

DEPARTMENT OF TRANSPORT AND POWER  
METEOROLOGICAL SERVICE

SOLAR RADIATION OBSERVATIONS  
AT VALENTIA OBSERVATORY

1964

---

U.D.C.  
551. 506. 3  
551. 521. 12 (418. 6)

---

DUBLIN  
1968  
Price 1s. 6d.



DEPARTMENT OF TRANSPORT AND POWER - METEOROLOGICAL SERVICE

LIST OF SOLAR RADIATION PUBLICATIONS

(Prices do not include postage)

- |  |            |
|--|------------|
| (1) Solar Radiation observations at Valentia Observatory<br>1954-59                    | 5s 3d.     |
| (2) Solar Radiation Observations at Valentia Observatory<br>for the years 1960 to 1964 | 1s 6d each |

---

A complete list of Meteorological Service publications  
will be supplied on request.

## C O N T E N T S

	<u>Page</u>
1. Introduction	1
2. Site of the Observatory	1
3. Measurement of Global Solar Radiation	1
3.1. Exposure of the Pyranometer	1
3.2. Pyranograph Used	2
3.3. Calibration of the Pyranograph	2
3.4. Tabulation of the Records	2
4. Measurement of Diffuse Solar Radiation	2
4.1. Exposure of the Pyranometer	2
4.2. Pyranograph Used	2
4.3. Calibration of the Pyranograph	2
4.4. Tabulation of the Records	2
4.5. Shadow - Ring Correction	3
5. Direct Sun Observations	3
5.1. Instruments Used	3
5.1.1. Filters Used	3
5.2. Calibration of the Actinometer	3
5.3. Observational Routine	4
5.4. Computation of the Sun's Zenith Distance ( $Z$ )	4
5.5. Computation of the Optical Air Mass ( $m$ )	4
6. Notes on the Tables	4
Table 1. Global Solar Radiation, Mean Hourly Values	6
Table 2. Diffuse Solar Radiation, Mean Hourly Values	18
Table 3. Direct Solar Radiation at Normal Incidences, Instantaneous Values	30
Table 4. Daily Totals of Global Solar Radiation	32
Table 5. Daily Totals of Diffuse Solar Radiation	33

# SOLAR RADIATION OBSERVATIONS AT VALENTIA OBSERVATORY.

1964.

## 1. Introduction

Solar Radiation observations were begun at Valentia Observatory in September 1954. At that time a Moll thermopile pyranometer and a recording millivoltmeter were installed, and have, since then, provided a continuous record of Global Solar Radiation. A Linke-Feussner thermoelectric iron clad Actinometer (Kipp and Zonen) was also brought into use at the same time and a schedule of routine observations on direct sunlight has been maintained, when weather conditions permitted. In 1962, a second Moll thermopile pyranometer, fitted with shading ring, was installed to provide a record of the Diffuse solar radiation. Data derived from the pyranograph and the results obtained from the direct sunlight observations for the period 1954 - 1959 have been published in [1]. The data for 1960 and subsequent years have been published in annual volumes. This volume contains the data for 1964.

## 2. Site of the Observatory

The Observatory, which is in the extreme South West of Ireland, (Lat.  $51^{\circ}56'N$ ; Long.  $10^{\circ}15'W$ ), is situated on the South East side of the narrow estuary of Valentia River, which runs approximately North East-South West (Fig. 1). It is about  $3/4$  mile to the South West of the town of Cahirciveen. To the North, across the river estuary, is a range of hills 400 ft. to 1200 ft. high. To the North East, beyond the town of Cahirciveen, the estuary opens out considerably and the terrain is generally an open boggy basin with only a gentle gradient. To the South East, however, the ground rises rapidly again to a range of hills 900 ft. to 1200 ft. high, the highest peak (Bentee 1245 ft.) being only a mile from the Observatory. To the South, the country opens out to a distance of nearly 5 miles from the Observatory, where the Kilkeaveragh range of hills runs East-West, varying in height from 400 ft. to 1300 ft. There is an opening to the sea to the South West between the mainland and Valentia Island. The hills on the island rise to a height of 900 ft. North of the island there is another opening to the sea, and the circle of hills is completed by a range to the North West, 400 ft. to 900 ft. high, separated by a narrow gully from the range to the Northward.

## 3. Measurement of Global Solar Radiation

### 3.1. Exposure of the Pyranometer

The layout of the Observatory is shown in Fig. 2. The instrument is exposed on the roof of the Radiation House and the recording millivoltmeter mounted vertically below it inside the house. The pyranometer is at a height of 4 metres above ground level and 20 metres above Mean Sea Level. The nature of the exposure can be seen in Fig. 3, in which the outline of all obscuring objects is plotted on an Elevation-Azimuth diagram. Apart from one sector, the obscuring objects have an elevation of less than  $5^{\circ}$ , so that their effect on the diffuse radiation is negligible.

In the sector  $080^{\circ} - 150^{\circ}$  E. from North, the elevation of the obscuring objects lies between  $8^{\circ}$  and  $10.5^{\circ}$  approximately. The loss of diffuse radiation according to Blackwell's formula [2] works out at approximately 1%. This is also very small, so no corrections have been made to the data to allow for this loss. The loss of radiation due to the obstruction of the direct solar beam occurs mainly in the same sector ( $080^{\circ} - 150^{\circ}$ ). During the period, from the end of August to mid-April, the initial 30 to 70 minutes of direct sun is cut off. This affects the hourly values given for the first and occasionally the second hour but the effect on the total for the day is negligible. No attempt has been made to correct the radiation data for this loss of direct sunlight.

### 3.2. Pyranograph Used

The instrument in use during 1964 is the same as has been used since recordings began in 1954, namely a G<sub>2</sub> Solarimetric Thermopile by Kipp and Zonen, serial No. 847. Recording millivoltmeter No. 29 (Kipp & Zonen) has been used since recordings began apart from a few months in 1963 when it was being overhauled.

The pyranometer consists of a special Moll thermopile mounted under two concentric hemispherical glass covers on a cast iron levelling base. At the bottom of the base of the pile, a tube is provided which communicates with the interior of the instrument. This tube is connected to a vessel containing silica gel, which keeps the air under the glass covers dry.

The recording millivoltmeter is of the intermittent dot type, a dot being made on the chart every half minute. The charts used are in rolls, each roll accomodating about two months record.

### 3.3. Calibration of the Pyranograph.

The Pyranometer and Recording Millivoltmeter were calibrated by means of the Actinometer and millivoltmeter, described in paragraphs 5.1. and 5.2. below. The calibration was done by comparing the intensity of the direct sunlight as measured by the Pyranograph with the corresponding intensity as measured by means of the Actinometer.

### 3.4. Tabulation of the Records.

The records were tabulated by means of a glass scale calibrated directly in energy units. The hourly values tabulated are the mean values for each hour (Local Apparent Time) centred at the half hour. To facilitate accurate timing, time marks were made on the chart twice daily, by hand, at approximately midnight and noon.

## 4. Measurement of Diffuse Solar Radiation

### 4.1. Exposure of the Pyranometer.

The Diffuse Pyranometer is mounted on the same site as the Total Pyranometer, at a distance of 3.1 metres North West of the latter. A description of the site is given in 3.1. above.

### 4.2. Pyranograph Used.

The instrument in use is similar to that used for recording the global solar radiation, i.e. G<sub>2</sub> Solarimetric Thermopile (Kipp and Zonen) serial No. 1387, and Recording Millivoltmeter (Kipp and Zonen) serial No. 168. The width of the shading ring is 48 mm. and its diameter is 308 mm.

### 4.3. Calibration of the Pyranograph.

The shadow ring was displaced below the horizontal position. The Pyranograph was then calibrated in exactly the same way as the total pyranograph (paragraph 3.3. above).

### 4.4. Tabulation of the Records.

The records were tabulated in the same way as the global radiation records (paragraph 3.4. above).

#### 4.5. Shadow - Ring Correction.

Corrections have been made to increase the values extracted from the charts to compensate for the diffuse energy intercepted by the ring simultaneously with the eclipsing of the sun's disc. Theoretical corrections were computed following the method described by Blackwell [2]. As a result of a series of comparisons, in overcast sky conditions, between the diffuse radiation and corresponding total radiation, it was found that the shadow - ring corrections, computed theoretically, had to be increased by an amount averaging 5% of the tabulated diffuse radiation.

### 5. Direct Sun Observations.

#### 5.1. Instruments Used.

The Actinometer used for all the direct sun observations, was the Linke - Feussner thermoelectric iron clad actinometer (serial No. 93) by Kipp and Zonen, provided with red and yellow filters. Millivoltmeter No. 233216, used in conjunction with the actinometer, was also supplied by Kipp and Zonen.

The actinometer body consists of six massive copper rings, which are made to serve as diaphragms. The openings of these diaphragms decrease progressively towards the thermopile, and the chambers formed between them are specially shaped so as to eliminate turbulent air currents within the instrument. Felt lagging around the body shields the instrument thermally.

The detachable filter head consists of a heavy copper core, which is screwed on to the exterior ring and carries a filter disc. Only a very small segment of this disc protrudes from the head, so that the filters are kept at Actinometer temperature. The Moll Thermopile is divided into two equal sections, connected in opposition and each consisting of twenty constantan-manganin couples. One of the sections is screened from radiation and thus acts as a compensating device for the elimination of thermal effects associated with quasi-adiabatic pressure changes, occurring near the thermopile surface.

A thermometer for reading the temperature of the instrument is set inside the copper parts.

##### 5.1.1. Filters Used.

Two filters of Schott glass OG<sub>1</sub> and RG<sub>2</sub> were received from the Radiation Commission of the International Association of Meteorology and were used for all the observations during 1964. These filters were tested at Davos Observatory and a Certificate with the reduction factor (DR) supplied.

For filter OG<sub>1</sub>, DR = 1.108

For filter RG<sub>2</sub>, DR = 1.132

#### 5.2. Calibration of the Actinometer

In 1961 an Angstrom Compensating Pyrheliometer (No. 548) was received, with calibration data, from Stockholm. This instrument is reserved as National reference standard.

The actinometer and millivoltmeter were calibrated by reference to the Pyrheliometer. During 1964 comparisons showed that the calibration figure (1 scale division of the millivoltmeter = 0.0225 gm.cal/cm<sup>2</sup>/min.) used for the actinometer was giving results 2.2% lower than the Pyrheliometer. In September, 1964 European (Region VI)

National standard pyrheliometers were compared with the Davos and W.M.O. standards at Davos, Switzerland. According to this comparison Valentia Pyrheliometer No. 548 was giving results 1.3% too high. Thus the Actinometer data and Solarimeter data (based on actinometer comparisons) given in this volume would appear to be 0.9% too low. Considering the nature of the data involved this small correction has not been applied.

### 5.3. Observational Routine

All observations were made at a site about 20 feet South East of the Radiation House (Fig. 2) and at a height of 51' above M.S.L. Observations were made three times daily, when sky conditions permitted, at approximately 1030, 1230 i.e. at approximately the average time of local noon, and at 1430 G.M.T. Each of the observations consisted of a double series of measurements in the order: ZERO - TOTAL - RED - YELLOW - RED - TOTAL - ZERO. Observations were also made of the time G.M.T. of each of the individual settings, the temperature at the beginning and end of each set of observations, as indicated by the thermometer attached to the actinometer, the cloud type and amount, visibility and weather.

### 5.4. Computation of the Sun's Zenith Distance (Z).

The Sun's Zenith Distance for each time of observation was obtained from a special table prepared for Valentia, based on tables 5, 6 and 11 as given in Linke's "Meteorologisches Taschenbuch" Vol. 1V (Leipzig, 1939 edition) and the "Alt-Azimuth Tables, for Latitude Limits 30° - 64°", prepared by P. L. H. Davis and published by H. M. Stationary Office, London (1918 Edition). The values are accurate to the nearest tenth of a degree.

