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ARGONNE NATIONAL LABORATORY
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FIVE-YEAR CLIMATOLOGICAL SUMMARY
JULY 1949 - JUNE 1954
ARGONNE NATIONAL LABORATORY, DU PAGE COUNTY, ILLINOIS

by

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THE METEOROLOGY GROUP
RADIOLOGICAL PHYSICS DIVISION

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INTRODUCTION

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FIVE-YEAR CLIMATOLOGICAL SUMMARY
JULY 1949 - JUNE 1954
ARGONNE NATIONAL LABORATORY, DU PAGE COUNTY, ILLINOIS

INTRODUCTION

A knowledge of climatic features enables man to use the resources at his disposal effectively and, in addition, aids him in promoting his health and safety. In industry, the use of meteorological information is currently well established. Particularly in the atomic energy industry, personnel concerned with plant construction, plant operation, transportation, and scientific experimentation, have found that the application of weather information to their work results in greater economy and increased efficiency.

In the atomic energy industry one must concern himself not only with the conventional applications of meteorological information, but also with the problems having to do with the possible release of radioactive materials into the atmosphere. Special kinds of meteorological measurements are necessary to provide satisfactory solutions to this problem. In order to ascertain how quickly the atmosphere disperses radioactive or inactive pollutants in a particular location, one must have information on the variation of wind speed and direction with height, the variation of temperature with height, and the intensity of solar and terrestrial radiation.

One of the objectives of the Meteorology Group has been to measure those features of the weather which would be useful to the atomic energy industry, and to make the data available in published form. It turns out that measurements of this type are of interest to many other scientific and industrial groups. For example, requests for this type of meteorological data have been received from botanists, gas technologists, and even entomologists.

This report is based on eight different kinds of meteorological measurements: wind, temperature, relative humidity, precipitation, solar radiation, atmospheric pressure, soil temperature, and atmospheric stability.

A summary of the instruments used, their elevation with respect to ground, and the length of record used in this report appear in Figure 1. All of the equipment used is autographic and provides a record of the meteorological elements as a function of time. All of the chart times are Central Standard Time.

The information obtained from the recorder traces was tabulated on data evaluation sheets and transferred onto IBM cards. Statistical computations were made with the IBM calculator type 604 and tabulations were

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METEOROLOGICAL ELEMENT	TYPE OF INSTRUMENT	ELEVATION RESPECT TO GROUND	PERIOD OF RECORD COVERED IN THIS REPORT
1. Wind	Friez Aerovane Wind System	a. 150 feet b. 19 feet	July 1, 1949 - June 30, 1954 July 1, 1949 - June 30, 1954
2. Temperature	Friez Hygrothermograph Model No. 594		July 1, 1949 - June 30, 1954
	Copper-Constantan Thermocouples - #36 Wire and Brown Elec- tronik Potentiometer	a. 3.5 feet b. 5.5 feet	July 1, 1951 - Aug. 6, 1952 Aug. 6, 1952 - June 30, 1954
3. Relative Humidity	Friez Hygrothermograph Model No. 594	5 feet	July 1, 1949 - June 30, 1954
4. Precipitation	Friez Weighing Type Rain Gauge - Model No. 755-B	3 feet	July 1, 1949 - June 30, 1954
5. Solar Radiation	Eppley 50-Junction Pyrheliometer and Leeds and Northrup Micromax Recorder	5.5 feet	Aug. 12, 1950 - June 30, 1954
6. Pressure	Friez Microbarograph Model No. 790-1	Ivory Point of Mercurial Barometer 746 Feet above Sea Level. Micro- barograph checked against Mercurial Barometer	July 1, 1949 - June 30, 1954
7. Soil Temperature	Leeds and Northrup 100-Ohm Copper Thermohms and Micromax Recorder	1-cm, 10-cm, 20-cm, 50-cm, 100-cm, 10 feet, and 29 feet below Ground	Nov. 5, 1952 - June 30, 1954
8. Stability	Copper-Constantan Thermocouples Using #36 Wire and Brown Elektronik Potentiom- eter	Temperature Difference Measured between Thermocouples at a. 3.5 and 144 feet above ground b. 5.5 and 144 feet above ground	July 1, 1951 - Aug. 6, 1952 Aug. 6, 1952 - June 30, 1954

FIGURE 1

SUMMARY OF METEOROLOGICAL MEASUREMENTS

obtained from the IBM tabulator type 407. The tables presented in the following pages are 407 tabulations, reproduced by a photographic process.

Three groups of studies are presented. The first group consists of analyses based on a single meteorological element. Examples of the type of data presented in this section are tables of averages and extremes, frequency distributions of individual elements as a function of time, and persistence studies.

The second section is devoted to studies based on two or more weather elements. The relation between variables is shown by means of joint frequency distributions.

The third group of studies compares the measurement of weather elements made simultaneously at the Chicago Midway Airport and the Argonne Meteorology Laboratory. The elements are compared by obtaining the differences for each hour of the day and presenting these in joint frequency distributions. Precipitation is compared by taking the ratio of monthly totals. Even though the Chicago Midway Airport is only about fourteen miles from the Argonne Meteorology Laboratory, the meteorological conditions are at times quite different. For some elements the long-term averages are significantly different.

A description of the topography at the Argonne site and details of the instruments used to obtain the Argonne data are described in the Appendix.

Four interim reports based on the climate of the Argonne site have been published: ANL-4538, ANL-4793, ANL-4928, and ANL-5256. They cover the period from July 1949 through July 1953.

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PART I

ANALYSES BASED ON A SINGLE METEOROLOGICAL VARIABLE

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PART I. ANALYSES BASED ON A SINGLE METEOROLOGICAL VARIABLE(A) Wind

The wind information summarized in this report is based on data obtained by two standard Aerovane wind instruments. One of these is mounted at 150 feet above ground level on a mast extending from the top of a forest fire lookout tower located at the Meteorology Laboratory. This instrument has a completely unobstructed exposure. The forest fire lookout tower will hereinafter be referred to as the meteorology tower.

The second instrument is mounted at 19 feet above ground level. Up to November 20, 1951, the latter anemometer was mounted at the end of an $8\frac{1}{2}$ -foot boom extending at right angles from the meteorology tower. It was found that this instrument provided wind speed readings which were too low whenever the wind blew through the tower before being measured. To overcome this difficulty, the instrument was moved on the above date to a pole approximately 150 feet northwest of the meteorology tower. Its new location is on top of the pole 19 feet above the ground.

The wind observations are recorded continuously on the Aerovane recorders. These recorders are manufactured by the Esterline-Angus Company and have the characteristics of the Model A-W Esterline-Angus recorder. Data for ten minutes of every hour are evaluated from the charts. Each reading represents a ten-minute average for the period beginning five minutes before the hour and ending five minutes after the hour. Averages were obtained by the well-known "equal area" method. In addition to hourly observations, the maximum gust for each day and the time at which it occurred were recorded. Gust data, however, were not evaluated during the first year of the study, July 1, 1949 - June 30, 1950. The maximum gust was taken as the peak value of the wind speed recorded during the day regardless of the gust duration.

Wind direction was determined to the nearest 10° of azimuth. If the direction trace were so variable as to make its evaluation to within 45° questionable, the direction was considered variable. Wind speed observations were recorded to the nearest whole mile per hour. Since the starting speed of the Aerovane is nearly 2 mph, the number of calms recorded is probably slightly high.

When the wind direction or wind speed for the 150-foot or the 19-foot level was missing, data from the wind equipment at adjacent levels on the tower, that is, 37.5-foot or 75-foot levels, were not used. The data were recorded as missing.

The data were missing whenever an instrument failure occurred. The instrument failed due to power failure, chart paper jamming,

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pens sticking, icing on the Aerovane rotor, and selsyn motor burn-out due to lightning. The data, of course, were also missing during times when the instruments were being calibrated.

For some studies wind directions to 16 or 8 points of the compass are desirable even though directions were initially recorded to 36 points. The criterion for converting from one to another of these wind direction scales is shown in Figure 2. Such a conversion scheme introduces a bias toward the cardinal directions in the 16 or 8-point systems. No correction for this bias has been made in the following summaries.

FIGURE 2. WIND DIRECTION CONVERSION DIAGRAM.

1. Wind Roses

Figures 3 through 8: The wind rose is a graphical presentation of how frequently winds of particular speeds occur from each direction. Wind roses based on the observations for each month and for the total period from July 1949 to June 1954 are presented in these figures. Data based on wind observations taken at both the 150-foot and 19-foot levels were used. The first set of wind roses, those in Figures 3 and 4, are based on all of the data during the period. Those of Figures 5 through 8 are divided into two parts. The first part is based on observations made during the hours 0700 through 1800, the hours considered as the working portion of the day. The second portion is based on data taken from 1900 through 0600, which are considered the non-working hours. This breakdown was made in order to provide data for personnel concerned with plant operations and for others planning work which takes place during periods when the Laboratory is normally in operation. On occasions, it is desirable to carry out some types of work during off hours. The non-working hours data are of value in those cases.

To illustrate how the wind rose is interpreted, in Figure 3 referring to the five-year summary wind rose, the spoke extending horizontally to the left represents the wind blowing from the west. In this

report, when a wind is assigned a particular direction, such as west, it means that the wind is blowing from this direction. The westerly spoke of this wind rose indicates that on 6.7% of the observations, the wind speed ranged from 4 to 12 mph; on 2.4% of the observations, it was from 13 to 24 mph; and on 0.1% of the observations, the wind was greater than 24 mph. The percentages can be obtained from the scale shown with each of the figures.

2. Joint Frequency Distribution of Wind Direction and Wind Speed

Tables 1 through 39: This group of tables shows in somewhat greater detail the same information shown in the wind roses of Figures 3 through 8. As before, the data are presented for each month and for the total five-year period. The data for a particular month indicates that the table is based on the data from all of the similar months within the five-year period. For example, the data for January include the measurements of all the Januarys within the five-year period.

The columns and rows labeled "percent of total hours" represent the percent of all hourly readings within the five similar months or the total five-year period during which the wind had a particular direction or a particular wind speed. For example, in Table 1 for the 150-foot level, under the column representing wind speeds of 4-7 mph, the entry under the percent of total hours is 17.8%. Since there were 3720 observations taken during the July months covered in this report, the entry 17.8% indicates that 17.8%, or 663, of the observations were recorded as having wind speeds of 4 to 7 miles per hour. In Tables 27 through 39, which represent data for working and non-working hours, the percentages again are based on the total number of observations. For example, 3720 observations are used as the base for the month of July and not 1860, or one-half the number of observations of this month.

It may be noted that the category "calm" appears both under speed and direction and that, in a few cases, a direction is given where the speed was indicated as calm and speed recorded with a calm direction. This apparent discrepancy results from the fact that the speed and direction traces were analyzed separately and that one or the other may have had a lower operating threshold at the time the measurements were made. With the use of an instrument such as the Aerovane, the indication of "calm" can mean any speed from 0 to 2 mph.

3. Persistence of Wind Direction

Tables 40 through 65: These tables present frequency distributions of the number of consecutive hours during which the wind persisted from a given direction to eight points of the compass.

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Information obtained from the anemometers both at 19-foot and 150-foot levels is presented. These data are the hourly observations discussed above.

Hours of persistence were determined by an item count of the number of consecutive readings from a given direction. Since these hourly observations were based on readings taken from five minutes before the hour to five minutes after the hour, fluctuations which occurred in the remaining portion of the hour were not considered. Comparatively steady winds which fluctuated across the boundaries in the direction sectors appear in these tables as nonpersistent winds. The data upon which these studies were based have been grouped in years, each year beginning on July 1 and ending on June 30. The overlap between the years was not included. For example, if a wind started to blow from a given direction on 2100, June 30, and continued through 0900 on July 1 of the following month, this period was broken. The first persistent period of each year was considered as beginning on the first hour and the last one as ending on the last hour of that year.

The column heading "Total Frequency" indicates the number of periods of a particular number of consecutive hours during which the winds blew from the same direction.

The column headed "Total" indicates the total number of hours involved in these periods.

4. Frequency Distribution of Wind Speed and Wind Direction for Each Hour of the Day

Tables 66 to 78: These tables are presented for two reasons: first, to show the diurnal variation of wind speed and direction, and, second, to indicate the degree to which Lake Michigan affected the air movement as far west as the Argonne site. The data for the 19-foot level are presented. The diurnal effect on the wind speed was quite marked. For example, there were very few calms in the middle of the day, whereas calms were relatively frequent during the night. Similarly, the speeds had a maximum during the middle of the day, although there were numerous cases of high speeds at night.

With regard to wind direction, one might observe during the warmer part of the year that there was a slight maximum of winds having an easterly component during the late afternoon and early evening. This effect also shows up in the five-year summary.

5. Average Hourly Wind Speeds

Tables 79 to 80: The averages of the wind speeds for each hour taken at the 150-foot and 19-foot levels are presented. None of the averages are considered missing since each average is composed of not less than 95% of the possible observations. The distribution of missing data was so small as to allow these averages to be representative. Each value represents the average of the total number of readings for the particular hour. For example, the average wind speed for 0300 for June represents the average of 150 readings since there were 150 readings for 0300 during the five June months.

Comparison of these tables shows that higher wind speeds were found at the 150-foot level, as is to be expected, and that the diurnal effect was much more pronounced at the 19-foot level. In fact, during the winter months, the average diurnal effect at the 150-foot level was rather small.

6. Peak Gust Magnitudes and Times of Occurrence

Tables 81 to 84: The magnitude of the daily maximum gust and the time during which it occurred are presented in these tables. Data for both the 150-foot and 19-foot levels are given. It is rather surprising to find the relatively high frequency of peak gusts occurring near midnight, especially during the winter months. This holds true for both the 150-foot and 19-foot levels.

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FIGURE 3 WIND ROSES – 150-FOOT LEVEL
BASED ON 24 HOURLY OBSERVATIONS PER DAY
JULY 1949 – JUNE 1954

FIGURE 4 WIND ROSES - 19-FOOT LEVEL
BASED ON 24 HOURLY OBSERVATIONS PER DAY
JULY 1949 - JUNE 1954

FIGURE 5 WIND ROSES -150-FOOT LEVEL
 BASED ON HOURLY OBSERVATIONS DURING 0700-1800
 JULY 1949-JUNE 1954

FIGURE 6   WIND ROSES—19-FOOT LEVEL
 BASED ON HOURLY OBSERVATIONS DURING 0700-1800
 JULY 1949-JUNE 1954

FIGURE 7 WIND ROSES—150-FOOT LEVEL
 BASED ON HOURLY OBSERVATIONS DURING 1900-0600
 JULY 1949-JUNE 1954

FIGURE 8 WIND ROSES—19-FOOT LEVEL
BASED ON HOURLY OBSERVATIONS DURING 1900-0600
JULY 1949-JUNE 1954

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TABLE 1

Joint Frequency Distribution of Wind Direction and Wind Speed
July 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	41	3										44	1.2
	NNE		6	35	99	49	5						194	5.2
	NE		5	22	101	52	3						183	4.9
	ENE	2	9	40	111	21							183	4.9
	E		14	80	203	10	1	1					309	8.3
	ESE		8	49	97	1	1						156	4.2
	SE		13	47	61	6	1						128	3.4
	SSE		14	48	88	15							165	4.4
	S	1	13	64	189	78	10						355	9.5
	SSW		9	34	165	140	35						383	10.3
	SW	1	10	44	152	143	17	2					369	9.9
	WSW		8	39	116	55	7	3					228	6.1
	W		9	32	113	53	15	3					225	6.0
	WNW		7	28	76	50	5	1					167	4.5
	NW	1	3	21	67	37	4						133	3.6
	NNW		6	27	65	30	2						130	3.5
	N		10	29	78	33							150	4.0
	VARIABLE	4	22	20	1	2	1						50	1.3
	MISSING		3	4	38	12	4					107	168	4.5
	TOTAL	50	172	663	1820	787	111	10				107	3720	
	% TOT. HRS.	1.3	4.6	17.8	48.9	21.2	3.0	.3				2.9		
19 - FOOT	CALM	153	17										170	4.6
	NNE		47	131	35							16	229	6.2
	NE	1	53	109	31							12	206	5.5
	ENE	5	69	92	20							2	188	5.1
	E	2	111	137	25	1						5	281	7.6
	ESE	3	56	40	5	1						4	109	2.9
	SE		63	59	8							2	132	3.5
	SSE		63	79	17	2						2	163	4.4
	S		52	113	85	5						3	258	6.9
	SSW		47	177	149	37						2	412	11.1
	SW	1	68	144	153	24							390	10.5
	WSW		53	114	54	12	1					1	235	6.3
	W		46	115	59	20	2					5	247	6.6
	WNW		21	82	33	9						2	147	4.0
	NW		12	62	41	3							118	3.2
	NNW		22	67	39	6						4	138	3.7
	N	3	43	75	44							9	174	4.7
	VARIABLE	3	48	24	4							2	81	2.2
	MISSING			8	1							33	42	1.1
	TOTAL	171	891	1628	803	120	3					104	3720	
	% TOT. HRS.	4.6	24.0	43.8	21.6	3.2	.1					2.8		

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TABLE 2
Joint Frequency Distribution of Wind Direction and Wind Speed
August 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
150 - FOOT	CALM	31										31	0.8
	NNE		6	42	148	87	10	1				294	7.9
	NE		6	32	91	42	2					173	4.7
	ENE		6	32	70	13	1					122	3.3
	E		6	66	116	11	1					200	5.4
	ESE		11	34	56	2						103	2.8
	SE		5	40	78	6	1					130	3.5
	SSE		14	54	76	13	2					159	4.3
	S		7	66	162	24	3					262	7.0
	SSW		12	59	153	80	7		1			312	8.4
	SW		5	39	128	79	12					263	7.1
	WSW		7	43	77	40	5					172	4.6
	W		8	46	78	47	11	2				192	5.2
	WNW		6	22	42	35	8					113	3.0
	NW		4	33	46	29	2					114	3.1
	NNW		11	32	66	21	1					131	3.5
	N		7	23	93	38	1					162	4.4
	VARIABLE		18	4		1	1					24	0.6
	MISSING	6	35	139	362	107	1	1				112	763 20.5
	TOTAL	37	174	806	1842	675	69	4	1			112	3720
	% TOT. HRS.	1.0	4.7	21.7	49.5	18.1	1.9	.1				2.7	
19 - FOOT	CALM	225	17									1	243 6.5
	NNE	4	106	160	71	3							344 9.2
	NE	4	63	97	62	3							229 6.2
	ENE	1	64	73	41	5							184 4.9
	E		82	119	16	1							218 5.9
	ESE		75	47	3								125 3.4
	SE		66	50	9							1	126 3.4
	SSE		68	70	20	1							159 4.3
	S	1	47	98	31	5						1	183 4.9
	SSW		74	179	61	8						4	326 8.8
	SW	2	68	185	95	5						4	359 9.7
	WSW	2	66	117	60	3						1	249 6.7
	W		61	116	60	16							253 6.8
	WNW	1	27	42	36	6							112 3.0
	NW		24	62	41	6							133 3.6
	NNW	1	40	93	20		1						155 4.2
	N	1	78	131	41	2							253 6.8
	VARIABLE		36	9								1	46 1.2
	MISSING	1	2									20	23 0.6
	TOTAL	243	1064	1648	667	64	1					33	3720
	% TOT. HRS.	6.5	28.6	44.3	17.9	1.7						.9	

TABLE 3

Joint Frequency Distribution of Wind Direction and Wind Speed
September 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	16											16	0.4
	NNE		7	19	75	71	13						185	5.1
	NE		4	17	67	56	4						148	4.1
	ENE		5	16	55	29	4						109	3.0
	E		9	35	79	9							132	3.7
	ESE		4	14	59	9							86	2.4
	SE		4	21	67	16	2						110	3.1
	SSE		3	33	98	29	7	1	1				172	4.8
	S		5	40	199	133	22	10	1				410	11.4
	SSW		4	44	172	135	42	11					408	11.3
	SW		9	31	120	114	29	1					304	8.4
	WSW		2	22	94	79	12	1					210	5.8
	W		4	33	118	105	21	11	5				297	8.3
	WNW		9	32	86	103	20					1	251	7.0
	NW		5	20	87	90	11						213	5.9
	NNW		7	31	74	78	10	1	1				202	5.6
	N		4	29	74	63	4						174	4.8
	VARIABLE		7	13	2								22	0.6
19 - FOOT	MISSING		10	18	62	41	3	1				16	151	4.2
	TOTAL	16	102	468	1588	1160	204	37	8			17	3600	
	% TOT. HRS.	.4	2.8	13.0	44.1	32.2	5.7	1.0	.2			.5		
19 - FOOT	CALM	127	7										134	3.7
	NNE	2	90	73	42	10							217	6.0
	NE		42	56	41	1							140	3.9
	ENE	1	36	32	35	1							105	2.9
	E		46	61	17								124	3.4
	ESE		55	25	5								85	2.4
	SE	1	44	43	17	3							108	3.0
	SSE	1	54	47	44	8							154	4.3
	S		45	140	82	17	7	1					292	8.1
	SSW		51	188	136	44	1						420	11.7
	SW		73	126	101	19							319	8.9
	WSW		38	131	55	12	1						237	6.6
	W		49	138	90	34	4						316	8.8
	WNW		33	122	64	26	6					1	251	7.0
	NW		29	109	50	15							203	5.6
	NNW		34	100	38	18	1						191	5.3
	N	2	37	109	40	2							190	5.3
	VARIABLE	1	25	20	3								49	1.4
19 - FOOT	MISSING		2	23	9							31	65	1.8
	TOTAL	135	790	1543	869	210	20	1				32	3600	
	% TOT. HRS.	3.8	21.9	42.9	24.1	5.8	.6					.9		

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TABLE 4

Joint Frequency Distribution of Wind Direction and Wind Speed
October 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										TOTAL	% TOTAL HOURS	
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46			MISSING
150 - FOOT	CALM	18										2	20	0.5
	NNE		6	18	73	80	18	2					197	5.3
	NE		7	12	46	37	8	4					114	3.1
	ENE		3	6	38	16	2	1	1				67	1.8
	E		7	14	48	8							77	2.1
	ESE			11	62	8							81	2.2
	SE		2	17	77	19						3	118	3.2
	SSE		13	18	82	24	1					1	139	3.7
	S		9	42	153	102	22	4				2	334	9.0
	SSW		5	34	152	208	57	13				2	471	12.7
	SW		3	27	99	175	53	2				3	362	9.7
	WSW		9	20	78	60	23	3				2	195	5.2
	W		4	27	76	93	13	6					219	5.9
	WNW	1	2	17	67	83	20	7	1			1	199	5.3
	NW		1	9	46	80	19	7					162	4.4
	NNW		5	18	77	119	32	3				1	255	6.9
	N		3	21	79	103	39	1					246	6.6
VARIABLE		6	1	1								8	0.2	
MISSING		2	46	212	123	29	2	3	2		37	456	12.3	
TOTAL	19	87	358	1466	1338	336	55	5	2		54	3720		
% TOT. HRS.	.5	2.3	9.6	39.4	36.0	9.0	1.5	.1	.1		1.5			
19 - FOOT	CALM	108	3										111	3.0
	NNE		41	99	58	18	2					3	221	5.9
	NE		26	78	41	10							155	4.2
	ENE		27	55	28	6	3					1	120	3.2
	E		33	61	18	5							117	3.1
	ESE		35	34	4							2	75	2.0
	SE		48	67	20								135	3.6
	SSE		53	66	46	3						1	169	4.5
	S		44	125	106	33	2	3					313	8.4
	SSW		43	209	194	62	3					2	513	13.8
	SW	1	55	160	148	30							394	10.6
	WSW		45	100	63	25	3						236	6.3
	W	1	37	131	57	19	2						247	6.6
	WNW		25	88	46	18	3						180	4.8
	NW		18	61	52	20	3						154	4.1
	NNW		19	83	88	45	5						240	6.5
	N		28	113	89	54						2	286	7.7
VARIABLE		11	5									16	0.4	
MISSING				2	1	1	1				33	38	1.0	
TOTAL	110	591	1535	1060	349	27	4				44	3720		
% TOT. HRS.	3.0	15.9	41.3	28.5	9.4	.7	.1				1.2			

TABLE 5

Joint Frequency Distribution of Wind Direction and Wind Speed
November 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
150 - FOOT	CALM	17										17	0.5
	NNE		5	9	16	12	5					47	1.3
	NE		2	3	21	4	4	1				35	1.0
	ENE		1	8	16	6	4	3				38	1.1
	E		2	17	25	10	2					56	1.6
	ESE		4	6	19	5	1					35	1.0
	SE		3	9	23	15	2	1	1			54	1.5
	SSE		3	25	53	33	15	3	4			136	3.8
	S	1	5	31	120	142	71	20	6	3		399	11.1
	SSW		1	18	81	168	107	22	2	4		403	11.2
	SW		4	11	74	153	90	10		3		345	9.6
	WSW		8	16	80	119	51	15	11	1		301	8.4
	W		6	24	132	216	68	29	5			480	13.3
	WNW		6	17	105	150	73	15				366	10.2
	NW		2	23	62	124	57	15				283	7.9
	NNW		8	18	65	111	62	23	15	1		303	8.4
	N	2	6	21	92	101	58	13				293	8.1
	VARIABLE	1	4	3	1							9	0.3
	MISSING												0.0
	TOTAL	21	70	259	985	1369	670	170	44	12		3600	
	% TOT. HRS.	.6	1.9	7.2	27.4	38.0	18.6	4.7	1.2	.3			
19 - FOOT	CALM	60	5									65	1.8
	NNE		8	19	14	1						42	1.2
	NE	1	14	19	11	3						48	1.3
	ENE		4	17	4	6	2					33	0.9
	E	1	13	29	8	4						55	1.5
	ESE		13	14	6	1						34	0.9
	SE		20	25	17	1	1					64	1.8
	SSE		29	46	42	13	3	2				135	3.8
	S		27	89	127	86	19	2				350	9.7
	SSW	1	18	100	157	79	7	6	1			369	10.3
	SW		33	113	149	62	4	4				365	10.1
	WSW		30	102	102	56	14	3				307	8.5
	W		33	184	159	81	21	3				481	13.4
	WNW		17	111	114	63	10					315	8.8
	NW		13	71	102	55	7					248	6.9
	NNW		17	56	92	103	24	13				305	8.5
	N	1	22	84	114	73	7	3				304	8.4
	VARIABLE		6	2								8	0.2
	MISSING			1		1						70	2.0
	TOTAL	64	322	1082	1218	688	119	36	1			70	3600
	% TOT. HRS.	1.8	8.9	30.1	33.8	19.1	3.3	1.0				1.9	

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TABLE 6
Joint Frequency Distribution of Wind Direction and Wind Speed
December 1949 - 1953

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	33											33	0.9
	NNE		9	20	22	19	3						73	2.0
	NE		3	9	11	13	9						45	1.2
	ENE		6	8	19	27	7						67	1.8
	E	1	7	20	71	62	4						165	4.4
	ESE		6	16	62	60	5						149	4.0
	SE		2	12	55	43	5						117	3.1
	SSE		6	19	49	41	28	1					144	3.9
	S		9	15	86	136	70	27	3	2			348	9.4
	SSW		5	9	64	163	136	16	7				400	10.8
	SW		2	15	74	108	103	27	2				331	8.9
	WSW		6	24	104	152	72	29	1				388	10.4
	W		11	33	137	222	93	23	3				522	14.0
	WNW		4	41	82	137	48	8					320	8.6
	NW		6	16	86	111	24	6					249	6.7
	NNW		7	31	54	92	23	11	2				220	5.9
	N		3	17	55	52	18	3					148	4.0
	VARIABLE				1								1	0.0
	MISSING													0.0
	TOTAL	34	92	305	1032	1438	648	151	18	2			3720	
	% TOT. HRS.	.9	2.5	8.2	27.7	38.7	17.4	4.1	.5	.1				
19 - FOOT	CALM	71	6										77	2.1
	NNE		15	24	26	5							70	1.9
	NE		10	18	13	9	1						51	1.4
	ENE		9	29	31	8							77	2.1
	E	1	26	68	63	10							168	4.5
	ESE		20	57	51	5							133	3.6
	SE	1	15	51	60	9							136	3.7
	SSE		20	41	55	21							137	3.7
	S		13	64	131	103	15	1	1				328	8.8
	SSW		15	85	166	81	11	1					359	9.7
	SW		30	97	112	103	19	1					362	9.7
	WSW		34	98	170	63	28	1					394	10.6
	W		39	184	206	91	11	1					532	14.3
	WNW		22	85	115	46	4	1					273	7.3
	NW	1	25	88	105	35							254	6.8
	NNW		16	64	84	34	10						208	5.6
	N		19	53	51	23	4						150	4.0
	VARIABLE													0.0
	MISSING				9							2	11	0.3
	TOTAL	74	334	1106	1448	646	103	6	1			2	3720	
	% TOT. HRS.	2.0	9.0	29.7	38.9	17.4	2.8	.2				.1		

TABLE 7

Joint Frequency Distribution of Wind Direction and Wind Speed
January 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	21											21	0.6
	NNE		7	22	48	43	8						128	3.4
	NE		5	16	28	13	4						66	1.8
	ENE		5	10	37	38	17	2					109	2.9
	E		10	19	68	65	3	1					166	4.5
	ESE	1	9	19	38	45	6					3	121	3.3
	SE		6	12	55	27	4	1					105	2.8
	SSE		1	15	77	50	9	3				1	156	4.2
	S		5	37	135	146	71	18	7			1	420	11.3
	SSW		8	21	61	122	89	20	1			3	325	8.7
	SW		3	23	66	97	51	10	2			6	258	6.9
	WSW		5	23	58	67	26	15	2	1		8	205	5.5
	W		7	37	112	154	76	31	24	4		2	447	12.0
	WNW		4	31	84	105	48	6	3				281	7.6
NW		7	19	54	114	54	7	2				257	6.9	
NNW		6	30	94	129	52	11	2				324	8.7	
N		6	58	97	81	42	5					289	7.8	
VARIABLE	2	7										9	0.2	
MISSING	1	1	3	6	1						21	33	0.9	
TOTAL	25	102	395	1118	1297	560	130	43	5		45	3720		
% TOT. HRS.	.7	2.7	10.6	30.1	34.9	15.1	3.5	1.2	.1		1.2			
19 - FOOT	CALM	73	1										74	2.0
	NNE		20	49	54	11							134	3.6
	NE		24	32	18	4							78	2.1
	ENE	1	24	34	44	25							128	3.4
	E		26	64	46	2							138	3.7
	ESE		26	41	44	7							118	3.2
	SE		23	58	39	7							127	3.4
	SSE		25	64	66	20	2						177	4.8
	S	1	21	75	137	76	13	3					326	8.8
	SSW		20	78	121	102	11						332	8.9
	SW	1	25	83	88	53	1						251	6.7
	WSW		17	60	65	23	13	1					179	4.8
	W		39	126	156	99	42	16					478	12.8
	WNW		20	68	83	49	7	2					229	6.2
	NW		17	38	119	65	2						241	6.5
	NNW		19	68	140	100	16	1					344	9.2
	N	1	34	72	123	57	3					1	291	7.8
	VARIABLE		15	1									16	0.4
MISSING			4	10	4						41	59	1.6	
TOTAL	77	396	1015	1353	704	110	23				42	3720		
% TOT. HRS.	2.1	10.6	27.3	36.4	18.9	3.0	.6				1.1			

TABLE 8

Joint Frequency Distribution of Wind Direction and Wind Speed
February 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	12										1	13	0.4
	NNE		8	11	45	42	27	7					140	4.1
	NE		4	19	22	33	18	6				1	103	3.0
	ENE		2	16	48	68	36	17	2			7	196	5.8
	E	1	11	25	78	46	19	3				3	186	5.5
	ESE		3	7	36	44	6	1				1	98	2.9
	SE		4	15	35	49	9	4					116	3.4
	SSE		6	10	45	42	21	6					130	3.8
	S		2	7	81	109	46	3	1			1	250	7.4
	SSW		4	6	45	59	89	17	1			4	225	6.6
	SW		4	9	43	74	59	18					207	6.1
	WSW		4	11	53	74	46	19	4	4			215	6.4
	W		7	24	92	149	62	46	17	3		4	404	11.9
	WNW		8	20	59	90	52	32	2			6	269	7.9
	NW		5	10	55	52	14	3				11	150	4.4
	NNW		6	20	71	83	21	3	2			17	223	6.6
	N		9	33	93	155	36	6	1			7	340	10.0
	VARIABLE		8	3									11	0.3
	MISSING		1	2	23	30	9					43	108	3.2
	TOTAL	13	96	248	924	1199	570	191	30	7		106	3384	
	% TOT. HRS.	.4	2.8	7.4	27.3	35.4	16.8	5.6	.9	.2		3.1		
19 - FOOT	CALM	39	3										42	1.2
	NNE	1	19	25	31	13	2						91	2.7
	NE		14	45	76	29	3						167	4.9
	ENE		15	40	69	42	11					7	184	5.4
	E	1	19	71	59	39	8						197	5.8
	ESE		15	57	47	9	1						129	3.8
	SE		17	33	35	18							103	3.0
	SSE		16	34	52	18	3						123	3.6
	S		11	47	108	74							240	7.1
	SSW		13	35	65	107	4	2					226	6.7
	SW		16	55	85	44	7	1					208	6.1
	WSW		17	65	72	52	13	7					226	6.7
	W		29	124	138	91	34	9					425	12.6
	WNW		12	78	84	60	22	2					258	7.6
	NW		12	51	63	27	6						159	4.7
	NNW	1	24	61	81	54	3	1					225	6.6
	N		33	78	121	77	10	1					320	9.5
	VARIABLE	1	15	3									19	0.6
	MISSING			6	18							18	42	1.2
	TOTAL	43	300	908	1204	754	127	23				25	3384	
	% TOT. HRS.	1.3	8.9	26.8	35.6	22.3	3.8	.7				.7		

