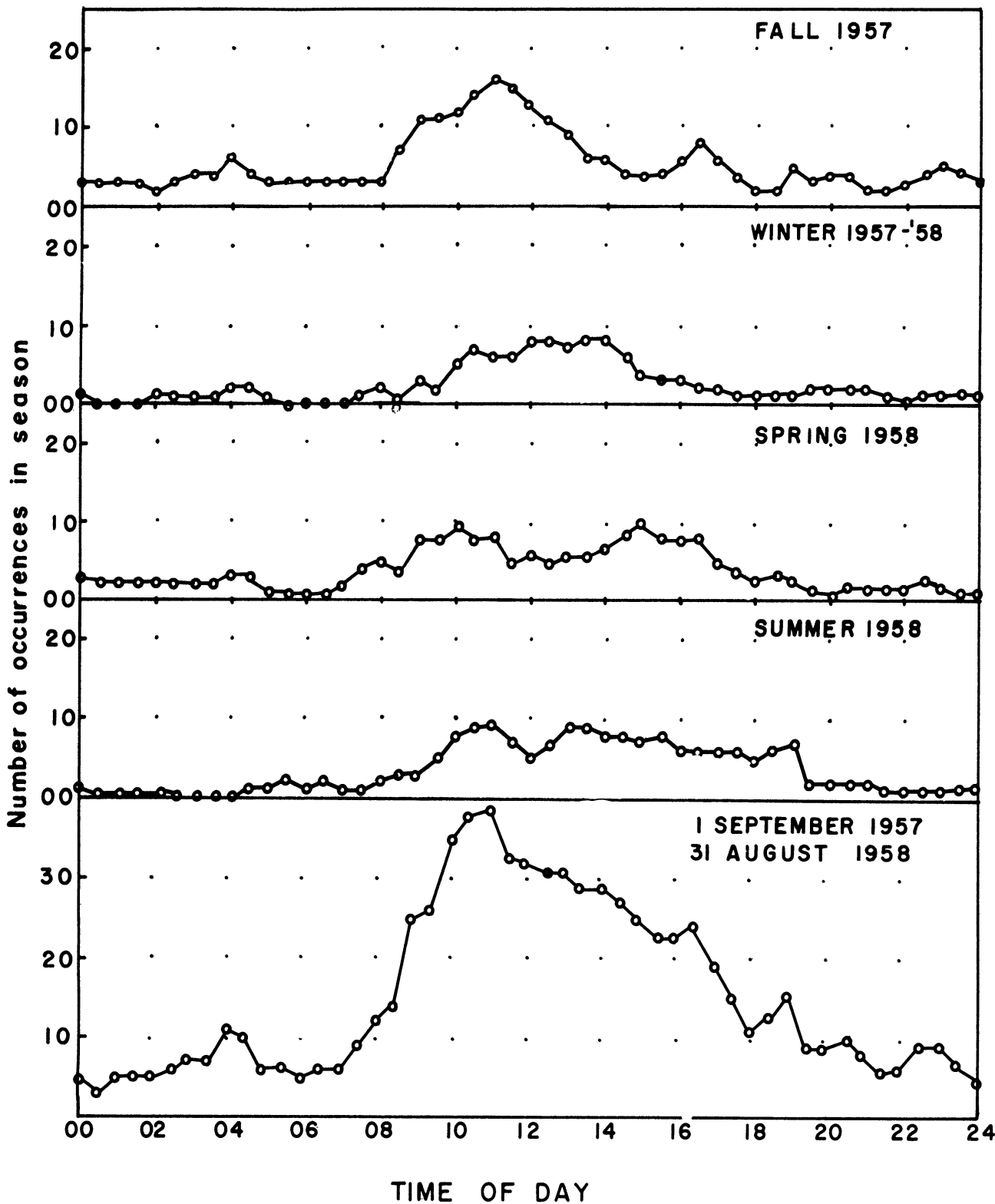
**PUBLIC SERVICE COMPANY OF INDIANA
NEW ALBANY, INDIANA
SUMMER (June, July, Aug.,) 1958**

Fig. 31. Number of occurrences of SO_2 at Silver Hill for various wind directions (rectangles) in three wind-speed categories; and corresponding average SO_2 concentrations in ppm (heavy lines) during such occurrences. Number of occurrences of calm (upper number) and average sulphur dioxide concentration (lower number) in center. Tower wind data used. Period: Summer, 1958.