### 5.5. Computation of the Optical Air Mass (m).

The Relative Air Mass ( $m_h$ ) was obtained from the Sun's Zenith Distance (Z) by using Table 137, Page 422 of "Smithsonian Meteorological Tables" (1951 edition). This table is based on Bemporad's formula:

$$m_h = \frac{\text{Atmospheric refraction in seconds}}{58.36 \sin Z}$$

The Optical Air Mass (m) was computed from the formula:

$$m = m_h \frac{P}{1000} \quad \text{where } P = \text{the atmospheric pressure in millibars}$$

## 6. Notes on the Tables

- (1) All the radiation values given in the following Tables are in the International Pyreheliometric Scale, 1956.
- (2) When record was missing for any hour due to instrument defects or other cause, an interpolated (estimated) value has, where possible been entered in Tables I and II. Such values are shown enclosed in brackets.
- (3) In Table III, the pressure, temperature and vapour pressure data were extracted from the routine meteorological records kept at the station. The cloud types and amounts were recorded by the observer during the Actinometer observations. The amounts of cloud are given in eights of sky covered.

References:

- [1] Solar Radiation Observations at Valentia Observatory 1954 - 1959.  
(Meteorological Service, Department of Transport and Power, Dublin, 1961).
- [2] Five Years Continuous Recording of Total and Diffuse Solar Radiation at  
Kew Observatory - by M. J. Blackwell.  
(Meteorological Research Committee, Air Ministry, London.  
M.R.P. No. 895, 1954).



TABLE I  
VALENTIA

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JANUARY, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1							1	4	4	5	4	1							19
2							1	1	3	3	1	1							10
3						1	4	4	5	4	4	3							25
4							1	5	8	6	4	1							25
5								3	3	4	5	5	4	1					25
6						1	5	8	15	14	16	6	3						68
7							1	3	3	3	3	4	1						18
8						1	3	5	8	5	5	4	1						32
9						3	4	5	5	5	4	3	1						30
10						1	3	6	8	6	4	3	1						32
11						3	9	13	13	19	16	10	3						91
12						1	8	16	18	11	10	5	3						72
13						3	9	16	18	18	16	10	5						95
14						1	4	11	9	8	8	6	3						50
15						3	11	15	19	14	8	5	3						78
16						3	4	6	10	18	16	8	4						69
17						1	3	3	1	3	3	1	1						16
18							1	1	3	3	3	1	1						13
19						4	14	20	23	16	20	14	4	1					116
20					1	4	6	19	24	25	20	10	4	1					114
21					1	4	10	18	14	13	11	8	3						82
22						4	6	5	6	8	3	3	1						36
23					1	4	15	16	27	19	9	9	4	1					105
24					1	5	15	23	28	30	19	15	5						141
25					1	6	16	24	27	23	25	16	6	1					150
26						1	4	10	19	23	18	3	3						81
27						1	3	4	5	9	11	14	6						53
28						3	6	19	24	20	13	3	3						91
29						1	1	3	3	4	4	3	3						22
30					1	4	5	11	10	15	6	6	3						61
31						1	3	6	9	11	9	18	8	1					66
Total					6	64	179	303	378	371	298	198	84	5					1886
Mean					0.2	2.1	5.8	9.8	12.2	12.0	9.6	6.4	2.7	0.2					60.8

TABLE I (Contd.)  
VALENTIA

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

FEBRUARY, 1964.

HOUR L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1					1	4	4	6	5	8	13	4	1						46
2					1	3	9	10	13	11	18	14	5	1					85
3					1	6	15	23	19	29	32	18	9	1					153
4					1	3	4	4	6	9	6	4	3	1					41
5					1	5	11	24	29	39	34	25	13	3					184
6					1	10	21	29	33	33	29	23	10	3					192
7					3	8	11	23	32	32	28	23	10	3					173
8					1	3	5	8	9	9	6	5	3						49
9						1	3	4	4	4	4	3	1	1					25
10					1	5	10	11	18	13	8	6	1						73
11					3	10	21	29	20	18	16	10	4						131
12					1	4	6	11	13	9	11	5	5	3					68
13					1	8	8	4	3	4	4	3	1						36
14					3	11	25	27	32	29	29	15	10	3					184
15					1	8	21	23	33	39	40	25	15	3					208
16					3	4	14	25	24	10	21	8	6	3					118
17					3	4	8	13	16	16	16	23	9	1					109
18					1	11	24	28	19	19	24	16	10	3					155
19					;	3	5	14	24	19	10	9	11	3					98
20					3	4	10	21	21	24	29	19	10	3					144
21					1	5	13	14	8	8	5	4	3	1					62
22					3	5	5	5	4	8	5	6	3	5	1				50
23					4	8	14	6	25	29	20	29	19	6	1				161
24					1	1	8	13	9	8	5	4	3	1					53
25					3	9	14	19	18	21	21	20	13	4	1				143
26					1	1	4	6	23	25	25	25	19	5	1				135
27					4	9	11	25	27	30	23	34	10	6	1				180
28					5	11	20	14	39	44	37	16	23	6	1				216
29					3	10	15	30	29	32	40	23	15	9	1				207
Total					54	171	339	467	556	576	554	428	248	79	7				3479
Mean					1.9	5.9	11.7	16.1	19.2	19.9	19.1	14.8	8.6	2.7	0.2				120.0

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

MARCH, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1					1	5	8	14	16	11	16	8	8	3					90
2				1	5	13	25	25	32	28	29	24	19	9	3				213
3				1	4	5	8	10	16	28	19	19	11	4	1				126
4				1	6	16	29	38	35	21	32	14	9	3	1				205
5				1	8	23	33	25	18	16	27	18	6	3	1				179
6				1	4	10	37	40	34	38	32	15	8	6	1				226
7				1	9	23	20	45	50	54	38	14	8	3	1				266
8				1	10	29	39	48	50	29	25	9	10	8	3				261
9				1	10	11	14	25	21	21	20	20	5	1	1				150
10				1	5	5	5	15	13	30	30	23	21	10	3				161
11				1	5	9	24	43	47	33	45	43	15	5	1				271
12				1	3	8	10	8	15	13	18	8	9	5	1				99
13				3	10	23	40	48	52	24	19	14	9	6	1				254
14				1	5	11	16	34	43	52	52	44	30	10	3				301
15				1	11	25	30	48	54	44	57	45	24	16	3				358
16					3	11	16	20	18	21	19	16	19	6	1				150
17				3	9	18	23	32	42	34	25	13	8	3	1				211
18					4	14	42	53	61	58	52	45	30	11	3				373
19					3	10	23	25	30	33	39	43	25	10	4				245
20				4	10	21	28	35	49	45	30	25	14	6	1				268
21				1	1	8	19	15	13	29	21	23	32	20	5				187
22				1	3	6	14	21	25	30	43	49	35	9	4				240
23				3	5	9	9	9	6	8	6	4	4	1	1				65
24				3	5	15	28	43	38	32	15	24	25	8	3				239
25				3	16	29	48	42	45	64	59	49	40	18	6	1			420
26			1	4	10	19	25	29	34	21	16	10	9	5	3				186
27				1	3	4	9	13	18	21	16	14	6	3	1				109
28				1	3	6	11	19	20	24	21	13	14	16	9	4	1		162
29				1	3	8	9	13	15	34	25	23	20	18	10	3	1		183
30				1	3	8	19	28	23	24	30	23	9	6	3	1			184
31				1	4	14	15	11	8	10	30	39	33	27	10	3	1		206
Total			5	52	204	439	693	869	967	944	898	709	506	227	70	5			6588
Mean			0.2	1.7	6.6	14.2	22.4	28.0	31.2	30.5	29.0	22.9	16.3	7.3	2.3	0.2			212.5

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

APRIL, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1				3	4	5	9	13	15	15	19	15	9	5	1				113
2			1	5	15	16	34	45	35	44	58	47	24	25	8	1			358
3			1	3	8	13	18	42	44	21	13	37	42	19	5	1			267
4			1	9	19	23	14	27	42	42	35	23	30	27	11	1			304
5			2	11	29	45	54	63	66	66	62	53	42	28	10	1			532
6			1	6	18	25	18	23	30	27	29	56	44	30	14	3			324
7			2	10	27	34	61	50	53	57	56	53	24	11	5	1			444
8			1	5	10	25	24	33	34	34	29	29	19	11	4	1			259
9			1	6	11	23	35	39	35	42	45	54	25	32	10	3			361
10			1	5	32	20	25	45	57	47	64	32	38	16	10	1			403
11			1	4	8	15	16	18	32	35	40	35	24	13	6	1			248
12			1	4	9	20	35	42	33	30	28	16	27	16	5	3			269
13			2	14	21	30	37	49	58	49	52	34	42	15	6	3			412
14			2	6	18	10	19	10	20	30	35	40	32	23	14	3			262
15			2	10	27	24	27	34	43	47	58	39	35	18	5	1			370
16			2	16	32	48	45	49	33	35	24	13	5	3	1	1			307
17			2	19	24	32	33	32	19	19	10	10	5	23	11	4			243
18			3	10	25	24	35	69	78	59	24	13	8	8	3	3			362
19			3	18	29	13	16	34	32	34	35	42	27	20	8	6			317
20			3	19	34	56	29	29	15	25	27	18	16	11	9	3			294
21			3	18	33	48	59	68	74	74	66	45	50	29	8	1			576
22			2	10	28	39	50	32	30	48	67	61	40	35	16	4			462
23			2	9	19	34	57	68	77	71	59	45	30	19	14	4	1		509
24			1	4	6	9	16	23	42	27	32	13	9	5	3	1			191
25			1	4	9	24	25	24	43	32	24	21	30	13	9	3			262
26			2	5	10	14	19	24	30	33	20	15	11	8	5	3			199
27			1	1	2	4	6	13	18	18	11	8	15	10	7	2			116
28			1	8	18	27	40	57	74	57	67	61	52	34	19	6	1		522
29			4	16	28	37	59	71	63	64	71	64	54	38	20	6	1		596
30			4	15	23	20	24	45	34	44	45	59	39	35	19	8	1		415
Total			53	283	576	757	939	1171	1259	1226	1205	1051	848	580	266	79	4		10297
Mean			1.8	9.4	19.2	25.2	31.3	39.0	42.0	40.9	40.1	35.0	28.3	19.3	8.9	2.6	0.1		343.2

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

MAY, 1964.

HEUR L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1		1	6	22	33	53	58	35	28	32	31	11	11	7	3	1	1		333
2			3	7	12	13	21	33	35	32	31	18	12	8	2				227
3		1	8	20	31	35	39	58	32	55	70	53	48	18	19	6			493
4		1	3	16	15	16	15	40	44	76	72	64	52	38	23	8	1		484
5		1	6	13	18	28	28	36	40	42	44	28	19	12	7	2	1		325
6		1	2	8	13	32	43	45	38	40	25	17	10	4	2	1			281
7		1	2	10	17	21	55	53	16	39	13	27	43	33	16	3	1		350
8		1	2	3	14	28	28	32	39	27	31	22	20	17	17	7	1		289
9		1	4	8	15	21	15	8	8	11	24	69	58	34	17	9	2		304
10		2	7	15	21	23	29	28	30	19	14	13	5	1	2	1			210
11			1	4	5	7	9	12	16	17	17	15	6	6	3	2	1		121
12			1	7	11	13	16	22	43	55	56	31	32	42	10	4	1		344
13		1	5	11	29	51	61	65	68	69	79	64	52	44	26	11	2		638
14		2	11	26	21	32	46	78	79	80	75	68	57	44	27	12	2		660
15		3	15	23	34	40	34	37	36	35	44	32	15	22	20	3	1		394
16		1	4	14	32	48	57	65	46	40	38	30	28	21	20	7	1		452
17		2	11	20	40	54	62	72	74	38	38	42	52	29	7	1			542
18			1	7	9	13	30	60	83	84	80	73	60	45	28	11	2		586
19		2	8	10	9	25	27	30	74	85	84	76	49	43	27	7	3		559
20		1	4	7	11	20	18	37	20	17	12	10	9	4	3	1	1		175
21			1	5	19	38	51	84	70	64	51	26	25	30	14	6	2		486
22		1	4	9	20	27	26	29	29	25	47	35	50	40	16	11	4		373
23		1	5	9	13	24	51	53	42	19	42	7	5	13	16	7	1		308
24		2	10	18	34	51	62	63	70	73	71	64	54	41	26	12	4	1	656
25		2	7	15	37	50	62	70	73	73	71	63	53	42	27	13	4		662
26		3	10	18	27	37	48	44	42	41	23	25	23	18	26	8	2		395
27		3	6	9	16	18	20	28	39	28	29	23	11	9	5	2	1		247
28		1	5	21	42	62	75	80	80	85	73	65	62	44	31	16	3		745
29		1	13	12	22	25	52	60	84	72	85	67	36	25	14	12	2		582
30		2	6	13	18	23	26	38	51	44	31	29	18	35	6	7	3		350
31		2	9	11	15	44	65	67	77	79	55	32	32	23	18	8	4		541
Total		40	180	391	653	972	1229	1462	1506	1496	1456	1199	1007	792	478	199	51	1	13112
Mean		1.3	5.8	12.6	21.1	31.4	39.6	47.2	48.6	48.3	47.0	38.7	32.5	25.5	15.4	6.4	1.6	0.0	423.0