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TABLE 9

Joint Frequency Distribution of Wind Direction and Wind Speed
March 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
150 - FOOT	CALM	16	2									18	0.5
	NNE	1	6	22	54	56	36	12				187	5.0
	NE		3	10	34	50	23	6				126	3.4
	ENE		3	15	70	81	49	6	2			226	6.1
	E		3	17	113	104	61	20	2			320	8.6
	ESE		2	11	56	66	20	2				157	4.2
	SE	1	5	18	51	25	18	3				121	3.3
	SSE		6	27	66	41	22	1	1			164	4.4
	S	2	5	29	98	74	50	24	5	1		288	7.7
	SSW		4	17	37	54	32	9	2			155	4.2
	SW		2	8	28	30	27	26	1	1		123	3.3
	WSW	2	2	15	48	46	86	44	4	2		249	6.7
	W		5	26	83	137	104	63	16	5	1	440	11.8
	WNW		5	28	74	110	59	31	7			314	8.4
	NW		4	14	45	91	45	15		1		215	5.8
	NNW		4	14	74	118	35	7				252	6.8
	N	1	6	33	107	129	29	15	1			322	8.7
	VARIABLE	2	1	7								10	0.3
	MISSING		2	4	3	1	1					22	0.9
	TOTAL	25	70	315	1041	1213	697	284	41	10	1	23	3720
	% TOT. HRS.	.7	1.9	8.5	28.0	32.6	18.7	7.6	1.1	.3		.6	
19 - FOOT	CALM	57	2									59	1.6
	NNE		19	56	74	36	11					196	5.3
	NE		13	32	74	32	6	1				158	4.2
	ENE	1	13	63	103	54	12	4				250	6.7
	E		16	56	99	84	9					264	7.1
	ESE	2	28	52	69	28						179	4.8
	SE	1	21	54	40	20						136	3.7
	SSE		24	47	55	19	3					148	4.0
	S		16	53	111	53	23	2				258	6.9
	SSW	1	12	30	72	37	11	1				164	4.4
	SW		19	19	30	39	16	1				124	3.3
	WSW		31	38	56	93	27	2				247	6.6
	W		19	96	147	135	61	10				468	12.6
	WNW		14	76	77	59	27	6				259	7.0
	NW		13	62	78	63	22	1				239	6.4
	NNW		19	51	112	63	9	1				255	6.9
	N		28	73	128	44	13	3				289	7.8
	VARIABLE	1	8	13	1							23	0.6
	MISSING											4	0.1
	TOTAL	63	315	871	1326	859	250	32				4	3720
	% TOT. HRS.	1.7	8.5	23.4	35.6	23.1	6.7	.9				.1	

TABLE 10

Joint Frequency Distribution of Wind Direction and Wind Speed
April 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
150 - FOOT	CALM	12	1									13	0.4
	NNE		3	20	66	64	17	11	1			182	5.1
	NE		2	8	47	44	27	2	1			131	3.6
	ENE		2	27	88	93	35	3				248	6.9
	E		6	50	156	88	25	8				333	9.3
	ESE		7	24	49	56	10					146	4.1
	SE		2	12	35	37	10	1				97	2.7
	SSE		2	24	44	54	28	6	1			159	4.4
	S		4	25	54	67	37	16				203	5.6
	SSW		1	13	39	46	49	13	2			163	4.5
	SW		7	16	52	100	42	17	1			235	6.5
	WSW		3	17	52	86	42	25	6			231	6.4
	W		7	27	95	125	90	42	24	3		413	11.5
	WNW		3	21	75	140	54	37	7			337	9.4
	NW		5	11	67	67	34	8			1	193	5.4
	NNW		5	18	58	75	47	10				213	5.9
	N	1	5	31	84	80	40	12				253	7.0
	VARIABLE	1	13	6	2	1						23	0.6
	MISSING		1	8	2	10	1					5	0.8
	TOTAL	14	79	358	1065	1233	588	211	43	3		6	3600
	% TOT. HRS.	.4	2.2	9.9	29.6	34.3	16.3	5.9	1.2	.1		.2	
19 - FOOT	CALM	38	8									46	1.3
	NNE		11	66	70	53	15					215	6.0
	NE		13	43	56	41	7					160	4.4
	ENE		25	86	103	40	7					261	7.3
	E		28	117	89	52	5					291	8.1
	ESE		28	51	59	9						147	4.1
	SE		23	26	41	19	2					111	3.1
	SSE		12	33	57	40	3					145	4.0
	S		12	33	42	44	9				2	142	3.9
	SSW		15	42	54	76	16	2				206	5.7
	SW		12	59	81	39	4				1	195	5.4
	WSW		10	57	61	48	19	4				199	5.5
	W		19	108	129	81	56	12				405	11.3
	WNW		7	79	143	85	37	3				354	9.8
	NW		14	52	58	45	8					177	4.9
	NNW		10	40	63	66	16	1				196	5.4
	N		26	77	65	43	9					220	6.1
	VARIABLE	1	23	21	2							47	1.3
	MISSING		1	14	23	4						41	2.3
	TOTAL	39	297	1004	1196	785	213	22				44	3600
	% TOT. HRS.	1.1	8.3	27.9	33.2	21.8	5.9	.6				1.2	

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TABLE 11

Joint Frequency Distribution of Wind Direction and Wind Speed
May 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	16											16	0.4
	NNE	1	8	21	145	132	61	12					380	10.2
	NE		6	30	109	127	13	10					295	7.9
	ENE		4	25	119	89	14	4	2				257	6.9
	E		4	33	170	66	1						274	7.4
	ESE		4	25	59	44	5						137	3.7
	SE			22	32	24	3	1					82	2.2
	SSE		4	24	70	25	14	4					141	3.8
	S		2	26	66	80	31	15	4	2			226	6.1
	SSW		3	30	75	81	33	6					228	6.1
	SW		8	18	45	88	31	14	1	2		1	208	5.6
	WSW		3	11	77	105	18	10	9	2			235	6.3
	W		5	29	133	138	51	52	10				418	11.2
	WNW		5	20	81	86	24	13				1	230	6.2
	NW		4	16	36	49	9	1					115	3.1
	NNW		7	18	56	66	8						155	4.2
	N		4	22	84	77	8	2					197	5.3
	VARIABLE	2	23	28	9		2						64	1.7
	MISSING				1	1						60	62	1.7
	TOTAL	19	94	398	1367	1278	326	144	26	6		62	3720	
	% TOT. HRS.	.5	2.5	10.7	36.7	34.4	8.8	3.9	.7	.2		1.6		
19 - FOOT	CALM	70	3										73	2.0
	NNE	2	54	160	185	55	6						462	12.4
	NE	2	23	90	123	36	3						277	7.4
	ENE		27	113	95	17	5						257	6.9
	E		47	134	72	10							263	7.1
	ESE		34	53	26	12							125	3.4
	SE		20	55	26	12							113	3.0
	SSE		19	37	28	12	1						97	2.6
	S		14	52	77	41	10	5					199	5.3
	SSW		18	80	47	48	5						198	5.3
	SW		28	89	64	28	9	2					220	5.9
	WSW		24	97	83	25	11	7	1				248	6.7
	W	1	20	160	119	72	45	2				1	420	11.3
	WNW	1	10	73	67	27	7					1	186	5.0
	NW		12	50	47	17							126	3.4
	NNW		16	45	63	21						1	146	3.9
	N	1	32	113	71	11							228	6.1
	VARIABLE		36	30	2								68	1.8
	MISSING			2	4	2						6	14	0.4
	TOTAL	77	437	1433	1199	446	102	16	1			9	3720	
	% TOT. HRS.	2.1	11.7	38.5	32.2	12.0	2.7	.4				.2		

TABLE 12

Joint Frequency Distribution of Wind Direction and Wind Speed
June 1950 - 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	25	2										27	0.8
	NNE		11	33	101	41	9	5				2	202	5.6
	NE		4	29	67	39	3	1				1	144	4.0
	ENE		5	26	118	47	9	4				1	210	5.8
	E		11	64	163	37	3					1	279	7.8
	ESE		7	31	88	25							151	4.2
	SE		12	31	76	19	2						140	3.9
	SSE		9	49	83	33	4						178	4.9
	S		10	41	109	122	27	2					311	8.6
	SSW		8	45	149	134	29	7					372	10.3
	SW		4	24	79	133	60	4					304	8.4
	WSW		3	19	81	108	35	5					251	7.0
	W		13	31	76	89	25	11	3				248	6.9
	WNW		9	27	62	53	11	4					166	4.6
	NW		6	17	50	40	8	2					123	3.4
	NNW		10	24	52	44	11	1					142	3.9
	N	1	8	22	62	33	5	6	3				140	3.9
VARIABLE	1	25	8	3	2	1						40	1.1	
MISSING	1	6	17	65	53	17	1				12	172	4.8	
TOTAL	28	163	538	1484	1052	259	53	6			17	3600		
% TOT. HRS.	.8	4.5	14.9	41.2	29.2	7.2	1.5	.2			.5			
19 - FOOT	CALM	94	1										95	2.6
	NNE		29	90	83	10	1					2	215	6.0
	NE		29	49	47	6	1					1	133	3.7
	ENE		31	85	59	11						1	187	5.2
	E		56	130	56	2						2	246	6.8
	ESE		46	50	26								122	3.4
	SE		32	65	26	2							125	3.5
	SSE		37	89	39	5							170	4.7
	S		20	78	97	27	1						223	6.2
	SSW		32	126	160	42							360	10.0
	SW		31	78	131	25							265	7.4
	WSW		24	76	61	32	1						194	5.4
	W		31	82	60	35	4	1					213	5.9
	WNW		11	67	49	19							146	4.1
	NW		17	43	33	6	1						100	2.8
	NNW		25	55	38	15							133	3.7
	N		22	58	37	11	4						132	3.7
VARIABLE		41	19									60	1.7	
MISSING	17	74	170	128	49	5					38	481	13.4	
TOTAL	111	589	1410	1130	297	18	1				44	3600		
% TOT. HRS.	3.1	16.4	39.2	31.4	8.3	.5					1.2			

TABLE 13

Joint Frequency Distribution of Wind Direction and Wind Speed
July 1949 - June 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)											TOTAL	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
150 - FOOT	CALM	258	8									3	269	0.6
	NNE	2	82	272	892	696	212	50	1			2	2209	5.0
	NE		51	207	644	510	118	30	1			2	1563	3.6
	ENE	2	51	229	789	528	178	40	7			8	1832	4.2
	E	2	90	440	1290	516	120	33	2			4	2497	5.7
	ESE	1	65	247	681	365	54	3				4	1420	3.2
	SE	1	58	256	645	286	57	11	1			3	1318	3.0
	SSE		81	346	831	400	151	25	7			2	1843	4.2
	S	4	76	423	1452	1213	460	139	27	8		4	3806	8.7
	SSW		64	330	1193	1390	705	134	16	4		9	3845	8.8
	SW	1	61	265	960	1294	574	131	7	6		10	3309	7.6
	WSW	2	60	260	918	991	423	169	37	10		10	2880	6.6
	W		86	369	1245	1528	629	319	107	15	1	6	4305	9.8
	WNW	1	68	304	893	1142	422	154	20			9	3013	6.9
	NW	1	52	209	701	884	281	64	2	1		12	2207	5.0
	NNW		82	281	806	966	304	70	22	1		18	2550	5.8
	N	5	71	339	998	945	280	63	5			8	2714	6.2
	VARIABLE	13	134	93	20	6	5						271	0.6
	MISSING	8	61	241	774	379	65	5	3	2		435	1973	4.5
	TOTAL	301	1301	5111	15732	14039	5038	1440	265	47	1	549	43824	
	% TOT. HRS.	.7	3.0	11.7	35.9	32.0	11.5	3.3	.6	.1		1.3		
19 - FOOT	CALM	1115	73									1	1189	2.7
	NNE	8	454		788	231	38					21	2512	5.7
	NE	9	329	648	548	158	20	1				13	1726	3.9
	ENE	9	344	719	632	215	40	4				11	1974	4.5
	E	5	503	1047	568	210	22					7	2362	5.4
	ESE	5	431	521	345	72	1					6	1381	3.2
	SE	3	392	586	338	91	3					3	1416	3.2
	SSE	1	420	653	521	162	15	2				3	1777	4.1
	S	2	322	967	1134	564	99	17	1			6	3112	7.1
	SSW	2	358	1329	1382	723	69	12	1			9	3885	8.9
	SW	5	458	1208	1237	471	60	9				4	3452	7.9
	WSW	2	389	1055	902	444	131	25	1			2	2951	6.7
	W	2	422	1564	1380	774	282	54				7	4485	10.2
	WNW	2	219	971	911	467	123	14				3	2710	6.2
	NW	1	206	749	789	357	49	1					2152	4.9
	NNW	2	261	783	858	525	85	17				5	2536	5.8
	N	9	402	1036	924	397	50	7				12	2837	6.5
	VARIABLE	7	264	147	12							3	433	1.0
	MISSING	18	79	228	204	61	6	1				337	934	2.1
	TOTAL	1207	6326	15183	13473	5922	1093	164	3			453	43824	
	% TOT. HRS.	2.8	14.4	34.6	30.7	13.5	2.5	.4				1.0		

TABLE 14

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, July 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	10											10	0.3
	NNE		6	26	49	16	5						102	2.7
	NE		5	13	47	18	3						86	2.3
	ENE	2	6	22	39	13							82	2.2
	E		12	50	75	4		1					142	3.8
	ESE		6	28	22	1							57	1.5
	SE		9	30	15	3	1						58	1.6
	SSE		8	30	32	10							80	2.2
	S		9	27	82	37	8						163	4.4
	SSW		9	20	61	69	25						184	4.9
	SW	1	8	25	67	75	11	1					188	5.1
	WSW		5	25	62	31	5	3					131	3.5
	W		7	25	62	33	15	3					145	3.9
	WNW		7	21	32	20	4	1					85	2.3
	NW		3	18	37	19	3						80	2.2
	NNW		4	16	33	10	2						65	1.7
	N		8	17	39	10							74	2.0
	VARIABLE	4	19	18									41	1.1
	MISSING		3	4	14	4	3					59	87	2.3
	SUM	17	134	415	768	373	85	9				59	1860	
	% TOT. HRS.	.5	3.6	11.2	20.6	10.0	2.3	.2				1.6		
NON-WORKING HOURS (1900 - 0600)	CALM	31	3										34	0.9
	NNE			9	50	33							92	2.5
	NE			9	54	34							97	2.6
	ENE		3	18	72	8							101	2.7
	E		2	30	128	6	1						167	4.5
	ESE		2	21	75		1						99	2.7
	SE		4	17	46	3							70	1.9
	SSE		6	18	56	5							85	2.3
	S	1	4	37	107	41	2						192	5.2
	SSW			14	104	71	10						199	5.3
	SW		2	19	85	68	6	1					181	4.9
	WSW		3	14	54	24	2						97	2.6
	W		2	7	51	20							80	2.2
	WNW			7	44	30	1						82	2.2
	NW	1		3	30	18	1						53	1.4
	NNW		2	11	32	20							65	1.7
	N		2	12	39	23							76	2.0
	VARIABLE		3	2	1	2	1						9	0.2
	MISSING				24	8	1					48	81	2.2
	SUM	33	38	248	1052	414	26	1				48	1860	
	% TOT. HRS.	.9	1.0	6.7	28.3	11.1	.7					1.3		

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TABLE 15

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, August 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	14											14	0.4
	NNE		3	25	71	43	3	1					146	3.9
	NE		6	16	33	28	1						84	2.3
	ENE		3	21	35	6	1						66	1.8
	E		4	39	36	6							85	2.3
	ESE		6	22	11								39	1.0
	SE		5	24	17		1						47	1.3
	SSE		9	33	34	4							80	2.2
	S		5	42	59	20	3						129	3.5
	SSW		9	37	73	41	6		1				167	4.5
	SW		4	30	74	38	7						153	4.1
	WSW		6	34	41	18	5						104	2.8
	W		5	28	51	30	8	2					124	3.3
	WNW		6	13	15	14	7						55	1.5
	NW		3	13	26	12	2						56	1.5
	NNW		8	19	23	2	1						53	1.4
	N		5	10	37	7							59	1.6
	VARIABLE		17	4			1						22	0.6
	MISSING	2	23	84	147	55	1	1				64	377	10.1
	SUM	16	127	494	783	324	47	4	1			64	1860	
	% TOT. HRS.	.4	3.4	13.3	21.0	8.7	1.3	.1				1.7		
NON-WORKING HOURS (1900 - 0600)	CALM	17											17	0.5
	NNE		3	17	77	44	7						148	4.0
	NE			16	58	14	1						89	2.4
	ENE		3	11	35	7							56	1.5
	E		2	27	80	5	1						115	3.1
	ESE		5	12	45	2							64	1.7
	SE			16	61	6							83	2.2
	SSE		5	21	42	9	2						79	2.1
	S		2	24	103	4							133	3.6
	SSW		3	22	80	39	1						145	3.9
	SW		1	9	54	41	5						110	3.0
	WSW		1	9	36	22							68	1.8
	W		3	18	27	17	3						68	1.8
	WNW			9	27	21	1						58	1.6
	NW		1	20	20	17							58	1.6
	NNW		3	13	43	19							78	2.1
	N		2	13	56	31	1						103	2.8
	VARIABLE		1			1							2	0.1
	MISSING	4	12	55	215	52						48	386	10.4
	SUM	21	47	312	1059	351	22					48	1860	
	% TOT. HRS.	.6	1.3	8.4	28.5	9.4	.6					1.3		

TABLE 16

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, September 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	10											10	0.3
	NNE		1	15	42	33	12						103	2.9
	NE		2	10	30	35	3						80	2.2
	ENE		4	11	28	15	4						62	1.7
	E		7	18	37	3							65	1.8
	ESE		3	6	10	1							20	0.6
	SE		2	10	22	7	2						43	1.2
	SSE		3	18	40	17	5						83	2.3
	S		4	26	70	63	15	9	1				188	5.2
	SSW		4	35	66	59	24	10					198	5.5
	SW		8	24	62	43	17	1					155	4.3
	WSW		2	15	52	35	9	1					114	3.2
	W		4	23	70	53	16	7	5				178	4.9
	WNW		7	23	50	40	17					1	138	3.8
	NW		4	15	47	36	6						108	3.0
	NNW		6	25	34	18	6	1					90	2.5
	N		4	16	33	21	1						75	2.1
	VARIABLE		7	12	2								21	0.6
	MISSING		5	8	27	18	3	1				7	69	1.9
	SUM	10	77	310	722	497	140	30	6			8	1800	
	% TOT. HRS.	.3	2.1	8.6	20.1	13.8	3.9	.8	.2			.2		
NON-WORKING HOURS (1900 - 0600)	CALM	6											6	0.2
	NNE		6	4	33	38	1						82	2.3
	NE		2	7	37	21	1						68	1.9
	ENE		1	5	27	14							47	1.3
	E		2	17	42	6							67	1.9
	ESE		1	8	49	8							66	1.8
	SE		2	11	45	9							67	1.9
	SSE			15	58	12	2	1	1				89	2.5
	S		1	14	129	70	7	1					222	6.2
	SSW			9	106	76	18	1					210	5.8
	SW		1	7	58	71	12						149	4.1
	WSW			7	42	44	3						96	2.7
	W			10	48	52	5	4					119	3.3
	WNW		2	9	36	63	3						113	3.1
	NW		1	5	40	54	5						105	2.9
	NNW		1	6	40	60	4		1				112	3.1
	N			13	41	42	3						99	2.8
	VARIABLE			1									1	0.0
	MISSING		5	10	35	23						9	82	2.3
	SUM	6	25	158	866	663	64	7	2			9	1800	
	% TOT. HRS.	.2	.7	4.4	24.1	18.4	1.8	.2	.1			.3		

TABLE 17

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, October 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	11										2	13	0.3
	NNE		6	9	36	32	16	1					100	2.7
	NE		5	9	27	21	3	3					68	1.8
	ENE		3	4	26	7	2	1					43	1.2
	E		3	10	20	2							35	0.9
	ESE			7	16	1							24	0.6
	SE		2	11	24	8						1	46	1.2
	SSE		10	9	27	8	1						55	1.5
	S		5	18	63	61	11	1				1	160	4.3
	SSW		4	22	80	95	41	4				2	248	6.7
	SW		3	21	62	70	31	1				1	189	5.1
	WSW		7	16	42	30	18	3				1	117	3.1
	W		4	22	36	51	11	1					125	3.4
	WNW	1	2	15	31	24	14	4				1	92	2.5
	NW		1	5	23	25	7	6					67	1.8
	NNW		4	13	38	51	16	1				1	124	3.3
	N		3	14	45	34	15	1					112	3.0
	VARIABLE		6	1	1								8	0.2
	MISSING		2	31	99	47	23	2	3	2		25	234	6.3
	SUM	12	70	237	696	567	209	29	3	2		35	1860	
	% TOT. HRS.	.3	1.9	6.4	18.7	15.2	5.6	.8	.1	.1		.9		
NON-WORKING HOURS (1900 - 0600)	CALM	7											7	0.2
	NNE			9	37	48	2	1					97	2.6
	NE		2	3	19	16	5	1					46	1.2
	ENE			2	12	9			1				24	0.6
	E		4	4	28	6							42	1.1
	ESE			4	46	7							57	1.5
	SE			6	53	11						2	72	1.9
	SSE		3	9	55	16						1	84	2.3
	S		4	24	90	41	11	3				1	174	4.7
	SSW		1	12	72	113	16	9					223	6.0
	SW			6	37	105	22	1				2	173	4.7
	WSW		2	4	36	30	5					1	78	2.1
	W			5	40	42	2	5					94	2.5
	WNW			2	36	59	6	3	1				107	2.9
	NW			4	23	55	12	1					95	2.6
	NNW		1	5	39	68	16	2					131	3.5
	N			7	34	69	24						134	3.6
	VARIABLE													0.0
	MISSING			15	113	76	6					12	222	6.0
	SUM	7	17	121	770	771	127	26	2			19	1860	
	% TOT. HRS.	.2	.5	3.3	20.7	20.7	3.4	.7	.1			.5		

TABLE 18

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, November 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	8											8	0.2
	NNE		4	7	10	8							29	0.8
	NE		1	2	12	3	1	1					20	0.6
	ENE			4	8	4	4	3					23	0.6
	E		2	5	5	4	2						18	0.5
	ESE		2	5	5	4	1						17	0.5
	SE		2	6	5	9	2	1	1				26	0.7
	SSE		3	13	25	13	7	2	2				65	1.8
	S		5	17	72	81	42	16	6				239	6.6
	SSW		1	12	38	74	47	14		3			189	5.3
	SW		4	4	38	67	33	7		3			156	4.3
	WSW		6	13	49	56	27	8	8	1			168	4.7
	W		4	16	60	95	40	21	4				240	6.7
	WNW		3	10	53	55	27	7					155	4.3
	NW		1	15	39	50	34	9					148	4.1
	NNW		7	13	31	44	37	16	4				152	4.2
	N		3	10	41	46	27	11					138	3.8
	VARIABLE	1	4	3	1								9	0.3
	MISSING													0.0
	SUM	9	52	155	492	613	331	116	25	7			1800	
	% TOT. HRS.	.3	1.4	4.3	13.7	17.0	9.2	3.2	.7	.2				
NON-WORKING HOURS (1900 - 0600)	CALM	9											9	0.3
	NNE		1	2	6	4	5						18	0.5
	NE		1	1	9	1	3						15	0.4
	ENE		1	4	8	2							15	0.4
	E			12	20	6							38	1.1
	ESE		2	1	14	1							18	0.5
	SE		1	3	18	6							28	0.8
	SSE			12	28	20	8	1	2				71	2.0
	S	1		14	48	61	29	4		3			160	4.4
	SSW			6	43	94	60	8	2	1			214	5.9
	SW			7	36	86	57	3					189	5.3
	WSW		2	3	31	63	24	7	3				133	3.7
	W		2	8	72	121	28	8	1				240	6.7
	WNW		3	7	52	95	46	8					211	5.9
	NW		1	8	23	74	23	6					135	3.8
	NNW		1	5	34	67	25	7	11	1			151	4.2
	N		3	11	51	55	31	2					155	4.3
	VARIABLE	2												0.0
	MISSING													0.0
	SUM	12	18	104	493	756	339	54	19	5			1800	
	% TOT. HRS.	.3	.5	2.9	13.7	21.0	9.4	1.5	.5	.1				

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TABLE 19

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, December 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	16											16	0.4
	NNE		4	9	12	6	3						34	0.9
	NE		1	5	4	10	4						24	0.6
	ENE		4	5	9	20	4						42	1.1
	E		5	8	38	37	2						90	2.4
	ESE		4	8	28	27							67	1.8
	SE		2	3	34	23	5						67	1.8
	SSE		3	11	29	21	11						75	2.0
	S		4	8	43	61	42	18	2				178	4.8
	SSW		3	5	34	84	77	7	2				212	5.7
	SW		2	10	37	43	50	16	2				160	4.3
	WSW		5	10	60	82	25	16	1				199	5.3
	W		10	24	78	99	57	15	3				286	7.7
	WNW		2	26	33	65	24	2					152	4.1
	NW		5	9	30	38	13	3					98	2.6
	NNW		3	20	30	23	15	6	2				99	2.7
	N		2	10	25	11	10	2					60	1.6
	VARIABLE				1								1	0.0
	MISSING													0.0
	SUM	16	59	171	525	650	342	85	12				1860	
	% TOT. HRS.	.4	1.6	4.6	14.1	17.5	9.2	2.3	.3					
NON-WORKING HOURS (1900 - 0600)	CALM	17											17	0.5
	NNE		5	11	10	13							39	1.0
	NE		2	4	7	3	5						21	0.6
	ENE		2	3	10	7	3						25	0.7
	E	1	2	12	33	25	2						75	2.0
	ESE		2	8	34	33	5						82	2.2
	SE			9	21	20							50	1.3
	SSE		3	8	20	20	17	1					69	1.9
	S		5	7	43	75	28	9	1	2			170	4.6
	SSW		2	4	30	79	59	9	5				188	5.1
	SW			5	37	65	53	11					171	4.6
	WSW		1	14	44	70	47	13					189	5.1
	W		1	9	59	123	36	8					236	6.3
	WNW		2	15	49	72	24	6					168	4.5
	NW		1	7	56	73	11	3					151	4.1
	NNW		4	11	24	69	8	5					121	3.3
	N		1	7	30	41	8	1					88	2.3
	VARIABLE													0.0
	MISSING													0.0
	SUM	18	33	134	507	788	306	66	6	2			1860	
	% TOT. HRS.	.5	.9	3.6	13.6	21.2	8.2	1.8	.2	.1				

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TABLE 20

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, January 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS	
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46			MISSING
WORKING HOURS (0700 - 1800)	CALM	11											11	0.3
	NNE		3	6	18	26	7						60	1.6
	NE		2	7	17	10	2						38	1.0
	ENE		4	4	20	22	3						53	1.4
	E		5	14	33	32							84	2.3
	ESE		6	8	20	32	6					3	75	2.0
	SE		3	4	20	6	1	1					35	0.9
	SSE		1	6	39	31	7	3				1	88	2.4
	S		2	19	65	80	43	16	4			1	230	6.2
	SSW		6	8	23	55	33	12					137	3.7
	SW		1	11	33	45	27	3	1			4	125	3.4
	WSW		4	14	38	36	14	8	1			2	117	3.1
	W		5	22	53	66	36	19	11	2		1	215	5.8
	WNW		2	17	45	43	22		1				130	3.5
NON-WORKING HOURS (1900 - 0600)	NW		6	10	33	60	29	4					142	3.8
	NNW		4	12	56	56	19	7					154	4.1
	N		2	27	41	41	18	1					130	3.5
	VARIABLE	2	7										9	0.2
	MISSING	1	1	3	6	1						15	27	0.7
	SUM	14	64	192	560	642	267	74	18	2		27	1860	
	% TOT. HRS.	.4	1.7	5.2	15.1	17.3	7.2	2.0	.5	.1		.7		
	CALM	10											10	0.3
	NNE		4	16	30	17	1						68	1.8
	NE		3	9	11	3	2						28	0.8
	ENE		1	6	17	16	14	2					56	1.5
	E		5	5	35	33	3	1					82	2.2
	ESE	1	3	11	18	13							46	1.2
	SE		3	8	35	21	3						70	1.9
SSE			9	38	19	2						68	1.8	
S		3	18	70	66	28	2	3				190	5.1	
SSW		2	13	38	67	56	8	1			3	188	5.1	
SW		2	12	33	52	24	7	1			2	133	3.6	
WSW		1	9	20	31	12	7	1	1		6	88	2.4	
W		2	15	59	88	40	12	13	2		1	232	6.2	
WNW		2	14	39	62	26	6	2				151	4.1	
NW		1	9	21	54	25	3	2				115	3.1	
NNW		2	18	38	73	33	4	2				170	4.6	
N		4	31	56	40	24	4					159	4.3	
VARIABLE													0.0	
MISSING											6	6	0.2	
SUM	11	38	203	558	655	293	56	25	3		18	1860		
% TOT. HRS.	.3	1.0	5.5	15.0	17.6	7.9	1.5	.7	.1		.5			

TABLE 21

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, February 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	2										1	3	0.1
	NNE		7	7	14	22	15	1					66	2.0
	NE		4	7	10	24	8					1	54	1.6
	ENE		2	7	23	33	18	6				7	96	2.8
	E	1	3	10	38	24	11	2				3	92	2.7
	ESE		2	5	8	20	4	1				1	41	1.2
	SE			10	10	19	1	2					42	1.2
	SSE		4	9	23	17	11	2					66	2.0
	S			3	50	57	23	3				1	137	4.0
	SSW		2	3	28	33	40	4	1			4	115	3.4
	SW		3	5	22	31	43	15					119	3.5
	WSW		4	8	30	33	24	16					115	3.4
	W		5	17	51	78	31	24	15			4	225	6.6
	WNW		6	9	30	31	35	17	1			5	134	4.0
NW		4	8	27	33	9					1	82	2.4	
NNW		1	16	29	43	11	3	2			7	112	3.3	
N		6	12	36	57	12	5	1			4	133	3.9	
VARIABLE		8	3									11	0.3	
MISSING			1		15	12	2				19	49	1.4	
SUM		3	62	139	444	567	298	101	20			58	1692	
% TOT. HRS.		.1	1.8	4.1	13.1	16.8	8.8	3.0	.6			1.7		
NON-WORKING HOURS (1900 - 0600)	CALM	10											10	0.3
	NNE												74	2.2
	NE		1	4	31	20	12	6					49	1.4
				12	12	9	10	6						
	ENE			9	25	35	18	11	2				100	3.0
	E		8	15	40	22	8	1					94	2.8
	ESE		1	2	28	24	2						57	1.7
	SE		4	5	25	30	8	2					74	2.2
	SSE		2	1	22	25	10	4					64	1.9
	S		2	4	31	52	23		1				113	3.3
	SSW		2	3	17	26	49	13					110	3.3
	SW		1	4	21	43	16	3					88	2.6
	WSW			3	23	41	22	3	4	4			100	3.0
	W		2	7	41	71	31	22	2	3			179	5.3
	WNW		2	11	29	59	17	15	1				135	4.0
	NW		1	2	28	19	5	3				1	68	2.0
	NNW		5	4	42	40	10					10	111	3.3
	N		3	21	57	98	24	1				3	207	6.1
VARIABLE													0.0	
MISSING			2	8	18	7					24	59	1.7	
SUM		10	34	109	480	632	272	90	10	7		48	1692	
% TOT. HRS.		.3	1.0	3.3	14.2	18.7	8.0	2.7	.3	.2		1.4		