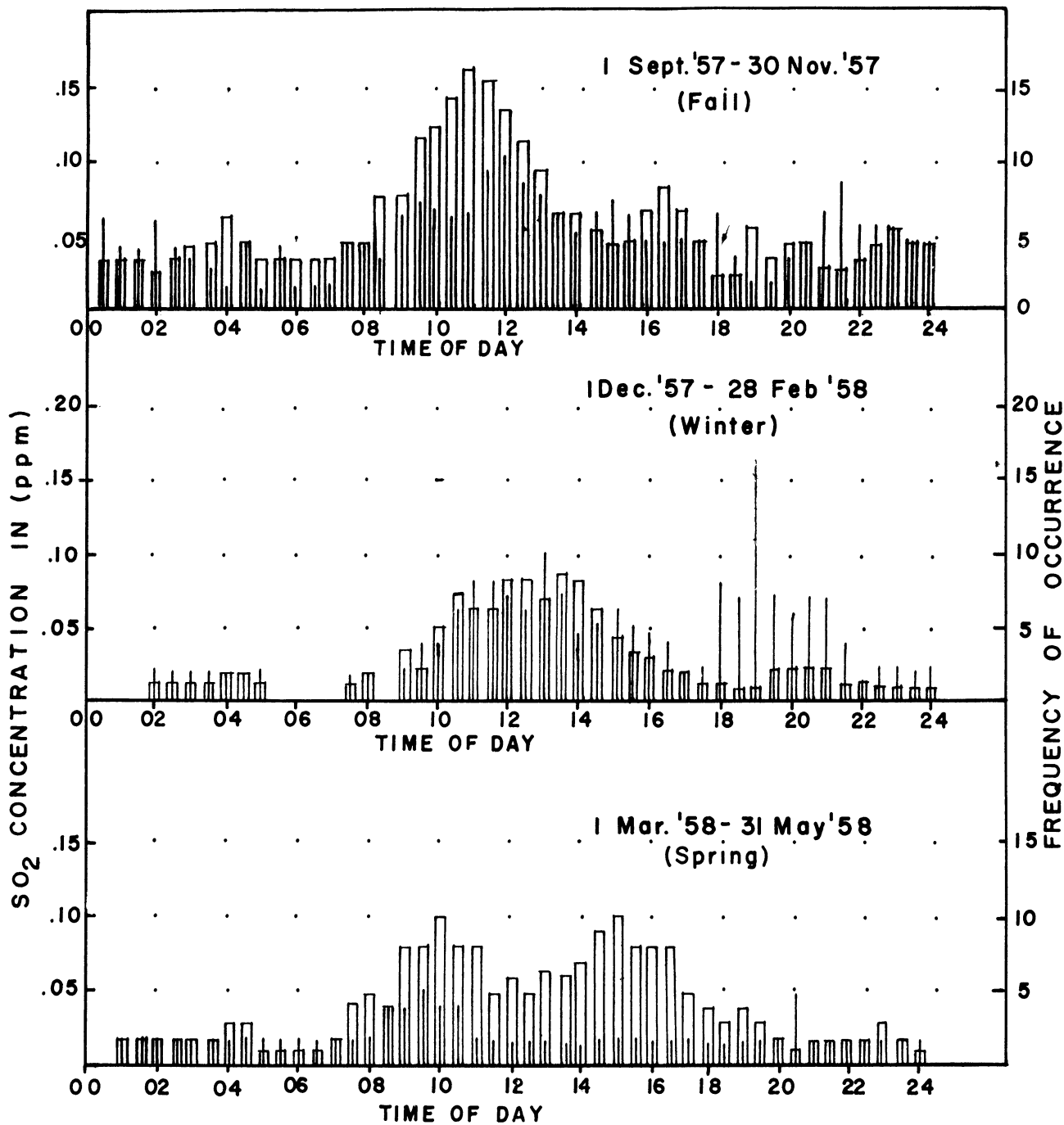
**PUBLIC SERVICE COMPANY OF INDIANA
 NEW ALBANY, INDIANA
 September '57 - August '58**

Fig. 32. Number of occurrences of SO₂ at Silver Hill for various wind directions (rectangles) in three wind-speed categories; and corresponding average SO₂ concentrations in ppm (heavy lines) during such occurrences. Number of occurrences of calm (upper number) and average sulphur dioxide concentration (lower number) in center. Tower wind data used. Period: One year, 1 September 1957 - 31 August 1958.