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JUNE, 1964

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1		1	6	15	16	25	27	30	20	9	14	6	6	5	3	1			184
2		1	1	4	5	9	20	37	23	18	11	6	6	4	4	3	1		153
3		4	13	28	42	42	35	30	27	38	47	24	20	11	5	3	1		370
4		1	5	9	13	21	24	45	50	43	25	11	14	24	14	6	1		306
5		3	9	18	19	28	44	61	34	27	28	25	42	35	15	6	4		398
6		3	14	20	40	57	68	76	62	63	77	69	58	38	16	8	3		672
7		3	6	10	20	61	68	76	85	83	78	56	19	40	30	15	4		654
8		5	16	24	35	23	16	15	34	28	14	10	11	11	6	1	1		250
9			3	5	6	9	15	13	9	15	18	24	24	19	11	4	3		178
10		4	9	10	19	29	42	38	49	74	57	59	53	37	18	4	1		503
11		4	14	24	27	28	29	35	33	29	32	19	15	10	5	3	1		308
12		1	4	10	9	13	16	34	35	27	6	5	8	4	5	1	1		179
13		1	3	6	15	27	35	38	37	53	42	23	27	25	15	10	4		361
14		3	5	11	18	13	11	11	15	18	14	15	9	8	9	6	1		167
15		1	3	6	11	18	27	40	62	57	58	63	57	45	32	10	3		493
16		1	4	4	11	13	18	18	16	16	25	34	21	18	9	3	1		212
17		1	8	13	24	27	30	37	56	71	56	62	53	57	30	6	3	1	535
18		1	6	19	21	30	42	54	83	82	78	69	58	33	19	6	3		604
19	1	6	19	33	47	45	42	56	82	83	81	72	62	48	34	20	5		736
20	1	9	19	33	48	62	71	76	77	68	73	62	48	42	33	15	5		742
21		1	3	10	16	24	34	45	63	82	71	50	38	43	23	13	3		519
22		1	4	4	9	13	24	24	14	23	27	14	19	20	14	5	3		218
23		3	5	6	16	33	43	35	30	50	57	44	58	47	32	16	4	1	480
24		1	5	9	15	13	21	53	56	63	58	53	48	44	34	15	4	1	493
25		3	6	15	28	57	69	78	79	82	72	58	39	34	25	10	4	1	660
26	1	4	18	21	32	45	32	30	15	15	27	18	16	9	3	1	1		288
27		1	3	5	11	11	16	24	30	40	34	16	10	8	9	6	1		225
28		1	3	5	9	10	11	15	15	15	21	25	28	21	10	4	1		194
29	1	5	10	25	53	62	68	76	79	81	71	74	45	24	15	8	3		700
30		1	4	5	10	11	20	28	15	20	33	19	10	20	10	4	3		213
Total	4	74	228	407	645	859	1018	1228	1285	1373	1305	1085	922	784	488	213	73	4	11995
Mean	0.1	2.5	7.6	13.6	21.5	28.6	33.9	40.9	42.8	45.8	43.5	36.2	30.7	26.1	16.3	7.1	2.4	0.1	399.8

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JULY, 1964

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1		1	5	15	27	34	54	71	79	78	74	68	57	45	32	16	4		660
2		3	6	15	28	35	43	68	83	81	74	57	38	24	24	15	4		598
3		1	5	13	27	25	23	24	33	43	49	38	57	47	33	16	5		439
4		6	19	33	48	62	72	78	79	73	73	69	57	47	32	14	4		771
5		3	8	24	28	11	13	38	53	53	56	32	28	30	15	9	3		404
6		3	8	11	23	30	20	23	47	61	64	54	49	47	16	6	3		465
7		1	3	5	6	5	5	6	9	10	10	8	6	5	6	5	3		93
8		3	8	10	14	32	53	56	59	61	56	49	48	39	21	9	1		519
9		1	10	18	24	35	24	43	79	64	58	54	57	42	16	5	3		533
10		4	14	8	21	19	23	23	16	10	6	4	4	4	3	1	1		161
11		1	4	8	16	15	15	13	10	10	8	6	9	9	5	3	1		133
12		3	8	13	29	35	56	59	83	85	77	71	58	47	29	13	4		670
13		4	6	10	19	25	38	40	35	24	24	11	5	5	4	3	1		254
14		1	3	10	32	45	54	56	53	52	40	37	21	15	23	6	1		449
15		4	11	18	34	59	74	73	66	81	79	73	58	42	29	9	1		716
16		1	4	8	15	24	32	32	20	23	23	20	24	13	4	1	1		245
17		1	3	5	9	16	19	24	42	56	57	45	34	18	10	4	1		344
18		4	6	16	19	13	15	23	56	37	28	13	10	15	10	3			268
19		1	6	16	15	18	30	33	40	81	77	48	29	16	5	3			418
20		1	1	5	11	15	32	15	20	19	30	20	13	28	18	3			231
21		1	4	8	13	24	34	45	40	42	36	25	22	14	13	9	3		333
22		1	6	19	21	20	27	34	38	31	29	9	8	8	5	2	1		259
23		1	4	8	28	53	62	73	77	76	72	67	59	34	27	6	1		648
24		3	4	9	16	28	33	37	24	11	16	8	6	6	4	4			209
25			3	8	16	25	52	62	59	69	50	39	29	20	9	5	1		447
26		1	6	19	34	38	42	72	76	45	47	59	54	39	24	11	1		568
27		1	4	10	20	32	33	38	33	33	28	19	18	18	8	4	1		300
28			1	1	8	16	21	33	27	38	29	16	13	8	4	1			216
29			3	8	10	18	23	29	42	29	24	27	32	16	9	4	1		275
30		1	5	9	11	20	30	42	54	44	29	11	16	13	8	4	1		298
31		1	5	13	23	30	32	47	61	50	62	52	34	28	21	9	3		471
Total		57	183	373	645	857	1084	1315	1493	1475	1385	1109	953	742	467	203	54		12395
Mean		1.8	5.9	12.0	20.8	27.6	35.0	42.4	48.2	47.6	44.7	35.8	30.7	23.9	15.1	6.5	1.7		399.8

TABLE I (CONTD.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

AUGUST, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1			1	4	9	13	20	18	10	10	15	15	11	9	6	1			142
2			1	4	19	45	19	37	48	38	43	29	18	9	1				311
3		1	4	12	22	30	42	70	52	74	71	64	51	28	22	6			549
4		2	8	18	32	40	45	43	36	41	40	57	28	24	7	2			423
5			3	5	6	6	10	9	9	8	9	11	5	5	3	1			90
6		1	9	19	20	28	40	30	65	43	28	52	45	34	24	7	1		446
7		1	4	9	14	33	45	50	58	61	49	39	24	15	9	9	1		421
8		1	5	14	21	39	45	38	45	52	33	32	28	33	21	8	1		421
9			3	8	13	20	35	25	30	33	43	33	15	18	16	5	1		298
10			6	15	15	27	30	32	37	16	19	13	15	8	3	1			237
11			3	9	15	25	57	67	53	71	72	45	50	35	18	3			523
12			3	13	30	48	40	45	50	47	63	68	39	15	5	1			467
13		1	5	19	33	38	49	64	47	48	72	44	10	10	8	3			451
14			1	4	21	29	33	40	14	15	61	56	35	8	5	3			325
15		1	3	7	21	30	19	15	13	13	13	15	13	6	2	1			172
16			3	4	5	13	8	6	8	9	19	21	13	11	8	3			131
17		1	9	14	21	24	27	18	48	27	21	16	25	21	6	1			279
18				3	4	8	14	18	25	23	21	18	16	11	5	1			167
19			1	10	19	24	42	48	50	50	50	42	40	34	18	5			433
20			5	18	32	47	62	69	72	71	67	59	49	34	18	5			608
21			4	21	24	47	59	67	69	71	67	59	47	32	16	5			588
22			3	8	15	32	28	37	59	61	49	48	38	34	19	3			434
23				3	11	19	23	35	32	21	15	9	3	5	3	1			180
24			3	8	14	19	23	24	21	13	11	16	9	4	3	1			169
25			1	4	5	9	15	19	21	23	18	6	5	4	3				133
26			3	4	5	10	16	19	18	16	39	24	27	29	15	3			228
27			1	10	21	10	23	45	34	37	44	59	45	33	14	4			380
28			1	6	16	27	45	52	72	69	63	57	47	25	14	4			498
29			3	9	28	34	33	25	37	58	66	58	34	30	16	4			435
30			3	13	27	44	48	28	34	28	27	23	23	15	9	4			326
31			3	14	29	42	53	61	67	66	61	53	42	27	13	4			535
Total		9	102	309	567	860	1048	1154	1234	1213	1269	1141	850	611	330	99	4		10800
Mean		0.3	3.3	10.0	18.3	27.7	33.8	37.2	39.8	39.1	40.9	36.8	27.4	19.7	10.6	3.2	0.1		348.4



TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

SEPTEMBER, 1964.

Hour L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1			1	6	16	33	43	24	9	14	16	8	6	4	3				188
2			1	4	13	28	19	18	15	9	6	8	9	5	8	1			144
3			1	6	27	25	38	35	52	66	61	48	38	23	11	3			434
4			2	6	15	15	24	44	61	64	61	54	43	33	19	4			445
5				3	3	4	5	8	10	13	9	14	27	27	10	1			134
6			1	4	8	18	20	18	30	47	50	40	21	10	4	1			272
7			1	4	11	15	34	57	59	53	49	47	37	24	5	1			397
8			1	4	16	23	29	33	35	37	28	32	24	10	4	1			282
9			1	1	10	18	16	10	15	8	8	11	13	4	1				116
10				1	4	7	10	15	23	32	24	19	13	5	1				159
11				4	10	20	32	30	44	59	63	57	40	24	6	1			390
12			1	5	23	25	39	45	44	45	48	40	35	21	5	1			377
13				1	5	6	11	9	23	13	20	29	16	5	3				141
14				3	13	24	38	49	44	44	57	53	32	10	4	1			372
15				6	15	24	23	33	40	45	33	47	6	8	2				287
16				4	5	15	15	50	63	58	57	48	35	13	4				367
17				3	6	15	33	37	27	45	44	25	16	9	4				264
18				3	10	15	21	33	27	24	16	10	14	8	1				187
19				3	9	16	24	25	30	30	24	34	18	9	3				225
20				4	6	29	35	33	30	39	29	21	27	14	4				271
21				3	9	10	11	6	9	4	4	3	1						60
22					3	3	3	4	4	5	4	4	3	2					35
23				1	6	15	18	23	20	16	11	6	5	3	1				125
24				3	5	8	6	21	6	5	23	8	4	3	1				93
25				3	13	21	27	30	53	62	50	45	32	11	3				350
26				1	6	18	42	49	53	56	49	43	32	16	1				366
27				1	15	18	42	56	50	20	44	40	29	16	4				335
28				1	3	8	18	30	45	56	50	40	29	15	3				298
29				3	11	27	39	47	50	50	48	39	29	14	3				360
30				1	10	27	38	47	50	50	43	42	27	11	3				349
Total			10	92	306	535	753	934	1026	1069	1029	915	661	357	121	15			7823
Mean			0.3	3.1	10.2	17.8	25.1	31.1	34.2	35.6	34.3	30.5	22.0	11.9	4.0	0.5			260.8