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TABLE 22

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, March 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
WORKING HOURS (0700 - 1800)	CALM	8										8	0.2
	NNE		3	7	30	32	18	5				95	2.6
	NE		2	7	26	31	11					77	2.1
	ENE		1	10	34	44	33	3	1			126	3.4
	E			2	41	57	21	14	1			136	3.7
	ESE		1	6	21	44	11					83	2.2
	SE	1	4	9	14	5	9					42	1.1
	SSE		6	18	32	21	9	1				87	2.3
	S	2	3	13	49	38	28	16	4	1		154	4.1
	SSW		3	7	12	34	12	5	1			74	2.0
	SW		1	4	12	17	13	8		1		56	1.5
	WSW	1	1	7	16	24	42	35	3	2		131	3.5
	W		4	11	51	69	55	38	8	4	1	241	6.5
	WNW		1	13	27	56	40	19	7			163	4.4
	NW		2	6	23	37	27	5				100	2.7
	NNW		3	6	35	50	21	5				120	3.2
	N	1	4	12	51	44	11					124	3.3
	VARIABLE	2	1	7								10	0.3
	MISSING		2	4	3	1	1					22	0.9
	SUM	15	42	149	477	604	362	154	25	8	1	23	1860
	% TOT. HRS.	.4	1.1	4.0	12.8	16.2	9.7	4.1	.7	.2		.6	
NON-WORKING HOURS (1900 - 0600)	CALM	8	2									10	0.3
	NNE	1	3	15	24	24	18	7				92	2.5
	NE		1	3	8	19	12	6				49	1.3
	ENE		2	5	36	37	16	3	1			100	2.7
	E		3	15	72	47	40	6	1			184	4.9
	ESE		1	5	35	22	9	2				74	2.0
	SE		1	9	37	20	9	3				79	2.1
	SSE			9	34	20	13		1			77	2.1
	S		2	16	49	36	22	8	1			134	3.6
	SSW		1	10	25	20	20	4	1			81	2.2
	SW		1	4	16	13	14	18	1			67	1.8
	WSW	1	1	8	32	22	44	9	1			118	3.2
	W		1	15	32	68	49	25	8	1		199	5.3
	WNW		4	15	47	54	19	12				151	4.1
	NW		2	8	22	54	18	10		1		115	3.1
	NNW		1	8	39	68	14	2				132	3.5
	N		2	21	56	85	18	15	1			198	5.3
	VARIABLE												0.0
	MISSING												0.0
	SUM	10	28	166	564	609	335	130	16	2		1860	
	% TOT. HRS.	.3	.8	4.5	15.2	16.4	9.0	3.5	.4	.1			

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TABLE 23

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, April 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
WORKING HOURS (0700 - 1800)	CALM	5										5	0.1
	NNE		3	12	33	25	9	4	1			87	2.4
	NE		1	6	30	18	21	1				77	2.1
	ENE		2	9	34	44	21	3				113	3.1
	E		3	20	58	35	12	1				129	3.6
	ESE		3	10	19	31	3					66	1.8
	SE		2	9	19	23	7					60	1.7
	SSE			9	13	33	13	2				70	1.9
	S		3	12	17	33	28	10				103	2.9
	SSW		1	8	7	24	31	13	1			85	2.4
	SW		5	12	22	54	25	16	1			135	3.8
	WSW		3	12	26	36	16	18	1			112	3.1
	W		4	17	45	55	58	32	18			229	6.4
	WNW		2	12	36	54	29	30	2			165	4.6
	NW		1	6	21	37	25	4			1	95	2.6
	NNW		3	13	29	40	36	7				128	3.6
	N		2	19	39	20	18	6				104	2.9
	VARIABLE	1	13	6	2							22	0.6
	MISSING				2	7	1					5	0.4
	SUM	6	51	192	452	569	353	147	24			1800	
	% TOT. HRS.	.2	1.4	5.3	12.6	15.8	9.8	4.1	.7			.2	
NON-WORKING HOURS (1900 - 0600)	CALM	7	1									8	0.2
	NNE			8	33	39	8	7				95	2.6
	NE		1	2	17	26	6	1	1			54	1.5
	ENE			18	54	49	14					135	3.8
	E		3	30	98	53	13	7				204	5.7
	ESE		4	14	30	25	7					80	2.2
	SE			3	16	14	3	1				37	1.0
	SSE		2	15	31	21	15	4	1			89	2.5
	S		1	13	37	34	9	6				100	2.8
	SSW			5	32	22	18		1			78	2.2
	SW		2	4	30	46	17	1				100	2.8
	WSW			5	26	50	26	7	5			119	3.3
	W		3	10	50	70	32	10	6	3		184	5.1
	WNW		1	9	39	86	25	7	5			172	4.8
	NW		4	5	46	30	9	4				98	2.7
	NNW		2	5	29	35	11	3				85	2.4
	N	1	3	12	45	60	22	6				149	4.1
	VARIABLE					1						1	0.0
	MISSING		1	8		3						12	0.3
	SUM	8	28	166	613	664	235	64	19	3		1800	
	% TOT. HRS.	.2	.8	4.6	17.0	18.4	6.5	1.8	.5	.1			

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TABLE 24

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, May 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
WORKING HOURS (0700 - 1800)	CALM	4										4	0.1
	NNE		1	12	56	61	36	3				169	4.5
	NE		1	13	60	72	10	5				161	4.3
	ENE		3	10	43	59	7	4	2			128	3.4
	E		2	18	66	38	1					125	3.4
	ESE		3	10	11	19	4					47	1.3
	SE			12	10	10	1	1				34	0.9
	SSE		3	17	29	15	5	2				71	1.9
	S			15	26	36	23	9	4	2		115	3.1
	SSW		2	18	28	35	29	4				116	3.1
	SW		4	15	20	40	21	10		2		113	3.0
	WSW		1	8	39	43	13	8	5			117	3.1
	W		2	12	69	66	35	39	9			232	6.2
	WNW		3	12	41	42	15	8				122	3.3
	NW		3	8	18	22	6					57	1.5
	NNW		4	17	28	30	5					84	2.3
	N		1	11	34	28	6					80	2.2
	VARIABLE	1	22	26	9		2					60	1.6
	MISSING					1						24	0.7
	SUM	5	55	234	587	617	219	93	20	4		26	1860
	% TOT. HRS.	.1	1.5	6.3	15.8	16.6	5.9	2.5	.5	.1		.7	
NON-WORKING HOURS (1900 - 0600)	CALM	12										12	0.3
	NNE	1	7	9	89	71	25	9				211	5.7
	NE		5	17	49	55	3	5				134	3.6
	ENE		1	15	76	30	7					129	3.5
	E		2	15	104	28						149	4.0
	ESE		1	15	48	25	1					90	2.4
	SE			10	22	14	2					48	1.3
	SSE		1	7	41	10	9	2				70	1.9
	S		2	11	40	44	8	6				111	3.0
	SSW		1	12	47	46	4	2				112	3.0
	SW		4	3	25	48	10	4	1			95	2.6
	WSW		2	3	38	62	5	2	4	2		118	3.2
	W		3	17	64	72	16	13	1			186	5.0
	WNW		2	8	40	44	9	5				108	2.9
	NW		1	8	18	27	3	1				58	1.6
	NNW		3	1	28	36	3					71	1.9
	N		3	11	50	49	2	2				117	3.1
	VARIABLE	1	1	2								4	0.1
	MISSING				1							36	1.0
	SUM	14	39	164	780	661	107	51	6	2		36	1860
	% TOT. HRS.	.4	1.0	4.4	21.0	17.8	2.9	1.4	.2	.1		1.0	

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TABLE 25

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
150-Foot Level, June 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS	
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46			MISSING
WORKING HOURS (0700 - 1800)	CALM	6										6	0.2	
	NNE		9	24	49	18	2	2				2	106	2.9
	NE		1	11	29	17	1					1	60	1.7
	ENE		4	17	54	20	4	1				1	101	2.8
	E		8	35	60	13	1					1	118	3.3
	ESE		5	21	34	14							74	2.1
	SE		10	15	32	9	1						67	1.9
	SSE		8	36	28	18	3						93	2.6
	S		5	23	35	49	19	2					133	3.7
	SSW		5	32	61	61	22	7					188	5.2
	SW		1	15	44	61	34	3					158	4.4
	WSW		3	10	34	61	34	5					147	4.1
	W		10	19	33	43	21	11	3				140	3.9
	WNW		6	16	31	25	9	4					91	2.5
	NW		2	9	19	23	7	2					62	1.7
NON-WORKING HOURS (1900 - 0600)	NNW		9	16	24	24	7	1					81	2.3
	N		3	12	25	15	3	2					60	1.7
	VARIABLE	1	24	8	2	1	1						37	1.0
	MISSING		6	11	16	24	15	1				5	78	2.2
	SUM	7	119	330	610	496	184	41	3			10	1800	
	% TOT. HRS.	.2	3.3	9.2	16.9	13.8	5.1	1.1	.1			.3		
	CALM	19	2										21	0.6
	NNE		2	9	52	23	7	3					96	2.7
	NE		3	18	38	22	2	1					84	2.3
	ENE		1	9	64	27	5	3					109	3.0
	E		3	29	103	24	2						161	4.5
	ESE		2	10	54	11							77	2.1
	SE		2	16	44	10	1						73	2.0
	SSE		1	13	55	15	1						85	2.4
	S		5	18	74	73	8						178	4.9
SSW		3	13	88	73	7						184	5.1	
SW		3	9	35	72	26	1					146	4.1	
WSW			9	47	47	1						104	2.9	
W		3	12	43	46	4						108	3.0	
WNW		3	11	31	28	2						75	2.1	
NW		4	8	31	17	1						61	1.7	
NNW		1	8	28	20	4						61	1.7	
N	1	5	10	37	18	2	4	3				80	2.2	
VARIABLE		1		1	1							3	0.1	
MISSING	1		6	49	29	2					7	94	2.6	
SUM	21	44	208	874	556	75	12	3			7	1800		
% TOT. HRS.	.6	1.2	5.8	24.3	15.4	2.1	.3	.1			.2			

TABLE 26
 Joint Frequency Distribution of Wind Direction and Wind Speed
 During Working and Non-Working Hours
 150-Foot Level, July 1949 - June 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS	
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46			MISSING
WORKING HOURS (0700 - 1800)	CALM	105										3	108	0.2
	NNE		50	159	420	322	126	17	1			2	1097	2.5
	NE		31	106	325	287	68	10				2	829	1.9
	ENE	2	36	124	353	287	101	21	3			8	935	2.1
	E	1	54	229	507	255	50	18	1			4	1119	2.6
	ESE		41	136	205	194	29	1				4	610	1.4
	SE	1	41	143	222	122	31	5	1			1	567	1.3
	SSE		58	209	351	208	72	12	2			1	913	2.1
	S	2	45	223	631	616	285	100	21	3		3	1929	4.4
	SSW		49	207	511	664	387	80	6	3		6	1913	4.4
	SW	1	44	176	493	584	312	81	4	6		6	1707	3.9
	WSW	1	47	172	489	485	232	121	19	3		3	1572	3.6
	W		64	236	659	738	383	212	76	6	1	5	2380	5.4
	WNW	1	47	187	424	469	243	92	11			8	1482	3.4
	NW		35	122	343	392	168	33				2	1095	2.5
NON-WORKING HOURS (1900 - 0600)	NNW		56	186	390	391	176	47	8			8	1262	2.9
	N	1	43	170	446	334	121	28	1			5	1149	2.6
	VARIABLE	12	128	88	18	1	4						251	0.6
	MISSING	3	43	145	329	170	49	5	3	2		245	994	2.3
	SUM	130	912	3018	7116	6519	2837	883	157	23	1	316	21912	
	% TOT. HRS.	.3	2.1	6.9	16.2	14.9	6.5	2.0	.4	.1		.7		
	CALM	153	8										161	0.4
	NNE	2	32	113	472	374	86	33					1112	2.5
	NE		20	101	319	223	50	20	1				734	1.7
	ENE		15	105	436	241	77	19	4				897	2.0
	E	1	36	211	783	261	70	15	1				1378	3.1
	ESE	1	24	111	476	171	25	2					810	1.8
	SE		17	113	423	164	26	6				2	751	1.7
	SSE		23	137	480	192	79	13	5			1	930	2.1
	S	2	31	200	821	597	175	39	6	5		1	1877	4.3
SSW		15	123	682	726	318	54	10	1		3	1932	4.4	
SW		17	89	467	710	262	50	3			4	1602	3.7	
WSW	1	13	88	429	506	191	48	18	7		7	1308	3.0	
W		22	133	586	790	246	107	31	9		1	1925	4.4	
WNW		21	117	469	673	179	62	9			1	1531	3.5	
NW	1	17	87	358	492	113	31	2	1		10	1112	2.5	
NNW		26	95	416	575	128	23	14	1		10	1288	2.9	
N	4	28	169	552	611	159	35	4			3	1565	3.6	
VARIABLE	1	6	5	2	5	1						20	0.0	
MISSING	5	18	96	445	209	16					190	979	2.2	
SUM	171	389	2093	8616	7520	2201	557	108	24		233	21912		
% TOT. HRS.	.4	.9	4.8	19.7	17.2	5.0	1.3	.2	.1		.5			

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TABLE 27

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, July 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	15											15	0.4
	NNE		14	60	28							7	109	2.9
	NE		20	49	22							8	99	2.7
	ENE	1	12	47	18								78	2.1
	E	1	28	80	24	1						5	139	3.7
	ESE		11	29	5							2	47	1.3
	SE		20	43	7								70	1.9
	SSE		30	58	16	2							106	2.8
	S		12	51	52	5							120	3.2
	SSW		19	65	96	32							212	5.7
	SW	1	14	66	100	22							203	5.5
	WSW		13	62	47	10						1	133	3.6
	W		10	50	55	20	2					5	142	3.8
	WNW		11	32	27	9						2	81	2.2
	NW		1	32	36	3							72	1.9
NON-WORKING HOURS (1900 - 0600)	NNW		4	28	30	5						2	69	1.9
	N		9	30	34							2	75	2.0
	VARIABLE	3	46	21	3							1	74	2.0
	MISSING			3								13	16	0.4
	SUM	21	274	806	600	109	2					48	1860	
	% TOT. HRS.	.6	7.4	21.7	16.1	2.9	.1					1.3		
	CALM	138	17										155	4.2
	NNE		33	71	7							9	120	3.2
	NE	1	33	60	9							4	107	2.9
	ENE	4	57	45	2							2	110	3.0
	E	1	83	57	1								142	3.8
	ESE	3	45	11		1						2	62	1.7
	SE		43	16	1							2	62	1.7
	SSE		33	21	1							2	57	1.5
	S		40	62	33							3	138	3.7
SSW		28	112	53	5						2	200	5.4	
SW		54	78	53	2							187	5.0	
WSW		40	52	7	2	1						102	2.7	
W		36	65	4								105	2.8	
WNW		10	50	6								66	1.8	
NW		11	30	5								46	1.2	
NNW		18	39	9	1						2	69	1.9	
N		34	45	10							7	99	2.7	
VARIABLE	3	2	3	1							1	7	0.2	
MISSING			5	1							20	26	0.7	
SUM	150	617	822	203	11	1					56	1860		
% TOT. HRS.	4.0	16.6	22.1	5.5	.3						1.5			

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TABLE 28

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, August 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	32	1										33	0.9
	NNE	1	24	91	50	3							169	4.5
	NE	1	18	47	55	3							124	3.3
	ENE		10	48	39	5							102	2.7
	E		24	86	15								125	3.4
	ESE		18	33	3								54	1.5
	SE		24	28	7								59	1.6
	SSE		23	53	18								94	2.5
	S		15	44	30	4							93	2.5
	SSW		22	86	55	8							171	4.6
	SW		24	98	82	5							209	5.6
	WSW		24	68	50	3						1	146	3.9
	W		26	68	54	15							163	4.4
	WNW	1	8	23	23	6							61	1.6
	NW		5	34	29	5							73	2.0
	NNW		10	32	16		1						59	1.6
	N	1	12	35	24	1							73	2.0
	VARIABLE		35	8									43	1.2
	MISSING											9	9	0.2
	SUM	36	323	882	550	58	1					10	1860	
	% TOT. HRS.	1.0	8.7	23.7	14.8	1.6						.3		
NON-WORKING HOURS (1900 - 0600)	CALM	193	16									1	210	5.6
	NNE	3	82	69	21								175	4.7
	NE	3	45	50	7								105	2.8
	ENE	1	54	25	2								82	2.2
	E		58	33	1	1							93	2.5
	ESE		57	14									71	1.9
	SE		42	22	2							1	67	1.8
	SSE		45	17	2	1							65	1.7
	S	1	32	54	1	1						1	90	2.4
	SSW		52	93	6							4	155	4.2
	SW	2	44	87	13							4	150	4.0
	WSW	2	42	49	10								103	2.8
	W		35	48	6	1							90	2.4
	WNW		19	19	13								51	1.4
	NW		19	28	12	1							60	1.6
	NNW	1	30	61	4								96	2.6
	N		66	96	17	1							180	4.8
	VARIABLE		1	1								1	3	0.1
	MISSING	1	2									11	14	0.4
	SUM	207	741	766	117	6						23	1860	
	% TOT. HRS.	5.6	19.9	20.6	3.1	.2						.6		

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TABLE 29

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, September 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	23	1										24	0.7
	NNE		22	37	40	10							109	3.0
	NE		10	37	33	1							81	2.3
	ENE	1	14	22	28	1							66	1.8
	E		16	36	14								66	1.8
	ESE		9	10	3								22	0.6
	SE		13	22	14	3							52	1.4
	SSE		15	25	39	7							86	2.4
	S		17	46	57	10	6	1					137	3.8
	SSW		17	69	91	36	1						214	5.9
	SW		21	63	55	17							156	4.3
	WSW		10	51	43	12	1						117	3.3
	W		11	56	84	28	4					1	184	5.1
	WNW		15	37	52	24	6						134	3.7
	NW		12	43	42	14							111	3.1
	NNW		10	45	27	15							97	2.7
	N	2	9	37	23	1							72	2.0
	VARIABLE		23	18	3								44	1.2
	MISSING			8	6							14	28	0.8
	SUM	26	245	662	654	179	18	1				15	1800	
	% TOT. HRS.	.7	6.8	18.4	18.2	5.0	.5					.4		
NON-WORKING HOURS (1900 - 0600)	CALM	104	6										110	3.1
	NNE	2	68	36	2								108	3.0
	NE		32	19	8								59	1.6
	ENE		22	10	7								39	1.1
	E		30	25	3								58	1.6
	ESE		46	15	2								63	1.8
	SE	1	31	21	3								56	1.6
	SSE	1	39	22	5	1							68	1.9
	S		28	94	25	7	1						155	4.3
	SSW		34	119	45	8							206	5.7
	SW		52	63	46	2							163	4.5
	WSW		28	80	12								120	3.3
	W		38	82	6	6							132	3.7
	WNW		18	85	12	2							117	3.3
	NW		17	66	8	1							92	2.6
	NNW		24	55	11	3	1						94	2.6
	N		28	72	17	1							118	3.3
	VARIABLE	1	2	2									5	0.1
	MISSING		2	15	3							17	37	1.0
	SUM	109	545	881	215	31	2					17	1800	
	% TOT. HRS.	3.0	15.1	24.5	6.0	.9	.1					.5		

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 TABLE 30

Joint Frequency Distribution of Wind Direction and Wind Speed
 During Working and Non-Working Hours
 19-Foot Level, October 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
WORKING HOURS (0700 - 1800)	CALM	41	1									42	1.1
	NNE		12	43	37	14	1					110	3.0
	NE		12	41	29	7						89	2.4
	ENE		10	31	25	5	2					74	2.0
	E		10	29	10	2						51	1.4
	ESE		4	17	4							25	0.7
	SE		12	29	13							54	1.5
	SSE		18	35	33	3						89	2.4
	S		12	50	67	25	2	3				159	4.3
	SSW		12	84	116	50	1					265	7.1
	SW	1	20	65	90	30						206	5.5
	WSW		14	43	43	23	3					126	3.4
	W	1	18	41	49	15						124	3.3
	WNW		8	35	33	14	1					91	2.4
	NW		3	18	21	15	3					60	1.6
	NNW		9	31	60	25	2					127	3.4
	N		12	41	42	31						128	3.4
	VARIABLE		10	5								15	0.4
	MISSING				2	1	1	1				20	0.7
	SUM	43	197	638	674	260	16	4				28	1860
	% TOT. HRS.	1.2	5.3	17.2	18.1	7.0	.4	.1				.8	
NON-WORKING HOURS (1900 - 0600)	CALM	67	2									69	1.9
	NNE		29	56	21	4	1					111	3.0
	NE		14	37	12	3						66	1.8
	ENE		17	24	3	1	1					46	1.2
	E		23	32	8	3						66	1.8
	ESE		31	17								50	1.3
	SE		36	38	7							81	2.2
	SSE		35	31	13							80	2.2
	S		32	75	39	8						154	4.1
	SSW		31	125	78	12	2					248	6.7
	SW		35	95	58							188	5.1
	WSW		31	57	20	2						110	3.0
	W		19	90	8	4	2					123	3.3
	WNW		17	53	13	4	2					89	2.4
	NW		15	43	31	5						94	2.5
	NNW		10	52	28	20	3					113	3.0
	N		16	72	47	23						158	4.2
	VARIABLE		1									1	0.0
	MISSING											13	0.3
	SUM	67	394	897	386	89	11					16	1860
	% TOT. HRS.	1.8	10.6	24.1	10.4	2.4	.3					.4	

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TABLE 31

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, November 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	23	1										24	0.7
	NNE		3	12	7								22	0.6
	NE	1	8	14	7								30	0.8
	ENE		1	9	3	6	2						21	0.6
	E		2	10	2	4							18	0.5
	ESE		4	4	5								13	0.4
	SE		9	7	9	1	1						27	0.8
	SSE		13	30	21	9	3						76	2.1
	S		16	47	77	58	18	1					217	6.0
	SSW		3	37	72	43	4	3					162	4.5
	SW		9	46	73	34	4	4					170	4.7
	WSW		14	39	61	35	7	3					159	4.4
	W		11	67	91	55	18	3					245	6.8
	WNW		7	35	52	36	3						133	3.7
	NW		6	35	46	37	7						131	3.6
	NNW		10	30	40	57	16	3					156	4.3
	N	1	8	42	47	46	5	3					152	4.2
	VARIABLE		5	2									7	0.2
	MISSING					1						36	37	1.0
	SUM	25	130	466	613	422	88	20				36	1800	
	% TOT. HRS.	.7	3.6	12.9	17.0	11.7	2.4	.6				1.0		
NON-WORKING HOURS (1900 - 0600)	CALM	37	4										41	1.1
	NNE		5	7	7	1							20	0.6
	NE		6	5	4	3							18	0.5
	ENE		3	8	1								12	0.3
	E	1	11	19	6								37	1.0
	ESE		9	10	1	1							21	0.6
	SE		11	18	8								37	1.0
	SSE		16	16	21	4		2					59	1.6
	S		11	42	50	28	1	1					133	3.7
	SSW	1	15	63	85	36	3	3	1				207	5.8
	SW		24	67	76	28							195	5.4
	WSW		16	63	41	21	7						148	4.1
	W		22	117	68	26	3						236	6.6
	WNW		10	76	62	27	7						182	5.1
	NW		7	36	56	18							117	3.3
	NNW		7	26	52	46	8	10					149	4.1
	N		14	42	67	27	2						152	4.2
	VARIABLE		1										1	0.0
	MISSING			1								34	35	1.0
	SUM	39	192	616	605	266	31	16	1			34	1800	
	% TOT. HRS.	1.1	5.3	17.1	16.8	7.4	.9	.4				.9		

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TABLE 32

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, December 1949 - 1953

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	27											27	0.7
	NNE		11	8	14	2							35	0.9
	NE		4	6	9	5	1						25	0.7
	ENE		5	18	24	5							52	1.4
	E		10	28	36	6							80	2.2
	ESE		9	27	26								62	1.7
	SE		7	30	36	6							79	2.1
	SSE		9	24	30	6							69	1.9
	S		2	30	62	66	13						173	4.7
	SSW		8	41	88	45	4						186	5.0
	SW		14	33	60	60	12						179	4.8
	WSW		15	45	95	30	17	1					203	5.5
	W		19	89	109	68	8	1					294	7.9
	WNW		10	36	55	26	3	1					131	3.5
	NW		14	23	40	23							100	2.7
	NNW		10	23	34	21	6						94	2.5
	N		5	20	20	12	3						60	1.6
	VARIABLE													0.0
	MISSING				9							2	11	0.3
	SUM	27	152	481	747	381	67	3				2	1860	
	% TOT. HRS.	.7	4.1	12.9	20.1	10.2	1.8	.1				.1		
NON-WORKING HOURS (1900 - 0600)	CALM	44	6										50	1.3
	NNE		4	16	12	3							35	0.9
	NE		6	12	4	4							26	0.7
	ENE		4	11	7	3							25	0.7
	E	1	16	40	27	4							88	2.4
	ESE		11	30	25	5							71	1.9
	SE	1	8	21	24	3							57	1.5
	SSE		11	17	25	15							68	1.8
	S		11	34	69	37	2	1	1				155	4.2
	SSW		7	44	78	36	7	1					173	4.7
	SW		16	64	52	43	7	1					183	4.9
	WSW		19	53	75	33	11						191	5.1
	W		20	95	97	23	3						238	6.4
	WNW		12	49	60	20	1						142	3.8
	NW	1	11	65	65	12							154	4.1
	NNW		6	41	50	13	4						114	3.1
	N		14	33	31	11	1						90	2.4
	VARIABLE													0.0
	MISSING													0.0
	SUM	47	182	625	701	265	36	3	1				1860	
	% TOT. HRS.	1.3	4.9	16.8	18.8	7.1	1.0	.1						

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TABLE 33

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, January 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	20	1										21	0.6
	NNE		11	24	32	9							76	2.0
	NE		10	21	12	3							46	1.2
	ENE	1	5	19	28	5							58	1.6
	E		14	27	22	2							65	1.7
	ESE		5	26	34	7							72	1.9
	SE		7	27	17	2							53	1.4
	SSE		9	33	48	15	2						107	2.9
	S	1	4	34	78	55	9	3					184	4.9
	SSW		6	32	59	41	10						148	4.0
	SW		8	38	50	30	1						127	3.4
	WSW		7	33	42	13	7						102	2.7
	W		15	54	75	55	23	6					228	6.1
	WNW		6	32	38	21	3	1					101	2.7
	NW		9	22	71	42							144	3.9
	NNW		8	37	72	43	8						168	4.5
	N		3	30	62	26						1	122	3.3
	VARIABLE		12	1									13	0.3
	MISSING			4	1	3						17	25	0.7
	SUM	22	140	494	741	372	63	10				18	1860	
	% TOT. HRS.	.6	3.8	13.3	19.9	10.0	1.7	.3				.5		
NON-WORKING HOURS (1900 - 0600)	CALM	53											53	1.4
	NNE		9	25	22	2							58	1.6
	NE		14	11	6	1							32	0.9
	ENE		19	15	16	20							70	1.9
	E		12	37	24								73	2.0
	ESE		21	15	10								46	1.2
	SE		16	31	22	5							74	2.0
	SSE		16	31	18	5							70	1.9
	S		17	41	59	21	4						142	3.8
	SSW		14	46	62	61	1						184	4.9
	SW	1	17	45	38	23							124	3.3
	WSW		10	27	23	10	6	1					77	2.1
	W		24	72	81	44	19	10					250	6.7
	WNW		14	36	45	28	4	1					128	3.4
	NW		8	16	48	23	2						97	2.6
	NNW		11	31	68	57	8	1					176	4.7
	N	1	31	42	61	31	3						169	4.5
	VARIABLE		3										3	0.1
	MISSING				9	1						24	34	0.9
	SUM	55	256	521	612	332	47	13				24	1860	
	% TOT. HRS.	1.5	6.9	14.0	16.5	8.9	1.3	.3				.6		

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 TABLE 34

Joint Frequency Distribution of Wind Direction and Wind Speed
 During Working and Non-Working Hours
 19-Foot Level, February 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	5											5	0.1
	NNE		10	17	31	16							74	2.2
	NE		12	8	26	10	1						57	1.7
	ENE		5	18	34	24	1					7	89	2.6
	E	1	4	23	35	26	4						93	2.7
	ESE		1	20	18	7	1						47	1.4
	SE		8	13	15	10							46	1.4
	SSE		9	20	30	10							69	2.0
	S		5	19	65	45							134	4.0
	SSW		5	16	42	50	4	1					118	3.5
	SW		4	20	46	34	7	1					112	3.3
	WSW		6	20	45	34	9						114	3.4
	W		11	51	89	58	22	6					237	7.0
	WNW		6	28	38	43	11	1					127	3.8
	NW		5	20	42	22	3						92	2.7
	NNW		9	17	53	33	2	1					115	3.4
	N		10	25	46	38	7	1					127	3.8
	VARIABLE	1	14	3									18	0.5
	MISSING			5	7							6	18	0.5
	SUM	7	124	343	662	460	72	11				13	1692	
	% TOT. HRS.	.2	3.7	10.1	19.6	13.6	2.1	.3				.4		
NON-WORKING HOURS (1900 - 0600)	CALM	34	3										37	1.1
	NNE		4	28	45	13	3						93	2.7
	NE	1	7	17	5	3	1						34	1.0
	ENE		10	22	35	18	10						95	2.8
	E		15	48	24	13	4						104	3.1
	ESE		14	37	29	2							82	2.4
	SE		9	20	20	8							57	1.7
	SSE		7	14	22	8	3						54	1.6
	S		6	28	43	29							106	3.1
	SSW		8	19	23	57		1					108	3.2
	SW		12	35	39	10							96	2.8
	WSW		11	45	27	18	4	7					112	3.3
	W		18	73	49	33	12	3					188	5.6
	WNW		6	50	46	17	11	1					131	3.9
	NW		7	31	21	5	3						67	2.0
	NNW		15	44	28	21	1						110	3.3
	N	1	23	53	75	39	3						193	5.7
	VARIABLE		1										1	0.0
	MISSING			1	11							12	24	0.7
	SUM	36	176	565	542	294	55	12				12	1692	
	% TOT. HRS.	1.1	5.2	16.7	16.0	8.7	1.6	.4				.4		

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TABLE 35

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, March 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	16											16	0.4
	NNE		7	25	52	23	3						110	3.0
	NE		6	15	54	19							94	2.5
	ENE		6	20	63	33	7	3					132	3.5
	E		3	18	58	41	6						126	3.4
	ESE	2	8	15	40	17							82	2.2
	SE	1	6	19	14	10							50	1.3
	SSE		10	27	37	14	2						90	2.4
	S		5	19	59	37	15	2					137	3.7
	SSW		2	13	46	21	7	1					90	2.4
	SW		2	6	14	19	6	1					48	1.3
	WSW		5	13	32	51	20	1					122	3.3
	W		5	26	94	84	39	8					256	6.9
	WNW		5	21	36	49	19	6					136	3.7
	NW		3	17	41	43	9						113	3.0
	NNW		3	13	60	46	5	1					128	3.4
	N		7	20	58	21		1					107	2.9
	VARIABLE	1	7	12	1								21	0.6
	MISSING											2	2	0.1
	SUM	20	90	299	759	528	138	24				2	1860	
	% TOT. HRS.	.5	2.4	8.0	20.4	14.2	3.7	.6				.1		
NON-WORKING HOURS (1900 - 0600)	CALM	41	2										43	1.2
	NNE		12	31	22	13	8						86	2.3
	NE		7	17	20	13	6	1					64	1.7
	ENE	1	7	43	40	21	5	1					119	3.2
	E		13	38	41	43	3						138	3.7
	ESE		20	37	29	11							97	2.6
	SE		15	35	26	10							86	2.3
	SSE		14	20	18	5	1						58	1.6
	S		11	34	52	16	8						121	3.3
	SSW	1	10	17	26	16	4						74	2.0
	SW		17	13	16	20	10						76	2.0
	WSW		26	25	24	42	7	1					125	3.4
	W		14	70	53	51	22	2					212	5.7
	WNW		9	55	41	10	8						123	3.3
	NW		10	45	37	20	13	1					126	3.4
	NNW		16	38	52	17	4						127	3.4
	N		21	53	70	23	13	2					182	4.9
	VARIABLE		1	1									2	0.1
	MISSING											2	2	0.1
	SUM	43	225	572	567	331	112	8				2	1860	
	% TOT. HRS.	1.2	6.0	15.4	15.2	8.9	3.0	.2				.1		

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 TABLE 36

Joint Frequency Distribution of Wind Direction and Wind Speed
 During Working and Non-Working Hours
 19-Foot Level, April 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
WORKING HOURS (0700 - 1800)	CALM	6										6	0.2
	NNE		2	30	46	29	10					117	3.3
	NE		3	16	31	25	6					81	2.3
	ENE		3	21	59	27	6					116	3.2
	E		3	33	57	24	1					118	3.3
	ESE		6	24	38	4						72	2.0
	SE		4	16	26	16						62	1.7
	SSE		1	14	36	23	1					75	2.1
	S			13	17	33	7				1	71	2.0
	SSW		4	7	26	59	16	1			1	114	3.2
	SW		4	20	44	32	4					104	2.9
	WSW		3	23	31	30	13	2				102	2.8
	W		2	24	73	61	43	6				209	5.8
	WNW		2	14	71	63	28	1				179	5.0
	NW		5	18	28	34	7					92	2.6
	NNW		3	16	40	54	14					127	3.5
N		6	23	24	18	4					75	2.1	
VARIABLE	1	22	21	1							45	1.3	
MISSING			1	13	4					17	35	1.0	
SUM	7	73	334	661	536	160	10				19	1800	
% TOT. HRS.	.2	2.0	9.3	18.4	14.9	4.4	.3				.5		
NON-WORKING HOURS (1900 - 0600)	CALM	32	8									40	1.1
	NNE		9	36	24	24	5					98	2.7
	NE		10	27	25	16	1					79	2.2
	ENE		22	65	44	13	1					145	4.0
	E		25	84	32	28	4					173	4.8
	ESE		22	27	21	5						75	2.1
	SE		19	10	15	3	2					49	1.4
	SSE		11	19	21	17	2					70	1.9
	S		12	20	25	11	2				1	71	2.0
	SSW		11	35	28	17		1				92	2.6
	SW		8	39	37	7						91	2.5
	WSW		7	34	30	18	6	2				97	2.7
	W		17	84	56	20	13	6				196	5.4
	WNW		5	65	72	22	9	2				175	4.9
	NW		9	34	30	11	1					85	2.4
	NNW		7	24	23	12	2	1				69	1.9
N		20	54	41	25	5					145	4.0	
VARIABLE	1			1							2	0.1	
MISSING		1	13	10						24	48	1.3	
SUM	32	224	670	535	249	53	12				25	1800	
% TOT. HRS.	.9	6.2	18.6	14.9	6.9	1.5	.3				.7		

