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NOTES ON THE GROUND DAY VISIBILITY

AT

CRANWELL, LINCOLNSHIRE,

During the period FEBRUARY 1 to APRIL 8 (inclusive) 1920,

BY

W. H. PICK, B. Sc.

Published by the Authority of the Meteorological Committee.



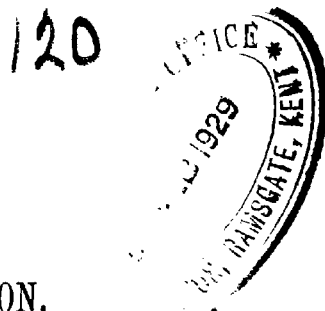
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NOTES ON THE GROUND DAY VISIBILITY

AT

CRANWELL, LINCOLNSHIRE,

DURING THE PERIOD FEB. 1—APRIL 8 (inclusive), 1920.

BY W. H. PICK.

1. The scale of visibility which came into operation at the Distributive Stations of the Meteorological Office on the 1st of February, 1920, is used throughout. Observations from 9h. G.M.T. to 17h. G.M.T., both these hours being inclusive, are counted as "day" observations.

2. An attempt is made to find the relations, if any, existing between the visibility experienced during the period in question and

- (a) The wind direction as shown by an anemo-biograph whose head is 43 feet above ground level;
- (b) The wind velocity as shown by the same anemo-biograph;
- (c) The distribution of pressure as shown by the synoptic-charts for 7h. G.M.T. each day.

3. **Wind Direction and Visibility.**—The results gained under this head are set out in the table which follows. On a few occasions the anemo-biograph was not working satisfactorily, and these have been omitted.

TABLE I.—WIND DIRECTION AND VISIBILITY.

| Wind Direction. | N/W-NNE both inclusive. | NE/N-ESE both inclusive. | E/N-ESE both inclusive. | SE/E-SSE both inclusive. | S/E-SSW both inclusive. | SW/S-WSW both inclusive. | W/S-WNW both inclusive. | NW/W-NNW both inclusive. |
|---------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| Number of Occasions | 60 | 30 | 26 | 66 | 125 | 139 | 108 | 49 |
| Mean Visibility ... | 4.2 | 4.4 | 3.7 | 3.7 | 5.7 | 4.8 | 4.6 | 4.1 |

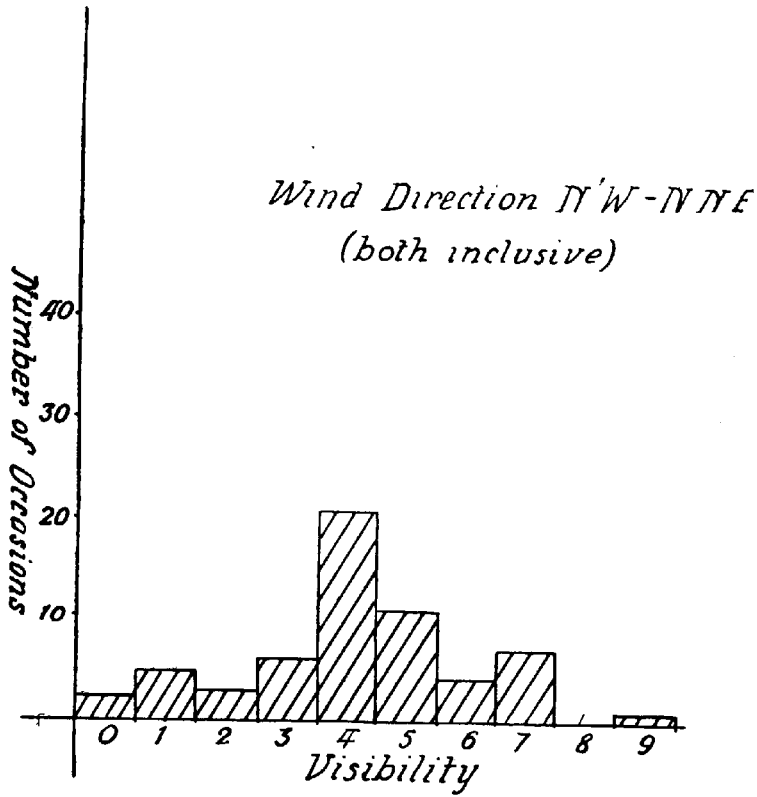


FIG. 1.