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

OCTOBER, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1				1	9	21	33	38	41	30	29	29	30	5	1				267
2				1	9	24	34	42	44	47	42	34	23	8	2				310
3				1	4	7	13	23	20	15	6	3	3	3	1				99
4				1	5	9	9	17	14	13	8	3	3	2					84
5				1	3	21	38	49	52	52	47	38	25	9	1				336
6					3	6	6	8	9	11	6	3	1						53
7					4	6	11	15	31	45	19	14	7	3	1				156
8					5	6	11	10	52	18	29	30	23	9	1				194
9					1	14	27	19	27	32	30	19	13	3	1				186
10				1	3	11	21	25	16	8	14	21	10	4	1				135
11					3	5	16	6	16	27	25	21	21	8	1				149
12					3	18	27	38	29	40	19	9	10	6					199
13				1	4	19	28	37	14	19	29	25	10	4	1				191
14				1	4	13	23	16	32	48	34	33	16	4					224
15					4	8	14	10	5	9	9	18	9	4	1				91
16					3	11	14	24	25	35	27	25	13	4					181
17					1	4	6	9	13	11	11	9	4	1					69
18					1	4	4	4	9	8	10	10	1	1					52
19					3	5	10	16	19	13	13	10	3	1					93
20					4	8	11	16	25	39	34	16	8	4					165
21					1	4	5	3	9	37	10	6	4	1					80
22					1	6	13	9	15	10	6	4	4	3					71
23					3	10	19	21	28	18	19	15	10	3					146
24					3	5	9	10	13	16	25	25	5	1					112
25					3	8	6	8	10	10	8	5	3	1					62
26					1	3	6	9	9	10	10	6	5	1					60
27					1	3	8	8	9	10	8	4	4	1					56
28					3	8	23	29	25	30	32	19	6	1					176
29					1	4	8	13	25	21	18	18	5	1					114
30					1	4	9	10	10	8	4	3	1	1					51
31					1	10	19	5	27	18	10	6	1						97
Total				8	95	285	481	547	673	708	591	481	281	97	12				4259
Mean				0.3	3.1	9.2	15.5	17.6	21.7	22.8	19.1	15.5	9.1	3.1	0.4				137.4

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (cm.cal./cm<sup>2</sup>)

NOVEMBER, 1964.

HOURLY L.A.T.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total for Day
	to 4	to 5	to 6	to 7	to 8	to 9	to 10	to 11	to 12	to 13	to 14	to 15	to 16	to 17	to 18	to 19	to 20	to 21	
Day 1					2	5	11	19	8	5	11	6	4	2					73
2					2	5	16	24	29	23	24	9	6	1					144
3					1	4	6	15	21	23	23	25	6	2					131
4					2	10	20	26	30	32	29	22	13	2					186
5					1	3	5	10	11	9	9	5	3						56
6					1	4	8	11	13	13	19	15	8	1					93
7					2	6	14	23	27	27	23	19	10	2					157
8					1	5	8	14	23	29	32	23	8	2					145
9					1	5	14	23	27	23	24	18	8	1					149
10					1	5	15	19	8	18	13	5	3						87
11					1	5	10	18	19	11	6	1	1						72
12					1	5	11	18	16	13	10	4	4	1					83
13						1	2	6	15	13	13	12	5	1					63
14					1	4	9	19	27	25	20	18	5	1					129
15					1	3	12	21	20	16	13	5	1						92
16					1	2	7	9	9	13	5	3	2	1					52
17						1	3	3	3	4	5	3	1						23
18						1	1	3	5	4	3	1	1						19
19						3	6	10	19	23	16	13	4						94
20						3	6	10	14	9	6	8	3						59
21						3	4	4	5	6	6	4	1						33
22						1	3	5	5	8	4	1	1						28
23						3	8	20	25	11	9	10	4						90
24						1	3	3	4	5	4	2	2						24
25						3	4	5	4	4	4	3	1						28
26						1	3	4	4	5	5	5	4						31
27						4	8	10	11	15	13	9	4						74
28						4	8	8	14	10	14	6	4						68
29						3	5	6	20	18	14	11	4						81
30						3	8	13	13	10	11	13	3						74
Total					19	106	238	379	449	445	393	278	124	17					2448
Mean					0.6	3.5	7.9	12.6	15.0	14.8	13.1	9.3	4.1	0.6					81.6

TABLE I (Contd.)

GLOBAL SOLAR RADIATION  
MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

DECEMBER, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1						3	6	13	18	18	18	11	4						91
2						3	5	9	14	8	6	6	3						54
3						3	8	16	19	14	10	8	3						81
4						1	6	10	13	11	11	6	3						61
5						1	3	4	4	8	5	5	3						33
6						1	1	1	1	3	6	5	1						19
7						1	3	6	3	3	3	4	3						26
8						1	1	1	1	1	1	1	1						8
9						3	5	10	13	13	14	6	3						67
10						1	9	13	20	18	14	6	1						82
11						3	5	4	4	4	3	1							24
12						1	1	3	3	3	3	1							15
13						1	4	5	5	6	10	6	1						38
14						3	9	13	9	14	14	8	3						73
15						1	4	9	9	13	11	8	3						58
16						1	5	13	13	6	5	4	1						48
17						1	5	5	5	9	6	4	1						36
18						1	6	14	16	14	13	8	1						73
19						1	4	8	11	9	8	3	1						45
20						1	6	10	18	20	11	9	3						78
21						1	4	14	18	14	11	8	3						73
22						1	4	4	6	4	5	3	1						28
23							1	3	8	6	5	3							26
24							3	5	6	11	10	5	3						43
25						3	5	16	14	6	13	5	1						63
26						1	4	4	6	8	6	5							34
27						1	4	8	11	18	16	5	3						66
28						3	11	13	9	8	9	4	1						58
29						1	4	4	4	3	3	1	1						21
30						3	6	11	14	18	10	6	1						69
31						1	6	10	15	10	8	5	1						56
Total						47	148	259	310	301	268	160	54						1547
MEAN						1.5	4.8	8.4	10.0	9.7	8.6	5.2	1.7						49.9

TABLE 2

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JANUARY, 1964.

Hour L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1							1	4	4	5	4	1							19
2							1	1	2	3	1	1							9
3							4	4	4	4	4	2							22
4							1	5	7	6	4	1							24
5							3	3	4	5	5	4	1						25
6						1	5	8	10	9	11	6	2						52
7							1	3	3	2	3	4	1						17
8						1	2	5	7	5	4	4	1						29
9						2	4	5	5	5	4	3	1						29
10						1	3	6	7	6	4	2	1						30
11						3	8	11	12	10	7	4	2						57
12						1	4	7	9	11	10	5	2						49
13						2	6	8	11	12	12	8	4						63
14						1	4	10	9	8	8	6	2						48
15						2	7	8	10	8	8	4	1						48
16						2	4	6	10	17	14	8	3						64
17						1	2	2	1	2	2	1	1						12
18							1	1	3	3	2	1	1						12
19						4	12	12	11	12	10	8	4						73
20				1		3	6	9	8	11	12	7	3						60
21				1		3	9	10	13	13	11	7	2						69
22						2	6	5	6	8	3	2	1						33
23				1		3	7	9	9	15	9	7	3						63
24				1		3	6	12	13	11	11	10	4						71
25						3	6	7	7	7	7	6	3						46
26						1	4	10	13	10	7	3	2						50
27						1	3	4	5	8	10	11	4						46
28						3	6	10	10	12	11	3	3						58
29						1	1	3	3	4	4	3	3						22
30				1		3	5	10	10	11	6	6	3						55
31						1	3	6	9	11	8	14	7	1					60
Total					5	48	135	204	235	254	216	152	65	1					1315
Mean					0.2	1.5	4.4	6.6	7.6	8.2	7.0	4.9	2.1	0.0					42.4

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

FEBRUARY, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1						1	4	4	6	5	8	9	4	1					42
2							3	9	10	12	11	13	11	5	1				75
3					1	3	7	8	12	13	9	8	5	1					67
4				1	1	2	4	4	6	8	6	3	3	1					38
5				1	1	5	11	17	13	13	13	11	7	1					92
6				1	1	4	7	7	7	8	8	7	4	1					54
7				1	1	7	11	11	9	9	9	9	7	2					75
8				1	1	3	5	7	9	9	6	4	2						46
9						1	2	4	4	4	3	3	1						22
10				1	1	4	9	11	17	12	8	4	1						67
11				2	2	7	8	15	20	18	16	10	4						100
12				1	1	4	6	11	12	9	10	5	5	2					65
13				1	1	7	7	4	3	4	4	3	1						34
14				2	2	6	7	14	18	20	18	14	7	1					107
15				1	1	6	8	12	13	15	17	15	8	2					97
16				1	1	4	13	16	22	10	15	7	6	3					97
17				2	2	4	8	13	16	16	16	17	9	1					102
18				1	1	7	13	22	17	16	21	16	9	3					125
19						2	5	14	24	19	10	9	11	3					97
20				3	3	4	8	18	20	22	21	15	9	3					123
21				1	1	5	13	14	7	7	5	4	3	1					60
22				3	3	5	5	5	4	8	5	6	3	5	1				50
23				3	3	8	13	6	22	24	20	22	12	5					135
24				1	1	1	8	13	9	8	5	3	2	1					51
25				3	3	5	13	13	10	16	16	18	7	2	1				104
26				1	1	1	4	6	12	16	17	15	7	2	1				82
27				2	2	6	11	13	13	15	16	17	8	4	1				106
28				2	2	5	10	14	14	15	17	14	7	4	1				103
29				1	1	5	8	14	14	15	18	12	7	3	1				98
Total					33	125	237	320	365	365	350	291	164	53	6				2314
Mean					1.3	4.3	8.2	11.0	12.6	12.6	12.1	10.0	5.7	1.8	0.2				79.8

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

MARCH, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1					1	5	8	14	16	11	16	8	8	3					90
2				1	5	6	10	14	18	14	18	12	9	4	1				112
3				1	4	5	8	10	16	16	19	14	9	4	1				107
4				1	5	7	10	18	18	16	17	14	9	3	1				119
5				1	5	7	8	18	18	16	19	13	8	6	1				120
6				1	4	6	9	18	19	18	20	10	8	6	1				120
7				1	5	7	8	19	20	20	19	12	8	3	1				123
8				1	5	6	9	17	20	18	19	9	6	4	1				115
9				1	4	5	11	20	17	17	20	14	5	1	1				116
10				1	5	5	5	10	10	17	20	14	5	5	1				98
11				1	5	9	10	12	15	15	21	16	11	5	1				121
12				1	3	8	10	8	15	13	18	8	9	5	1				99
13				2	4	10	10	10	15	20	19	14	9	6	1				120
14				1	5	9	12	15	20	23	20	17	14	8	1				145
15				1	5	11	15	20	22	22	21	15	10	6	2				150
16					1	11	16	20	18	21	19	16	19	6	1				148
17				2	7	18	23	24	29	27	23	12	7	3	1				176
18					4	10	12	19	21	19	18	17	10	7	3				140
19					2	10	21	17	23	27	21	20	20	10	4				175
20				4	7	11	17	25	23	24	24	14	11	6	1				167
21				1	1	7	18	15	12	25	19	21	21	14	5				159
22				1	3	6	14	20	24	29	27	15	12	9	4				164
23				2	5	9	9	9	6	7	6	4	4	1	1				63
24				1	5	13	21	28	29	28	15	23	17	7	2				189
25				2	10	12	13	18	22	17	15	10	13	8	4	1			145
26			1	4	10	19	23	27	30	21	16	10	9	5	1				176
27				1	3	4	9	12	18	21	16	14	6	2	1				107
28				2	6	11	19	20	24	21	13	14	16	9	4	1			160
29				1	7	8	13	15	28	23	23	20	17	10	2				167
30			1	2	7	17	24	23	23	29	23	8	6	6	2				171
31			1	4	13	13	11	7	10	29	28	23	18	7	2	1			167
Total			3	42	156	285	406	522	599	624	592	431	334	179	53	3			4229
Mean			0.1	1.4	5.0	9.2	13.1	16.8	19.3	20.1	19.1	13.9	10.8	5.8	1.7	0.1			136.4