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TABLE 37

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, May 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS		
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46			MISSING	
WORKING HOURS (0700 - 1800)	CALM	4											4	0.1	
	NNE		10	48	107	38	1						204	5.5	
	NE		7	27	80	26	2						142	3.8	
	ENE		4	31	74	16	5						130	3.5	
	E		5	43	56	10							114	3.1	
	ESE		8	20	17	11							56	1.5	
	SE		4	22	22	5							53	1.4	
	SSE		6	28	19	8							61	1.6	
	S		2	18	42	33	7	5					107	2.9	
	SSW		4	32	34	42	4						116	3.1	
	SW		5	21	46	24	4	2					102	2.7	
	WSW		4	28	60	23	8	3					126	3.4	
	W		4	45	83	59	36	2				1	230	6.2	
	WNW		4	21	49	25	6					1	106	2.8	
	NW		4	18	34	14							70	1.9	
NON-WORKING HOURS (1900 - 0600)	NNW		7	20	40	17						1	85	2.3	
	N		7	28	41	9							85	2.3	
	VARIABLE		30	29	2								61	1.6	
	MISSING				2							6	8	0.2	
	SUM	4	115	479	808	360	73	12				9	1860		
	% TOT. HRS.	.1	3.1	12.9	21.7	9.7	2.0	.3				.2			
	CALM	66	3										69	1.9	
	NNE	2	44	112	78	17	5						258	6.9	
	NE	2	16	63	43	10	1						135	3.6	
	ENE		23	82	21	1							127	3.4	
	E		42	91	16								149	4.0	
	ESE		26	33	9	1							69	1.9	
	SE		16	33	4	7							60	1.6	
	SSE		13	9	9	4	1						36	1.0	
	S		12	34	35	8	3						92	2.5	
SSW		14	48	13	6	1						82	2.2		
SW		23	68	18	4	5						118	3.2		
WSW		20	69	23	2	3	4	1				122	3.3		
W	1	16	115	36	13	9						190	5.1		
WNW	1	6	52	18	7	1						80	2.2		
NW		8	32	13	3							56	1.5		
NNW		9	25	23	4							61	1.6		
N	1	25	85	30	2							143	3.8		
VARIABLE		6	1									7	0.2		
MISSING				2	2	2						6	0.2		
SUM	73	322	954	391	86	29	4	1				1860			
% TOT. HRS.	2.0	8.7	25.6	10.5	2.3	.8	.1								

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TABLE 38

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, June 1950 - 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)										SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING	
WORKING HOURS (0700 - 1800)	CALM	9											0.3
	NNE		11	44	49	8	1					2	115 3.2
	NE		6	21	26	3	1					1	58 1.6
	ENE		5	31	41	4						1	82 2.3
	E		10	57	44	2						2	115 3.2
	ESE		10	30	23								63 1.8
	SE		11	32	18	1							62 1.7
	SSE		11	47	26	4							88 2.4
	S		9	22	47	22	1						101 2.8
	SSW		10	50	110	34							204 5.7
	SW		10	31	76	20							137 3.8
	WSW		2	28	44	32	1						107 3.0
	W		7	27	49	35	4	1					123 3.4
	WNW		5	15	39	19							78 2.2
	NW		5	13	26	6	1						51 1.4
	NNW		4	24	26	11							65 1.8
	N		1	20	24	8							53 1.5
	VARIABLE		38	18									56 1.6
	MISSING	1	32	59	81	40	5					15	233 6.5
	SUM	10	187	569	749	249	14	1				21	1800
	% TOT. HRS.	.3	5.2	15.8	20.8	6.9	.4					.6	
NON-WORKING HOURS (1900 - 0600)	CALM	85	1										86 2.4
	NNE		18	46	34	2							100 2.8
	NE		23	28	21	3							75 2.1
	ENE		26	54	18	7							105 2.9
	E		46	73	12								131 3.6
	ESE		36	20	3								59 1.6
	SE		21	33	8	1							63 1.8
	SSE		26	42	13	1							82 2.3
	S		11	56	50	5							122 3.4
	SSW		22	76	50	8							156 4.3
	SW		21	47	55	5							128 3.6
	WSW		22	48	17								87 2.4
	W		24	55	11								90 2.5
	WNW		6	52	10								68 1.9
	NW		12	30	7								49 1.4
	NNW		21	31	12	4							68 1.9
	N		21	38	13	3	4						79 2.2
	VARIABLE		3	1									4 0.1
	MISSING	16	42	111	47	9						23	248 6.9
	SUM	101	402	841	381	48	4					23	1800
	% TOT. HRS.	2.8	11.2	23.4	10.6	1.3	.1					.6	

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TABLE 39

Joint Frequency Distribution of Wind Direction and Wind Speed
During Working and Non-Working Hours
19-Foot Level, July 1949 - June 1954

PERIOD	DIRECTION (16 POINTS)	WIND SPEED (MPH)											SUM	% TOTAL HOURS
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46	MISSING		
WORKING HOURS (0700 - 1800)	CALM	221	5										226	0.5
	NNE	1	137	439	493	152	16					12	1250	2.9
	NE	2	116	302	384	102	11					9	926	2.1
	ENE	3	80	315	436	131	23	3				9	1000	2.3
	E	2	129	470	373	118	11					7	1110	2.5
	ESE	2	93	255	216	46	1					2	615	1.4
	SE	1	125	288	198	54	1						667	1.5
	SSE		154	394	353	101	8						1010	2.3
	S	1	99	393	653	393	78	15				1	1633	3.7
	SSW		112	532	835	461	51	6				3	2000	4.6
	SW	2	135	507	736	327	38	8					1753	4.0
	WSW		117	453	593	296	86	10				2	1557	3.6
	W	1	139	598	905	553	199	33				7	2435	5.6
	WNW	1	87	329	513	335	80	10				3	1358	3.1
	NW		72	293	456	258	30						1109	2.5
	NNW		87	316	498	327	54	5				3	1290	2.9
	N	4	89	351	445	211	19	5				5	1129	2.6
	VARIABLE	6	242	138	10							1	397	0.9
	MISSING	1	32	80	121	49	6	1				157	447	1.0
	SUM	248	2,500	6,453	8,218	3,914	712	96				221	21,912	
	% TOT. HRS.	.6	4.7	14.7	18.8	8.9	1.6	.2				.5		
NON-WORKING HOURS (1900 - 0600)	CALM	894	68									1	963	2.2
	NNE	7	317	533	295	79	22					9	1262	2.9
	NE	7	213	346	164	56	9	1				4	800	1.8
	ENE	6	264	404	196	84	17	1				2	974	2.2
	E	3	374	577	195	92	11						1252	2.9
	ESE	3	338	266	129	26						4	766	1.7
	SE	2	267	298	140	37	2					3	749	1.7
	SSE	1	266	259	168	61	7	2				3	767	1.8
	S	1	223	574	481	171	21	2	1			5	1479	3.4
	SSW	2	246	797	547	262	18	6	1			6	1885	4.3
	SW	3	323	701	501	144	22	1				4	1699	3.9
	WSW	2	272	602	309	148	45	15	1				1394	3.2
	W	1	283	966	475	221	83	21					2050	4.7
	WNW	1	132	642	398	132	43	4					1352	3.1
	NW	1	134	456	333	99	19	1					1043	2.4
	NNW	2	174	467	360	198	31	12				2	1246	2.8
	N	5	313	685	479	186	31	2				7	1708	3.9
	VARIABLE	1	22	9	2							2	36	0.1
	MISSING	17	47	148	83	12						180	487	1.1
	SUM	959	4,276	8,730	5,255	2,008	381	68	3			232	21,912	
	% TOT. HRS.	2.2	9.8	19.9	12.0	4.6	.9	.2				.5		

TABLE 40

Persistence of Wind Direction
150-Foot Level, July 1949 - 1953

[illegible]

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TABLE 44

Persistence of Wind Direction
150-Foot Level, November 1949 - 1953

[illegible]

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TABLE 46
Persistence of Wind Direction
150-Foot Level, January 1950 - 1954

[illegible]

Persistence of Wind Direction 150-Foot Level, February 1950 - 1954

[illegible]

TABLE 49

Persistence of Wind Direction 150-Foot Level, April 1950 - 1954

[illegible]

TABLE 50
Persistence of Wind Direction
150-Foot Level, May 1950 - 1954

[illegible]

TABLE 51

Persistence of Wind Direction
150-Foot Level, June 1950 - 1954

[illegible]

TABLE 52
Persistence of Wind Direction
150-Foot Level, July 1949 - June 1954

HOURS	WIND DIRECTION (8 POINTS)											TOTAL FREQUENCY	TOTAL HOURS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE	MISSING		
1	163	511	428	422	552	653	668	586	560	168	41	4752	4752
2	29	220	193	216	240	277	299	282	243	21	8	2028	4056
3	7	128	107	134	137	182	188	199	129	10	5	1226	3678
4	3	87	90	85	106	130	120	101	87	5	4	818	3272
5		44	60	42	62	92	73	64	59	1	4	501	2505
6	1	33	34	42	74	64	66	44	32	1	5	396	2376
7		27	32	18	42	49	47	45	35		4	299	2093
8		24	14	19	36	41	40	35	23			232	1856
9	1	28	21	24	29	30	30	24	19		4	210	1890
10		14	22	12	27	40	26	14	12			167	1670
11		9	11	10	21	31	20	16	18		1	137	1507
12		5	8	6	14	29	18	12	10			102	1224
13		9	6	1	15	8	13	10	12			74	962
14		4	8	6	7	9	19	12	10		4	79	1106
15		6	5	3	11	10	12	4	10		1	62	930
16		7	4	1	8	12	8	9	3			52	832
17		7	4		6	9	9	3	1		1	40	680
18		2	6	1	10	8	5	9	2		1	44	792
19		5	3	1	9	5	7	5	2		1	38	722
20		2	4	1	8	3	4	4	2			28	560
21		2	1	1	4	6	5	2	1		2	24	504
22			2		2	4	1	1	4			14	308
23		1	1		1	1	2	1	2		1	10	230
24		1	1	1	3	2	3	1	2			14	336
25					1	3	4	1	2			11	275
26		1	1		1	1	3	1	3			11	286
27			1		2	2	4				1	10	270
28				1	2	3	2	2	2			12	336
29				1	3	1	1	1				7	203
30			1		3	1	2	1			1	9	270
31						2	2	1				5	155
32					2				2			4	128
33					1	1		1	2			5	165
34		1					1					2	68
35					1	1			1			3	105
36			1			2		1				4	144
37					1							1	37
38						1	1				1	3	114
39			1					2				3	117
40			1								1	2	80
41							1	1			1	3	123
42		1					1		1			3	126
43						1					1	2	86
44						1						1	44
46					1			1				2	92
47					1	</							

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TABLE 53

Persistence of Wind Direction 19-Foot Level, July 1949 - 1953

[illegible]

TABLE 54
Persistence of Wind Direction
19-Foot Level, August 1949 - 1953

[illegible]

TABLE 55
Persistence of Wind Direction
19-Foot Level, September 1949 - 1953

[illegible]

TABLE 57

Persistence of Wind Direction 19-Foot Level, November 1949 - 1953

[illegible]

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TABLE 59

[illegible]

TABLE 62

Persistence of Wind Direction
19-Foot Level, April 1950 - 1954

[illegible]

TABLE 64

Persistence of Wind Direction
19-Foot Level, June 1950 - 1954

[illegible]

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TABLE 65

Persistence of Wind Direction 19-Foot Level, July 1949 - June 1954

HOURS	WIND DIRECTION (8 POINTS)											TOTAL FRE- QUENCY	TOTAL HOURS
	CALM	NE	E	SE	S	SW	W	NW	N	VARI- ABLE	MISSING		
1	447	681	552	570	700	819	780	687	662	214	24	6136	6136
2	141	244	225	258	284	347	321	271	273	50	10	2424	4848
3	60	126	125	120	144	190	195	170	156	26	4	1316	3948
4	19	90	85	73	110	131	140	104	91	6	3	852	3408
5	7	53	59	42	83	95	77	82	44	1	2	545	2725
6	13	32	50	41	60	66	68	62	38	2	4	436	2616
7	5	29	32	32	37	51	37	30	37			290	2030
8	3	21	29	25	37	40	38	28	25			246	1968
9	1	25	16	18	14	40	27	34	20		2	197	1773
10		18	8	6	18	30	28	27	15			150	1500
11	1	13	1	6	12	28	13	15	22		1	112	1232
12	1	5	12	6	14	24	17	16	15		3	113	1356
13		9	9	5	14	15	14	13	8		1	88	1144
14		7	2	3	6	9	16	15	7		2	67	938
15		1	3	1	7	10	8	10	10			50	750
16		4	2		9	5	7	5	11			43	688
17			3		3	14	3	4	5			32	544
18		6	2		6	8	4	3	4		1	34	612
19		6	3		3	9	5		2			28	532
20		2			4	4	6	4	7		1	28	560
21		1	3	2	3	5	5	1	1		1	22	462
22		1	2	1	1	5	3	3	1			17	374
23			2			1	2	1	1		1	8	184
24			1		5	3	2	1	2			14	336
25		1	1	1	2	2	5	4	4			20	500
26			1	1		1	1	1	5			10	260
27			1				1		3			5	135
28		1			1		2					4	112
29			1				3		1			5	145
30					1	1	1					3	90
31									1			1	31
32					1	2	1		1		1	6	192
33						1	1					1	33
34					1	1						2	68
35						1						1	35
36						1	1	1	1			4	144
37					2	2						4	148
38			1			1						2	76
40							1					1	40
41			1				1				3	5	205
46						3						3	138
48					1			1				2	96
49						1						1	49
56									1			1	56
58							1				1	2	116
60							1					1	6

TABLE 66

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, July 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	7	53	63	27							5	155
2	13	53	66	17	1						5	155
3	8	47	75	19	1						5	155
4	15	46	75	13	1						5	155
5	10	49	79	11	1						5	155
6	10	48	72	18	1	1					5	155
7	5	29	63	31	2						5	155
8	4	31	68	44	4						4	155
9	3	26	65	52	5						4	155
10	1	23	62	58	8						3	155
11		22	57	57	15						4	155
12		25	54	57	14	1					4	155
13		15	67	51	18						4	155
14		17	65	53	16						4	155
15	2	14	60	61	13	1					4	155
16	2	14	64	62	9						4	155
17	1	21	80	46	3						4	155
18	3	37	81	28	2						4	155
19	12	48	71	17	3						4	155
20	14	52	71	14							4	155
21	13	63	64	11							4	155
22	17	57	57	19	1						4	155
23	17	49	65	18	1						5	155
24	14	52	64	19	1						5	155
TOTAL	171	891	1628	803	120	3					104	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	3	18	10	9	21	32	20	11	23		3	155
2	11	19	10	10	14	36	15	17	20		3	155
3	8	17	13	11	17	33	16	18	19		3	155
4	17	16	10	13	19	34	16	7	20		3	155
5	12	15	11	14	17	37	14	10	22		3	155
6	8	13	15	14	24	33	15	9	20	1	3	155
7	4	16	11	21	17	34	21	10	17	1	3	155
8	2	15	11	22	21	30	21	10	20	1	2	155
9	1	15	11	16	25	33	17	11	16	7	3	155
10	1	15	13	12	26	23	22	16	13	14		155
11		10	14	12	23	32	23	18	12	10	1	155
12		16	12	15	23	31	24	13	9	11	1	155
13		14	14	10	22	37	19	16	11	11	1	155
14		17	17	13	20	37	16	18	8	8	1	155
15	2	16	21	7	24	34	16	20	7	7	1	155
16	2	17	25	3	21	36	15	19	13	3	1	155
17	1	19	26	10	22	36	13	14	12	1	1	155
18	2	19	29	6	19	38	13	14	14		1	155
19	12	16	36	11	17	24	11	14	10	3	1	155
20	15	20	34	8	20	25	10	9	12	1	1	155
21	16	16	32	11	23	23	9	8	16		1	155
22	18	17	27	10	23	27	7	11	13	1	1	155
23	18	21	16	11	23	33	11	8	12		2	155
24	12	18	12	11	19	37	16	5	22	1	2	155
TOTAL	170	395	430	280	500	775	380	306	361	81	42	3720

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TABLE 67

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, August 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	18	63	64	7	1						2	155
2	17	53	67	9	2						2	155
3	12	60	69	12							2	155
4	16	58	66	13							2	155
5	17	53	70	12	1						2	155
6	20	47	71	14	1						2	155
7	7	47	71	28							2	155
8	3	39	77	36	3						1	155
9	3	28	76	42	4						2	155
10	1	26	77	43	7						1	155
11		22	66	61	5						1	155
12		22	65	60	7						1	155
13		17	68	60	10							155
14	3	15	70	59	7						1	155
15	3	18	64	61	8						1	155
16	2	16	82	50	4	1						155
17	4	27	91	31	2							155
18	10	50	75	19	1							155
19	13	73	60	7	1						1	155
20	9	78	58	8							2	155
21	24	73	47	9							2	155
22	19	66	61	7							2	155
23	23	54	69	7							2	155
24	19	58	64	12							2	155
TOTAL	243	1064	1648	667	64	1					33	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	17	23	5	12	12	31	14	17	23		1	155
2	17	16	14	11	11	24	20	16	25		1	155
3	11	15	13	10	15	26	19	16	23	1	1	155
4	16	14	12	8	21	27	10	15	33		1	155
5	18	14	9	9	19	33	14	12	26		1	155
6	21	17	7	10	15	33	12	11	27	1	1	155
7	7	20	14	10	17	34	18	11	25		1	155
8	3	19	19	10	23	32	21	9	17	1	1	155
9	2	14	17	18	14	39	17	8	21	3	2	155
10	1	21	10	17	16	33	26	15	10	7	1	155
11		16	11	17	15	42	21	13	15	4	1	155
12		22	10	15	16	35	24	12	12	8	1	155
13		19	14	15	14	32	26	17	10	8		155
14	3	25	17	8	14	36	22	14	9	6	1	155
15	2	30	17	8	16	32	18	18	8	5	1	155
16	2	33	21	4	19	34	16	14	11	1		155
17	4	29	26	5	15	32	18	14	12			155
18	9	33	30	9	15	23	13	13	10			155
19	16	24	28	13	11	22	12	11	16	1	1	155
20	10	29	26	20	13	19	5	13	18		2	155
21	24	26	17	13	15	19	9	11	19		2	155
22	19	20	14	16	14	23	8	9	31		1	155
23	23	21	9	14	16	21	11	11	28		1	155
24	18	25	9	10	13	30	12	11	26		1	155
TOTAL	243	525	369	282	369	712	386	307	458	46	23	3720

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TABLE 68

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, September 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	8	44	76	19	2						1	150
2	6	44	80	18	1						1	150
3	10	42	75	13	3						2	150
4	7	44	77	16	3	1					2	150
5	7	45	73	20	3						2	150
6	9	38	79	17	5						2	150
7	4	33	72	37	2						2	150
8	3	24	67	46	7	1					2	150
9	1	17	56	64	9	1					2	150
10	1	12	52	62	20	1					2	150
11		13	48	64	22	2					1	150
12	1	12	46	64	23	3					1	150
13		9	47	61	29	2					2	150
14		13	42	64	27	3					1	150
15	1	11	51	66	18	1	1				1	150
16	1	14	53	66	14	2						150
17	5	31	68	41	4	1						150
18	9	56	60	19	4	1					1	150
19	12	53	70	9	5						1	150
20	9	60	63	16	1						1	150
21	15	45	71	17	1						1	150
22	6	47	74	20	2						1	150
23	8	48	70	21	1						2	150
24	12	35	73	24	4	1					1	150
TOTAL	135	790	1543	869	210	20	1				32	3600
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	9	12	3	12	22	34	16	20	17	1	4	150
2	6	9	4	9	23	32	22	18	23	1	3	150
3	10	14	1	11	23	30	19	20	18	1	3	150
4	6	6	6	10	23	30	25	19	22		3	150
5	6	9	7	10	21	33	21	16	22	1	4	150
6	9	7	6	5	25	34	18	20	21	1	4	150
7	3	10	8	8	30	30	17	25	15		4	150
8	2	14	9	11	22	34	19	21	15		3	150
9	1	13	7	12	19	35	22	22	15	1	3	150
10	1	13	7	12	14	38	21	22	13	6	3	150
11		14	7	8	25	25	28	18	13	9	3	150
12	1	17	5	9	27	23	23	27	9	8	1	150
13		13	8	7	25	24	28	23	10	9	3	150
14		13	7	9	20	29	32	20	13	5	2	150
15		17	7	9	24	24	30	22	11	4	2	150
16	1	16	11	6	26	26	31	17	13	2	1	150
17	5	20	14	7	22	28	14	24	15		1	150
18	10	17	20	8	21	25	13	21	13		2	150
19	12	21	16	14	20	21	11	21	11		3	150
20	11	21	13	17	18	23	10	24	11		2	150
21	14	12	12	14	25	26	12	22	11		2	150
22	6	16	8	17	24	31	16	21	8		3	150
23	9	13	7	10	24	34	14	17	19		3	150
24	12	12	4	9	24	34	15	18	19		3	150
TOTAL	134	329	197	244	547	703	477	498	357	49	65	3600

TABLE 69

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, October 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	5	30	76	33	10						1	155
2	4	25	84	30	11						1	155
3	5	30	82	29	8						1	155
4	7	31	79	29	6	2					1	155
5	4	35	78	29	6	2					1	155
6	8	33	77	28	6	1					2	155
7	8	33	70	33	8	1					2	155
8	4	16	77	37	18	1					2	155
9	2	8	57	62	22	1					3	155
10		14	39	72	25	2					3	155
11	1	8	40	70	31	1	1				3	155
12		9	38	75	27	1	1				4	155
13	1	9	34	71	34	2	1				3	155
14		10	37	70	33	2	1				2	155
15	1	12	44	66	27	2					3	155
16	4	16	60	50	24						1	155
17	9	28	71	36	9	1					1	155
18	13	34	71	32	2	2					1	155
19	10	43	65	30	4	2					1	155
20	7	41	67	30	8	1					1	155
21	3	35	69	38	6	2					2	155
22	5	35	66	40	6	1					2	155
23	5	27	80	35	7						1	155
24	4	29	74	35	11						2	155
TOTAL	110	591	1535	1060	349	27	4				44	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	5	7	5	14	27	33	17	20	25	1	1	155
2	5	14	5	10	23	42	13	20	22		1	155
3	5	13	6	8	32	33	15	21	21		1	155
4	7	14	7	11	24	37	12	22	20		1	155
5	4	16	8	8	27	36	18	20	17		1	155
6	9	15	7	12	20	41	14	21	14		2	155
7	7	13	7	10	27	35	15	21	18		2	155
8	4	13	9	8	29	38	15	14	22	1	2	155
9	2	11	11	8	23	41	22	10	25		2	155
10		14	6	9	24	43	17	16	23	1	2	155
11	1	15	6	11	23	40	15	18	20	2	4	155
12		18	4	7	30	41	12	17	19	5	2	155
13	1	18	4	9	21	48	13	16	21	2	2	155
14		15	4	8	26	37	19	20	21	3	2	155
15	1	15	8	7	29	37	18	16	20	1	3	155
16	3	18	8	9	25	38	17	16	19		2	155
17	10	15	13	12	24	33	12	16	19		1	155
18	13	17	12	13	22	31	12	14	20		1	155
19	10	14	11	18	17	33	14	14	23		1	155
20	7	12	14	12	19	35	15	14	26		1	155
21	3	13	11	13	19	40	16	14	25		1	155
22	5	12	10	13	22	32	19	21	20		1	155
23	5	12	8	16	19	37	13	23	21		1	155
24	4	10	6	18	25	32	12	19	28		1	155
TOTAL	111	334	190	264	577	893	365	423	509	16	38	3720

TABLE 70

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, November 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	2	9	60	50	23	2	1				3	150
2	4	13	52	50	25	2	1				3	150
3	5	16	55	44	23	4					3	150
4	3	18	55	47	22	1		1			3	150
5	6	16	52	49	18	4	2				3	150
6	4	16	59	42	21	3	2				3	150
7	5	18	58	43	16	6	1				3	150
8	3	13	54	47	24	5	1				3	150
9	4	10	37	59	26	9	1				4	150
10	2	10	25	60	40	8	3				2	150
11		7	31	52	46	9	2				3	150
12	1	7	21	55	48	10	4				4	150
13		7	19	60	48	10	2				4	150
14	1	4	25	55	50	9	3				3	150
15	1	9	29	51	45	10	2				3	150
16	3	9	41	60	30	3	1				3	150
17	2	19	61	39	22	5					2	150
18	3	17	65	32	27	4					2	150
19	4	17	58	40	26	1	2				2	150
20	4	13	48	57	21	3	2				2	150
21	3	17	45	52	25	3	2				3	150
22	1	19	44	54	23	4	2				3	150
23	2	20	44	56	22	2	1				3	150
24	1	18	44	64	17	2	1				3	150
TOTAL	64	322	1082	1218	688	119	36	1			70	3600
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	2	1	5	6	23	33	30	26	21		3	150
2	4	1	3	6	19	32	33	27	22		3	150
3	6	1	3	8	20	34	27	26	24		3	150
4	3	2	2	7	21	35	28	25	24		3	150
5	5	2	2	7	25	32	29	22	23		3	150
6	4	2	2	9	23	32	30	23	22		3	150
7	5	1	4	6	26	34	26	22	22	1	3	150
8	3	1	3	6	31	32	23	27	21		3	150
9	3	3	2	9	28	25	26	26	23		5	150
10	1	4	3	10	26	25	30	26	23		2	150
11		4	3	8	29	30	27	28	18		3	150
12	1	5	1	8	25	27	31	31	16	1	4	150
13		5	2	4	29	31	29	26	17	3	4	150
14	1	5	4	4	25	32	31	24	19	2	3	150
15	1	6	2	2	29	32	31	24	20		3	150
16	3	6	1	4	25	34	30	27	17		3	150
17	2	7	2	4	27	30	34	24	18		2	150
18	4	4	3	8	22	30	34	26	17		2	150
19	3	7	2	6	19	32	36	25	17	1	2	150
20	5	3	4	9	21	25	39	24	18		2	150
21	5	2	7	6	21	26	37	25	17		4	150
22	1	3	5	8	19	34	32	28	17		3	150
23	2	2	5	6	22	33	32	27	18		3	150
24	1	2	5	9	24	30	30	28	18		3	150
TOTAL	65	79	75	160	579	740	735	617	470	8	72	3600

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TABLE 71

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, December 1949 - 1953

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	4	15	47	66	20	2	1					155
2	5	15	54	60	18	3						155
3	5	16	58	52	21	3						155
4	2	18	66	44	21	4						155
5	6	21	49	54	22	3						155
6	3	21	60	46	20	5						155
7	2	22	55	54	16	6						155
8	4	18	47	59	23	4						155
9	4	14	44	59	28	5	1					155
10		10	45	58	36	6						155
11		9	29	72	38	7						155
12		10	31	60	46	7					1	155
13	2	10	26	61	49	5	1				1	155
14		8	29	68	40	9	1					155
15	1	11	36	69	30	8						155
16	4	13	40	64	31	3						155
17	7	11	51	64	19	3						155
18	3	16	48	59	25	4						155
19	3	18	46	62	23	2		1				155
20	5	12	51	55	28	3	1					155
21	6	10	57	52	26	4						155
22	3	11	43	68	27	3						155
23	2	11	45	75	19	3						155
24	3	14	49	67	20	1	1					155
TOTAL	74	334	1106	1448	646	103	6	1			2	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	6	4	8	14	17	37	22	37	10			155
2	5	5	8	13	22	29	32	29	12			155
3	5	3	8	11	21	32	31	31	13			155
4	2	3	11	7	26	26	36	33	11			155
5	5	4	13	7	25	27	38	23	13			155
6	3	5	12	9	25	29	36	26	10			155
7	2	5	11	11	25	29	38	23	11			155
8	4	4	13	8	23	33	33	24	13			155
9	4	5	10	14	19	36	40	16	11			155
10		4	12	13	21	32	40	24	7		2	155
11		4	14	13	21	32	41	17	10		3	155
12		4	10	13	25	32	42	17	9		3	155
13	2	8	10	12	25	31	40	17	7		3	155
14		8	10	15	22	35	37	20	8			155
15	1	8	7	19	22	32	40	14	12			155
16	4	6	11	16	25	34	31	18	10			155
17	7	3	13	14	25	34	31	19	9			155
18	3	3	13	15	24	36	29	21	11			155
19	3	4	12	15	18	34	32	21	16			155
20	5	7	9	16	17	37	33	22	9			155
21	7	1	16	11	20	30	33	25	12			155
22	3	4	13	12	17	37	31	22	16			155
23	3	4	11	14	21	33	30	27	12			155
24	3	7	8	15	21	33	33	28	7			155
TOTAL	77	113	263	307	527	780	829	554	259		11	3720

TABLE 72

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, January 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	5	23	38	55	28	3	1				2	155
2	7	19	40	52	31	3	1				2	155
3	7	23	36	56	28	2	1				2	155
4	5	15	47	55	28	2	1				2	155
5	5	21	41	56	27	3					2	155
6	6	20	44	57	23	2	1				2	155
7	3	13	60	51	23	3					2	155
8	4	15	48	60	22	4					2	155
9	2	13	37	70	30	1	1				1	155
10	2	7	40	60	38	6	1				1	155
11		12	32	65	39	5	1				1	155
12		8	33	74	33	5	1				1	155
13	1	6	42	56	42	7					1	155
14	1	10	28	73	34	7	1				1	155
15	1	12	32	70	31	6	2				1	155
16	1	15	34	68	26	7	1				3	155
17	3	16	44	61	21	7	1				2	155
18	4	13	64	33	33	5	1				2	155
19	4	19	55	44	22	7	2				2	155
20	2	23	51	37	29	10	1				2	155
21	4	26	46	40	31	5	1				2	155
22	1	28	46	41	32	3	2				2	155
23	5	15	43	60	25	4	1				2	155
24	4	24	34	59	28	3	1				2	155
TOTAL	77	396	1015	1353	704	110	23				42	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	5	9	8	14	16	30	26	24	20		3	155
2	6	7	6	12	18	25	29	23	26		3	155
3	7	10	8	10	20	19	29	22	26	1	3	155
4	5	10	12	8	17	26	23	30	21		3	155
5	5	13	8	12	18	23	26	27	21		2	155
6	6	11	9	15	15	23	22	30	22		2	155
7	3	13	12	14	18	24	23	26	20		2	155
8	4	14	12	12	20	24	23	25	19		2	155
9	2	5	16	10	26	18	28	27	21		2	155
10	1	6	12	13	27	24	23	26	22		1	155
11		6	12	13	25	20	30	24	23	1	1	155
12		13	3	20	23	22	26	26	18	3	1	155
13	1	9	5	15	26	20	30	23	21	4	1	155
14	1	12	6	12	29	21	28	26	17	2	1	155
15	1	12	6	14	29	22	27	24	15	2	3	155
16	1	13	8	9	32	18	28	32	11		3	155
17	4	12	7	12	25	25	23	26	17		4	155
18	3	8	11	13	24	19	30	27	15	1	4	155
19	4	5	13	10	28	18	27	24	22	1	3	155
20	2	6	13	12	25	19	28	26	21		3	155
21	3	8	11	12	23	22	26	24	23		3	155
22	1	10	9	14	27	17	32	21	20	1	3	155
23	5	7	9	12	27	17	33	15	27		3	155
24	4	5	13	9	22	22	34	20	23		3	155
TOTAL	74	224	229	297	560	518	654	598	491	16	59	3720