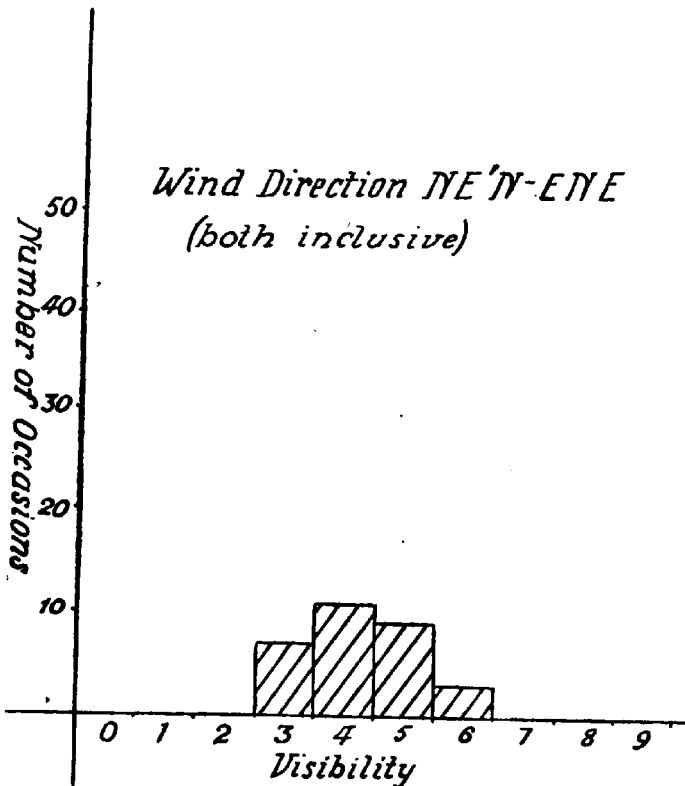


FIG. 2.

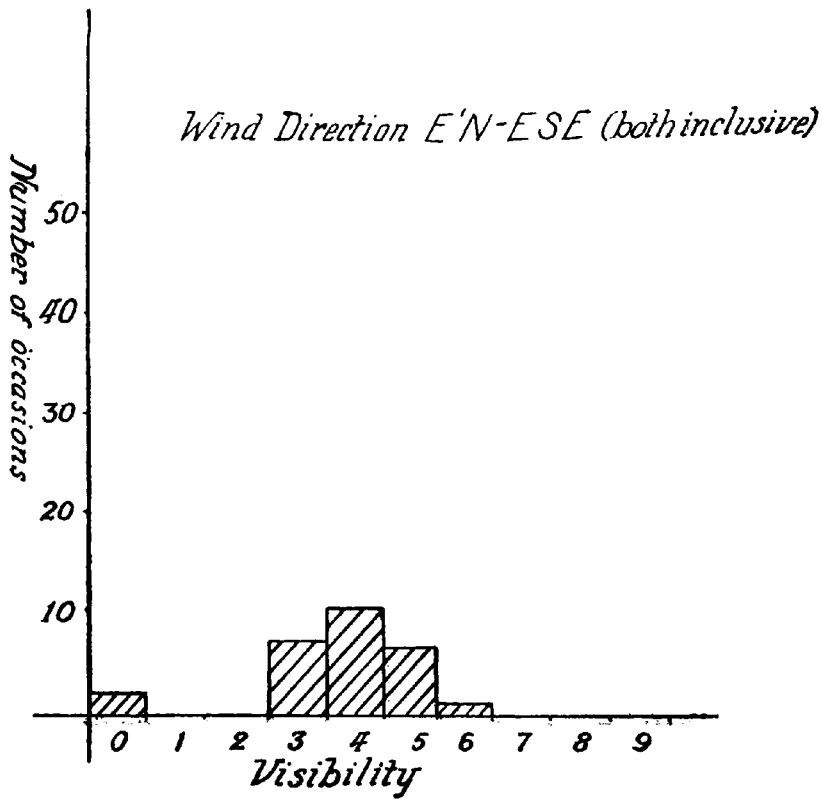


FIG. 3.