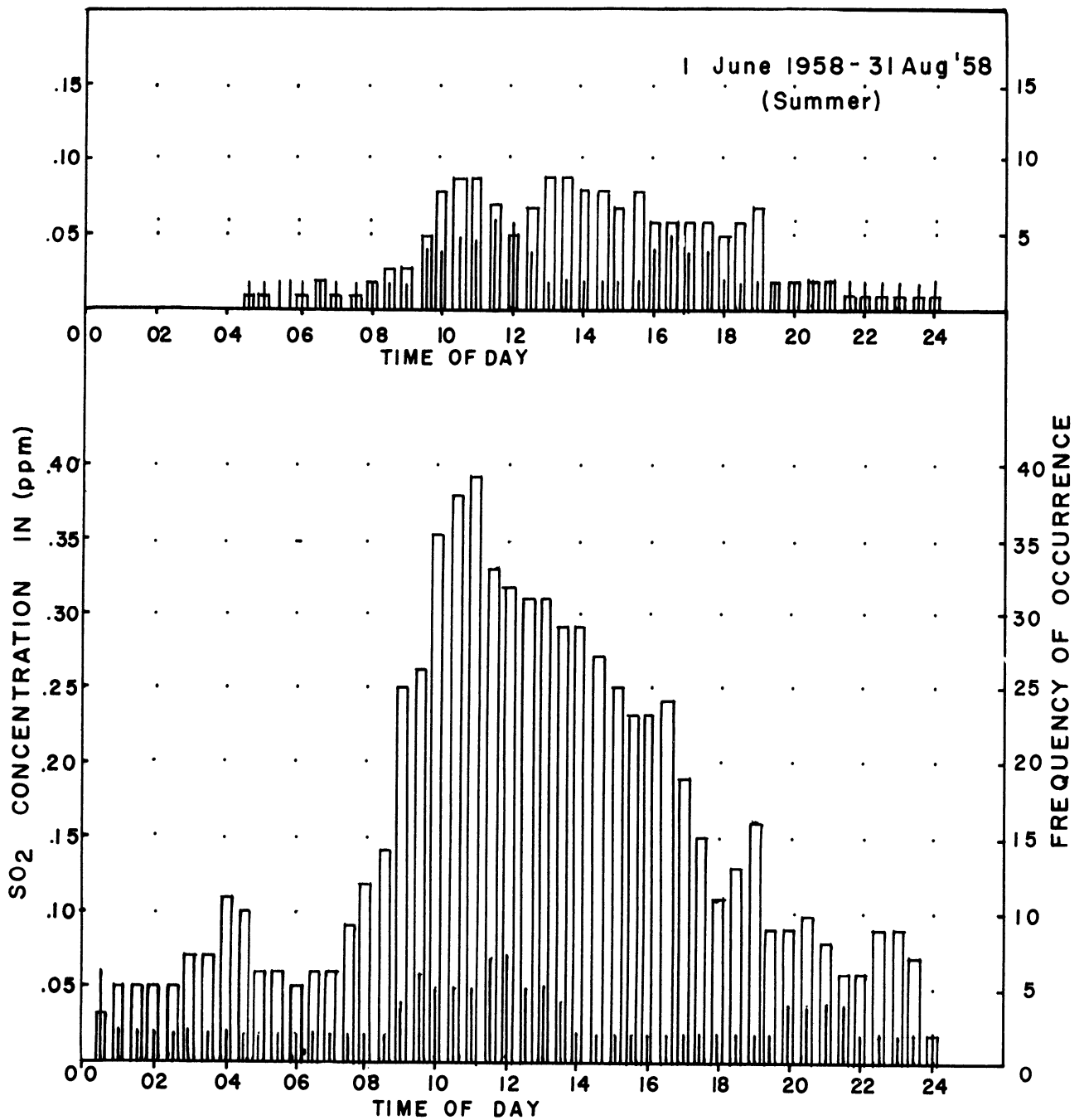
HOURLY OCCURRENCES OF SO₂-SEASONAL AND ANNUAL
 PUBLIC SERVICE COMPANY OF INDIANA
 NEW ALBANY, INDIANA
 1 SEPTEMBER 1957-31 AUGUST 1958

Fig. 33. Number of occurrences of measurable sulphur dioxide concentration vs. time of the day; 1957, Fall; 1957 - 1958, Winter; 1958, Spring; 1958, Summer; and 1957 - 1958, year summary.



**PUBLIC SERVICE COMPANY of INDIANA
NEW ALBANY, INDIANA**

Fig. 34. Number of occurrences (rectangles) and average sulphur dioxide concentrations in ppm (heavy lines) at Silver Hill vs. time of the day; 1957, Fall; 1957 - 1958, Winter; and 1958, Spring.



PUBLIC SERVICE COMPANY OF INDIANA
 1 September 1957 - 31 August 1958

Fig. 35. Number of occurrences (rectangles) and average sulphur dioxide concentrations in ppm (heavy lines) at Silver Hill vs. time of the day; 1958, Summer; and 1957 - 1958, year summary.