TABLE 73
Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, February 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	1	19	41	51	24	3	1				1	141
2	6	13	50	44	22	3	2				1	141
3	3	12	49	42	26	6	2				1	141
4	2	15	49	46	21	6	1				1	141
5	3	16	44	45	29	2	1				1	141
6	5	16	45	48	24	1	1				1	141
7	3	21	38	52	23	2	1				1	141
8	2	14	32	58	31	3					1	141
9	1	11	29	54	37	7					2	141
10		13	21	53	48	4	1				1	141
11		10	22	58	42	7	1				1	141
12		2	26	57	45	8	2				1	141
13		6	22	49	53	10					1	141
14	1	7	17	57	50	6	2				1	141
15		10	16	56	49	7	2				1	141
16		8	23	66	34	8	1				1	141
17		10	39	61	24	5	1				1	141
18		12	58	41	24	5					1	141
19	3	13	51	44	22	7					1	141
20	2	14	46	47	25	6					1	141
21	4	13	49	44	23	7					1	141
22	3	12	49	41	28	7					1	141
23	3	17	43	48	24	4	1				1	141
24	1	16	49	42	26	3	3				1	141
TOTAL	43	300	908	1204	754	127	23				25	3384
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	1	13	13	11	16	19	19	20	27		2	141
2	5	11	15	12	13	15	25	17	26		2	141
3	3	8	19	12	14	18	23	15	27		2	141
4	2	10	12	12	19	19	19	20	25	1	2	141
5	3	9	16	11	14	24	22	16	24		2	141
6	5	10	15	9	14	24	18	19	25		2	141
7	3	12	16	7	14	23	23	16	23	2	2	141
8	2	11	16	9	17	21	18	20	24	1	2	141
9		11	17	7	19	21	25	17	19	3	2	141
10		8	14	10	19	25	23	21	18	2	1	141
11		6	16	5	19	26	26	20	20	2	1	141
12		8	14	9	19	22	29	20	16	3	1	141
13		10	8	8	20	22	27	24	17	3	2	141
14		10	13	6	20	17	36	21	16	1	1	141
15		9	14	7	16	19	38	18	18	1	1	141
16		12	10	10	17	16	34	25	16		1	141
17		13	13	12	15	13	32	24	17		2	141
18		11	17	18	9	17	28	21	18		2	141
19	4	10	17	17	8	17	30	19	17		2	141
20	3	10	21	11	11	17	24	21	21		2	141
21	4	7	22	10	13	15	21	25	22		2	141
22	3	6	15	14	14	19	23	21	24		2	141
23	3	8	14	13	12	22	19	19	29		2	141
24	1	10	17	11	14	21	20	18	27		2	141
TOTAL	42	233	364	251	366	472	602	477	516	19	42	3384

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TABLE 74

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, March 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	4	17	50	42	31	10	1					155
2	4	18	44	50	28	10	1					155
3	2	19	48	57	20	8	1					155
4	5	18	51	50	23	8						155
5	5	18	43	56	26	4	2				1	155
6	9	13	54	48	21	9					1	155
7	7	14	46	56	24	5	2				1	155
8	1	13	32	64	35	7	2				1	155
9	1	10	22	67	44	10	1					155
10		7	21	62	51	13	1					155
11		3	24	62	52	14						155
12		5	21	62	48	17	2					155
13	1	3	19	63	51	15	3					155
14		5	18	65	49	14	4					155
15	1	6	14	66	47	17	4					155
16	2	5	17	67	50	11	3					155
17	3	5	25	69	44	8	1					155
18	4	14	40	56	33	7	1					155
19	1	19	47	50	24	13	1					155
20	2	22	47	46	28	10						155
21	2	20	48	42	35	8						155
22	2	16	53	34	39	9	2					155
23	4	23	44	46	26	12						155
24	3	22	43	46	30	11						155
TOTAL	63	315	871	1326	859	250	32				4	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	4	14	16	11	17	16	23	30	24			155
2	4	13	17	11	17	20	21	29	23			155
3	3	13	15	11	18	19	21	30	25			155
4	4	12	17	13	18	18	25	22	26			155
5	5	15	19	10	17	21	16	25	26		1	155
6	8	10	20	14	15	16	18	28	24	1	1	155
7	7	13	19	13	21	15	20	25	21		1	155
8	1	12	22	15	19	14	23	22	26		1	155
9		12	21	14	22	15	22	21	27	1		155
10		13	20	12	21	15	25	26	20	3		155
11		18	14	13	17	20	29	23	17	4		155
12		19	15	12	19	13	37	21	15	4		155
13	1	23	15	11	20	13	37	21	12	2		155
14		20	16	12	19	12	39	18	15	4		155
15	1	18	21	10	17	9	34	27	15	3		155
16	1	19	18	17	13	10	34	22	21			155
17	2	21	20	10	16	10	33	24	19			155
18	3	15	27	13	12	8	32	23	22			155
19	1	14	25	18	11	8	37	16	25			155
20	2	15	25	16	11	10	33	18	25			155
21	3	13	26	17	11	16	27	23	19			155
22	2	10	24	16	12	13	29	25	24			155
23	4	13	17	16	17	17	23	27	21			155
24	3	14	18	16	15	14	22	31	21	1		155
TOTAL	59	359	467	321	395	342	660	577	513	23	4	3720

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TABLE 75

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, April 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	1	21	53	42	26	3	2				2	150
2		19	60	42	23	3	1				2	150
3	1	10	68	47	17	4	1				2	150
4	3	13	62	40	25	3	2				2	150
5	4	11	54	51	24	3	1				2	150
6		14	49	55	19	10					3	150
7		10	46	51	29	10	1				3	150
8	1	7	32	60	36	9	2				3	150
9	3	5	28	56	44	12	1				1	150
10		10	22	52	47	16	2				1	150
11	1	9	19	49	51	18	2				1	150
12		6	24	49	50	19					2	150
13		5	22	54	52	16					1	150
14		1	25	49	52	22					1	150
15		2	25	53	54	13	2				1	150
16	1	2	19	64	53	10					1	150
17	1	7	25	65	41	9					2	150
18		9	47	59	27	6					2	150
19	4	17	59	44	20	4					2	150
20	5	21	58	44	14	6					2	150
21	4	25	50	45	18	6					2	150
22	3	21	56	46	17	5					2	150
23	4	24	54	39	22	2	3				2	150
24	3	28	47	40	24	4	2				2	150
TOTAL	39	297	1004	1196	785	213	22				44	3600
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	1	18	22	10	8	20	31	18	18		4	150
2	1	15	17	13	6	18	28	23	24	1	4	150
3	1	13	22	8	11	18	26	23	23		5	150
4	3	16	18	11	12	20	22	18	25		5	150
5	4	13	18	12	10	19	27	14	28		5	150
6		9	24	6	12	21	25	19	29		5	150
7		11	20	11	13	17	27	25	21		5	150
8	1	15	15	16	11	18	25	20	22	1	6	150
9	3	17	15	12	14	21	26	22	17	1	2	150
10		16	13	13	13	21	24	28	15	5	2	150
11		19	11	14	11	17	28	24	13	11	2	150
12		15	13	14	11	26	23	25	15	5	3	150
13		19	11	11	11	23	29	24	12	8	2	150
14		21	12	10	10	22	30	25	13	5	2	150
15		15	20	8	6	27	23	28	17	4	2	150
16	1	18	24	6	9	21	25	24	16	3	3	150
17	1	12	28	9	10	20	25	21	20	1	3	150
18		23	20	13	8	18	30	14	20	1	3	150
19	4	24	28	10	9	19	21	19	13		3	150
20	6	22	30	11	11	16	21	16	14		3	150
21	5	17	29	14	11	15	27	12	17		3	150
22	6	14	28	13	11	17	26	19	13		3	150
23	6	15	26	11	8	17	25	21	17		4	150
24	3	17	22	9	10	20	24	24	16	1	4	150
TOTAL	46	394	486	265	246	471	618	506	438	47	83	3600

TABLE 76
Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, May 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	7	29	87	20	9	3						155
2	8	23	81	33	6	4						155
3	7	26	79	32	7	4						155
4	9	23	77	34	9	3						155
5	5	18	89	33	8	2						155
6	6	21	72	45	9	2						155
7	2	17	48	65	20	3						155
8	1	15	46	61	27	5						155
9		11	45	60	31	6					2	155
10		12	34	64	36	7	1				1	155
11		8	41	62	33	9	1				1	155
12		6	36	68	34	8	2				1	155
13		5	29	69	40	6	3				3	155
14		5	33	68	39	7	2				1	155
15		14	27	70	34	9	1					155
16		4	40	72	31	7	1					155
17		7	45	78	20	4	1					155
18	1	11	55	71	15	2						155
19	3	20	75	51	5		1					155
20	3	30	78	36	6	1		1				155
21	6	35	78	24	10	1	1					155
22	5	30	80	29	9	2						155
23	7	36	77	26	5	3	1					155
24	7	31	81	28	3	4	1					155
TOTAL	77	437	1433	1199	446	102	16	1			9	3720
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	8	26	14	16	9	24	24	11	23			155
2	7	28	13	12	10	21	27	9	26	2		155
3	8	27	14	12	12	19	26	13	23		1	155
4	8	22	17	6	17	20	22	11	31		1	155
5	4	24	17	6	13	23	24	14	29		1	155
6	5	30	13	7	10	23	28	14	24		1	155
7	2	23	15	13	10	27	24	13	27		1	155
8	1	26	16	10	13	26	24	13	22	4		155
9		25	16	11	15	24	27	14	16	6	1	155
10		25	12	11	13	22	28	18	16	9	1	155
11		22	15	12	18	21	27	13	18	9		155
12		24	12	9	19	20	31	12	20	7	1	155
13		21	14	8	15	24	27	15	20	9	2	155
14		28	9	12	17	17	28	19	18	5	2	155
15		28	16	8	14	19	29	18	17	6		155
16		29	16	10	11	21	29	18	17	4		155
17		35	17	12	11	15	32	15	18			155
18	1	38	24	8	11	17	27	13	14	2		155
19	3	39	26	6	13	19	21	13	14	1		155
20	4	33	31	5	13	21	16	13	18	1		155
21	4	27	30	12	11	21	18	10	22			155
22	5	30	28	6	10	21	19	11	23	1	1	155
23	7	31	19	11	8	19	24	8	25	2	1	155
24	6	33	17	12	13	19	22	14	19			155
TOTAL	73	674	421	235	306	503	604	322	500	68	14	3720

TABLE 77
Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, June 1950 - 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	12	30	65	35	5						3	150
2	8	41	65	30	3						3	150
3	6	36	73	26	5						4	150
4	12	30	66	32	6						4	150
5	7	29	78	27	5						4	150
6	8	27	70	39	2						4	150
7	3	21	56	58	8						4	150
8		23	59	55	9	1					3	150
9	1	17	53	63	12						4	150
10	1	12	52	59	22	1					3	150
11	1	15	50	59	22	1					2	150
12		15	46	56	29	1					3	150
13	1	13	39	64	31	1					1	150
14	1	19	34	61	33	1					1	150
15		15	28	73	29	4	1					150
16	1	10	35	73	29	2						150
17		12	50	73	14	1						150
18	1	15	67	55	11	1						150
19	3	25	80	37	4	1						150
20	5	34	74	33	3	1						150
21	11	45	60	31	2	1						150
22	12	38	70	25	4	1						150
23	7	38	70	30	5							150
24	10	29	70	36	4						1	150
TOTAL	111	589	1410	1130	297	18	1				44	3600
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	11	14	11	13	20	20	13	13	13	1	21	150
2	6	16	9	11	23	25	10	12	16	1	21	150
3	4	19	13	10	19	25	12	11	15		22	150
4	10	14	9	12	17	29	5	11	21		22	150
5	6	15	11	14	18	24	12	9	18		23	150
6	6	10	16	16	19	25	10	8	16		24	150
7	3	12	13	13	21	27	16	7	15		23	150
8		9	17	13	22	29	14	9	15	1	21	150
9	1	11	10	17	15	31	17	10	13	5	20	150
10	1	13	10	16	18	30	15	10	10	7	20	150
11	1	12	9	16	15	31	15	10	12	9	20	150
12		13	8	11	17	26	21	8	13	14	19	150
13		15	13	10	22	26	21	9	11	4	19	150
14	1	13	10	12	17	29	16	15	12	6	19	150
15		13	19	14	17	29	14	13	9	4	18	150
16	1	14	18	13	17	21	17	15	11	5	18	150
17		18	26	10	11	27	15	16	8	1	18	150
18	1	18	26	9	15	24	12	16	11		18	150
19	2	18	28	14	13	18	19	12	8		18	150
20	4	16	30	12	14	23	14	12	7		18	150
21	10	15	27	13	13	20	14	11	8		19	150
22	10	12	23	11	17	23	12	11	10	1	20	150
23	8	15	14	16	17	20	15	10	14	1	20	150
24	9	11	15	13	19	21	13	16	13		20	150
TOTAL	95	336	385	309	416	603	342	274	299	60	481	3600

TABLE 78

Frequency Distribution of Wind Speed and Wind Direction
for Each Hour of the Day
19-Foot Level, July 1949 - June 1954

HOUR	WIND SPEED (MPH)										MISSING	TOTALS
	CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
1	74	353	720	447	179	26	7				20	1826
2	82	341	743	435	171	28	6				20	1826
3	71	337	767	434	159	31	5				22	1826
4	86	329	770	419	165	30	4	1			22	1826
5	79	332	750	443	170	23	6				23	1826
6	89	314	752	457	152	34	4				25	1826
7	49	278	703	559	171	36	5				25	1826
8	30	224	639	627	239	40	5				22	1826
9	25	170	549	708	292	52	5				25	1826
10	8	156	490	703	378	64	9				18	1826
11	3	138	459	731	396	73	8				18	1826
12	2	127	441	737	404	80	12				23	1826
13	6	105	434	719	457	74	10				21	1826
14	7	114	423	742	430	80	14				16	1826
15	11	134	426	752	385	78	15				15	1826
16	21	126	508	762	335	54	7				13	1826
17	35	194	650	664	223	44	4				12	1826
18	51	284	731	504	204	37	2				13	1826
19	72	365	737	435	159	37	6	1			14	1826
20	67	400	712	423	163	41	4	1			15	1826
21	95	407	684	405	177	37	4				17	1826
22	77	380	699	424	188	35	6				17	1826
23	87	362	704	461	157	30	7				18	1826
24	81	356	692	472	168	29	9				19	1826
TOTAL	1207	6326	15183	13473	5922	1093	164	3			453	43824
HOUR	WIND DIRECTION (8 POINTS)										MISSING	TOTALS
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
1	77	159	120	142	208	329	255	247	244	3	42	1826
2	77	154	121	130	199	319	275	240	265	5	41	1826
3	71	153	135	122	222	306	264	246	260	3	44	1826
4	83	139	133	118	234	321	243	231	279	1	44	1826
5	77	149	139	120	224	332	261	208	269	1	46	1826
6	84	139	146	126	217	334	246	228	254	4	48	1826
7	46	149	150	137	239	329	268	224	233	4	47	1826
8	27	153	162	140	251	331	259	214	236	10	43	1826
9	19	142	153	148	239	339	289	204	224	27	42	1826
10	6	152	132	148	238	331	294	246	190	54	35	1826
11	2	146	132	142	241	336	310	226	191	61	39	1826
12	2	174	107	142	254	318	323	229	171	69	37	1826
13	5	174	118	120	250	331	326	231	169	63	39	1826
14	6	187	125	121	239	324	334	240	169	47	34	1826
15	9	187	158	113	243	316	318	242	169	37	34	1826
16	19	201	171	107	240	309	307	247	175	18	32	1826
17	36	204	205	117	223	303	282	237	184	3	32	1826
18	49	206	232	133	202	286	273	223	185	4	33	1826
19	74	136	242	152	184	265	271	209	192	7	34	1826
20	74	194	250	149	193	270	248	212	200	2	34	1826
21	98	157	240	146	205	273	249	210	211		37	1826
22	79	154	204	150	210	294	254	220	219	4	38	1826
23	93	162	155	150	214	303	250	213	243	3	40	1826
24	76	164	146	142	219	313	253	232	239	3	39	1826
TOTAL	1189	3995	3876	3215	5388	7512	6652	5459	5171	433	934	43824

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TABLE 79

Average Hourly Wind Speed (MPH)
150-Foot Level, July 1949 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	11	10	12	13	15	14	14	14	15	14	12	12	1
2	11	10	12	13	15	14	14	15	15	14	13	11	2
3	11	10	12	13	15	14	14	15	14	14	13	11	3
4	10	10	12	13	15	14	14	14	14	14	13	12	4
5	10	10	12	13	14	14	13	14	14	15	13	11	5
6	10	10	11	13	15	14	13	14	14	14	12	10	6
7	9	8	10	12	14	14	13	14	14	14	12	10	7
8	8	8	9	11	14	14	13	14	14	14	12	10	8
9	9	8	11	11	14	14	13	14	15	14	13	10	9
10	10	9	11	12	15	14	14	14	15	15	14	11	10
11	10	9	12	13	15	15	14	14	15	15	14	11	11
12	11	10	12	13	16	14	14	15	16	15	14	12	12
13	11	10	13	13	16	15	14	15	16	16	14	12	13
14	11	10	13	13	16	15	14	15	16	16	15	13	14
15	11	10	13	13	16	14	14	15	17	16	14	13	15
16	11	10	12	12	15	14	14	15	16	15	14	13	16
17	10	10	11	12	14	14	14	15	16	15	14	12	17
18	10	10	11	12	15	14	14	15	15	14	13	12	18
19	10	10	11	12	15	15	14	15	15	13	13	11	19
20	10	10	12	13	15	15	14	15	15	13	12	11	20
21	10	10	12	13	15	15	14	15	15	14	13	11	21
22	10	10	12	13	15	15	14	15	16	13	13	12	22
23	11	10	12	13	15	15	14	15	15	14	13	12	23
24	11	10	13	13	15	14	14	15	15	14	13	12	24

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TABLE 80
Average Hourly Wind Speed (MPH)
19-Foot Level, July 1949 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	5	3	5	6	8	8	8	9	9	8	6	6	1
2	4	4	5	6	8	8	9	9	9	8	6	5	2
3	4	4	5	6	8	8	8	9	9	8	6	5	3
4	4	4	5	6	8	8	9	9	8	8	6	5	4
5	4	4	5	6	8	8	8	8	9	8	6	5	5
6	4	4	5	6	8	8	8	8	8	9	7	6	6
7	5	5	5	6	8	8	8	9	9	10	8	7	7
8	6	6	7	7	9	8	8	9	10	11	9	7	8
9	6	6	8	8	10	9	9	10	11	11	10	7	9
10	7	7	8	9	11	10	10	11	12	12	10	8	10
11	7	7	9	9	11	11	10	11	12	12	10	8	11
12	7	7	9	9	12	11	10	11	12	12	11	9	12
13	8	7	9	10	12	11	10	12	12	12	11	9	13
14	7	7	9	10	12	11	10	12	12	13	11	9	14
15	7	7	9	9	11	10	10	11	12	12	10	9	15
16	7	7	8	8	9	9	10	11	12	12	10	9	16
17	6	6	6	6	8	8	9	10	11	11	9	8	17
18	5	4	4	5	8	8	9	9	10	9	8	7	18
19	4	3	4	5	8	9	9	9	9	8	7	6	19
20	4	3	4	6	8	9	9	9	9	8	6	5	20
21	4	3	4	6	9	9	9	9	9	8	6	5	21
22	4	3	5	6	9	9	9	9	10	8	6	5	22
23	4	3	5	6	8	9	9	9	9	8	6	5	23
24	4	4	5	6	8	8	9	9	9	8	6	5	24

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TABLE 81

Frequency Distribution of Peak Gust Magnitudes - 150-Foot Level
July 1949 - June 1954

WIND SPEED (MPH)	MONTH												TOTAL
	JUL	AUG.	SEP .	OCT.	NOV.	DEC.	JAN.	FEB.	MAR	APR	MAY	JUN	
0 - 4													
5 - 9													
10 - 14	10	17	5	3	1	1	1	4	2			2	46
15 - 19	45	53	30	26	13	11	12	7	15	13	23	25	273
20 - 24	40	38	45	42	21	41	33	31	22	26	33	37	409
25 - 29	25	20	31	31	40	35	43	28	22	23	31	23	352
30 - 34	21	8	18	23	36	23	25	25	34	34	28	22	297
35 - 39	3	5	7	12	15	20	20	20	20	16	17	19	174
40 - 44	1	4	5	8	12	14	6	7	17	19	5	11	109
45 - 49	1	1	2	4	4	7	5	4	7	9	10	4	58
50 - 54	3		4	1	2	1	3	6	7	6	4	3	40
55 - 59		1			4		3	2	3	2		2	17
60 - 64			1	1		1	2	1	1	2		1	10
65 - 69					1		1	1	1		1		5
70 - 74					1								1
75 - 79	1												1
80 - 84						1							1
MISSING	5	8	2	4			1	5	4		3	1	33
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 82
Frequency Distribution of Peak Gust Magnitudes - 19-Foot Level
July 1949 - June 1954

WIND SPEED (MPH)	MONTH												TOTAL
	JUL	AUG.	SEP	OCT.	NOV.	DEC.	JAN.	FEB.	MAR	APR.	MAY	JUN	
0 - 4													
5 - 9	5	3	3	3	1	2	1	1					19
10 - 14	38	49	20	24	11	12	10	13	6	7	15	23	228
15 - 19	54	57	46	36	26	43	36	26	25	21	36	39	445
20 - 24	35	31	50	46	36	43	39	43	38	38	47	36	482
25 - 29	10	6	11	28	38	26	33	24	39	29	28	25	297
30 - 34	4	6	11	11	20	16	15	16	21	29	9	15	173
35 - 39	2		3	3	8	9	7	6	11	16	12	7	84
40 - 44			2	1	6	3	7	8	11	8	2	1	49
45 - 49	2	1		1	2		2	2	3	1	3	3	20
50 - 54							2			1			3
55 - 59									1		1		2
60 - 64						1							1
65 - 69													
70 - 74													
75 - 79													
80 - 84													
MISSING	5	2	4	2	2		3	2			2	1	23
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 83

Frequency Distribution of Time of Peak Gust
150-Foot Level, July 1949 - June 1954

TIME	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
0000-0059	8	4	10	16	20	13	21	13	14	9	7	9	144
0100-0159	9	4	1	7	8	8	12	5	11	9	4	2	80
0200-0259	5	2	3	4	6	6	7	5	4	6	4	6	58
0300-0359	7	3	4	1	3	9	2	8	4	2	2	3	48
0400-0459	2	6	5	3	2	5	4	3	4	4		4	42
0500-0559	5	5	2	3	1		3	1	3	4	4	1	32
0600-0659	2	2	3		2	5	1	2	1	3	3	5	29
0700-0759	3	2	2	6	3	3	2	4	3	3	3	5	39
0800-0859	2	6	1	2	1	2	4	3	5	4	3	3	36
0900-0959	4	7	6	3	11	5	5	4	4	7	8	4	68
1000-1059	7	7	6	10	6	7	11	7	4	8	4	7	84
1100-1159	14	10	9	8	8	6	2	4	6	10	7	8	92
1200-1259	11	14	21	8	5	8	6	3	6	6	16	7	111
1300-1359	13	12	13	11	7	5	5	5	12	15	16	15	129
1400-1459	11	12	11	18	11	6	3	13	7	9	13	10	124
1500-1559	14	12	10	8	8	4	6	9	11	12	17	17	128
1600-1659	11	9	7	1	3	2	3	2	10	6	9	12	75
1700-1759	3	6	4	3	1	4	3	1	4	2	7	4	42
1800-1859	4	3	3	3	6	4	6	2	4	6	5	5	51
1900-1959		1	4	4	5	9	6	6	4	3	1		43
2000-2059	4	3	2	4	9	10	7	5	5	5	2	5	61
2100-2159		5	4	9	7	9	11	5	9	2	4	4	69
2200-2259	5	5	7	7	8	14	6	8	5	7	6	7	85
2300-2400	6	7	10	12	9	11	18	18	11	8	7	6	123
MISSING	5	8	2	4			1	5	4		3	1	33
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 84

Frequency Distribution of Time of Peak Gust
19-Foot Level, July 1949 - June 1954

TIME	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
0000-0059	3	1	4	8	14	8	22	7	17	6	2	3	95
0100-0159	2	1	2	5	5	7	11	6	7	5	2	4	57
0200-0259			1	2	3	4	6	3	3	3	3	4	32
0300-0359	4		1	1	4	3	1	4	3	1			22
0400-0459	2		1	1	3	6	4	3	3	1		1	25
0500-0559	3	4	2	2	2		5	3	3		2		26
0600-0659	3		2		1	2	4	1		5	2	5	25
0700-0759	5	2	3	2	2	6	2	2	6	4	4	5	43
0800-0859	4	2	5	5	2	3	3	1	3	5	7	2	42
0900-0959	6	7	10	7	9	6	4	6	5	6	5	4	75
1000-1059	10	11	7	14	8	10	11	9	6	10	13	12	121
1100-1159	15	18	15	11	9	9	7	6	10	11	11	15	137
1200-1259	19	20	17	18	14	15	8	5	9	9	24	10	168
1300-1359	25	30	26	19	19	14	4	16	11	22	21	16	223
1400-1459	13	22	20	28	10	4	6	19	14	16	18	16	186
1500-1559	11	12	14	7	9	6	6	8	12	15	15	18	133
1600-1659	11	6	3	2	4	3	4	5	12	5	9	13	77
1700-1759	4	6	3	2	3	5		4	3	3	4	7	44
1800-1859	3	2	2	1	3	3	5	1	3	7	2	5	37
1900-1959	1	1	2	2	3	5	6	4		3	1	1	29
2000-2059	2	2	1	3	3	13	5	1	5	4	2	3	44
2100-2159		2	3	4	7	5	4	6	4	1	3	2	41
2200-2259	2	2		4	5	7	5	6	5	2	2	3	43
2300-2400	2	2	2	5	6	11	19	13	11	6	1		78
MISSING	5	2	4	2	2		3	2			2	1	23
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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(B) Temperature Studies

The temperature data used in this report were obtained by means of two different types of instruments. From July 1, 1949 to June 30, 1951, the temperature data were obtained by means of a hygrothermograph mounted in a standard U. S. Weather Bureau cotton-region type shelter. For the remainder of the period, the data were obtained from a sensitive aspirated thermopile mounted 3.5 or 5.5 feet above the ground (see Figure 1) and recorded on a Brown Electronik Potentiometer Recorder.

The temperature was determined from the hygrothermograph by reading the value on the hour to the nearest whole degree Fahrenheit. Also, maximum and minimum values for each day were determined in this way. Since the temperature element of this instrument does not respond to rapid fluctuations, each instantaneous reading represents a time average taken over a period of several minutes.

The hygrothermograph was serviced once a week. During the servicing, the temperature readings were compared with a mercurial thermometer and the time was checked. Both the calibration corrections and time corrections were distributed proportionately for the preceding week. Although this procedure may not have been valid at all times, it was made for the sake of objectivity in evaluating the data. Interpolations were used to fill gaps of less than three hours if such interpolations appeared valid after an examination of the hygrothermograph records from a nearby station.

The temperature record from the thermopile was examined daily. The recorder for this instrument is mounted on the meteorology instrument panel at the Meteorology Laboratory. Since the charts are driven by a synchronous motor, time corrections were seldom necessary. On occasion, time errors occurred because of power failure or improper chart paper feed. Adequate time corrections could be applied upon examining the cause of the time error.

Each hourly temperature reading obtained from the Brown Recorder represents a ten-minute average beginning at five minutes before the hour and ending at five minutes past the hour. Values of temperature were read to the nearest 0.1°C . Whenever the data from the thermopile were missing for one or two consecutive hourly readings, interpolations were made if the continuity of the available record clearly indicated that interpolation was justifiable. The hygrothermograph trace was used whenever more than two hourly readings were missing. Maximum and minimum temperature readings from the Brown Recorder represent five-minute averages. The time of the maximum or minimum reading was taken at the midpoint of this five-minute period.

1. Average Hourly Temperature (°F)

Table 85: In this table the average temperature for each hour of the day is presented. The data are grouped by corresponding months, i.e., five Januarys, five Februarys, etc., for the five-year period under study. Each temperature average is based on the total number of corresponding hourly readings. For example, the entry for 0500 in July is based on 155 readings, since there are thirty-one 0500 readings in each of the five Julys considered.

2. Average Daily Degree Days - Base 65°F

Table 86, Figure 9: The average value of degree days is tabulated for each day of the year. Average monthly totals and cumulative average monthly totals are also listed. The degree day value is defined as the difference between the average temperature for the day and 65°F. Degree day values are always positive or zero. If the average temperature exceeds 65°F, then the degree day value is considered zero. The entry for each date in this table represents the average of the five degree-day values for the five corresponding dates covered by this report.

In Figure 9 the cumulative average degree days for Argonne based on this five-year period and the Chicago normals based on the thirty-year period from January 1921 to December 1950 are shown.

3. Frequency Distribution of the Number of Hours and Days with Temperature (°F) above or below Specified Values

Table 87: It is of interest to note that 11,309 or slightly over 26% of the observations were recorded as 32°F or below. Also, freezing temperatures occurred on 758 of the 1826 days covered in this report, i.e., freezing temperatures occurred on over 41% of the days.

4. Temperature Means and Extremes

Figures 10-12: Five-year monthly maximum and minimum temperatures and the five-year averages of daily maximum and minimum and mean temperatures for each month are shown in Figure 10. The difference between the top and bottom curves represents the monthly temperature range. From this set of curves it is apparent that July was the warmest month and January the coldest.

Figure 11 is a bar diagram showing the maximum and minimum temperatures which occurred during each of the months in the five years of this report. Figure 12, also, is a bar diagram based on individual months. The average daily maximum, mean, and minimum temperatures for individual months and the five-monthly average are shown in this figure.

5. Frequency Distribution of Daily Maximum and Minimum Temperature

Tables 88 and 89: These tables show graphically the seasonal variations as well as the range of maximum and minimum temperatures that occurred during each month.

6. Frequency Distribution of Time of Daily Maximum and Daily Minimum Temperatures

Tables 90 and 91: These tables show, as might be expected, that maximum temperatures most frequently occurred during the afternoon and minimum temperatures during the early morning. The secondary peak in the frequency of maximum and minimum temperatures which occurred at midnight was due to the marked air mass changes accompanying frontal passages. For example, if a cold front passed sometime during the day and the temperature began to fall steadily, the minimum temperature for the 24-hour period ending at midnight often occurred at midnight. If the minimum or maximum temperature occurred at the end of the day, it was considered as occurring at 2400. If it occurred at the beginning of the day, it was recorded as occurring at 0000.

7. Frequency Distribution of Daily Temperature Range

Table 92: There was a tendency for small ranges to occur during the colder months; however, some of the largest ranges occurred during the spring and fall, accompanying frontal passes with marked air mass changes. Small diurnal temperature ranges were associated with cloudy and precipitating conditions such as occur during frontal rains. These occurred more frequently during the colder months.

8. Joint Frequency Distribution of Daily Temperature Range and Maximum Temperature

Table 93: These data show a tendency for lower temperature ranges to be associated with lower maximum temperatures. This is to be expected since smaller ranges occurred in the colder months.

9. Joint Frequency Distribution of Daily Temperature Range and Minimum Temperature

Table 94: It is of interest to note that the lowest minima were not associated with extreme diurnal ranges.

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10. Monthly Maxima, Means, and Minima of Daily Temperature Range Values

Tables 94(a), 94(b), 94(c), and Figure 13: In these tables and this figure the maximum, average, and minimum daily temperature ranges for each month of each of the five years studied are presented. An entry of M in Tables 94(a) and 94(c) indicates that the data that were missing were such as to make the determination of the maximum or minimum doubtful. In Table 94(b) the M indicates that more than 20% of the range values were missing or doubtful.

Although March had one of the lowest average diurnal temperature ranges, both the highest range recorded, 43°F, and also the lowest, 2°F, occurred in this month. These tables also indicate the tendency for the diurnal temperature range in the warmer months to exceed that in the colder months.

11. Monthly Maximum and Minimum Temperatures and Ranges of Monthly Temperatures (°F)

Table 94(d): The maximum and minimum temperature for each month and their difference, which is defined as monthly temperature range, are shown in this table.

Although the diurnal temperature ranges averaged higher in the warmer months, it is interesting to note that the monthly temperature ranges were greater in the colder months. This is due to the low minima which occurred with excursions of arctic air. An entry of M, as in the previous tables, signifies missing data.

In the five-year period the highest maximum recorded was 97°F and the lowest minimum was -19°F, resulting in a five-year range of 116°F.