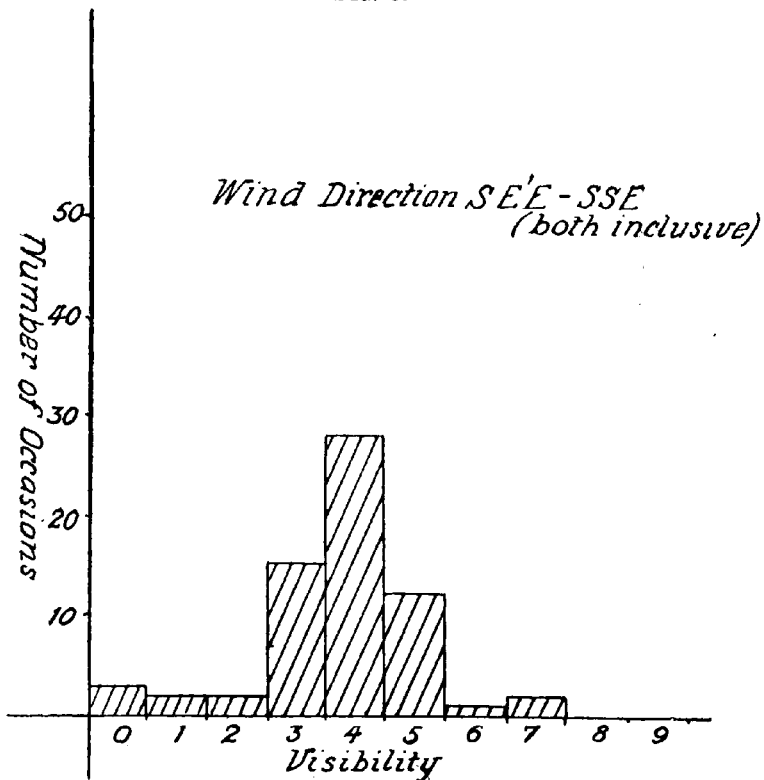


FIG. 4.

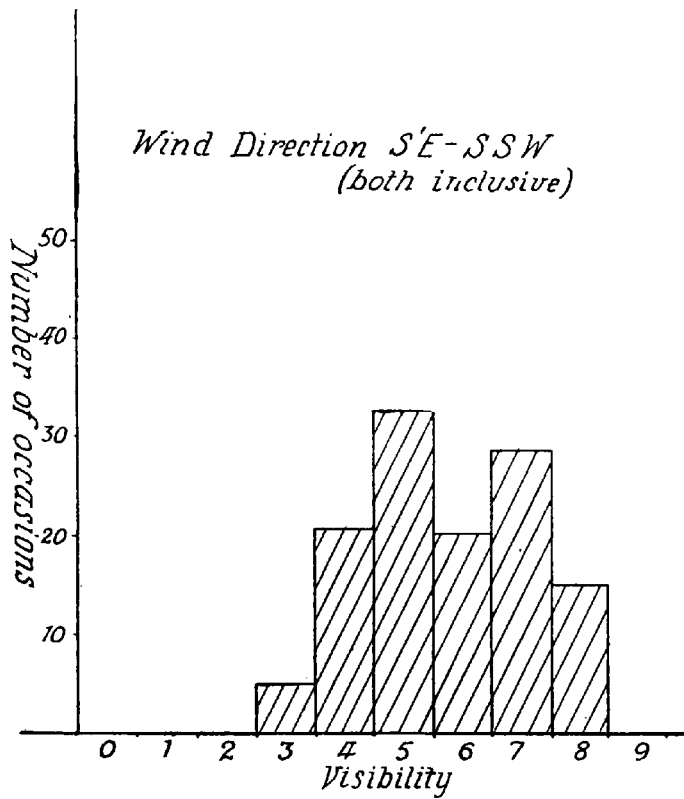


FIG. 5.