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

APRIL, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1				1	4	5	8	12	15	15	18	15	8	5	1				107
2			1	5	7	13	15	23	23	24	19	23	19	13	7	1			193
3			1	2	7	11	17	19	24	19	13	19	15	10	5	1			163
4			1	6	10	18	15	16	21	23	24	22	17	13	7	1			194
5			1	6	15	11	8	8	10	10	10	10	8	10	5	1			113
6			1	5	12	21	16	22	27	23	18	12	11	8	5	2			183
7			1	5	7	13	18	32	26	23	17	20	23	11	5	1			202
8			1	4	7	17	21	31	32	28	26	22	18	11	4	1			223
9			1	6	11	22	26	29	28	35	37	23	17	13	6	2			256
10			1	7	10	20	23	33	32	28	20	24	22	16	10	1			247
11			1	4	7	13	16	18	28	32	34	28	22	13	6	1			223
12			1	4	7	20	31	37	32	29	27	15	23	15	4	2			247
13			2	7	12	18	26	23	24	26	31	27	22	13	6	2			239
14			1	6	12	10	19	10	20	27	33	33	24	16	10	3			224
15			2	7	13	15	18	23	22	24	21	29	23	15	5	1			218
16			2	5	7	11	24	32	24	31	21	11	5	2	1	1			177
17			2	6	11	20	27	28	19	17	10	10	5	14	7	2			178
18			2	7	11	20	26	27	26	27	22	10	7	7	3	2			197
19			2	7	9	11	15	25	23	30	28	25	23	18	7	5			233
20			2	5	7	15	23	25	15	25	26	17	16	10	9	2			197
21			2	5	6	7	9	9	18	27	28	23	23	15	7	1			180
22			2	9	16	22	30	25	25	22	27	28	26	14	9	4			259
23			2	9	12	15	21	27	23	27	30	26	23	16	11	2			244
24			1	2	6	5	16	22	39	25	31	13	7	5	1	1			174
25			1	4	7	22	25	23	36	28	23	21	27	13	9	3			242
26			2	5	10	14	19	23	28	30	18	15	10	8	5	2			189
27			1	1	2	4	6	13	17	18	11	8	15	10	7	2			115
28			1	7	17	21	25	26	11	31	21	25	17	19	14	5	1		241
29			2	7	11	19	20	15	24	29	16	25	17	16	14	6	1		222
30			4	9	11	19	22	24	30	30	33	25	25	14	9	5	1		261
Total			44	163	284	452	585	680	727	763	693	604	518	363	199	63	3		6141
Mean			1.5	5.4	9.5	15.1	19.5	22.7	24.2	25.4	23.1	20.1	17.3	12.1	6.6	2.1	0.1		204.7



TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

MAY, 1964.

HOUR L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1			4	7	15	14	12	33	28	32	31	10	10	5	3	1			205
2			2	7	11	13	19	31	32	29	27	18	12	7	2				210
3		1	5	10	15	21	26	33	29	32	29	26	25	12	11	6			281
4		1	3	11	15	15	15	29	31	25	11	17	11	12	12	7	1		216
5		1	5	11	18	26	28	35	37	38	40	27	19	11	7	2	1		306
6		1	2	7	13	26	35	38	36	35	25	17	10	4	2	1			252
7		1	1	10	17	21	29	29	16	35	13	25	25	20	12	2	1		257
8		1	2	2	14	22	26	31	35	26	29	21	19	14	16	6	1		265
9		1	4	8	15	21	15	7	7	10	16	17	21	19	10	7	2		180
10		2	6	8	16	23	26	25	29	19	14	13	5	1	2	1			190
11			1	4	4	6	9	12	16	17	17	15	6	6	3	2	1		119
12			1	6	10	13	15	19	33	34	41	26	26	16	10	4	1		255
13		1	5	10	21	19	32	36	43	40	24	21	19	14	9	5	1		300
14		1	6	11	11	24	33	24	24	15	13	13	13	10	8	5	1		212
15		1	8	11	16	25	30	33	31	30	34	24	15	21	19	3	1		302
16		1	4	11	21	24	24	28	34	35	34	28	24	18	11	6	1		304
17		1	5	9	10	10	20	19	15	19	20	20	21	24	7	1			201
18			1	6	8	11	28	26	24	24	20	18	14	10	10	8	2		210
19		2	8	10	9	19	24	26	25	25	24	24	24	19	11	7	2		259
20		1	2	7	11	20	18	34	20	17	12	10	9	4	3	1	1		170
21			1	5	15	28	31	29	29	33	38	21	25	18	9	4	1		287
22		1	2	9	18	25	24	24	23	24	30	25	24	19	14	9	4		275
23		1	5	9	13	20	24	26	21	19	21	7	5	10	11	7	1		200
24		1	5	9	14	15	16	19	19	19	19	16	15	14	11	8	2		202
25		1	5	8	15	15	28	18	18	18	16	16	15	14	11	9	2		209
26		2	8	14	21	26	29	31	31	36	23	23	23	15	18	8	2		310
27		2	6	8	15	16	19	24	33	26	24	20	11	8	5	2	1		220
28		1	5	9	11	14	26	24	24	24	18	19	23	11	8	6	3		226
29		1	9	10	19	24	28	26	24	28	25	30	30	18	11	9	2		294
30		2	6	13	18	23	24	34	37	34	29	24	16	19	6	6	3		294
31		1	8	10	14	26	24	25	32	34	34	29	26	23	15	8	2		311
Total		30	135	270	443	605	737	828	836	832	751	620	541	416	287	151	40		7522
Mean		1.0	4.4	8.7	14.3	19.5	23.8	26.7	27.0	26.8	24.2	20.0	17.5	13.4	9.3	4.9	1.3		242.6

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JUNE, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1		1	6	15	16	24	25	28	20	9	14	6	6	5	2	1			178
2		1	1	4	5	9	20	29	21	16	10	6	6	4	4	2	1		139
3		2	6	8	11	19	28	29	26	37	38	21	20	8	5	2	1		261
4		1	5	9	13	20	24	25	29	32	23	10	13	20	14	5	1		244
5		2	9	15	14	18	20	20	21	23	26	23	19	16	14	6	4		250
6		3	8	10	9	8	9	11	21	23	11	23	24	21	14	8	2		205
7		2	6	10	19	14	10	13	18	16	16	24	18	23	15	10	4		218
8		2	9	15	21	23	16	15	30	25	14	10	11	11	6	1	1		210
9			2	5	6	8	14	13	8	13	18	23	23	19	11	4	3		170
10		4	8	9	18	25	34	29	37	34	33	34	26	25	18	4	1		339
11		2	9	15	24	24	26	32	29	29	29	19	14	10	5	2			269
12		1	4	9	9	13	15	33	33	25	6	5	8	4	5	1	1		172
13		1	2	6	15	24	25	34	30	39	39	23	25	23	15	10	4		315
14		2	5	10	18	13	11	10	14	16	13	14	9	8	9	6	1		159
15		1	3	6	11	18	25	37	42	42	38	28	21	18	16	9	3		318
16		1	4	4	11	13	18	16	15	16	24	32	20	18	9	3	1		205
17		1	8	11	21	24	28	29	34	30	39	24	18	19	16	6	3	1	312
18		1	6	11	19	25	35	26	16	15	16	13	11	14	16	6	1		231
19	1	2	8	8	9	15	24	24	16	18	16	13	14	10	9	8	4		199
20	1	5	8	8	10	11	11	24	35	39	23	20	24	18	10	8	5		260
21		1	3	10	16	24	33	39	28	18	28	33	32	20	19	10	2		316
22		1	4	4	9	11	19	24	14	21	25	13	19	18	14	5	3		204
23		2	5	6	16	29	37	34	30	44	43	34	23	15	9	8	4	1	340
24		1	5	8	15	13	20	39	44	47	44	30	20	23	16	8	4	1	338
25		2	6	14	15	11	19	15	15	24	25	30	28	24	19	9	4	1	261
26	1	2	8	15	23	34	29	30	15	14	26	18	16	9	2	1	1		244
27		1	2	5	11	11	16	24	28	38	34	15	10	8	8	6	1		218
28		1	2	5	9	9	11	15	15	15	21	25	25	21	10	4	1		189
29	1	4	8	8	15	11	9	9	9	20	40	21	26	24	14	8	2		229
30		1	4	5	9	11	18	28	14	20	32	19	10	19	10	4	3		207
Total	4	51	164	268	417	512	629	734	707	758	764	609	539	475	334	165	66	4	7200
Mean	0.1	1.7	5.5	8.9	13.9	17.1	21.0	24.5	23.6	25.3	25.5	20.3	18.0	15.8	11.1	5.5	2.2	0.1	240.0

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

JULY, 1964.

HOUR L.A.T.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total for Day
	to 4	to 5	to 6	to 7	to 8	to 9	to 10	to 11	to 12	to 13	to 14	to 15	to 16	to 17	to 18	to 19	to 20	to 21	
Day 1		1	5	14	24	34	39	28	9	8	8	8	8	8	6	5	2		207
2		2	6	14	24	32	30	24	19	13	39	38	32	24	15	10	4		326
3		1	5	13	24	24	23	24	32	39	35	26	23	11	8	6	4		298
4		2	5	6	8	9	10	11	11	13	15	11	10	10	9	6	4		140
5		2	8	11	15	10	13	33	39	42	39	29	24	24	14	8	2		313
6		2	8	11	21	28	20	21	42	45	44	28	19	18	16	6	2		331
7		1	2	5	6	5	5	6	8	9	9	8	6	5	6	5	3		89
8		2	8	10	14	21	20	32	26	33	30	33	28	24	18	8	1		308
9		1	8	18	24	34	24	33	25	35	33	29	19	18	11	5	3		320
10		4	10	8	21	19	23	23	16	10	6	4	4	4	3	1	1		157
11		1	4	8	16	14	15	11	10	10	8	5	9	8	5	2	1		127
12		1	6	10	24	29	39	43	21	25	10	14	9	10	9	8	2		260
13		2	6	10	19	25	34	35	30	24	23	8	5	5	4	3	1		234
14		1	3	10	18	23	30	37	42	42	34	32	19	14	19	6	1		331
15		2	8	11	18	21	25	21	25	28	28	29	23	18	19	9	1		286
16		1	4	8	14	24	23	30	20	20	23	16	24	13	4	1	1		226
17		1	2	5	9	16	19	23	38	40	35	34	29	16	9	4	1		281
18		2	6	14	19	13	15	23	33	31	26	13	10	15	9	3			232
19		1	6	15	11	18	28	30	31	24	19	35	24	16	5	2			265
20		1	1	5	11	13	29	14	18	19	25	18	13	26	16	3			212
21		1	4	8	13	24	31	39	35	39	34	25	21	14	11	8	3		310
22		1	6	11	19	20	21	31	33	30	24	9	8	8	5	2	1		229
23		1	2	6	18	13	15	14	11	10	10	11	19	20	18	6	1		175
24		2	4	8	16	24	29	31	23	10	16	8	6	6	4	3			190
25			1	8	15	21	29	34	36	29	41	33	26	20	9	5	1		308
26		1	5	8	16	25	25	35	34	39	33	24	9	8	6	4	1		273
27		1	4	8	18	24	24	33	29	30	26	18	16	18	8	4	1		262
28			1	1	6	14	19	30	24	33	29	16	13	8	4	1			199
29			2	6	9	16	21	24	39	29	23	25	29	16	8	2	1		250
30			2	8	11	19	24	35	31	38	29	11	16	13	8	4	1		250
31		1	4	11	15	26	28	36	39	33	31	30	25	20	15	8	2		324
Total		39	146	289	496	638	730	844	829	830	785	628	526	438	301	148	46		7713
Mean		1.3	4.7	9.3	16.0	20.6	23.5	27.2	26.7	26.8	25.3	20.3	17.0	14.1	9.7	4.8	1.5		248.8