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TABLE 85

Average Hourly Temperature of
July 1949 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	66	63	56	48	34	24	23	26	30	41	51	63	1
2	65	63	55	47	33	24	23	25	29	41	50	62	2
3	65	62	54	46	33	24	23	25	29	40	50	62	3
4	64	62	54	46	32	23	22	25	28	40	49	61	4
5	64	61	53	45	32	23	22	24	28	39	49	61	5
6	66	63	53	45	32	23	22	24	28	40	51	63	6
7	69	65	55	46	32	23	22	24	28	42	54	65	7
8	72	69	59	49	34	24	22	26	30	44	57	68	8
9	74	72	63	53	36	25	24	28	32	47	60	71	9
10	77	74	65	57	38	26	25	30	34	49	62	73	10
11	78	76	67	59	40	28	26	32	36	51	64	74	11
12	79	77	69	60	42	29	28	33	37	52	65	76	12
13	80	78	70	62	43	30	29	34	38	53	65	76	13
14	80	78	70	62	43	30	29	34	38	53	66	77	14
15	80	78	70	62	43	30	29	34	38	54	66	77	15
16	80	77	69	61	41	29	28	33	37	53	65	76	16
17	79	75	68	56	39	28	27	31	36	52	64	75	17
18	77	73	64	54	38	27	26	30	35	50	61	73	18
19	73	69	61	53	37	27	25	29	33	47	58	70	19
20	71	67	59	51	36	26	25	28	32	46	56	67	20
21	69	66	59	51	35	26	24	28	32	45	54	66	21
22	68	65	58	50	35	25	24	27	32	44	53	65	22
23	67	65	57	49	34	25	24	27	31	43	52	64	23
24	66	64	56	48	34	25	23	26	31	42	51	63	24

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TABLE 86

Average Daily Degree Days - Base 65°F
July 1949 - June 1954

DAY	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1			3	2	17	35	32	44	40	27	6	5
2		1	4	4	25	29	31	43	41	26	10	3
3			3	7	29	26	41	41	38	29	13	5
4		1	5	10	31	31	40	36	41	29	12	7
5		1	3	12	30	32	43	33	40	23	12	5
6			4	18	27	29	45	37	35	19	12	3
7			7	20	28	32	46	41	35	20	16	3
8	1		4	19	26	33	38	41	40	25	12	2
9	1		1	14	26	35	35	39	34	19	12	
10				13	25	38	38	33	29	22	14	1
11	1	1		11	26	33	43	34	30	23	14	1
12		1	3	11	22	42	41	35	31	25	12	
13			6	12	20	44	35	35	35	23	13	
14			8	11	20	46	33	33	36	19	8	1
15			7	10	21	52	34	34	35	20	6	
16			6	10	22	53	42	39	32	23	8	
17			3	9	23	45	38	41	29	21	12	3
18		1	3	9	25	44	40	32	28	16	10	3
19		1	4	10	23	41	36	32	31	20	9	2
20	1	2	5	14	31	32	38	31	32	18	7	2
21		1	6	11	32	37	43	38	29	11	5	1
22		2	11	12	31	44	40	39	27	12	9	2
23		3	12	16	36	46	39	34	29	16	5	
24		1	10	19	39	46	40	37	33	14	3	
25			7	17	37	41	38	38	30	13	3	
26			5	16	37	43	41	35	28	17	6	
27			8	18	39	49	42	35	23	14	9	
28			8	21	39	40	47	34	25	15	7	
29			7	18	34	36	53	37	30	11	5	1
30			4	14	35	38	51		29	6	1	1
31		1		17		31	42		26		1	
TOTAL	4	17	157	405	856	1205	1245	1061	1001	576	272	51
CUMULATIVE TOTAL	4	21	178	583	1439	2644	3889	4950	5951	6527	6799	6850

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FIGURE 9 CUMULATIVE DEGREE DAYS (Base 65° F)

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TABLE 87

Frequency Distribution of the Number of Hours and Days
With Temperature ($^{\circ}\text{F}$) Above or Below Specified Values
July 1949 - June 1954

NUMBER OF HOURS WITH TEMPERATURE:	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
≥ 95	9		7									5	21
≥ 90	40	46	26									48	160
≥ 85	255	164	71	4							31	230	755
≥ 80	745	453	135	58						14	113	570	2088
≥ 75	1445	960	306	157	5					73	291	1017	4254
≥ 70	2295	1768	644	315	19				5	183	573	1706	7508
≤ 32				124	1477	2539	2742	2158	1911	343	15		11309
≤ 0					23	152	108	101	4				388
MISSING	9	1	170	130	5	35	2	52	24	225		18	689
NUMBER OF DAYS WITH TEMPERATURE:													
≥ 95	3	1	3									4	11
≥ 90	10	15	4								1	17	47
≥ 85	61	36	14	2							10	41	164
≥ 80	102	72	22	19						6	24	77	322
≥ 75	139	125	48	30	1					17	47	108	515
≥ 70	152	147	86	47	7				1	27	73	130	670
MISSING			8	6	1	2	2	3	3	11			36
NUMBER OF DAYS WITH TEMPERATURE:													
≤ 32				25	103	147	159	142	127	49	6		758
≤ 0					3	17	15	12	1				48
MISSING		1	8	6		4	2	3	3	11		1	39

FIGURE 10 MONTHLY MAXIMUM AND MINIMUM TEMPERATURES, MONTHLY AVERAGES OF DAILY MAXIMUM, MINIMUM AND MEAN TEMPERATURES 1949-1954

FIGURE II MONTHLY MAXIMUM AND MINIMUM TEMPERATURES
JULY 1949 - JUNE 1954

FIGURE 12 AVERAGE DAILY MAXIMUM, MEAN, AND MINIMUM TEMPERATURES
IN EACH MONTH JULY 1949 - JUNE 1954

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TABLE 88
Frequency Distribution of Daily Maximum Temperature
July 1949 - June 1954

MAXIMUM TEMPERATURE oF	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
95 - 99	3	1	3									4	11
90 - 94	7	14	1								1	13	36
85 - 89	51	21	10	2							9	24	117
80 - 84	41	36	8	16						6	14	36	157
75 - 79	37	53	26	11	1					11	23	31	193
70 - 74	13	22	38	17	6				1	10	26	22	155
65 - 69	2	8	33	27	8		1	1	2	9	26	8	125
60 - 64	1		14	20	9	3	1		8	12	22	8	98
55 - 59			7	19	15	3	2	3	9	16	15	2	91
50 - 54			2	23	12	8	5	7	10	31	13	2	113
45 - 49				10	20	10	11	10	24	17	5		107
40 - 44				2	19	20	14	23	20	13	1		112
35 - 39				2	17	22	23	39	29	10			142
30 - 34					25	38	43	26	26	3			161
25 - 29					14	12	24	15	14	1			80
20 - 24					2	21	14	5	8				50
15 - 19						7	6	4					17
10 - 14						6	5	2	1				14
5 - 9					1	2	2	2					7
0 - 4						1	1	1					3
-5 - -1							1						1
MISSING			8	6	1	2	2	3	3	11			36
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 89

Frequency Distribution of Daily Minimum Temperature
July 1949 - June 1954

MINIMUM TEMPERATURE °F	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
75 - 79												2	2
70 - 74	20	7	1									8	36
65 - 69	29	25	2	2							2	25	85
60 - 64	52	44	17	6							6	33	158
55 - 59	37	43	28	7	2					3	12	29	161
50 - 54	16	30	28	20	2					12	30	32	170
45 - 49	1	5	27	27	6	1	1		2	15	44	16	145
40 - 44			28	25	9	5	1	1	5	17	27	3	121
35 - 39			11	26	18	7	4	5	12	30	27	1	141
30 - 34				22	26	23	7	17	29	32	5		161
25 - 29				8	38	21	33	35	33	25	2		195
20 - 24				5	19	19	18	29	31	3			124
15 - 19				1	12	19	30	17	18	2			99
10 - 14					12	21	22	13	14				82
5 - 9					3	9	11	8	4				35
0 - 4						11	14	1	3				29
-5 - -1					3	9	9	5	1				27
-10 - -6						3		5					8
-15 - -11						2	2	1					5
-20 - -16						1	1	1					3
MISSING		1	8	6		4	2	3	3	11		1	39

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TABLE 90

Frequency Distribution of Time of Daily Maximum Temperature
July 1949 - June 1954

HOUR	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
0000-0059	1	1	4	4	9	9	14	9	9	3	1	3	67
0100-0159			1	2	1	6	4	1	3	1	1		20
0200-0259	1				3	5	2	1			1		13
0300-0359			1		2	1	2	1	1	1			9
0400-0459	1						1						2
0500-0559			1			1		1		1	1		5
0600-0659				1		1	2	2		1		1	8
0700-0759							1		1				2
0800-0859		1	1		1			1			1		5
0900-0959	1		1		2	2	2	2	5		2	1	18
1000-1059	1	1	1	5		4		3	4	3	6	5	33
1100-1159	11	6	5	12	5	10	4	7	12	4	10	6	92
1200-1259	9	16	16	16	17	7	13	14	4	17	10	20	159
1300-1359	22	50	26	34	39	20	29	19	21	15	26	17	318
1400-1459	52	35	50	45	42	30	25	38	38	34	37	47	473
1500-1559	35	32	27	23	16	21	21	19	29	29	34	32	318
1600-1659	13	9	5	4	2	4	6	4	10	19	16	12	104
1700-1759	6	3	3	1	2	4	2	1	4	2	8	5	41
1800-1859	2	1			1	2	2		1	2		1	12
1900-1959				1		2	2			2	1		8
2000-2059					2	4	2		2	1			11
2100-2159				1		1	1	2	1				6
2200-2259					1	3	1	2	3				10
2300-2359					1	3	2	1	1				8
2400					3	13	15	10	3	4			48
MISSING			8	6	1	2	2	3	3	11			36
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 91

Frequency Distribution of Time of Daily Minimum Temperature
July 1949 - June 1954

HOUR	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
0000-0059	8	5	5	4	16	27	18	14	8	8	13	14	140
0100-0159	10	4	3	3	3	6	8	6	5	8	10	9	75
0200-0259	12	7	3	6	4	5	6	4	5	5	11	5	73
0300-0359	9	13	8	7	9	3	7	6	9	12	7	17	107
0400-0459	42	32	21	6	11	4	8	10	6	11	35	42	228
0500-0559	23	41	32	34	10	10	7	11	19	26	23	11	247
0600-0659	1	5	21	41	21	20	9	23	36	13	2	1	193
0700-0759		1	1	3	15	15	23	10	9	4	1	1	83
0800-0859		1			2	3	4	1	2				13
0900-0959	1	1				3			1	1			7
1000-1059	1		1						2			1	5
1100-1159	1						1						2
1200-1259							1		2	1			4
1300-1359	1												1
1400-1459	1												1
1500-1559						1		1				1	3
1600-1659		1				1				1			3
1700-1759								1					1
1800-1859					1	1	1	2		1		1	7
1900-1959					1	1	3	2		1			8
2000-2059					1	1	1		2			1	6
2100-2159	1	1	4	4	3	1	2		3	4	2	2	27
2200-2259	4	9	5	3	7	8	12	3	3	4	5	6	69
2300-2359	11	10	13	14	9	6	7	7	12	10	13	13	125
2400	29	23	25	24	37	35	35	37	28	29	33	24	359
MISSING		1	8	6		4	2	3	3	11		1	39
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

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TABLE 92
Frequency Distribution of Daily Temperature Range
July 1949 - June 1954

TEMPERATURE °F	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
40 - 44			1						1	1			3
35 - 39			4	1	3		3	1		3	3	2	20
30 - 34	3	1	9	24	6	2	3	2	2	18	18	7	95
25 - 29	33	31	35	31	19	11	11	13	15	15	39	26	279
20 - 24	54	55	46	37	25	22	29	25	21	25	47	50	436
15 - 19	44	42	26	33	37	45	35	37	49	34	31	44	457
10 - 14	17	23	12	11	35	35	40	32	35	22	9	18	289
5 - 9	4	2	7	11	21	28	27	26	22	17	7	1	173
0 - 4			2		3	8	5	2	7	4	1	1	33
MISSING		1	8	7	1	4	2	3	3	11		1	41
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

TABLE 93

Joint Frequency Distribution of Daily Temperature Range
and Maximum Temperature
July 1949 - June 1954

MAXIMUM TEMPERATURE °F	TEMPERATURE RANGE °F											MISSING	TOTAL
	50 - 54	45 - 49	40 - 44	35 - 39	30 - 34	25 - 29	20 - 24	15 - 19	10 - 14	5 - 9	0 - 4		
95 - 99					1	7	3						11
90 - 94					1	14	17	4					36
85 - 89				6	7	34	42	22	5			1	117
80 - 84			1	2	14	36	55	35	14				157
75 - 79			1		21	50	64	39	17	1			193
70 - 74				5	11	39	34	49	14	2		1	155
65 - 69				2	15	23	37	23	13	10	1	1	125
60 - 64				1	10	11	35	21	15	4	1		98
55 - 59			1	1	6	11	23	31	15	2	1		91
50 - 54				1	1	16	25	38	19	12	1		113
45 - 49				1	3	11	20	44	20	6	2		107
40 - 44				1	1	4	14	38	32	20	2		112
35 - 39					1	6	17	38	38	34	8		142
30 - 34					2	5	21	29	32	57	15		161
25 - 29					1	4	10	24	28	11	1	1	80
20 - 24						4	12	9	12	11	1	1	50
15 - 19						2	3	7	5				17
10 - 14						2	2	3	6	1			14
5 - 9							1	1	3	2			7
0 - 4							1	2					3
-5 - -1									1				1
MISSING												36	36
TOTAL			3	20	95	279	436	457	289	173	33	41	1826

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TABLE 94

Joint Frequency Distribution of Daily Temperature Range
and Minimum Temperature
July 1949 - June 1954

MINIMUM TEMPERATURE °F	TEMPERATURE RANGE °F											MISSING	TOTAL
	50 - 54	45 - 49	40 - 44	35 - 39	30 - 34	25 - 29	20 - 24	15 - 19	10 - 14	5 - 9	0 - 4		
75 - 79							1	1					2
70 - 74						3	9	11	13				36
65 - 69						10	31	32	10	2			85
60 - 64					1	38	55	37	20	6	1		158
55 - 59					6	26	58	47	15	8	1		161
50 - 54				3	13	52	49	36	13	2	1	1	170
45 - 49				5	19	37	37	19	18	9	1		145
40 - 44			1	1	10	32	32	24	11	8	2		121
35 - 39			1	5	16	13	33	38	18	12	4	1	141
30 - 34				2	11	11	19	40	33	33	12		161
25 - 29					9	16	27	48	40	46	9		195
20 - 24					2	10	14	40	29	27	2		124
15 - 19				2	3	7	17	27	33	10			99
10 - 14			1	1	1	4	22	28	18	7			82
5 - 9				1	1	6	8	12	6	1			35
0 - 4						4	13	8	4				29
-5 - -1					3	4	6	6	6	2			27
-10 - -6						4	2	1	1				8
-15 - -11						1	2	1	1				5
-20 - -16						1	1	1					3
MISSING												39	39
TOTAL			3	20	95	279	436	457	289	173	33	41	1826

FIGURE 13
DAILY MAXIMUM, MEAN, AND MINIMUM TEMPERATURE RANGES IN EACH
MONTH JULY 1949-JUNE 1954

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TABLE 94a
Maximum Daily Temperature Range (°F)
July 1949 - June 1954

	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	28	32	M	M	35	30	35	33	26	M	33	38
JULY 1950 - JUNE 1951	27	26	26	31	32	27	28	M	43	37	36	36
JULY 1951 - JUNE 1952	32	29	32	31	24	33	28	26	27	40	37	29
JULY 1952 - JUNE 1953	30	28	36	38	36	23	37	37	29	34	34	31
JULY 1953 - JUNE 1954	30	28	41	34	32	28	35	29	30	34	32	33

TABLE 94b
Average Daily Temperature Range (°F)
July 1949 - June 1954

	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	19	21	M	21	16	14	18	14	14	M	22	18
JULY 1950 - JUNE 1951	19	18	16	20	16	17	14	16	16	18	22	21
JULY 1951 - JUNE 1952	21	19	20	20	15	17	16	14	14	22	21	21
JULY 1952 - JUNE 1953	22	20	24	25	21	11	14	18	17	19	23	22
JULY 1953 - JUNE 1954	20	22	25	23	18	15	17	18	17	22	23	21

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TABLE 94c
Minimum Daily Temperature Range (°F)
July 1949 - June 1954

	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	10	12	M	M	5	M	2	3	2	M	11	4
JULY 1950 - JUNE 1951	7	5	6	5	4	3	5	M	2	4	4	10
JULY 1951 - JUNE 1952	8	10	3	5	5	6	5	5	4	4	7	12
JULY 1952 - JUNE 1953	13	11	11	11	6	3	3	5	4	2	6	16
JULY 1953 - JUNE 1954	7	14	15	6	4	6	5	5	3	5	14	9

TABLE 94d
Maximum, Minimum and Ranges of Monthly Temperatures (°F)
July 1949 - June 1954

		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	MAXIMUM	97	91	M	M	70	60	65	39	62	M	87	86
	MINIMUM	54	50	M	M	13	M	0	- 8	- 2	M	36	46
	RANGE	43	41	M	M	57	M	65	47	64	M	51	40
JULY 1950 - JUNE 1951	MAXIMUM	89	87	81	84	77	48	51	M	65	81	86	87
	MINIMUM	50	45	38	33	- 2	15	-19	M	10	28	37	39
	RANGE	39	42	43	51	79	63	70	M	55	53	49	48
JULY 1951 - JUNE 1952	MAXIMUM	88	89	88	86	61	62	54	50	61	83	90	95
	MINIMUM	47	47	35	30	9	-16	- 4	13	6	25	35	45
	RANGE	41	42	53	56	52	78	58	37	55	58	55	50
JULY 1952 - JUNE 1953	MAXIMUM	91	87	89	83	72	56	55	54	73	78	87	96
	MINIMUM	50	47	39	16	8	11	- 5	- 7	11	23	35	44
	RANGE	41	40	50	67	64	45	60	61	62	55	52	52
JULY 1953 - JUNE 1954	MAXIMUM	90	95	96	85	71	54	50	67	66	81	84	95
	MINIMUM	50	51	35	30	14	- 4	-11	3	1	16	28	46
	RANGE	40	44	61	55	57	58	61	64	65	65	56	49

(C) Relative Humidity Studies

Relative humidity data were obtained by means of a standard hygrothermograph. This instrument was located in a standard U. S. Weather Bureau cotton-region type shelter and mounted at five feet above grass-covered ground. The hygrothermograph was serviced weekly. At servicing, the hygrothermograph reading was checked against a wet-and-dry-bulb mercurial psychrometer and calibration corrections were applied. Time checks were also made at this time.

In evaluating the data, for the sake of objectivity, calibration and time errors were assumed to be linearly distributed throughout the seven-day period, the time between servicings. Relative humidity values were read for each hour on the hour to the nearest whole percent. The highest and lowest relative humidity values for each day to the nearest whole percent were also determined.

Whenever less than three hours of relative humidity data were missing, the data were interpolated if an examination of comparable records from a nearby station two miles away indicated that interpolations were justified. Otherwise the data from this station were substituted. Data from the nearby station were also used when the hygrothermograph from the regular station was inoperative for three hours or more.

1. Average Hourly Relative Humidity in Percent

Table 95: This table shows the average relative humidity for each hour of the day during each month. Each relative humidity value average is based on the total number of corresponding hourly readings. For example, the entry for 0500 in July is based on 155 readings since there are thirty-one 0500 readings in each of the five Julys considered. None of the averages were considered missing since each entry was based on over 90% of the total possible observations.

The diurnal variation of relative humidity is evident from this table. Minimum values occur in mid-afternoon and maximum values occur during the early morning hours. A comparison of the data in this table with those of Table 85, showing the average hourly temperatures, indicates that the average diurnal temperature wave is nearly 180 degrees out of phase with the average diurnal relative humidity wave.

2. Number of Hours and Number of Days with Relative Humidity Greater than 89 Percent

Tables 96 and 97: These tables indicate how frequently values of relative humidity 90% or higher occurred. It is of interest to note that during each of the years the relative humidity exceeded 90%

on over 200 of the 365 or 366 days. The tabulation of the frequency of occurrence of readings equal to 90% or greater shows that the annual average is 2355 hours. This indicates that the relative humidity was over 90% for more than one-fourth of the readings. As a rule, if more than 20% of the data were missing, the entry was considered missing.

However, three entries were included in these tables which did not meet this criterion. These are the entries for: September 1949 with 550 readings, April 1950 with 535 readings, and May 1951 with 502 readings.

3. Relative Humidity Means and Extremes

Figures 14 and 15: Figure 14 is a bar diagram showing the maximum and minimum relative humidity for each month for the period July 1950 through June 1954. Maximum and minimum relative humidity values were not evaluated for the first year of this five-year period. In each month the maximum relative humidity was 100%.

Figure 15 is a bar diagram showing the average daily maximum, mean and minimum relative humidity for the same period as in Figure 14. The four-year averages are also shown. Note that the average minimum and mean values are higher in the colder months of the year.

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TABLE 95

Average Hourly Relative Humidity in Per Cent
July 1949 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	88	91	85	77	78	85	86	84	82	82	81	87	1
2	90	92	88	79	79	85	86	85	82	83	82	88	2
3	90	93	88	81	80	86	86	85	83	83	83	89	3
4	91	92	90	83	81	87	86	85	83	84	84	89	4
5	91	94	92	84	82	87	86	86	83	84	85	89	5
6	87	92	92	85	83	87	86	87	84	84	82	86	6
7	79	85	87	83	82	87	86	86	82	79	75	80	7
8	72	77	77	76	80	86	86	84	77	74	67	75	8
9	66	69	67	66	73	83	83	79	71	68	62	69	9
10	62	63	61	60	68	79	80	74	68	64	59	65	10
11	59	59	56	55	63	76	77	71	66	61	56	62	11
12	57	57	52	53	61	74	76	69	65	59	54	60	12
13	56	55	51	50	59	73	74	68	64	58	53	59	13
14	55	55	50	49	59	73	74	67	63	57	53	58	14
15	55	56	50	47	59	74	74	67	64	57	53	58	15
16	55	57	51	51	61	76	76	69	65	58	53	59	16
17	57	60	55	56	66	80	79	72	67	60	55	62	17
18	62	67	63	63	69	82	82	76	71	65	57	65	18
19	69	76	72	68	72	83	83	79	75	70	63	70	19
20	76	83	77	71	73	83	84	81	77	74	68	75	20
21	81	86	80	74	75	85	85	82	79	76	73	80	21
22	83	89	82	74	76	85	85	82	80	78	75	83	22
23	86	90	84	76	77	85	85	83	81	79	78	85	23
24	87	91	85	77	78	85	85	84	82	80	80	86	24

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TABLE 96

Number of Days with Relative Humidity Greater than 89 Per Cent

PERIOD	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1949 - JUNE 1950	20	31	19	12	21	24	20	21	19	17	4	5	213
JULY 1950 - JUNE 1951	19	30	30	24	22	25	18	19	19	27	21	30	284
JULY 1951 - JUNE 1952	31	30	29	29	17	26	21	24	24	15	23	25	294
JULY 1952 - JUNE 1953	30	29	28	13	20	27	30	21	25	17	23	26	289
JULY 1953 - JUNE 1954	29	21	20	19	11	23	23	16	17	26	19	26	250
AVERAGE	26	28	25	19	18	25	22	20	21	20	18	22	266

TABLE 97

Number of Hours with Relative Humidity Greater than 89 Per Cent

PERIOD	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APRIL	MAY	JUN	
JULY 1949 - JUNE 1950	131	297	156	89	124	277	212	190	151	137	23	42	1829
JULY 1950 - JUNE 1951	139	244	298	183	177	223	174	230	206	291	141	241	2547
JULY 1951 - JUNE 1952	281	343	266	300	164	258	247	242	265	133	226	248	2973
JULY 1952 - JUNE 1953	254	279	211	72	118	326	404	158	246	120	191	198	2577
JULY 1953 - JUNE 1954	190	169	88	141	74	205	254	119	103	201	137	166	1847
AVERAGE	199	266	204	157	131	258	258	188	194	176	144	179	2355

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LEGEND

MONTHLY MAXIMUM 100%
 MONTHLY MINIMUM

PERIOD: 1 - JULY 1950 - JUNE 1951
 2 - JULY 1951 - JUNE 1952
 3 - JULY 1952 - JUNE 1953
 4 - JULY 1953 - JUNE 1954

FIGURE 14 MONTHLY MAXIMUM AND MINIMUM RELATIVE HUMIDITY JULY 1950 - JUNE 1954

LEGEND

AVERAGE OF DAILY MAXIMUM

AVERAGE OF DAILY MINIMUM

MONTHLY MEAN RELATIVE HUMIDITY

PERIOD: 1 - JULY 1949 - JUNE 1950

2 - JULY 1950 - JUNE 1951

3 - JULY 1951 - JUNE 1952

4 - JULY 1952 - JUNE 1953

5 - JULY 1953 - JUNE 1954

A - 4 YEAR MONTHLY AVERAGE FOR
MAXIMUM AND MINIMUM RELATIVE
HUMIDITY AND 5 YEAR MONTHLY
AVERAGE FOR MEAN RELATIVE
HUMIDITY

FIGURE 15 AVERAGE DAILY MAXIMUM, MEAN, AND
MINIMUM RELATIVE HUMIDITY IN EACH
MONTH JULY 1950 - JUNE 1954

(D) Precipitation Studies

A self-recording weighing-type rain gauge was used to obtain the precipitation record. This instrument was serviced every seven days. Calibration drifts have appeared to be negligible, but time errors have been appreciable on occasion. For the sake of objectivity in evaluating the data, the time drift has been distributed linearly throughout the seven-day period. The precipitation amount during each hour was read on the hour to the nearest 0.01 inch.

It is probable that the amounts of snow accumulated by the Argonne precipitation gauge were less than actually occurred. There are two reasons for this: (1) the collection efficiency may have been erratic in moderate or high winds, since no snow shield was used, and (2) observers were not always on duty to scrape into the weighing bucket the snow which may have clung to the inner surface of the collector. The station was manned only eight hours per day Monday through Friday. If the rain gauge chart showed a measurable amount of precipitation but less than 0.005 inch, the amount was recorded as a "trace." Trace amounts of precipitation were not counted in the calculations of total amounts of precipitation but they were included in the count of the number of hours or days during which precipitation occurred.

1. Frequency Distribution of Daily Amounts of Precipitation

Table 98: A frequency distribution of the daily amounts of precipitation occurring in each month is presented in this table. As one would expect, the larger amounts of precipitation occurred during the warmer months. These relatively high amounts of precipitation frequently occurred with squall lines or other forms of convective activity. The data also indicate the relative dryness of the fall months.

2. Number of Days during which Precipitation Amounts Equalled or Exceeded Specified Values

Table 99: These data indicate the frequency with which amounts greater than a specified value occurred at the Argonne site. During this five-year period there were eight to ten days in each year during which the precipitation exceeded one inch. Also, it is of interest to note that in each year precipitation exceeding 0.01 inch occurred on 100 to 117 days. These data indicate that on about 29% of the days during the five-year period, precipitation of 0.01 inch or greater fell.

3. Precipitation Amounts in Inches

Table 100, Figure 16: Monthly totals of precipitation in inches for each year of the study are presented. During any one month, the variation of precipitation may be quite high. For example, the lowest

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precipitation in any one month (0.10 inch) occurred in February, 1952, whereas the highest in this five-year period (5.91 inches) occurred in July, 1953. Precipitation in this area is appreciably higher during the summer months - June and July - due to the higher amounts of precipitation which may occur with convective activity. During the winter months, although the number of hours or days with precipitation may be higher, the amounts are lower. Although some of the precipitation in the form of snow is lost because of the tendency of snow to blow around the precipitation gauge without falling in, the observed amounts are still significantly higher in summer.

Figure 16 is a bar diagram showing the total amounts of precipitation which fell during each month. The variability of precipitation amounts from year to year within any month is clearly shown.

4. Number of Hours of Precipitation

Table 101, Figure 17: This table shows the total number of hours in each month of the five-year period during which precipitation occurred. In all probability, the figures given in this table are too low since periods in which the total amount of precipitation was a trace were not recorded. This is due to the fact that observers were on duty only eight hours per day, five days a week. Precipitation amounts of 0.01 inch or greater could be adequately determined from an examination of the precipitation gauge. Although there is considerable variation from month to month, the data indicate that there was a greater number of hours of precipitation in the winter and spring months than in the summer and fall months.

The bar diagram of Figure 17 shows the total number of hours of precipitation within each month of the period from July 1, 1949, through June 30, 1954. Both the annual variability and the winter maxima are quite evident from this figure.

5. Persistence of Precipitation and Dry Periods

- a. Table 102: Frequency Distribution of the Number of Consecutive Hours without Precipitation
- b. Table 103: Frequency Distribution of the Number of Consecutive Hours with Precipitation
- c. Table 104: Frequency Distribution of the Number of Consecutive Days without Precipitation
- d. Table 105: Frequency Distribution of the Number of Consecutive Days with Precipitation

The number of consecutive hours with and without precipitation are shown in Tables 102 and 103. In presenting the data for the number of hours without precipitation, an unequal hourly grouping was used in order to include all of the data in a relatively small space. Tables 104 and 105 indicate the occurrence frequency of groups of consecutive days with and without precipitation. In all of the above tables, a zero value is indicated by a blank or no entry. In Tables 102 and 103 the last column shows the total number of hourly observations in the category. For example, in Table 102 the entry on the last line in the last column is 1230. There were two entries in the category 500-749 hours. The 1230 means that the total number of hours involved in these two entries was 1230 hours.

In Tables 104 and 105 the last column is analogous to the last column in Tables 102 and 103. The entries in the next to the last column are the totals of the frequencies on each line, i.e., the total number of groups of consecutive days in each category.

If the period of consecutive days or consecutive hours began in one month and ended in the following month, the data were entered for the month during which the period began. Similarly, persistence periods which continued across years were not broken for these calculations.

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TABLE 98
Frequency Distribution of Daily Amounts of Precipitation
July 1949 - June 1954

PRECIPITATION IN INCHES	MONTH												TOTAL
	JUL	AUG.	SEP	OCT.	NOV.	DEC.	JAN.	FEB.	MAR	APR.	MAY	JUN	
TRACE	7	1	4	4	10	10	18	8	19	4	10	4	99
.01 - .04	7	6	10	8	10	20	13	14	17	14	10	17	146
.05 - .09	6	4	2	4	3	13	11	9	9	7	10	10	88
.10 - .49	16	11	14	8	15	15	16	14	22	21	19	15	186
.50 - .99	4	5	5	8	7	8	2	3	4	9	4	5	64
1.00 - 1.99	10	6	2	1			2		5	5	1	5	37
2.00 - 2.99		1	1								1	2	5
3.00 - 3.99	1												1
> 4.00												1	1
TOTAL	51	34	38	33	45	66	62	48	76	60	55	59	627

TABLE 99

Number of Days During which Precipitation Amounts
Equalled or Exceeded Specified Values

PPTN. IN INCHES	PERIOD	MONTH												TOTAL
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1.00" OR GREATER	JULY 1949 - JUNE 1950	2	1		1			1			1		3	8
	JULY 1950 - JUNE 1951	3		1	1			1			1	1	1	9
	JULY 1951 - JUNE 1952	2	2	2						1	1		2	10
	JULY 1952 - JUNE 1953	1	3							1	1	1	2	9
	JULY 1953 - JUNE 1954	3	1							3	1			8
	TOTAL	11	7	3	1			2		5	5	2	8	44
.50" OR GREATER	JULY 1949 - JUNE 1950	3	2		3		2	1			4		4	19
	JULY 1950 - JUNE 1951	4	2	2	1		1	1	1	1	3	2	2	20
	JULY 1951 - JUNE 1952	2	3	3	3	4		1		2	2		2	22
	JULY 1952 - JUNE 1953	2	4	1	1	2	2		1	3	2	2	3	23
	JULY 1953 - JUNE 1954	4	1	2	1	1	3	1	1	3	3	2	2	24
	TOTAL	15	12	8	9	7	8	4	3	9	14	6	13	108
.10" OR GREATER	JULY 1949 - JUNE 1950	7	4	4	5	3	7	9	3	1	7		4	54
	JULY 1950 - JUNE 1951	6	3	2	2	5	2	1	4	9	9	7	5	55
	JULY 1951 - JUNE 1952	4	5	6	6	6	5	4		8	4	8	7	63
	JULY 1952 - JUNE 1953	7	5	5	1	6	5	4	2	6	7	6	7	61
	JULY 1953 - JUNE 1954	7	6	5	3	2	4	2	8	7	8	4	5	61
	TOTAL	31	23	22	17	22	23	20	17	31	35	25	28	294
.05" OR GREATER	JULY 1949 - JUNE 1950	8	5	4	6	3	9	10	6	2	7	1	6	67
	JULY 1950 - JUNE 1951	7	4	3	3	5	7	3	6	11	9	7	8	73
	JULY 1951 - JUNE 1952	6	6	6	8	6	7	7	1	11	8	13	9	88
	JULY 1952 - JUNE 1953	7	6	5	1	7	7	8	4	8	9	8	8	78
	JULY 1953 - JUNE 1954	9	6	6	3	4	6	3	9	8	9	6	7	76
	TOTAL	37	27	24	21	25	36	31	26	40	42	35	38	382
.01" OR GREATER	JULY 1949 - JUNE 1950	9	8	8	9	6	10	12	12	13	14	5	11	117
	JULY 1950 - JUNE 1951	8	5	4	4	8	15	7	8	12	10	9	10	100
	JULY 1951 - JUNE 1952	6	7	8	8	7	12	8	2	13	8	14	14	107
	JULY 1952 - JUNE 1953	10	7	6	3	7	10	11	8	11	12	10	9	104
	JULY 1953 - JUNE 1954	11	6	8	5	7	9	6	10	8	12	7	11	100
	TOTAL	44	33	34	29	35	56	44	40	57	56	45	55	528

TABLE 100
Precipitation Amounts in Inches

PERIOD	MONTH												TOTAL
	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1949 - JUNE 1950	5.04	2.34	1.23	3.00	.71	2.75	3.52	1.43	.60	4.82	.13	5.86	31.43
JULY 1950 - JUNE 1951	5.72	1.91	1.89	1.20	1.53	1.20	1.46	2.08	2.39	3.66	5.23	2.66	30.93
JULY 1951 - JUNE 1952	5.30	4.22	5.19	2.89	3.53	1.40	1.47	.10	3.45	2.53	2.74	4.98	37.80
JULY 1952 - JUNE 1953	3.47	5.18	1.76	.62	2.62	2.03	1.36	1.23	3.47	2.98	2.97	7.39	35.08
JULY 1953 - JUNE 1954	5.91	2.95	2.23	.94	1.03	2.51	.98	2.38	4.02	4.10	2.48	2.44	31.97
TOTAL	25.44	16.60	12.30	8.65	9.42	9.89	8.79	7.22	13.93	18.09	13.55	23.33	167.21