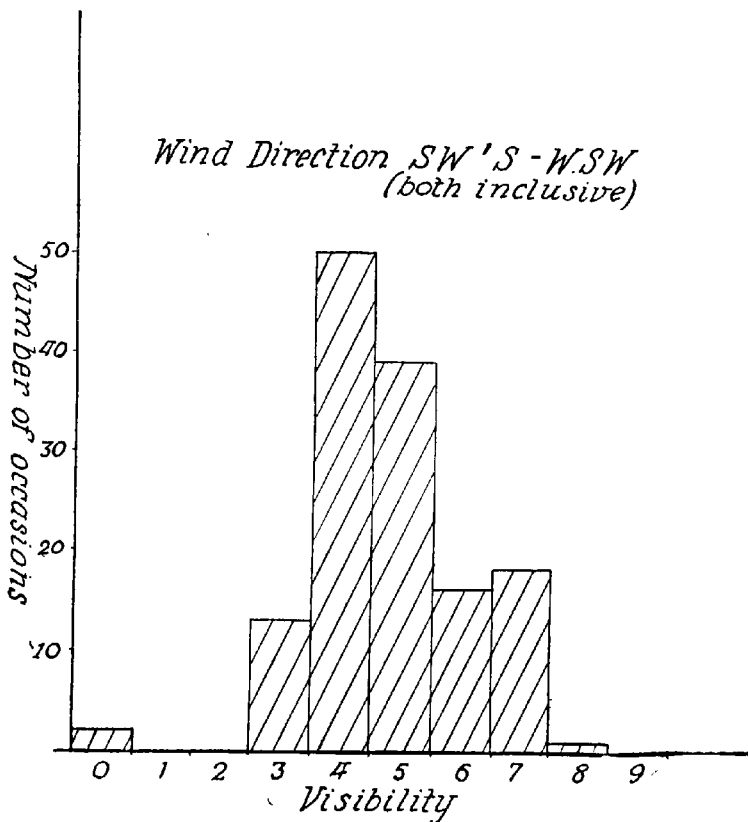


FIG. 6.

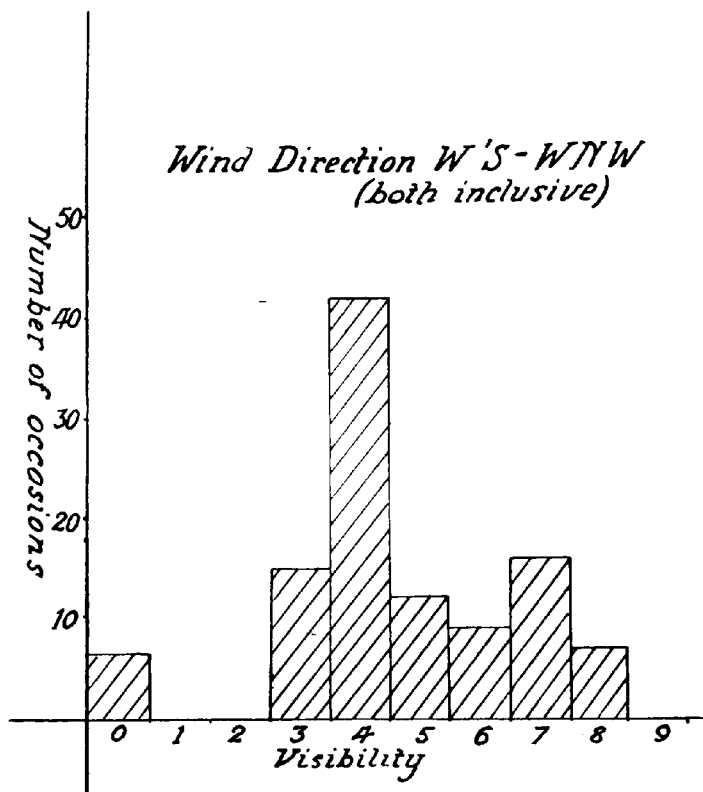


FIG. 7.