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

AUGUST, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1			1	4	9	13	19	18	10	9	14	15	11	9	6	1			139
2			1	4	15	21	19	30	38	35	36	29	18	9	1				256
3		1	4	9	17	25	25	11	24	10	10	12	7	9	9	5			178
4		1	5	9	15	24	31	32	29	32	37	27	20	20	7	2			291
5			2	5	6	6	9	7	7	7	9	9	5	5	2	1			80
6		1	5	15	16	24	15	24	33	37	24	33	27	19	7	2	1		283
7		1	4	7	14	24	27	30	29	24	35	30	24	12	7	6	1		275
8		1	5	12	16	24	33	32	37	36	31	30	27	22	10	5	1		322
9			2	7	11	20	26	24	29	30	35	30	15	17	14	4	1		265
10			6	10	15	24	26	30	30	16	19	12	15	7	2	1			213
11			2	7	15	24	16	15	22	24	29	24	14	14	10	4			220
12			3	11	20	26	33	38	38	40	35	24	24	15	5	1			313
13		1	4	9	12	19	22	20	32	35	29	24	10	9	7	2			235
14			1	4	17	24	21	24	14	15	31	25	24	7	5	2			214
15			2	7	16	24	19	15	13	11	11	15	13	6	2	1			155
16			2	4	5	12	8	6	8	9	19	21	13	10	8	3			128
17			4	9	17	20	18	18	23	27	21	14	20	20	6	1			218
18				3	4	7	14	17	23	23	21	18	16	11	5	1			163
19			1	10	15	23	28	33	32	26	25	25	17	10	7	4			256
20			4	6	7	7	11	11	9	7	7	7	7	6	5	2			96
21			2	7	7	7	7	7	7	7	7	7	7	9	6	4			91
22			2	6	14	21	21	30	28	31	26	25	21	12	10	2			249
23				3	11	16	21	26	28	21	15	9	3	5	3	1			162
24			1	7	12	14	21	23	21	12	10	15	9	4	2	1			152
25			1	2	5	7	11	18	21	22	17	6	5	4	3				122
26			1	4	5	10	13	17	17	16	28	23	18	15	11	2			180
27			1	6	16	10	16	16	23	27	22	12	9	10	7	4			179
28			1	6	9	11	18	28	21	15	18	17	15	16	6	2			183
29			2	5	7	15	20	21	28	22	7	7	6	6	6	2			154
30			2	6	7	10	16	23	28	24	24	23	21	13	6	1			204
31			1	4	6	7	10	10	9	10	10	10	9	7	5	2			100
Total		6	72	208	361	519	594	654	711	660	662	578	450	338	190	69	4		6076
Mean		0.2	2.3	6.7	11.6	16.7	19.2	21.1	22.9	21.3	21.4	18.6	14.5	10.9	6.1	2.2	0.1		196.0

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

SEPTEMBER, 1964.

HOURL L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1			1	5	12	20	24	23	9	11	15	7	6	4	3				140
2			1	4	9	20	19	18	15	9	6	7	9	5	7	1			130
3			1	6	9	11	18	28	16	17	24	21	21	10	5	1			188
4			1	5	12	13	21	26	15	7	7	7	7	6	4	1			132
5				2	3	4	5	7	10	11	9	11	11	6	4	1			84
6			1	4	7	18	20	18	27	38	35	28	21	10	4	1			232
7			1	2	7	12	21	23	23	23	15	18	19	17	5	1			187
8			1	4	10	12	17	21	29	28	24	23	19	8	4				200
9				1	7	18	16	10	15	8	8	11	13	4	1				112
10				1	4	7	10	13	22	29	24	19	13	5	1				148
11				2	10	18	16	17	17	10	11	17	12	10	4	1			145
12				1	6	13	17	21	18	27	23	18	11	8	5	1			169
13				1	4	6	8	9	17	13	20	17	15	5	3				118
14				2	7	10	11	15	22	21	18	15	12	8	4	1			146
15				4	7	12	16	24	24	24	23	19	6	7	2				168
16				4	5	11	12	15	18	15	13	11	7	7	4				122
17				3	6	15	19	28	22	24	23	23	16	9	4				192
18				2	10	15	21	25	25	23	16	10	14	8	1				170
19				2	9	16	21	23	19	26	19	19	17	9	3				183
20				4	6	7	11	12	20	23	20	18	14	10	2				147
21				3	8	10	11	6	9	4	4	3	1						59
22					3	3	3	4	4	5	4	4	3	2					35
23				1	6	15	18	21	19	16	11	6	5	3	1				122
24				2	5	8	6	21	6	5	23	7	4	3	1				91
25				2	6	8	11	15	21	17	21	12	8	5	2				128
26				1	5	10	13	14	14	12	8	8	7	7	1				100
27				1	7	13	8	18	11	14	18	7	7	5	2				111
28				1	3	8	12	13	10	8	7	7	6	5	2				82
29				2	5	6	7	7	7	8	8	7	6	4	1				68
30				1	4	6	6	7	7	10	14	11	7	7	2				82
Total			7	73	202	345	418	502	491	486	471	391	317	197	82	9			3991
Mean			0.2	2.4	6.7	11.5	13.9	16.7	16.4	16.2	15.7	13.0	10.6	6.6	2.7	0.3			133.0

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

OCTOBER, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1				1	6	10	14	14	14	14	14	18	21	5	1				132
2				1	6	7	10	11	12	17	14	11	8	6	1				104
3				1	4	7	13	23	20	15	6	3	3	3	1				99
4				1	5	9	9	17	14	13	8	3	3	2					84
5				1	3	7	10	12	15	18	8	13	7	4	1				99
6					2	6	6	8	9	11	6	3	1						52
7					4	6	11	15	15	16	17	14	7	2	1				108
8					4	6	11	10	17	18	17	16	12	6	1				118
9					1	8	13	16	17	16	15	12	13	3	1				115
10				1	3	7	15	21	15	7	13	16	9	3	1				111
11					2	5	10	6	14	20	10	12	7	5	1				92
12					2	6	13	12	13	13	9	9	8	5					90
13					2	6	7	8	14	18	16	21	9	4	1				106
14					3	8	9	14	17	13	12	12	7	4					99
15					3	7	12	10	5	9	9	14	7	4	1				81
16					2	7	12	15	22	18	12	9	8	4					109
17					1	4	6	9	13	11	11	8	3	1					67
18					1	3	4	4	8	7	9	9	1	1					47
19					2	5	9	14	18	12	13	9	3	1					86
20					3	7	11	16	15	9	9	9	7	3					89
21					1	4	5	3	7	21	10	6	4	1					62
22					1	6	13	9	13	10	6	4	4	3					69
23					3	8	13	13	17	14	16	12	7	3					106
24					1	5	8	10	13	16	18	15	5	1					92
25					2	7	6	8	10	10	8	5	2	1					59
26					1	3	6	9	9	10	10	6	5	1					60
27					1	3	7	8	9	10	8	4	4	1					55
28					2	7	12	13	16	18	16	15	6	1					106
29					1	4	8	13	21	18	15	12	5	1					98
30					1	3	8	10	9	8	4	3	1	1					48
31					1	7	9	5	15	13	10	6	1						67
Total				6	74	188	300	356	426	423	349	309	188	80	11				2710
Mean				0.2	2.4	6.1	9.7	11.5	13.7	13.6	11.3	10.0	6.1	2.6	0.4				87.4

TABLE 2 (Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>)

NOVEMBER, 1964.

HOUR L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1				1	4	8	9	7	5	9	6	4	2						55
2				1	5	11	10	10	11	12	9	6	1						76
3				1	4	6	8	9	8	9	10	6	2						63
4				1	3	7	7	8	7	7	7	6	2						55
5				1	2	5	9	10	9	9	5	3							53
6				1	4	7	11	13	13	14	9	4	1						77
7				2	6	9	10	11	12	17	10	6	1						84
8				1	3	7	11	17	15	18	13	6	2						93
9				1	5	7	7	8	8	7	7	3	1						54
10				1	5	11	14	8	12	12	5	3							71
11				1	4	8	13	14	11	6	1	1							59
12				1	4	9	13	13	15	10	3	3	1						72
13					1	2	6	13	12	11	9	3	1						58
14				1	2	7	10	13	12	12	11	5	1						74
15				1	3	7	11	15	15	11	4	1							68
16					1	7	8	7	11	5	2	2	1						44
17					1	2	2	2	3	3	1	1							15
18					1	1	3	5	4	3	1	1							19
19					2	6	10	9	8	8	8	4							55
20					2	6	8	13	9	6	8	3							55
21					1	3	3	5	6	6	3	1							28
22					1	2	4	5	8	4	1	1							26
23					3	6	6	7	10	9	7	3							51
24					1	2	3	4	5	4	2	2							23
25					2	3	4	3	3	4	2	1							22
26					1	2	4	4	5	5	5	3							29
27					2	4	7	10	9	8	6	2							48
28					2	4	6	10	9	10	6	3							50
29					2	4	6	8	9	8	7	3							47
30					2	6	8	12	9	9	8	3							57
Total				15	79	169	231	273	273	256	176	93	16						1581
Mean				0.5	2.6	5.6	7.7	9.1	9.1	8.5	5.9	3.1	0.5						52.7

TABLE 2(Contd.)

DIFFUSE SOLAR RADIATION - MEAN HOURLY VALUES (gm.cal./cm<sup>2</sup>).

DECEMBER, 1964.

HOURLY L.A.T.	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	Total for Day
Day 1						2	6	10	12	10	9	7	2						58
2						2	5	8	10	7	6	6	1						45
3						2	6	7	7	8	7	4	1						42
4						1	6	9	11	10	10	6	2						55
5						1	2	3	4	7	4	5	2						28
6						1	1	1	1	3	6	5	1						19
7						1	3	6	3	3	3	4	3						26
8						1	1	1	1	1	1	1							7
9						2	5	8	10	8	7	4	2						46
10						1	4	7	6	8	8	6	1						41
11						3	5	4	4	4	3	1							24
12						1	1	3	3	3	3	1							15
13						1	4	5	5	6	7	4	1						33
14						1	6	9	7	10	7	4	2						46
15						1	4	7	6	8	7	4	1						38
16						1	5	7	8	6	5	4	1						37
17						1	3	5	5	9	6	4	1						34
18						1	2	6	7	7	7	4	1						35
19						1	4	7	8	8	7	3	1						39
20						1	4	6	7	8	8	6	2						42
21						1	4	11	14	11	7	4	2						54
22						1	4	4	6	4	5	3	1						28
23							1	3	8	6	5	3							26
24							3	4	6	8	7	4	2						34
25						2	5	7	8	6	7	5	1						41
26						1	4	4	6	8	6	5							34
27						1	4	8	10	8	7	4	2						44
28						2	7	10	9	8	7	4	1						48
29						1	4	4	4	3	3	1	1						21
30						2	4	6	6	8	8	5	1						40
31						1	3	6	11	7	7	5	1						41
Total						38	120	186	213	211	190	126	37						1121
Mean						1.2	3.9	6.0	6.9	6.8	6.1	4.1	1.2						36.2



DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (gm.cal./cm<sup>2</sup>/min.). 1964.