TABLE 101
Number of Hours of Precipitation

PERIOD	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1949 - JUNE 1950	35	33	23	42	23	80	90	101	105	87	16	48	683
JULY 1950 - JUNE 1951	32	14	9	16	31	75	48	40	78	68	78	27	516
JULY 1951 - JUNE 1952	39	28	36	65	87	68	49	11	114	53	83	39	672
JULY 1952 - JUNE 1953	32	37	22	10	60	136	123	74	100	107	83	39	823
JULY 1953 - JUNE 1954	65	35	40	52	103	116	149	91	99	76	69	59	954
TOTAL	203	147	130	185	304	475	459	317	496	391	329	212	3648

FIGURE 16 MONTHLY PRECIPITATION AMOUNTS IN INCHES
 JULY 1949-JUNE 1954

FIGURE 17   NUMBER OF HOURS OF PRECIPITATION IN EACH MONTH
JULY 1949-JUNE 1954

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TABLE 102

Frequency Distribution of the Number of
Consecutive Hours without Precipitation
July 1949 - June 1954

HOURS	MONTH												TOTAL HOURS
	JUL	AUG.	SEP .	OCT.	NOV.	DEC.	JAN.	FEB.	MAR .	APR	MAY	JUN	
1	11	4	1	6	8	10	5	4	20	13	4	6	92
2	6	3	4	2	3	5	5	6	9	7	4	4	116
3	4	1	1		3	1	3	7	8	5	5	3	123
4	1	2	2		5	3	2	2	6	3		3	116
5- 9	12	3	2	2	7	9	10	7	18	17	11	9	696
10- 14	7	3		4	5	3	8	5	13	8	4	6	796
15- 19	4	1	2	2		1	6	3	6	3	3	3	566
20- 29	3	3	4	3	3	3	5	2	8	8	5	7	1297
30- 39	5		2	1	2	6	3	5	4	3	5	7	1458
40- 49		2	3	3	4	8	2	7	6	2	2	7	2020
50- 74	5	5	7	5	4	7	7	6	6	4	10	5	4295
75- 99	5	3	4	1	5	7	7	4	2	9	5	9	5207
100-149	10	6	5	1	5	6	6	1	6	7	6	6	7781
150-199	3	3	4	2	5	2	4	2	2	2	2	2	5689
200-299	2	4	3	3	1	2		1	2	2	1	2	5633
300-399		1		2	1						1		1741
400-499				2			1						1320
500-749		1						1					1230

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TABLE 103

Frequency Distribution of the Number of Consecutive
Hours with Precipitation
July 1949 - June 1954

HOURS	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	36	16	15	14	27	20	16	18	42	26	18	33	281
2	14	11	13	5	7	14	11	8	28	17	14	22	328
3	12	4	4	6	5	2	9	7	9	11	7	7	249
4	6	2	2	3	3	4	8	11	4	11	7	5	264
5		6	4	1	1	7	8	4	7	3	5	2	240
6	3	3	1		2	1	5	1	7	5	3	1	192
7	2			3	2	2	4	2	3	2	4	5	203
8		1	1		4	3	2	1	2	1	2	1	144
9	2	1	1	1	1	1	1		2	3		1	126
10			1	1	2	5		3	2				140
11					1	2		1	2	4	1	1	132
12	1	1		3			4		1	2			144
13		1			1	1	2	3	2	2	2		182
14					1	2		2	1	1			98
15			1		1		1				2		75
16				1		2			2				80
17	1					1			1		2		85
18						1			1	1			54
20									1				20
21						2				1			63
22					1								22
25						1							25
26								1					26
27									1				27
28					1				1				56
30											1		30
31							1				1		62
33						1							33
34				1									34
36								1					36
37						1							37
41					1								41
54							1						54
65							1						65

TABLE 104

Frequency Distribution of the Number of
Consecutive Days without Precipitation
July 1949 - June 1954

DAYS WITHOUT PPTN.	MONTH												TOTAL FRE- QUENCY	TOTAL DAYS
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN		
1	2	3	8	7	5	11	7	9	11	8	6	13	90	90
2	6	5	4	2	5	11	6	4	6	4	9	7	69	138
3	4	2	5	1	4	3	7	5	2	7	5	7	52	156
4	6	3	3	1	3	2	4		3	4	5	3	37	148
5	3	4	1		1	2	1	3	1	2		2	20	100
6	1	2	2	1	2	1	2	1		1	2	2	17	102
7	1		1	1	3	1	1		2	1			11	77
8	1		2	2					2			1	8	64
9		3	2		1	2		1					9	81
10	1	1											2	20
11	1			1						2	1		5	55
12				1									1	12
13		1											1	13
14				1	1						1		3	42
16							1						1	16
17				1									1	17
19				1									1	19
22		1											1	22
27								1					1	27
	26	25	28	20	25	33	29	23	27	29	29	35	329	1199

TABLE 105

Frequency Distribution of the Number of
Consecutive Days with Precipitation
July 1949 - June 1954

DAYS WITH PPTN.	MONTH												TOTAL FRE- QUENCY	TOTAL DAYS
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN		
1	14	17	19	9	13	15	12	10	4	11	15	20	159	159
2	8	6	6	9	9	13	10	8	15	9	7	7	107	214
3	1	1	1	2	2	3	2	5	5	3	4	4	33	99
4	1		1		2		1	2	1	2	2	2	14	56
5	2					3	3		1	1	2		12	60
6	1					1			1				3	18
7									1				1	7
14									1				1	14

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(E) Studies of Solar Radiation on a Horizontal Surface

A 50-junction Eppley pyr heliometer was used to obtain measurements of the intensity of solar and sky radiation received on a horizontal surface 5.5 feet above the ground. These data were recorded on a Leeds and Northrup Micromax Recorder which was designed to give readings in langleys per minute. Errors involving time were rare since the chart was driven by a synchronous motor. It was assumed that the calibration of the pyr heliometer furnished by the manufacturer remained unchanged. In evaluating the charts the average value of the solar radiation intensity was read for the first, second, and third twenty-minute period of each hour, Central Standard Time. The "equal area" method was used to obtain average values to the nearest 0.01 langley per minute.

1. Average Hourly Solar Radiation Intensity on a Horizontal Surface in Langleys

Table 106: In this table the average values of the readings for each hour have been tabulated. To calculate the average hourly value, all of the 20-minute readings were summed and the total divided by the number of readings. The entry for 0700 in December, for example, is the average of $31 \times 4 \times 3$, or 372, twenty-minute values. The "31" represents the thirty-one 0700 readings for each December; the "4" represents the number of years of data; and the "3" represents the three 20-minute averages in each hour. The entry under any hour represents the average solar radiation intensity for the hourly period ending at the time indicated. For example, the entry for 0700 represents the average hourly solar radiation intensity for the period beginning at 0600 and ending at 0700.

If the reading during one or more 20-minute interval were zero in the early morning or late afternoon hours, the values were counted as zero in calculating the average hourly values.

2. Maximum, Average, and Minimum Daily Totals of Solar Radiation on a Horizontal Surface in Langleys

Tables 107 through 109, Figure 18: The highest and lowest daily total and the average daily total solar radiation on a horizontal surface are presented for each month. Values for July and August of 1950 are missing since the record began on August 12, 1950. The instrument was inoperative during most of May 1951.

Average Hourly Solar Radiation Intensity on a Horizontal Surface in Langley's August 1950 - June 1954

[illegible]

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TABLE 107

Maximum Daily Totals of Solar Radiation
on a Horizontal Surface in Langley

PERIOD	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
AUGUST 1950 - JUNE 1951	M	M	620	443	290	279	270	418	590	689	M	789
JULY 1951 - JUNE 1952	785	688	628	484	378	276	315	435	586	712	816	815
JULY 1952 - JUNE 1953	802	724	616	476	361	261	314	460	594	736	777	794
JULY 1953 - JUNE 1954	752	675	615	459	328	265	317	389	566	681	773	796

TABLE 108

Monthly Average of Daily Totals of Solar Radiation
on a Horizontal Surface in Langley

PERIOD	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1950 - JUNE 1951		M	356	295	171	157	152	189	296	331	M	530
JULY 1951 - JUNE 1952	542	445	426	287	198	151	153	219	331	465	468	610
JULY 1952 - JUNE 1953	606	513	457	333	195	99	130	243	297	365	510	608
JULY 1953 - JUNE 1954	589	540	462	309	186	150	151	247	357	409	538	582

TABLE 109

Minimum Daily Totals of Solar Radiation
on a Horizontal Surface in Langley

PERIOD	MONTH											
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
AUGUST 1950 - JUNE 1951	M	M	113	20	11	16	5	23	46	57	M	131
JULY 1951 - JUNE 1952	96	167	100	29	10	33	29	39	32	42	98	211
JULY 1952 - JUNE 1953	346	156	76	79	8	11	15	38	26	55	81	315
JULY 1953 - JUNE 1954	178	311	233	3	48	16	22	34	23	66	165	131

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FIGURE 18 MAXIMUM, MINIMUM, AND MEAN DAILY TOTAL OF SOLAR RADIATION ON A HORIZONTAL SURFACE IN LANGLEYS FOR EACH MONTH JULY 1950 - JUNE 1954

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(F) Pressure Studies

The information in the following tables was obtained from the microbarograph chart traces which were read to the nearest 0.01 inch of mercury. The pressure readings represent the atmospheric pressure at the station, which is 746 feet above sea level. Methods used for evaluating the chart traces for pressure were the same as those for temperature and relative humidity from the hygrothermograph. The pressure for each hour, on the hour, as well as the maximum and minimum pressure for each day, were determined. Because of the lag of the pressure-sensing element, the instantaneous on-the-hour readings represent a time average taken over a period of several minutes.

Corrections due to calibration drift were distributed proportionately over a period of one week, the time between servicings. Time corrections were handled the same way. Proportionate distribution was assumed for the sake of objectivity in evaluating the data.

Wherever the pressure record for any portion of a day was missing, pressure readings from the U. S. Weather Bureau Office at Chicago were reviewed. If the review indicated that an extreme pressure occurred during the unrecorded period, the U. S. Weather Bureau pressures were adjusted and used in the calculations.

1. Maximum, Mean, and Minimum Station Pressure in Inches of Mercury

Tables 110 through 112: These tables show the maximum and minimum values of station pressure for the four-year period beginning July 1, 1950, through June 30, 1954. The average pressures are presented for the entire five-year period beginning on July 1, 1949. The microbarograph was inoperative for about one-half of the month of June 1950. The average pressure for this month was, therefore, omitted, and is indicated by an "M." The pressure record for the remaining months is nearly complete.

The pressure maxima, minima, and means shown in these tables are .07 in. higher than the values for the same period given in previous reports. A comparison of the averages of hourly pressure readings at Argonne and the Chicago Midway Airport for each of the five years under study indicated a larger difference than could be explained by the difference in elevation at the two stations. In order to explain this difference the Argonne mercurial barometer was checked against a Weather Bureau standard barometer and a difference of .067 in. was found. When the data were grouped by years, it became evident that this was a constant error which was present throughout the period. The Argonne data were therefore corrected by this amount.

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2. Maximum, Mean, and Minimum Pressure Ranges in Inches of Mercury for 24 , 48-, 72-, and 168 Hourly Periods

Tables 113 through 124. In scientific work involving pressure vessels or pressure chambers, one frequently needs to know the range over which the atmospheric pressure may vary within a specified period. The data presented in these tables are designed to provide such information. The maximum and minimum pressure ranges for periods of 24, 48, 72, and 168 hours during each month within the four-year period from July 1950 through June 1954 are presented in these tables. Also, the average pressure range during each month for the same periods is shown. In the tables showing the maximum and minimum pressure ranges, the last column represents the highest maximum or the lowest minimum. The last column in the tables representing the average pressure ranges shows the average of the monthly values. The overlap of periods between months and also between years was not broken.

3. Monthly Pressure Range in Inches of Mercury

Table 125. In this table are presented the ranges of pressure which occurred during each month. This value is obtained by subtracting the minimum pressure from the maximum pressure for the month. The value in the last column of this table represents the difference between the highest and lowest pressure for each year of data presented.

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TABLE 110
Maximum Station Pressure in Inches of Mercury

PERIOD	MONTH												ANNUAL MAXIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	29.42	29.46	29.57	29.48	29.57	29.62	29.85	29.94	29.75	29.52	29.55	29.42	29.94
JULY 1951 - JUNE 1952	29.42	29.54	29.60	29.61	29.67	29.88	29.71	29.54	29.76	29.55	29.39	29.40	29.88
JULY 1952 - JUNE 1953	29.44	29.52	29.52	29.76	29.68	29.64	29.66	29.65	29.68	29.30	29.58	29.46	29.76
JULY 1953 - JUNE 1954	29.48	29.45	29.60	29.57	29.78	29.73	29.70	29.72	29.70	29.76	29.36	29.36	29.78

TABLE 111
Mean Station Pressure in Inches of Mercury

PERIOD	MONTH												AVERAGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APRIL	MAY	JUN	
JULY 1949 - JUNE 1950	29.20	29.22	29.24	29.28	29.06	29.32	29.29	29.29	29.17	29.19	29.17	M	29.22
JULY 1950 - JUNE 1951	29.20	29.25	29.27	29.21	29.17	29.21	29.22	29.33	29.14	29.06	29.14	29.13	29.19
JULY 1951 - JUNE 1952	29.21	29.21	29.21	29.26	29.25	29.18	29.25	29.17	29.14	29.21	29.14	29.15	29.20
JULY 1952 - JUNE 1953	29.25	29.21	29.28	29.31	29.21	29.20	29.14	29.17	29.19	29.01	29.12	29.19	29.19
JULY 1953 - JUNE 1954	29.25	29.27	29.19	29.30	29.27	29.15	29.31	29.10	29.16	29.25	29.17	29.13	29.21

TABLE 112
Minimum Station Pressure in Inches of Mercury

PERIOD	MONTH												ANNUAL MINIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	28.91	29.02	29.00	29.92	28.68	28.72	28.69	28.77	28.53	28.52	28.61	28.86	28.52
JULY 1951 - JUNE 1952	28.83	28.91	28.73	28.82	28.33	28.49	28.51	28.65	28.51	28.59	28.75	28.93	28.33
JULY 1952 - JUNE 1953	29.01	28.85	28.86	28.91	28.51	28.89	28.80	28.46	28.66	28.48	28.57	28.86	28.46
JULY 1953 - JUNE 1954	28.80	28.99	28.87	28.95	28.62	28.58	28.79	28.64	28.53	28.75	28.74	28.58	28.53

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TABLE 113

24-Hour Maximum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MAXIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.32	0.16	0.35	0.28	0.67	0.55	0.59	0.61	0.60	0.50	0.24	0.29	0.67
JULY 1951 - JUNE 1952	0.31	0.29	0.51	0.43	0.43	0.73	0.71	0.61	0.68	0.51	0.42	0.33	0.73
JULY 1952 - JUNE 1953	0.28	0.30	0.29	0.37	0.74	0.36	0.66	0.81	0.52	0.63	0.41	0.26	0.81
JULY 1953 - JUNE 1954	0.30	0.16	0.39	0.36	0.46	0.56	0.58	0.59	0.54	0.45	0.43	0.32	0.59

TABLE 114

24-Hour Mean Pressure Range in Inches of Mercury

PERIOD	MONTH												AVERAGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.12	0.09	0.12	0.13	0.25	0.22	0.26	0.29	0.24	0.21	0.14	0.14	0.18
JULY 1951 - JUNE 1952	0.13	0.14	0.16	0.18	0.18	0.32	0.34	0.21	0.28	0.15	0.16	0.14	0.21
JULY 1952 - JUNE 1953	0.12	0.14	0.12	0.18	0.20	0.18	0.23	0.28	0.23	0.21	0.19	0.16	0.18
JULY 1953 - JUNE 1954	0.11	0.09	0.17	0.14	0.18	0.26	0.29	0.27	0.24	0.22	0.14	0.14	0.19

TABLE 115

24-Hour Minimum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MINIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.05	0.04	0.05	0.05	0.08	0.05	0.08	0.10	0.06	0.04	0.06	0.04	0.04
JULY 1951 - JUNE 1952	0.04	0.05	0.05	0.06	0.07	0.11	0.09	0.09	0.04	0.04	0.06	0.05	0.04
JULY 1952 - JUNE 1953	0.04	0.05	0.05	0.06	0.05	0.05	0.04	0.06	0.06	0.07	0.05	0.07	0.04
JULY 1953 - JUNE 1954	0.04	0.03	0.08	0.05	0.06	0.05	0.10	0.10	0.07	0.05	0.01	0.06	0.01

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TABLE 116
48-Hour Maximum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MAXIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.41	0.26	0.47	0.45	0.77	0.55	0.89	0.84	0.82	0.63	0.44	0.47	0.89
JULY 1951 - JUNE 1952	0.48	0.42	0.64	0.51	0.80	0.89	0.99	0.64	1.01	0.75	0.47	0.39	1.01
JULY 1952 - JUNE 1953	0.36	0.44	0.41	0.61	0.97	0.52	0.77	0.88	0.60	0.82	0.64	0.45	0.97
JULY 1953 - JUNE 1954	0.45	0.31	0.58	0.51	0.59	0.71	0.83	0.88	0.89	0.81	0.53	0.57	0.89

TABLE 117
48-Hour Mean Pressure Range in Inches of Mercury

PERIOD	MONTH												AVERAGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.18	0.14	0.20	0.22	0.42	0.34	0.41	0.48	0.41	0.35	0.24	0.22	0.30
JULY 1951 - JUNE 1952	0.21	0.22	0.27	0.29	0.44	0.52	0.56	0.35	0.45	0.26	0.25	0.24	0.34
JULY 1952 - JUNE 1953	0.19	0.22	0.20	0.30	0.34	0.27	0.34	0.48	0.38	0.33	0.32	0.27	0.30
JULY 1953 - JUNE 1954	0.19	0.13	0.28	0.24	0.30	0.42	0.44	0.45	0.40	0.37	0.22	0.23	0.30

TABLE 118
48-Hour Minimum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MINIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.06	0.07	0.08	0.08	0.14	0.14	0.12	0.19	0.08	0.11	0.07	0.07	0.06
JULY 1951 - JUNE 1952	0.08	0.07	0.08	0.12	0.09	0.16	0.14	0.12	0.09	0.06	0.08	0.12	0.06
JULY 1952 - JUNE 1953	0.08	0.09	0.09	0.11	0.07	0.09	0.09	0.15	0.16	0.10	0.08	0.12	0.07
JULY 1953 - JUNE 1954	0.06	0.05	0.09	0.09	0.08	0.07	0.22	0.14	0.08	0.08	0.07	0.08	0.05

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TABLE 119

72-Hour Maximum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MAXIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.47	0.33	0.47	0.45	0.81	0.64	0.91	1.00	0.89	0.67	0.59	0.47	1.00
JULY 1951 - JUNE 1952	0.59	0.43	0.85	0.59	1.08	1.12	1.03	0.65	1.09	0.96	0.55	0.44	1.12
JULY 1952 - JUNE 1953	0.36	0.45	0.51	0.61	1.10	0.52	0.77	0.98	0.85	0.82	0.80	0.52	1.10
JULY 1953 - JUNE 1954	0.56	0.31	0.67	0.66	0.72	0.82	0.83	0.95	1.03	0.81	0.62	0.65	1.03

TABLE 120

72-Hour Mean Pressure Range in Inches of Mercury

PERIOD	MONTH												AVERAGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.23	0.18	0.26	0.27	0.50	0.42	0.52	0.61	0.53	0.45	0.32	0.27	0.38
JULY 1951 - JUNE 1952	0.26	0.28	0.35	0.37	0.58	0.65	0.68	0.43	0.58	0.34	0.30	0.28	0.43
JULY 1952 - JUNE 1953	0.24	0.29	0.25	0.38	0.42	0.33	0.42	0.60	0.48	0.41	0.42	0.35	0.38
JULY 1953 - JUNE 1954	0.25	0.42	0.36	0.31	0.38	0.53	0.53	0.59	0.52	0.46	0.27	0.30	0.41

TABLE 121

72-Hour Minimum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MINIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.10	0.09	0.09	0.08	0.16	0.17	0.20	0.35	0.10	0.15	0.14	0.10	0.08
JULY 1951 - JUNE 1952	0.13	0.14	0.10	0.15	0.13	0.22	0.24	0.20	0.16	0.12	0.17	0.14	0.10
JULY 1952 - JUNE 1953	0.11	0.13	0.10	0.12	0.13	0.12	0.15	0.23	0.20	0.13	0.10	0.17	0.10
JULY 1953 - JUNE 1954	0.09	0.07	0.15	0.11	0.13	0.24	0.27	0.19	0.18	0.17	0.11	0.11	0.07

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TABLE 122

168-Hour Maximum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MAXIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.47	0.48	0.57	0.52	0.81	0.77	0.94	1.00	1.12	0.89	0.70	0.70	1.12
JULY 1951 - JUNE 1952	0.59	0.52	0.87	0.87	1.30	1.39	1.20	0.79	1.19	0.96	0.64	0.46	1.39
JULY 1952 - JUNE 1953	0.44	0.64	0.62	0.71	1.17	1.17	0.77	1.19	1.02	0.82	0.90	0.73	1.19
JULY 1953 - JUNE 1954	0.63	0.42	0.73	0.70	0.94	0.98	0.83	0.95	1.12	1.01	0.62	0.72	1.12

TABLE 123

168-Hour Mean Pressure Range in Inches of Mercury

PERIOD	MONTH												AVERAGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.34	0.28	0.43	0.38	0.64	0.59	0.74	0.85	0.80	0.65	0.50	0.42	0.55
JULY 1951 - JUNE 1952	0.39	0.42	0.49	0.56	0.85	0.93	0.96	0.61	0.86	0.55	0.42	0.41	0.62
JULY 1952 - JUNE 1953	0.34	0.45	0.42	0.53	0.59	0.54	0.58	0.86	0.72	0.59	0.62	0.50	0.56
JULY 1953 - JUNE 1954	0.39	0.26	0.54	0.47	0.57	0.77	0.69	0.82	0.78	0.72	0.37	0.43	0.56

TABLE 124

168-Hour Minimum Pressure Range in Inches of Mercury

PERIOD	MONTH												ANNUAL MINIMUM
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.23	0.19	0.18	0.14	0.45	0.36	0.41	0.59	0.32	0.47	0.34	0.26	0.14
JULY 1951 - JUNE 1952	0.18	0.22	0.29	0.30	0.50	0.48	0.59	0.31	0.45	0.22	0.23	0.28	0.18
JULY 1952 - JUNE 1953	0.23	0.31	0.20	0.35	0.22	0.31	0.39	0.49	0.39	0.41	0.33	0.34	0.20
JULY 1953 - JUNE 1954	0.24	0.16	0.25	0.21	0.37	0.46	0.46	0.59	0.34	0.34	0.18	0.20	0.16

TABLE 125

Monthly Pressure Range in Inches of Mercury
July 1950 - June 1954

PERIOD	MONTH												ANNUAL RANGE
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
JULY 1950 - JUNE 1951	0.51	0.44	0.57	0.53	0.89	0.90	1.16	1.17	1.22	1.00	0.94	0.56	1.42
JULY 1951 - JUNE 1952	0.59	0.63	0.87	0.76	1.34	1.39	1.20	0.89	1.25	0.96	0.64	0.47	1.55
JULY 1952 - JUNE 1953	0.43	0.67	0.66	0.85	1.17	0.75	0.86	1.19	1.02	0.82	1.01	0.60	1.30
JULY 1953 - JUNE 1954	0.68	0.46	0.73	0.62	1.16	1.15	0.91	1.08	1.17	1.01	0.62	0.78	1.25

(G) Soil Temperature Studies

Soil temperature measurements were made at seven levels: 1 cm, 10 cm, 20 cm, 50 cm, 100 cm, 10 feet, and 29 feet below ground level. In addition, an eighth measuring element was placed at 100 cm below the ground surface at approximately forty feet southwest of the primary site. The ground cover over these sites was grass and was mowed periodically during the growing season.

Soil temperature measurements were begun on November 5, 1952. On March 3, 1953, the 29-foot element failed due to a line break below ground level and remained inoperative until July 17, 1953, when it was replaced at a site approximately 18 feet northeast of the original site.

The soil temperature values were recorded sequentially by the use of a stepping switch and a single-pen Leeds and Northrup Micromax Recorder. The Recorder was programmed as follows: reference, 1 cm, 10 cm, 20 cm, 50 cm, 100 cm, 10 feet, 29 feet, 100 cm auxiliary, 1 cm, 10 cm, 20 cm, 1 cm, 10 cm, 20 cm. Two minutes were spent on each position so that this program was completed in thirty minutes; two complete cycles were run each hour.

Temperature values were reduced, to the nearest 0.1°C , for each of the above levels with the exception of the auxiliary 100-cm level, which was used for check purposes only. These values were taken as close to the nominal hour as was possible and represent two-minute averages. Temperature values were read for each hour of the day for the 1, 10, 20, and 50-cm levels, for every fourth hour (0100, 0500, 0900, etc.) for the 100-cm level, and once daily at 0100 for the 10-foot and 29-foot levels.

1. Average Hourly Soil Temperature ($^{\circ}\text{F}$)

Tables 126 through 137: The average hourly temperature for each level as computed for each month of the year, July 1953 through June 1954, is shown in these tables. With the exception of the data for the 29-foot level below the ground surface for July 1953, the data are nearly complete. Since observations for the 100-centimeter level were read every four hours (1, 5, 9, both a.m. and p.m.), and the data from the 10-foot and 29-foot levels were measured only once daily at 1:00 a.m., these values are not truly hourly averages. However, the difference between the data presented here and the true hourly averages is negligible.

Even though there were seventeen of the thirty-one days during July 1953 missing, the changes at the 29-foot level were so small that the values presented in Table 126 may be considered as correct to within a few tenths of a degree Fahrenheit.

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The average diurnal variation of the temperature and also the phase shift of the temperature wave with depth are readily discernible from these tables.

2. Daily Average Soil Temperature (°F)

Tables 138 through 149: The daily average temperature and the monthly average temperature for each level are presented in these tables for the year beginning on July 1, 1953, and ending on June 30, 1954. The last line of these tables shows the number of hourly observations which were available. With the exception of the July 1953 data for the 29-foot level, the record is quite complete. Since only one observation per day was taken for the 10-foot and 29-foot levels, these values are not true averages; however, the difference between the values presented and the true averages is negligibly small. The 100-centimeter level average is based upon six daily readings and the averages of the remainder of the levels are based on twenty-four individual readings, with the exception of a few missing cases where the total number of readings was slightly less than twenty four.

3. Monthly Average Soil Temperatures (°F)

Table 150, Figure 19: The averages of the hourly soil temperature readings for each month within the period from November 1952 through June 1954 are shown in Table 150. It is of interest to note that in over two-thirds of the comparisons the observations for the second year indicated higher temperatures. The average monthly soil temperatures for the year July 1953 to June 1954 are plotted for each level below the ground surface in Figure 19.

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TABLE 126
Average Hourly Soil Temperature (°F)
July 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	20 FT
1	72.1	73.3	74.4	70.6	65.7	53.5	50.1
2	71.6	72.7	74.1	70.7	65.7	53.5	50.1
3	71.1	72.2	73.8	70.7	65.7	53.5	50.1
4	70.7	71.7	73.5	70.7	65.7	53.5	50.1
5	70.4	71.3	73.1	70.7	65.7	53.5	50.1
6	70.4	71.0	72.8	70.7	65.7	53.5	50.1
7	71.3	71.2	72.6	70.7	65.7	53.5	50.1
8	72.8	71.9	72.3	70.7	65.7	53.5	50.1
9	75.1	73.2	72.3	70.6	65.7	53.5	50.1
10	78.1	75.0	72.6	70.6	65.7	53.5	50.1
11	80.6	77.1	72.8	70.6	65.7	53.5	50.1
12	82.8	78.9	73.2	70.6	65.7	53.5	50.1
13	83.8	80.3	73.7	70.5	65.7	53.5	50.1
14	83.9	81.2	74.4	70.5	65.7	53.5	50.1
15	83.0	81.5	74.9	70.5	65.7	53.5	50.1
16	82.0	81.2	75.5	70.4	65.7	53.5	50.1
17	80.8	80.6	75.9	70.4	65.7	53.5	50.1
18	79.3	79.6	76.1	70.4	65.7	53.5	50.1
19	77.6	78.5	76.1	70.4	65.7	53.5	50.1
20	76.2	77.3	76.0	70.4	65.7	53.5	50.1
21	75.0	76.2	75.8	70.5	65.8	53.5	50.1
22	74.2	75.4	75.5	70.6	65.8	53.5	50.1
23	73.4	74.6	75.2	70.6	65.8	53.5	50.1
24	72.8	73.9	74.8	70.7	65.8	53.5	50.1

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TABLE 127
Average Hourly Soil Temperature (°F)
August 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	70.4	72.2	73.7	71.1	67.6	56.8	50.2
2	69.9	71.7	73.4	71.2	67.6	56.8	50.2
3	69.3	71.2	73.0	71.2	67.6	56.8	50.2
4	69.0	70.7	72.8	71.2	67.6	56.8	50.2
5	68.5	70.3	72.4	71.2	67.6	56.8	50.2
6	68.5	69.9	72.2	71.2	67.6	56.8	50.2
7	69.5	69.9	71.9	71.2	67.6	56.8	50.2
8	71.4	70.6	71.7	71.1	67.6	56.8	50.2
9	74.2	71.7	71.6	71.1	67.6	56.8	50.2
10	77.6	73.3	71.7	71.1	67.6	56.8	50.2
11	80.6	75.3	71.9	71.0	67.6	56.8	50.2
12	83.0	77.4	72.3	71.0	67.6	56.8	50.2
13	84.2	79.2	72.8	70.9	67.6	56.8	50.2
14	84.3	80.3	73.5	70.9	67.6	56.8	50.2
15	83.2	80.6	74.1	70.9	67.6	56.8	50.2
16	81.8	80.3	74.6	70.9	67.6	56.8	50.2
17	80.1	79.5	75.0	70.8	67.6	56.8	50.2
18	78.3	78.5	75.2	70.9	67.6	56.8	50.2
19	76.2	77.3	75.2	70.9	67.6	56.8	50.2
20	74.6	76.1	75.2	70.9	67.6	56.8	50.2
21	73.4	75.1	75.0	70.9	67.6	56.8	50.2
22	72.6	74.3	74.7	71.0	67.6	56.8	50.2
23	71.8	73.5	74.4	71.0	67.6	56.8	50.2
24	71.1	72.9	74.0	71.1	67.6	56.8	50.2

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TABLE 128
Average Hourly Soil Temperature (°F)
September 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	62.8	64.3	66.7	66.6	65.9	58.7	50.5
2	62.2	63.8	66.4	66.6	65.9	58.7	50.5
3	61.7	63.3	66.1	66.6	65.9	58.7	50.5
4	61.2	62.9	65.9	66.6	65.9	58.7	50.5
5	60.7	62.4	65.6	66.6	65.8	58.7	50.5
6	60.4	62.1	65.4	66.6	65.8	58.7	50.5
7	60.9	61.9	65.1	66.6	65.8	58.7	50.5
8	62.2	61.9	64.7	66.5	65.8	58.7	50.5
9	64.8	62.8	64.5	66.4	65.8	58.7	50.5
10	68.0	64.2	64.5	66.4	65.8	58.7	50.5
11	71.3	66.1	64.7	66.3	65.8	58.7	50.5
12	73.9	68.1	65.0	66.3	65.8	58.7	50.5
13	74.9	69.7	65.5	66.2	65.7	58.7	50.5
14	75.1	70.7	66.0	66.2	65.7	58.7	50.5
15	74.2	71.0	66.6	66.1	65.7	58.7	50.5
16	72.7	70.9	67.0	66.1	65.7	58.7	50.5
17	70.9	70.1	67.3	66.1	65.7	58.7	50.5
18	68.9	69.1	67.6	66.1	65.7	58.7	50.5
19	67.1	68.0	67.5	66.1	65.7	58.7	50.5
20	65.8	66.9	67.4	66.1	65.7	58.7	50.5
21	64.8	66.1	67.2	66.1	65.7	58.7	50.5
22	64.0	65.3	67.0	66.1	65.7	58.7	50.5
23	63.4	64.9	66.8	66.2	65.7	58.7	50.5
24	62.8	64.3	66.5	66.3	65.7	58.7	50.5

TABLE 129
Average Hourly Soil Temperature (°F)
October 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	54.2	56.0	58.6	59.8	60.6	58.6	50.8
2	53.7	55.6	58.4	59.8	60.6	58.6	50.8
3	53.3	55.2	58.2	59.8	60.6	58.6	50.8
4	53.0	54.9	57.9	59.8	60.6	58.6	50.8
5	52.6	54.5	57.7	59.8	60.6	58.6	50.8
6	52.2	54.2	57.5	59.8	60.6	58.6	50.8
7	52.4	53.9	57.3	59.7	60.6	58.6	50.8
8	53.8	54.1	57.0	59.7	60.6	58.6	50.8
9	55.9	54.9	56.9	59.7	60.6	58.6	50.8
10	59.0	56.2	56.9	59.7	60.6	58.6	50.8
11	61.9	57.9	57.1	59.6	60.6	58.6	50.8
12	64.1	59.8	57.3	59.6	60.6	58.6	50.8
13	64.9	61.1	57.7	59.5	60.6	58.6	50.8
14	64.9	61.9	58.2	59.5	60.6	58.6	50.8
15	63.9	62.1	58.7	59.5	60.6	58.6	50.8
16	62.5	61.8	59.1	59.4	60.6	58.6	50.8
17	60.6	60.9	59.2	59.4	60.5	58.6	50.8
18	58.9	60.0	59.4	59.4	60.5	58.6	50.8
19	57.8	59.1	59.4	59.4	60.5	58.6	50.8
20	56.9	58.3	59.3	59.4	60.5	58.6	50.8
21	56.1	57.7	59.1	59.4	60.5	58.6	50.8
22	55.5	57.1	58.9	59.4	60.5	58.6	50.8
23	55.0	56.6	58.7	59.4	60.5	58.6	50.8
24	54.5	56.2	58.5	59.4	60.5	58.6	50.8