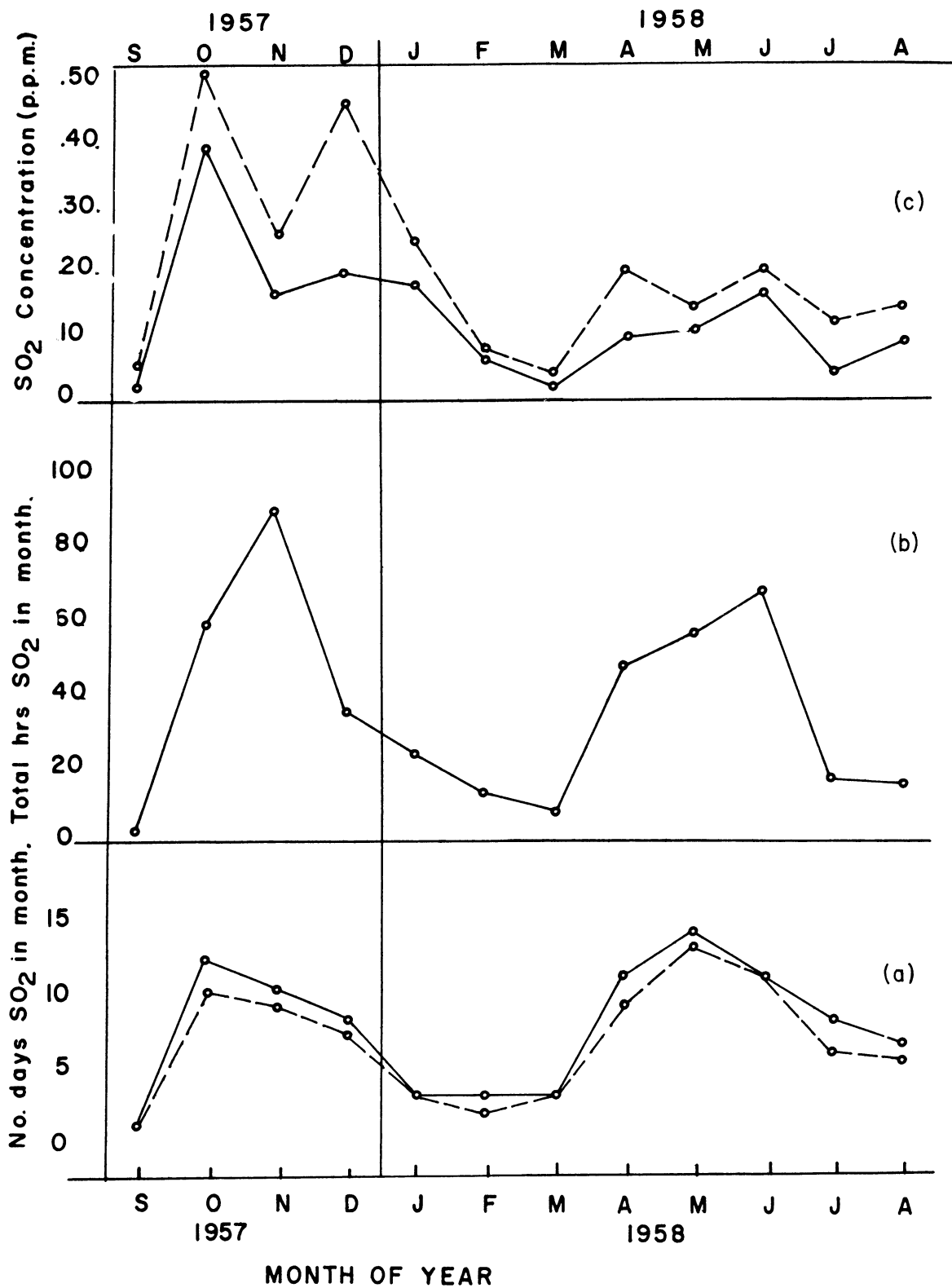


Fig. 36. Sulphur dioxide concentrations at Silver Hill, September, 1957 - August, 1958. (a) Number of days per month that any measurable SO_2 concentration was recorded at Silver Hill (solid curve), and number of days of measurable SO_2 concentration of two hours' duration or longer (broken curve), September 1957 - August 1958. (b) Total hours of measurable sulphur dioxide concentration at Silver Hill per month; September, 1957 - August, 1958. (c) Highest concentration lasting for one hour or longer during each month (solid curve), and short period peak concentration for each month (broken curve), at Silver Hill; one year, 1 September 1957 - 31 August 1958.