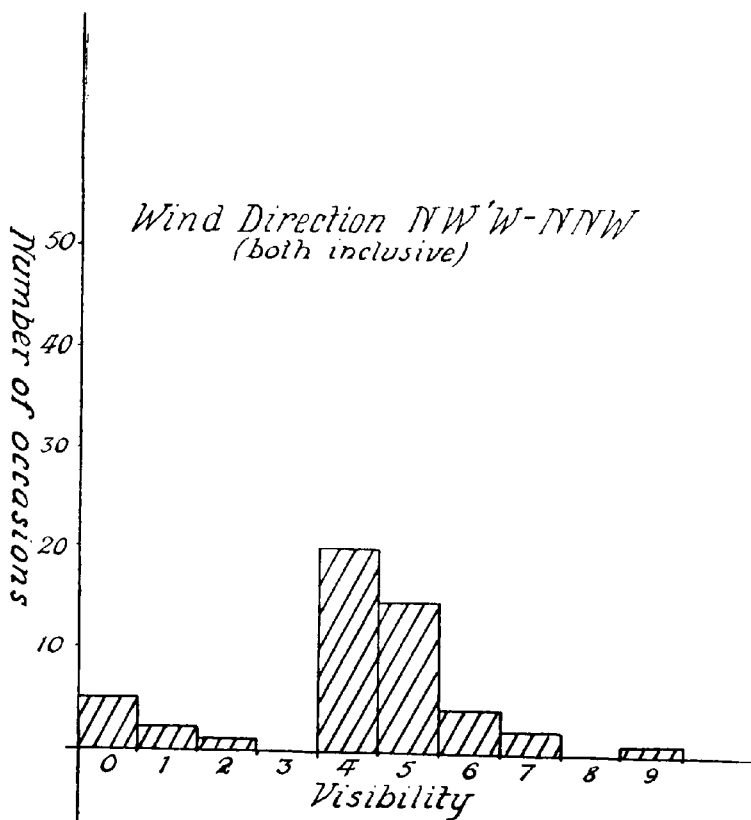


FIG. 8.

The distribution of the observations in each of the eight directional groups considered separately is shown in figures 1—8, inclusive.

Table I. shows that the highest degree of visibility accompanied winds given by the directional group S. by E.—SSW., and the next highest winds given by the group SW. by S.—WSW.; and that the lowest degree accompanied the two directional groups E. by N.—ESE., and SE. by E.—SSE.

In general, winds in the South-West quadrant brought the best visibility; winds between West and East through North a considerably lower degree; and winds in the South-East quadrant the lowest degree of all.

4. **Wind Force and Visibility.**—The winds at the stated hours (9 h.—17 h. G.M.T., both inclusive) during the period in question were divided into two classes according to the anemo-biograph readings, as follows:—

(a) Those greater than 12 miles per hour.

(b) Those equal to, or less than, 12 miles per hour.

A.—Considering all the winds with regard to force alone, and irrespective of direction, the following result (Table II.) was obtained:—

TABLE II.

| — | Number of Occasions. | Mean Visibility. |
|------------------------------|----------------------|------------------|
| Winds > 12 m. p. h. ... | 360 | 5·2 |
| Winds < or = 12 m. p. h. ... | 243 | 3·9 |

B.—Considering now the winds according to the same directional groups as in Table I., the following results were obtained:—

TABLE III.

| Wind Group. | > 12 m.p.h. | | < or = 12 m.p.h. | |
|--------------|----------------------|------------------|----------------------|------------------|
| | Number of Occasions. | Mean Visibility. | Number of Occasions. | Mean Visibility. |
| N'W-NNE ... | 32 | 4·5 | 27 | 3·8 |
| NEN-ENE ... | 11 | 4·5 | 20 | 4·4 |
| EN-ESE ... | 0 | — | 26 | 3·7 |
| SE-E-SSE ... | 20 | 3·3 | 46 | 4·0 |
| S'E-SSW ... | 104 | 5·9 | 21 | 4·6 |
| SW'S-WSW ... | 96 | 5·3 | 42 | 3·6 |
| W'S-WNW ... | 66 | 5·5 | 43 | 3·6 |
| NW'W-NNW ... | 31 | 4·4 | 18 | 3·6 |