TABLE 3

MONTH AND DAY	TIME		ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION			PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
	G.M.T.	L.A.T.			CLEAR	RED (RG <sub>2</sub> )	YELLOW (OG <sub>1</sub> )					TYPE	AMOUNT.
					x10 <sup>-3</sup>	x10 <sup>-3</sup>	x10 <sup>-3</sup>	mb.	°C	mb.	mls.		okta
Jan. 23	1242	1149	71.6	3.26	918	651	781	1037	7.7	9.8	10	CuScCi	3
Feb. 6	1049	0954	73.1	3.57	1006	722	846	1043	4.0	5.5	40	Sc	Tr
6	1227	1132	68.0	2.77	1053	727	870	1045	8.7	5.8	40	Cu	Tr
7	1240	1145	67.5	2.72	883	676	791	1047	7.6	5.9	30	ScCi	2
7	1433	1338	70.7	3.14	973	684	817	1044	8.7	5.9	30	Sc	1
Apr. 2	1437	1352	52.3	1.66	1045	716	854	1017	8.6	7.2	16	CuSc	3
5	1040	0956	52.4	1.67	1197	794	974	1020	7.8	5.8	32	Sc	Tr
5	1354	1310	47.9	1.52	1195	828	959	1020	10.5	6.5	32	FcCi	1
21	1044	1004	46.4	1.44	1231	780	952	992	10.6	8.5	40	CuFcCi	1
28	1205	1126	38.4	1.29	1211	759	942	1009	12.6	12.0	15	Cu	2
May 14	1447	1410	41.9	1.38	1165	736	902	1029	13.1	9.7	25	FcScCi	3
18	1055	1018	33.0	1.28	1254	762	959	1012	12.6	13.0	4	CuFcSc	3
25	1216	1138	31.3	1.19	1016	694	828	1016	20.4	12.9	10	NIL	
June 6	1045	1006	36.6	1.25	1238	804	963	1002	15.4	11.8	25	CuFc	1
7	1046	1006	36.5	1.25	1220	777	948	1007	14.7	12.4	30	CuFcAc	1
7	1446	1406	37.9	1.28	1172	740	913	1012	14.9	13.3	30	CuFc	4
18	1214	1132	29.0	1.16	1224	764	957	1016	15.9	14.3	20	CuFcSc	2
18	1432	1350	35.5	1.25	1195	757	939	1016	16.1	13.8	25	CuScCi	3
19	1211	1129	29.2	1.17	1229	776	952	1020	15.6	10.8	20	CuFcSc	4
19	1434	1352	35.7	1.26	1221	772	954	1020	16.0	11.3	20	CuFc	2
20	1040	0958	36.9	1.28	1250	772	970	1023	13.0	9.8	30	CuAcCi	3
25	1057	1014	34.9	1.25	1103	703	873	1025	17.7	16.6	25	CuSc	2
25	1224	1141	23.8	1.17	1205	748	940	1026	18.1	17.1	30	CuSc	2
29	1046	1002	36.6	1.28	1253	782	965	1031	16.2	12.1	40	Sc	Tr
29	1219	1135	29.2	1.18	1269	782	974	1031	16.2	12.2	40	Sc	Tr
July 1	1227	1142	29.1	1.18	1275	777	977	1030	19.0	18.2	30	Fc	1
1	1447	1402	37.1	1.29	1247	772	960	1032	17.8	16.0	30	ScFc	1
4	1027	0942	39.8	1.34	1271	807	993	1026	14.9	10.7	25	CuFcCi	3
12	1448	1402	33.2	1.29	1265	778	975	1012	15.6	13.0	40	FcCuAc	3
15	1049	1002	33.1	1.29	1103	710	846	1019	17.1	14.2	15	CuFcCi	6
23	1426	1339	37.2	1.29	1184	727	914	1027	17.8	15.2	25	CuScCi	3
Aug. 11	1108	1022	41.6	1.37	1145	719	810	1020	19.3	19.2	16	CuCi	4
20	1030	0946	43.0	1.52	1238	782	970	1020	14.9	12.9	40	CuCb	2
20	1223	1139	39.8	1.33	1269	791	985	1020	15.0	10.9	40	CuCb	2
20	1434	1350	45.4	1.45	1247	770	968	1016	15.2	11.4	40	CuFc	1
21	1111	1026	44.2	1.42	1263	821	998	1018	14.9	11.6	40	CuFc	2
21	1211	1126	40.6	1.34	1276	788	995	1018	14.8	11.4	40	CuFc	2
21	1433	1348	45.6	1.46	1255	812	990	1020	15.4	10.8	40	Cu	1
29	1432	1350	48.3	1.55	1252	793	987	1031	16.2	12.8	25	CuFcCi	3
31	1052	1011	48.9	1.56	1107	788	900	1025	18.3	12.2	16	Cu	Tr
31	1223	1142	43.7	1.42	1229	771	962	1025	20.0	12.1	16	Sc	Tr
31	1439	1358	49.6	1.58	1107	743	927	1025	20.2	12.9	16	FcAcCi	Tr
31	1549	1508	57.9	1.92	905	703	854	1025	19.3	12.5	16	CuCi	Tr

TABLE 3 (Contd.) DIRECT SOLAR RADIATION AT NORMAL INCIDENCES  
INSTANTANEOUS VALUES (gm.cal./cm<sup>2</sup>/min.). 1964

MONTH AND DAY	TIME		ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION			PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
	G.M.T.	L.A.T.			CLEAR	RED (R <sub>C2</sub> )	YELLOW (O <sub>C1</sub> )					TYPE	AMOUNT
					x10 <sup>-3</sup>	x10 <sup>-3</sup>	x10 <sup>-3</sup>	mb.	°C	mb.	mls.		okta
<u>Sept.</u>													
11	1604	1526	63.7	2.28	1167	740	916	1015	17.3	15.2	30	CuFeCi	3
14	1107	1130	52.2	1.63	1172	733	910	1000	15.0	12.0	12	CuFe	5
16	1542	1506	62.8	2.18	1019	666	793	1000	15.3	11.7	25	CuCb	2
25	1633	1600	72.9	3.43	921	636	755	1011	15.5	12.6	30	CuFe	6
26	1621	1538	71.7	3.20	923	622	748	1011	16.0	12.4	20	CuFe	6
27	1701	1628	77.6	4.65	853	610	723	1016	14.9	12.0	40	CuFe	3
28	1434	1402	60.0	2.03	1177	752	930	1019	17.4	14.9	35	CuFe	1
28	1718	1646	80.6	6.08	717	535	626	1019	16.4	14.8	35	FeCi	Tr
29	1037	1005	59.6	2.01	1103	701	856	1021	15.6	14.5	25	FsFeCi	2
29	1447	1415	61.5	2.13	1080	697	864	1021	18.5	15.1	50	FeScCi	2
30	1029	0958	60.7	2.04	1125	733	903	1022	15.5	14.6	25	CuSc	1
30	1214	1143	54.9	1.78	1175	757	935	1022	16.2	14.9	25	CuSc	1
30	1433	1402	60.7	2.08	1116	723	890	1022	16.6	14.8	35	CuScCi	1
30	1633	1602	74.9	3.89	810	582	697	1022	15.1	14.7	25	CuSc	3
<u>Oct.</u>													
1	1033	1002	60.7	2.08	664	518	596	1023	16.2	14.9	12	Sc	1
1	1222	1151	55.3	1.79	682	550	603	1023	18.1	14.4	15	Cu	1
2	1221	1150	55.7	1.81	877	612	726	1022	17.4	12.9	10	FeCi	Tr
8	1214	1145	58.0	1.88	834	730	785	997	11.6	9.3	20	CuCb	4
13	1041	1013	63.8	2.28	1068	706	868	1012	11.1	9.8	25	CuFeSc	1
<u>Nov.</u>													
2	1227	1202	66.8	2.61	631	484	509	1034	13.6	11.0	6	Sc	Tr
3	1027	1002	71.8	3.27	750	552	653	1031	8.2	8.0	12	FeSc	2
3	1232	1207	67.1	2.63	932	654	779	1030	10.0	8.6	12	CuSc	3
4	1030	1005	71.8	3.26	844	633	738	1026	8.6	8.4	14	Cu	Tr
4	1226	1201	67.4	2.65	1008	717	855	1025	10.0	8.5	15	Cu	Tr
4	1442	1417	73.8	3.65	821	612	722	1024	10.1	9.0	15	Cu	Tr
9	1231	1206	69.0	2.82	861	613	718	1019	13.0	10.4	8	NIL	
19	1231	1205	71.4	3.19	879	596	720	1024	13.3	13.2	10	StCu	5
<u>Dec.</u>													
3	1226	1155	74.0	3.70	589	405	519	1024	10.2	9.0	15	CuFe	3
9	1435	1402	79.4	5.39	656	477	507	1004	8.9	8.8	22	CuFe	3
18	1030	0953	80.3	6.00	554	462	493	1026	0.3	5.8	16	Cu	Tr
18	1232	1155	75.4	4.03	669	541	609	1026	2.8	6.7	16	Ci	Tr

TABLE 4.

DAILY TOTALS OF GLOBAL SOLAR RADIATION (gm.cal./cm<sup>2</sup>).

YEAR 1964.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Day												
1	19	46	90	113	333	184	660	142	188	267	73	91
2	10	85	213	358	227	153	598	311	144	310	144	54
3	25	153	126	267	493	370	439	549	434	99	131	81
4	25	41	205	304	484	306	771	423	445	84	186	61
5	25	184	179	532	325	398	404	90	134	336	56	33
6	68	192	226	324	281	672	465	446	272	53	93	19
7	18	173	266	444	350	654	93	421	397	156	157	26
8	32	49	261	259	289	250	519	421	282	194	145	8
9	30	25	150	361	304	178	533	298	116	186	149	67
10	32	73	161	403	210	503	161	237	159	135	87	82
11	91	131	271	248	121	308	133	523	390	149	72	24
12	72	68	99	269	344	179	670	467	377	199	88	15
13	95	36	254	412	638	361	254	451	141	191	68	38
14	50	184	301	262	660	167	449	325	372	224	129	73
15	78	208	358	370	394	493	716	172	287	91	92	58
16	69	118	150	307	452	212	245	131	367	181	52	48
17	16	109	211	243	542	535	344	279	264	69	23	36
18	13	155	373	362	586	604	268	167	187	52	19	73
19	116	98	245	317	559	736	418	433	225	93	94	45
20	114	144	268	294	175	742	231	608	271	165	59	78
21	82	62	187	576	486	519	333	588	60	80	33	73
22	36	50	240	462	373	218	259	434	35	71	28	28
23	105	161	65	509	308	480	648	180	125	146	90	26
24	141	53	239	191	656	493	209	169	93	112	24	43
25	150	143	420	262	662	660	447	133	350	62	28	63
26	81	135	186	199	395	288	568	228	366	60	31	34
27	53	180	109	116	247	225	300	380	335	56	74	66
28	91	216	162	522	745	194	216	498	298	176	68	58
29	22	207	183	596	582	700	275	435	360	114	81	21
30	61		184	415	350	213	298	326	349	51	74	69
31	66		206		541		471	535		97		56
Total	1886	3479	6588	10297	13112	11995	12395	10800	7823	4259	2448	1547
Mean	60.8	120.0	212.5	343.2	423.0	399.8	399.8	348.4	260.8	137.4	81.6	49.9

TABLE 5

DAILY TOTALS OF DIFFUSE RADIATION (gm.cal./cm<sup>2</sup>)

YEAR 1964.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Day												
1	19	42	90	107	205	178	207	139	140	132	55	58
2	9	75	112	193	210	139	326	256	130	104	76	45
3	22	67	107	163	281	261	298	178	188	99	63	42
4	24	38	119	194	216	244	140	291	132	84	55	55
5	25	92	120	113	306	250	313	80	84	99	53	28
6	52	54	120	183	252	205	331	283	232	52	77	19
7	17	75	123	202	257	218	89	275	187	108	84	26
8	29	46	115	223	265	210	308	322	200	118	93	7
9	29	22	116	256	180	170	320	265	112	115	54	46
10	30	67	98	247	190	339	157	213	148	111	71	41
11	57	100	121	223	119	269	127	220	145	92	59	24
12	49	65	99	247	255	172	260	313	169	90	72	15
13	63	34	120	239	300	315	234	235	118	106	58	33
14	48	107	145	224	212	159	331	214	146	99	74	46
15	48	97	150	218	302	318	286	155	168	81	68	38
16	64	97	148	177	304	205	226	128	122	109	44	37
17	12	102	176	178	201	312	281	218	192	67	15	34
18	12	125	140	197	210	231	232	163	170	47	19	35
19	73	97	175	233	259	199	265	256	183	86	55	39
20	60	123	167	197	170	260	212	96	147	89	55	42
21	69	60	159	180	287	316	310	91	59	62	28	54
22	33	50	164	259	275	204	229	249	35	69	26	28
23	63	135	63	244	200	340	175	162	122	106	51	26
24	71	51	189	174	202	338	190	152	91	92	23	34
25	46	104	145	242	209	261	308	122	128	59	22	41
26	50	82	176	189	310	244	273	180	100	60	29	34
27	46	106	107	115	220	218	262	179	111	55	48	44
28	58	103	160	241	226	189	199	183	82	106	50	48
29	22	98	167	222	294	229	250	154	68	98	47	21
30	55		171	261	294	207	250	204	82	48	57	40
31	60		167		311		324	100		67		41
Total	1315	2314	4229	6141	7522	7200	7713	6076	3991	2710	1581	1121
Mean	42.4	79.8	136.4	204.7	242.6	240.0	248.8	196.0	133.0	87.4	52.7	36.2