The distribution of the visibilities with regard to value is shown as under :—

TABLE IV.
Velocity Greater than 12 m.p.h.

| | | | | | | | | | | | | | |
|---------------------|-----|-----|-----|---|----|----|----|----|----|----|---|---|----|
| Visibility | ... | ... | ... | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Number of Occasions | ... | | | 2 | 22 | 69 | 50 | 91 | 96 | 14 | 3 | 3 | 10 |

TABLE V.
Velocity Less than or Equal to 12 m.p.h.

| | | | | | | | | | | | | | |
|---------------------|-----|-----|-----|---|---|---|---|----|-----|----|---|---|----|
| Visibility | ... | ... | ... | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Number of Occasions | ... | | | 0 | 1 | 5 | 8 | 41 | 121 | 48 | 3 | 6 | 10 |

It will be noticed from Table II. that the mean visibility with winds greater than 12 m.p.h. was much higher than it was with winds less than or equal to 12 m.p.h.

Table III. shows that this result was not a fallacious one, inasmuch as seven of the eight directional groups show better mean visibility with the stronger winds.

Tables IV. and V., considered together, show that, of 157 visibilities of value 6 or over obtained during the period in question, no less than 143 occurred when the wind was greater than 12 miles per hour.

5.—**Pressure Distribution and Visibility.**—An attempt was also made to correlate the isobaric distribution over the British Isles, as shown by the synoptic chart for 7 h. G.M.T. on the morning of the day in question, with the visibility observations made each hour during the period, 9 h.—17 h. G.M.T., both hours inclusive, of that day.

It is extremely difficult to classify maps according to isobaric distribution with any certainty of getting a unanimous opinion from meteorologists studying the same map, but the following table (Table VI.) shows the results obtained for the period February 1—April 8, 1920.

TABLE VI.

| — | No. of days. | Mean visibility. |
|-------------------------------------|--------------|------------------|
| Front of Depression | 14 | 5·1 |
| Rear of Depression | 16 | 5·0 |
| Secondary Depression | 7 | 4·9 |
| Anticyclone | 15 } | 3·9 |
| Wedge | 1 } | |
| Col. | 2 | 4·7 |
| Straight (S.-N.) Isobars | 2 | 3·2 |
| Straight (W.-E.) Isobars | 7 } | 5·5 |
| Straight (S.W.-N.E.) Isobars | 1 } | |
| Irregular | 3 | 3·5 |

The shortness of the period considered makes any generalisation on Table VI. unjustifiable; but the high mean visibility which accompanied straight isobars from a Westerly to an Easterly direction seems worthy of notice.

6. The general results arrived at for the period investigated may be summarised as follows:—

- (a) Ninety per cent. of all visibilities which could be classed as good (scale value 6 or over) occurred with anemograph winds (43 feet above ground) of a speed greater than 12 miles per hour (Tables IV. and V.).
 - (b) No matter what the wind direction, with a possible exception in the case of winds in the directional group SE. by E.—SSE., winds at 43 feet of velocity greater than 12 miles per hour brought better visibility than winds under 12 miles per hour in velocity (Table III.).
 - (c) Winds greater in velocity than 12 miles per hour blowing from S. by E. to SSW., both inclusive, brought the best visibilities and never brought any visibility so low as 2.
 - (d) Straight West-to-East isobars gave the type of isobaric distribution which brought the best average visibility (Table VI.).
 - (e) Considering the winds from the eight main compass points, Southerly winds brought the best visibility, and South-Westerly and then Westerly the next highest degrees. Following these, in order of degree of visibility brought, came North-Easterly, Northerly, and North-Westerly; and, at some distance behind Easterly and South-Easterly bringing the lowest degree of all (Table I.).
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