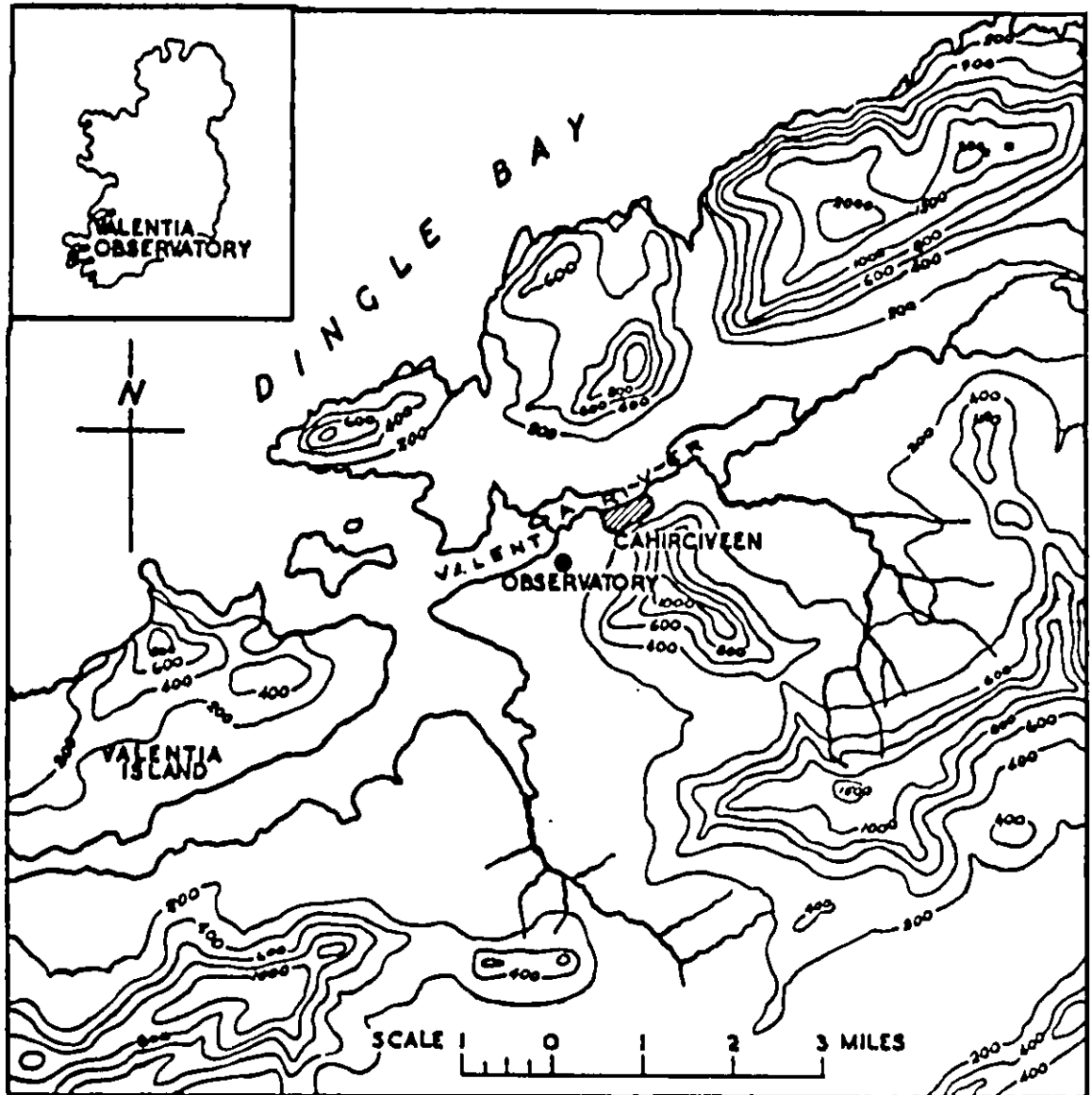


Fig. 1. Maps showing the site of Valentia Observatory.

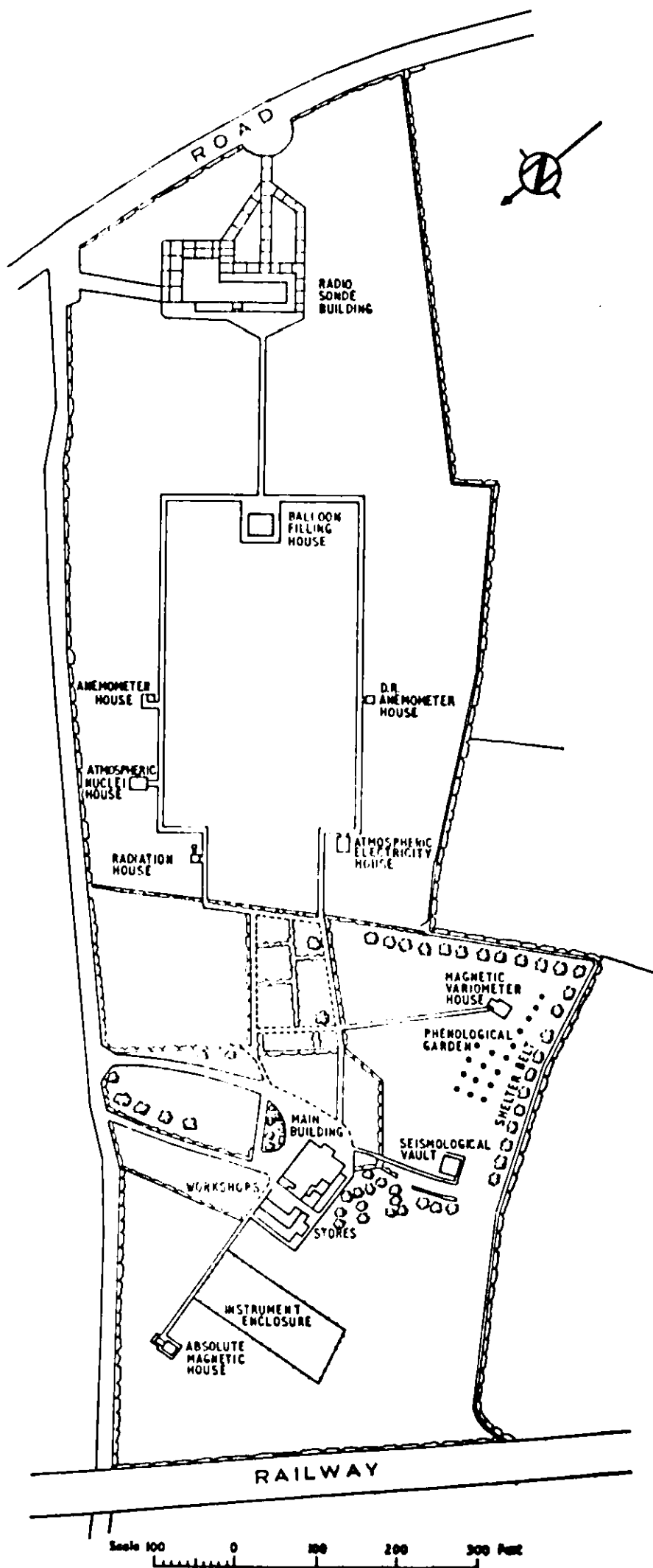


Fig. 2. General layout of Valentia Observatory.

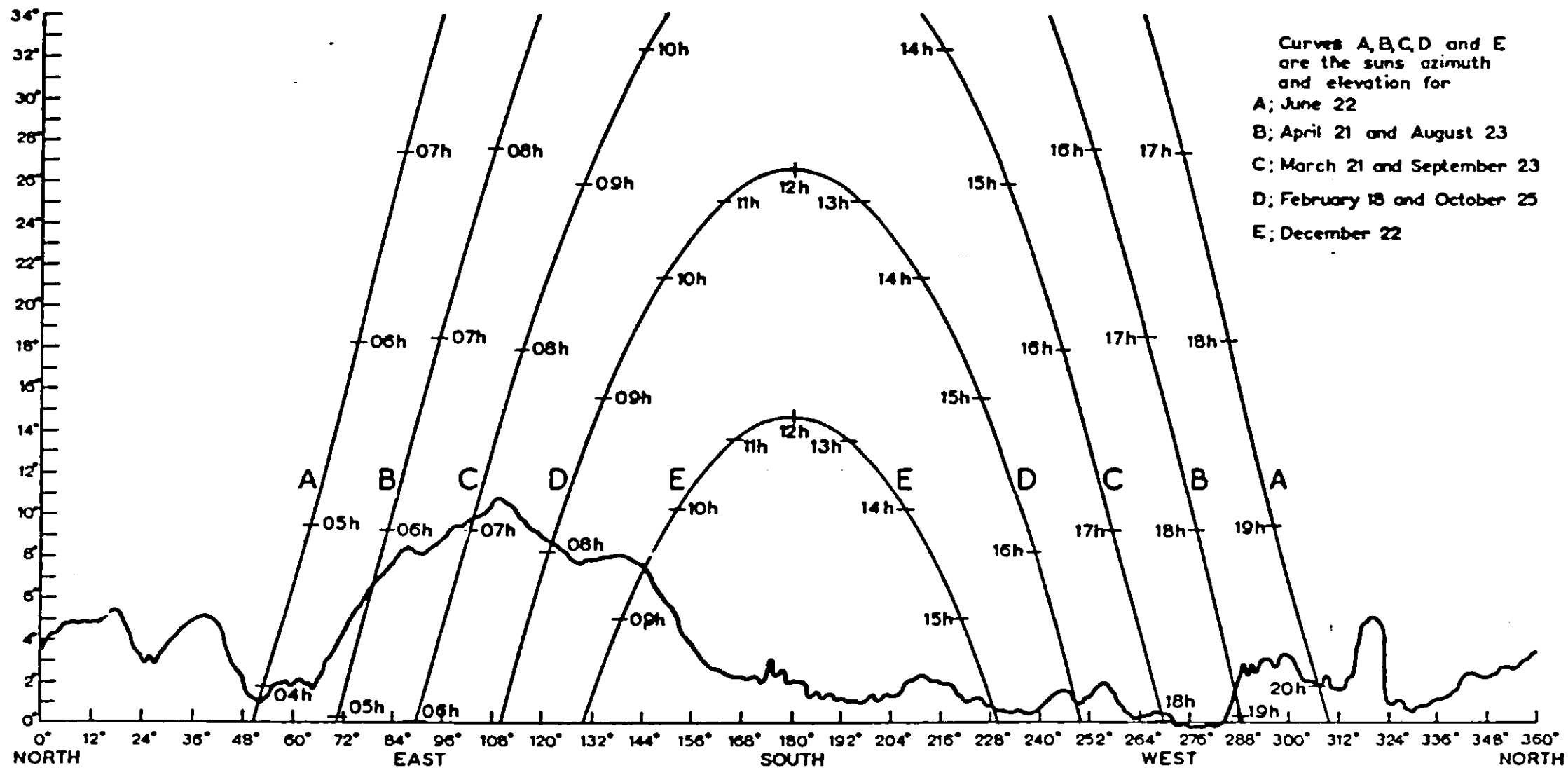


Fig. 3 Exposure diagram showing Azimuth and Elevation of all objects which obscure the Solarimeter, together with Elevation and Azimuth of the sun at different times of the year.