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TABLE 130
Average Hourly Soil Temperature (°F)
November 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	42.9	44.3	47.2	50.3	53.9	57.1	51.1
2	42.7	44.2	47.0	50.3	53.9	57.1	51.1
3	42.4	43.9	46.9	50.4	53.9	57.1	51.1
4	42.0	43.7	46.8	50.4	53.9	57.1	51.1
5	41.7	43.4	46.7	50.3	53.9	57.1	51.1
6	41.6	43.2	46.6	50.4	53.9	57.1	51.1
7	41.5	43.0	46.4	50.3	53.9	57.1	51.1
8	42.0	43.0	46.3	50.3	53.9	57.1	51.1
9	43.0	43.3	46.2	50.3	53.8	57.1	51.1
10	44.7	44.0	46.1	50.3	53.8	57.1	51.1
11	46.6	44.8	46.1	50.2	53.8	57.1	51.1
12	48.1	45.8	46.2	50.2	53.8	57.1	51.1
13	48.8	46.6	46.4	50.2	53.8	57.1	51.1
14	49.0	47.3	46.6	50.2	53.8	57.1	51.1
15	48.3	47.5	46.8	50.1	53.8	57.1	51.1
16	47.4	47.2	47.0	50.1	53.8	57.1	51.1
17	46.2	46.7	47.2	50.1	53.7	57.1	51.1
18	45.2	46.2	47.3	50.0	53.7	57.1	51.1
19	44.5	45.7	47.2	50.0	53.7	57.1	51.1
20	44.1	45.3	47.2	50.0	53.7	57.1	51.1
21	43.7	45.0	47.1	50.0	53.7	57.1	51.1
22	43.4	44.7	47.0	50.0	53.7	57.1	51.1
23	43.1	44.4	46.9	50.0	53.7	57.1	51.1
24	42.7	44.1	46.8	50.0	53.7	57.1	51.1

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TABLE 131
Average Hourly Soil Temperature (°F)
December 1953

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	35.0	35.3	37.1	40.8	46.1	54.5	51.7
2	35.0	35.3	37.1	40.8	46.1	54.5	51.7
3	34.9	35.2	37.1	40.7	46.1	54.5	51.7
4	34.9	35.2	37.0	40.7	46.1	54.5	51.7
5	34.8	35.2	37.0	40.7	46.1	54.5	51.7
6	34.8	35.1	37.0	40.7	46.1	54.5	51.7
7	34.7	35.1	37.0	40.7	46.1	54.5	51.7
8	34.6	35.0	36.9	40.7	46.1	54.5	51.7
9	34.7	35.0	36.9	40.7	46.0	54.5	51.7
10	35.0	35.1	36.9	40.7	46.0	54.5	51.7
11	35.4	35.3	36.8	40.7	46.0	54.5	51.7
12	35.7	35.5	36.9	40.7	46.0	54.5	51.7
13	35.9	35.6	36.9	40.7	46.0	54.5	51.7
14	36.0	35.8	37.0	40.7	46.0	54.5	51.7
15	35.9	35.9	37.0	40.7	46.0	54.5	51.7
16	35.8	35.8	37.0	40.6	46.0	54.5	51.7
17	35.5	35.7	37.0	40.6	45.9	54.5	51.7
18	35.3	35.6	37.0	40.6	45.9	54.5	51.7
19	35.2	35.5	37.0	40.6	45.9	54.5	51.7
20	35.1	35.4	37.0	40.6	45.9	54.5	51.7
21	35.1	35.4	37.0	40.6	45.9	54.5	51.7
22	35.0	35.3	37.0	40.6	45.9	54.5	51.7
23	35.0	35.3	37.0	40.6	45.9	54.5	51.7
24	34.9	35.2	37.0	40.6	45.9	54.5	51.7

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TABLE 132

Average Hourly Soil Temperature (°F)
January 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	30.7	31.0	32.4	35.3	40.4	50.9	52.0
2	30.6	31.0	32.4	35.3	40.4	50.9	52.0
3	30.6	31.0	32.4	35.3	40.4	50.9	52.0
4	30.5	30.9	32.4	35.3	40.4	50.9	52.0
5	30.4	30.9	32.4	35.3	40.3	50.9	52.0
6	30.4	30.9	32.4	35.3	40.3	50.9	52.0
7	30.3	30.8	32.3	35.3	40.3	50.9	52.0
8	30.3	30.8	32.3	35.3	40.3	50.9	52.0
9	30.4	30.8	32.3	35.4	40.3	50.9	52.0
10	30.7	30.8	32.3	35.4	40.3	50.9	52.0
11	31.0	30.9	32.3	35.4	40.3	50.9	52.0
12	31.3	31.0	32.3	35.3	40.3	50.9	52.0
13	31.7	31.2	32.3	35.3	40.3	50.9	52.0
14	31.9	31.2	32.3	35.3	40.3	50.9	52.0
15	31.9	31.3	32.3	35.3	40.3	50.9	52.0
16	31.7	31.3	32.3	35.3	40.3	50.9	52.0
17	31.5	31.3	32.3	35.3	40.3	50.9	52.0
18	31.3	31.3	32.3	35.2	40.3	50.9	52.0
19	31.2	31.3	32.3	35.3	40.3	50.9	52.0
20	31.1	31.2	32.3	35.3	40.3	50.9	52.0
21	30.9	31.2	32.3	35.3	40.3	50.9	52.0
22	30.8	31.0	32.3	35.3	40.3	50.9	52.0
23	30.8	31.0	32.3	35.3	40.3	50.9	52.0
24	30.7	31.0	32.3	35.3	40.3	50.9	52.0

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TABLE 133
Average Hourly Soil Temperature (°F)
February 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	33.3	33.2	33.5	35.2	38.2	47.9	52.1
2	33.2	33.1	33.5	35.2	38.2	47.9	52.1
3	33.2	33.1	33.5	35.2	38.2	47.9	52.1
4	33.1	33.0	33.5	35.2	38.2	47.9	52.1
5	33.0	33.0	33.5	35.2	38.2	47.9	52.1
6	32.9	32.9	33.5	35.2	38.2	47.9	52.1
7	32.9	32.9	33.5	35.2	38.2	47.9	52.1
8	32.9	32.9	33.5	35.2	38.2	47.9	52.1
9	33.2	32.9	33.4	35.2	38.2	47.9	52.1
10	33.6	33.0	33.4	35.2	38.2	47.9	52.1
11	34.2	33.2	33.4	35.2	38.2	47.9	52.1
12	34.6	33.4	33.4	35.2	38.2	47.9	52.1
13	35.2	33.8	33.4	35.2	38.2	47.9	52.1
14	35.4	34.1	33.5	35.2	38.2	47.9	52.1
15	35.4	34.3	33.5	35.2	38.2	47.9	52.1
16	35.2	34.3	33.6	35.2	38.2	47.9	52.1
17	34.8	34.3	33.6	35.2	38.2	47.9	52.1
18	34.4	34.1	33.7	35.2	38.2	47.9	52.1
19	34.2	33.9	33.7	35.2	38.2	47.9	52.1
20	33.9	33.8	33.7	35.2	38.2	47.9	52.1
21	33.9	33.7	33.7	35.2	38.2	47.9	52.1
22	33.7	33.5	33.7	35.2	38.2	47.9	52.1
23	33.7	33.5	33.7	35.2	38.2	47.9	52.1
24	33.5	33.4	33.7	35.2	38.2	47.9	52.1

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TABLE 134

Average Hourly Soil Temperature (°F)
March 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	35.4	35.4	36.2	37.2	39.1	46.3	52.1
2	35.2	35.3	36.1	37.2	39.1	46.3	52.1
3	35.1	35.2	36.1	37.2	39.1	46.3	52.1
4	35.0	35.1	36.0	37.2	39.1	46.3	52.1
5	34.9	35.0	35.9	37.3	39.1	46.3	52.1
6	34.8	34.9	35.9	37.2	39.1	46.3	52.1
7	34.7	34.8	35.9	37.2	39.1	46.3	52.1
8	34.8	34.8	35.8	37.2	39.1	46.3	52.1
9	35.3	34.9	35.8	37.2	39.1	46.3	52.1
10	36.1	35.1	35.7	37.2	39.1	46.3	52.1
11	36.9	35.5	35.8	37.2	39.1	46.3	52.1
12	37.9	35.9	35.8	37.2	39.1	46.3	52.1
13	38.7	36.3	35.9	37.2	39.1	46.3	52.1
14	39.0	36.6	36.0	37.2	39.1	46.3	52.1
15	38.7	36.8	36.1	37.2	39.1	46.3	52.1
16	38.5	36.9	36.2	37.1	39.1	46.3	52.1
17	37.9	36.8	36.3	37.2	39.1	46.3	52.1
18	37.3	36.6	36.4	37.2	39.1	46.3	52.1
19	36.8	36.4	36.5	37.2	39.1	46.3	52.1
20	36.3	36.1	36.5	37.2	39.1	46.3	52.1
21	36.1	35.9	36.5	37.2	39.1	46.3	52.1
22	35.9	35.7	36.4	37.2	39.1	46.3	52.1
23	35.7	35.6	36.3	37.2	39.1	46.3	52.1
24	35.5	35.5	36.3	37.3	39.1	46.3	52.1

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TABLE 135
Average Hourly Soil Temperature (°F)
April 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT
1	48.5	48.6	48.6	46.1	44.0	45.4	51.8
2	48.3	48.3	48.5	46.1	44.0	45.4	51.8
3	48.0	48.0	48.4	46.1	44.0	45.4	51.8
4	47.7	47.8	48.3	46.2	44.0	45.4	51.8
5	47.5	47.6	48.1	46.2	44.1	45.4	51.8
6	47.4	47.4	47.9	46.2	44.1	45.4	51.8
7	47.7	47.3	47.8	46.3	44.1	45.4	51.8
8	48.5	47.5	47.7	46.3	44.1	45.4	51.8
9	49.9	48.0	47.6	46.3	44.1	45.4	51.8
10	51.3	48.8	47.6	46.3	44.1	45.4	51.8
11	53.3	49.8	47.7	46.3	44.1	45.4	51.8
12	54.9	51.0	47.9	46.3	44.1	45.4	51.8
13	56.0	52.0	48.1	46.3	44.2	45.4	51.8
14	56.4	52.8	48.5	46.3	44.2	45.4	51.8
15	56.2	53.2	48.8	46.3	44.2	45.4	51.8
16	55.6	53.3	49.2	46.3	44.2	45.4	51.8
17	54.6	53.1	49.4	46.3	44.2	45.4	51.8
18	53.4	52.5	49.7	46.3	44.2	45.4	51.8
19	52.4	52.1	49.8	46.3	44.2	45.4	51.8
20	51.7	51.5	49.8	46.3	44.2	45.4	51.8
21	51.1	51.0	49.8	46.4	44.3	45.4	51.8
22	50.6	50.6	49.7	46.4	44.3	45.4	51.8
23	50.1	50.1	49.6	46.5	44.3	45.4	51.8
24	49.7	49.8	49.5	46.5	44.3	45.4	51.8

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TABLE 136

Average Hourly Soil Temperature (°F)
May 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	20 FT
1	54.2	55.0	56.4	53.7	51.0	47.1	51.3
2	53.7	54.5	56.1	53.8	51.0	47.1	51.3
3	53.2	53.9	55.8	53.8	51.0	47.1	51.3
4	52.7	53.5	55.5	53.8	51.0	47.1	51.3
5	52.3	53.1	55.2	53.8	51.0	47.1	51.3
6	52.6	52.8	54.9	53.8	51.0	47.1	51.3
7	53.7	53.1	54.7	53.8	51.0	47.1	51.3
8	55.4	53.7	54.5	53.8	51.0	47.1	51.3
9	57.9	54.9	54.4	53.8	51.0	47.1	51.3
10	60.4	56.5	54.5	53.8	51.0	47.1	51.3
11	63.4	58.4	54.8	53.8	51.0	47.1	51.3
12	65.6	60.3	55.2	53.7	51.0	47.1	51.3
13	67.0	61.8	55.7	53.7	51.0	47.1	51.3
14	67.4	62.9	56.3	53.7	51.0	47.1	51.3
15	66.8	63.1	56.8	53.6	51.0	47.1	51.3
16	65.7	63.0	57.3	53.6	51.0	47.1	51.3
17	63.8	62.4	57.6	53.6	51.0	47.1	51.3
18	61.9	61.3	57.8	53.6	51.0	47.1	51.3
19	60.1	60.1	57.9	53.6	51.0	47.1	51.3
20	58.6	59.1	57.8	53.7	51.0	47.1	51.3
21	57.5	58.0	57.6	53.7	51.1	47.1	51.3
22	56.6	57.2	57.4	53.8	51.1	47.1	51.3
23	55.8	56.4	57.2	53.8	51.1	47.1	51.3
24	55.0	55.8	56.9	53.9	51.1	47.1	51.3

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TABLE 137
Average Hourly Soil Temperature (°F)
June 1954

HOUR	DEPTH BENEATH GROUND SURFACE						
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	20 FT
1	69.1	69.9	70.5	65.4	59.5	50.0	51.0
2	68.6	69.4	70.2	65.4	59.5	50.0	51.0
3	67.7	68.9	69.9	65.5	59.5	50.0	51.0
4	67.7	68.4	69.6	65.6	59.5	50.0	51.0
5	67.4	68.0	69.2	65.6	59.6	50.0	51.0
6	67.9	68.0	69.0	65.6	59.6	50.0	51.0
7	69.1	68.3	68.8	65.6	59.6	50.0	51.0
8	71.2	69.1	68.6	65.5	59.6	50.0	51.0
9	74.1	70.6	68.5	65.5	59.6	50.0	51.0
10	77.2	72.7	68.7	65.5	59.6	50.0	51.0
11	80.6	75.0	69.0	65.5	59.6	50.0	51.0
12	83.0	77.1	69.6	65.4	59.6	50.0	51.0
13	84.1	78.6	70.3	65.4	59.6	50.0	51.0
14	84.2	79.5	71.0	65.4	59.6	50.0	51.0
15	83.2	79.8	71.4	65.4	59.6	50.0	51.0
16	81.6	79.5	72.0	65.4	59.6	50.0	51.0
17	79.3	78.5	72.4	65.4	59.7	50.0	51.0
18	77.5	77.1	72.5	65.4	59.7	50.0	51.0
19	75.5	75.8	72.6	65.5	59.7	50.0	51.0
20	73.9	74.5	72.5	65.5	59.7	50.0	51.0
21	72.6	73.3	72.2	65.6	59.7	50.0	51.0
22	71.6	72.4	71.9	65.6	59.7	50.0	51.0
23	70.8	71.5	71.6	65.7	59.7	50.0	51.0
24	70.1	70.8	71.2	65.7	59.7	50.0	51.0

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TABLE 138

Daily Average Soil Temperature (°F)
July 1953

DAY	DEPTH BENEATH GROUND SURFACE							DAY
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	29 FT	
1	79.8	80.2	77.6	71.1	64.1	51.4	M	1
2	75.1	75.6	75.3	71.3	64.4	51.6	M	2
3	74.1	74.9	73.5	70.5	64.9	51.8	M	3
4	75.9	76.7	74.3	70.4	65.1	52.2	M	4
5	80.0	80.1	76.8	70.8	65.2	52.3	M	5
6	77.0	76.6	75.7	71.4	65.2	52.3	M	6
7	73.9	74.0	73.4	70.8	65.5	52.5	M	7
8	72.8	72.0	72.0	70.1	65.6	52.7	M	8
9	70.2	70.0	70.1	69.2	65.6	52.7	M	9
10	71.0	71.3	70.2	68.5	65.4	52.9	M	10
11	72.5	73.2	71.3	68.5	65.1	52.9	M	11
12	72.4	73.6	72.1	69.0	65.0	53.1	M	12
13	73.1	74.0	72.1	69.1	65.1	53.2	M	13
14	75.1	74.8	72.9	69.2	65.0	53.4	M	14
15	76.6	75.9	73.3	69.5	65.0	53.6	M	15
16	77.7	76.8	74.1	69.8	65.1	53.6	M	16
17	73.1	73.0	73.2	70.3	65.3	53.6	M	17
18	77.2	75.8	73.5	69.9	65.5	53.8	50.2	18
19	80.4	78.9	75.9	70.4	65.6	53.8	50.2	19
20	78.5	77.7	76.2	71.3	65.8	54.0	50.2	20
21	77.8	77.2	75.8	71.5	66.1	54.1	50.2	21
22	76.9	76.3	75.1	71.5	66.2	54.3	50.2	22
23	75.9	74.2	73.7	71.3	66.7	54.5	50.2	23
24	73.5	72.6	72.4	70.7	66.7	54.5	50.2	24
25	74.9	74.2	72.6	70.3	66.7	54.7	50.0	25
26	78.2	77.2	74.8	70.6	66.5	54.7	50.0	26
27	79.7	78.5	76.0	71.3	66.6	54.9	50.0	27
28	79.2	78.5	76.2	71.9	66.8	55.0	50.2	28
29	M	M	M	M	66.9	55.0	50.2	29
30	80.7	79.4	77.8	73.1	67.2	55.2	50.2	30
31	78.7	77.8	76.7	73.0	67.6	55.2	50.0	31
AVERAGE	76.2	75.8	74.2	70.6	65.7	53.5	50.1	AVG.
NUMBER OF OBS.	731	731	731	735	744	744	336	NUMBER OF OBS.

TABLE 140

Daily Average Soil Temperature (°F)
September 1953

DAY	DEPTH BENEATH GROUND SURFACE							DAY
	1 CM	10 CM	20 CM	50 CM	100 CM	10 FT	20 FT	
1	84.2	82.1	78.8	73.6	68.3	57.9	50.4	1
2	83.2	81.8	79.1	74.1	68.6	57.9	50.4	2
3	81.4	80.2	78.4	74.4	69.0	58.1	50.4	3
4	70.9	71.8	74.6	74.1	69.4	58.3	50.5	4
5	67.7	67.7	70.1	71.9	69.4	58.1	50.4	5
6	67.3	66.9	68.5	70.1	69.1	58.5	50.4	6
7	67.0	66.4	67.5	69.0	68.7	58.5	50.4	7
8	67.6	66.7	67.0	68.1	68.1	58.5	50.5	8
9	65.1	65.1	66.5	67.7	67.6	58.5	50.5	9
10	69.9	68.4	67.3	67.2	67.2	58.6	50.5	10
11	73.1	71.4	69.7	67.7	67.0	58.6	50.5	11
12	62.7	63.7	67.1	68.1	66.9	58.6	50.4	12
13	60.3	59.6	62.2	66.2	66.7	58.8	50.5	13
14	61.1	60.9	62.2	64.8	66.3	59.0	50.5	14
15	61.8	61.3	62.0	64.1	65.7	59.0	50.5	15
16	63.9	63.0	63.0	64.0	65.2	59.0	50.5	16
17	63.0	62.7	63.1	64.2	65.0	59.2	50.5	17
18	69.0	67.4	65.3	64.2	64.5	59.2	50.7	18
19	67.1	66.6	66.5	65.2	64.5	59.0	50.5	19
20	63.6	63.1	64.4	65.0	64.6	59.2	50.7	20
21	M	M	M	M	64.2	59.0	50.4	21
22	59.1	58.2	59.4	62.5	64.0	59.0	50.5	22
23	59.1	58.7	59.6	61.8	63.5	59.0	50.5	23
24	60.9	60.2	60.3	61.6	63.2	59.0	50.5	24
25	62.5	62.5	62.1	61.9	62.9	59.0	50.5	25
26	62.1	61.7	61.5	62.2	62.6	59.0	50.5	26
27	63.3	62.9	62.8	62.4	62.6	59.0	50.5	27
28	63.4	62.4	62.1	62.4	62.6	59.0	50.5	28
29	67.6	66.6	64.5	62.7	62.6	59.0	50.5	29
30	65.4	66.2	65.6	63.9	62.7	59.0	50.7	30
AVERAGE	66.5	65.9	66.1	66.3	65.8	58.7	50.5	AVG.
NUMBER OF OBS.	711	711	711	711	720	720	720	NUMBER OF OBS.

TABLE 141
Daily Average Soil Temperature (°F)
October 1953

[illegible]

Daily Average Soil Temperature (°F)
November 1953

[illegible]

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TABLE 146

Daily Average Soil Temperature (°F)
March 1954

[illegible]

TABLE 148

Daily Average Soil Temperature (°F)
May 1954

[illegible]

TABLE 150
Monthly Average Soil Temperature (°F)

LEVEL	PERIOD	MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1 CM	JULY 1952 - JUNE 1953	M	M	M	M	40.4	32.4	31.4	31.7	39.2	46.5	61.1	72.4
	JULY 1953 - JUNE 1954 DIFFERENCE	76.2	75.1	66.5	57.4	- 4.0	35.2	31.0	33.9	36.4	51.3	58.8	74.5
10 CM	JULY 1952 - JUNE 1953	M	M	M	M	41.7	32.7	31.6	31.4	37.9	44.9	59.9	72.6
	JULY 1953 - JUNE 1954 DIFFERENCE	75.8	74.7	65.9	57.5	44.9	35.4	31.0	33.5	35.7	50.1	57.5	73.2
20 CM	JULY 1952 - JUNE 1953	M	M	M	M	43.3	34.2	32.4	32.0	37.5	44.2	58.0	70.3
	JULY 1953 - JUNE 1954 DIFFERENCE	74.2	73.4	66.1	58.2	46.7	37.0	32.3	33.6	36.1	48.7	56.2	70.5
50 CM	JULY 1952 - JUNE 1953	M	M	M	M	46.9	38.1	35.2	34.3	37.2	43.3	54.3	65.7
	JULY 1953 - JUNE 1954 DIFFERENCE	70.6	71.0	66.3	59.6	50.2	40.7	35.3	35.2	37.2	46.3	53.7	65.5
100 CM	JULY 1952 - JUNE 1953	M	M	M	M	50.2	43.2	39.2	37.5	38.3	42.8	50.3	59.9
	JULY 1953 - JUNE 1954 DIFFERENCE	65.7	67.6	65.8	60.6	53.8	46.0	40.3	38.2	39.1	44.1	51.0	59.6
10 FT	JULY 1952 - JUNE 1953	M	M	M	M	54.9	52.7	49.4	46.9	45.2	44.9	46.1	49.4
	JULY 1953 - JUNE 1954 DIFFERENCE	53.5	56.8	58.7	58.6	57.1	54.5	50.9	47.9	46.3	45.4	47.1	50.0
29 FT	JULY 1952 - JUNE 1953	M	M	M	M	51.6	52.1	52.3	52.3	M	M	M	M
	JULY 1953 - JUNE 1954 DIFFERENCE	50.1	50.2	50.5	50.8	51.1	51.7	52.0	52.1	52.1	51.8	51.3	51.0

FIGURE 19 MONTHLY AVERAGE SOIL TEMPERATURE (°F)
JULY 1953 — JUNE 1954

(H) Stability

The difference in temperature between two levels in the atmosphere is a measure of the thermodynamic stability. The stability data upon which this report is based were obtained by means of two artificially aspirated thermopiles. The lower thermopile was located at 5.5 feet above the ground surface, and the upper one at 144 feet. The lower element was mounted on the same horizontal boom used to support the ambient temperature thermopile. The upper one was mounted on a boom 8 feet long at right angles to the mast supporting the Aerovane on top of the Meteorology Tower.

A Brown Electronik Potentiometer was used to measure the temperature difference values. These values were read to the nearest 0.1°C. Ten-minute averages for the period beginning five minutes to the hour were determined for each hour of the day.

1. Average Hourly Temperature Difference (°C) - 144-Foot Level Minus 5.5-Foot Level

Table 151: This table shows the average temperature difference for each hour of the day during each month within the three-year period beginning July 1, 1951, and ending June 30, 1954. Each temperature difference value is the average of a total number of corresponding hourly readings. For example, the entry for 0500 in July was based on all of the 0500 readings for the three Julys considered in this report.

Positive values indicate that the temperature increased with height and that inversion conditions were present. Negative values indicate that the temperature decreased with height. It may be noted that during the morning and afternoon the temperature difference was usually negative. At times these values exceeded the dry adiabatic lapse rate. The highest average values of inversion occurred in the summer and fall months.

There was an appreciable amount of data missing because of the malfunction of the equipment during the early part of the operating period. The largest amount of missing data occurred during the month of January, with only 79% of the total possible observations present. The remaining months contain over 85% of the possible total. However, it is felt that a sufficient amount of data was available to provide representative values.

2. Frequency Distribution of Temperature Difference between 144-Foot and 5.5-Foot Levels

Tables 152 through 155: These tables show the monthly frequency distribution of the temperature difference values for the four six-hourly periods: 0100 - 0600, 0700 - 1200, 1300 - 1800, and 1900 - 2400.

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The observations indicate that an inversion existed during a major portion of the hours of darkness. Almost three-fourths of the observations show an inversion to be present during the hours 1900 - 0600. During the remaining twelve hours, from 0700 to 1800, the period representing most of the daylight hours, only 19% of the observations indicated that an inversion was present. These tables supplement the information of the previous tables in showing that inversions of greatest magnitude occurred during the summer and fall months. These occurred in the early morning hours from 0100 through 0600.

TABLE 151

Average Hourly Temperature Difference (°C)
 144-Foot Level Minus 5.5-Foot Level
 July 1951 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	2.0	2.3	1.9	1.8	0.8	0.6	0.2	0.7	0.6	1.0	1.7	1.5	1
2	2.0	2.3	1.9	1.9	0.9	0.5	0.2	0.7	0.7	1.1	1.5	1.5	2
3	1.9	2.2	2.0	1.9	1.0	0.5	0.2	0.6	0.7	1.0	1.4	1.5	3
4	2.0	2.2	1.9	2.0	1.0	0.5	0.1	0.6	0.6	1.1	1.5	1.5	4
5	1.8	2.2	2.0	2.2	0.9	0.6	0.1	0.6	0.6	1.0	1.4	1.2	5
6	0.6	1.2	1.6	2.1	0.9	0.6	0.1	0.6	0.6	0.5	0.4	0.3	6
7	-0.3	0.0	0.3	1.2	0.8	0.6	0.0	0.5	0.1	-0.2	-0.3	-0.2	7
8	-0.5	-0.5	-0.4	-0.2	0.0	0.2	-0.1	-0.2	-0.3	-0.6	-0.6	-0.5	8
9	-0.6	-0.6	-0.6	-0.6	-0.4	-0.1	-0.3	-0.5	-0.5	-0.7	-0.8	-0.6	9
10	-0.8	-0.7	-0.7	-0.7	-0.6	-0.3	-0.5	-0.7	-0.7	-0.9	-0.9	-0.7	10
11	-0.8	-0.8	-0.8	-0.8	-0.7	-0.4	-0.5	-0.8	-0.7	-1.0	-0.9	-0.7	11
12	-0.8	-0.8	-0.8	-0.8	-0.7	-0.4	-0.5	-0.8	-0.8	-1.0	-0.9	-0.7	12
13	-0.8	-0.8	-0.8	-0.8	-0.7	-0.3	-0.5	-0.8	-0.8	-1.0	-0.9	-0.7	13
14	-0.6	-0.6	-0.7	-0.7	-0.6	-0.3	-0.5	-0.8	-0.8	-0.9	-0.7	-0.5	14
15	-0.4	-0.4	-0.3	-0.3	-0.3	-0.2	-0.3	-0.6	-0.5	-0.6	-0.5	-0.2	15
16	-0.1	-0.2	0.0	0.1	0.1	0.1	-0.1	-0.3	-0.3	-0.4	-0.3	0.0	16
17	0.2	0.1	0.5	1.0	0.7	0.4	0.1	0.1	-0.1	-0.2	-0.1	0.2	17
18	0.6	0.7	1.5	1.7	0.9	0.4	0.2	0.5	0.2	0.3	0.2	0.6	18
19	1.4	1.5	2.0	1.7	1.0	0.5	0.3	0.6	0.5	0.7	0.7	1.0	19
20	1.8	1.9	2.1	1.8	0.9	0.4	0.3	0.5	0.6	0.8	1.0	1.4	20
21	2.1	2.1	2.0	1.9	0.9	0.4	0.3	0.5	0.6	0.9	1.3	1.5	21
22	2.0	2.3	2.1	1.8	0.9	0.5	0.3	0.6	0.7	1.0	1.4	1.6	22
23	2.1	2.4	2.1	1.9	0.8	0.5	0.2	0.6	0.7	1.1	1.5	1.5	23
24	2.0	2.3	2.0	1.8	0.8	0.5	0.2	0.7	0.6	0.9	1.5	1.5	24

TABLE 152

Frequency Distribution of Temperature Difference
Between 144-Foot and 5.5-Foot Level
For Hours 0100 - 0600
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144 FT. MINUS 5.5 FT. LEVEL	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
-1.4--1.0					3							2	5
-0.9--0.5	3	1	6	7	21	63	18	21	22	24	9	4	199
-0.4--0.0	85	69	68	104	163	192	205	212	179	188	116	93	1674
0.1--0.5	96	90	92	66	119	90	132	97	128	77	90	98	1175
0.6--1.0	62	58	45	53	65	43	54	46	45	41	61	80	653
1.1--1.5	27	50	36	51	43	17	33	19	49	28	49	58	460
1.6--2.0	39	52	40	43	38	5	25	30	35	24	31	64	426
2.1--2.5	36	36	46	36	25	6	16	15	25	19	26	40	326
2.6--3.0	29	33	41	28	11	4	9	12	10	11	26	18	232
> 3.0	114	157	143	154	52	7	24	45	26	58	84	57	921
MISSING	67	12	23	16		131	42	13	39	70	66	26	505
TOTAL	558	558	540	558	540	558	558	510	558	540	558	540	6576

TABLE 153

Frequency Distribution of Temperature Difference Between
144-Foot and 5.5-Foot Level
For Hours 0700 - 1200
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144 FT. MINUS 5.5 FT. LEVEL	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
<-2.0									1		1		2
-1.9--1.5	10	6	2		1	1		11	27	37	25	1	121
-1.4--1.0	133	89	79	93	64	35	17	88	88	127	153	86	1052
-0.9--0.5	198	267	247	240	216	178	139	160	193	210	232	292	2572
-0.4--0.0	115	148	142	136	167	131	235	177	151	106	94	111	1713
0.1--0.5	31	23	31	29	39	40	69	31	44	6	11	36	390
0.6--1.0	5	10	9	14	17	29	24	8	15	2	1	7	141
1.1--1.5	3	4	4	4	17	4	11	7	4	7	1	1	67
1.6--2.0	1	1	1	8	5	2	5	4	2		1		30
2.1--2.5		1	3	8	4	2	5	7	3				33
2.6--3.0			1	1			4						6
> 3.0			1	15	9	2	11	4	2				44
MISSING	62	9	20	10	1	134	38	13	28	45	39	6	405
TOTAL	558	558	540	558	540	558	558	510	558	540	558	540	6576

TABLE 154

Frequency Distribution of Temperature Difference Between
144-Foot and 5.5-Foot Level
For Hours 1300 - 1800
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144-FT. MINUS 5.5-FT. LEVEL	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
< -2.0					1				1	6			8
-1.9 - -1.5	5	8	3					12	30	22	15	2	97
-1.4 - -1.0	54	41	48	50	34	28	7	56	53	80	67	38	556
-0.9 - -0.5	141	150	136	139	126	135	89	160	150	160	171	151	1708
-0.4 - 0.0	137	181	128	134	188	155	259	166	203	148	158	173	2030
0.1 - 0.5	90	107	99	85	81	61	88	55	63	49	67	87	932
0.6 - 1.0	50	33	39	52	38	21	35	23	21	14	26	45	397
1.1 - 1.5	19	21	26	28	27	5	15	8	7	9	6	30	201
1.6 - 2.0	4	6	17	20	14	10	11	8	5	4	1	9	109
2.1 - 2.5	1	1	13	14	12	3	7	3	4	2		4	64
2.6 - 3.0		1	4	10	8	4	2	1				1	31
> 3.0		1	10	20	7	2	4	2			1		47
MISSING	57	8	17	6	4	134	41	16	21	46	46		396
TOTAL	558	558	540	558	540	558	558	510	558	540	558	540	6576

TABLE 155

Frequency Distribution of Temperature Difference Between
144-Foot and 5.5-Foot Level
For Hours 1900 - 2400
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144-FT. MINUS 5.5-FT. LEVEL	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
-1.9 - -1.5										6			6
-1.4 - -1.0					1					1			2
-0.9 - -0.5		1		1	19	46	15	9	22	18	5		136
-0.4 - 0.0	39	40	44	102	157	209	208	214	192	156	108	71	1540
0.1 - 0.5	77	65	77	73	119	66	134	107	94	102	91	95	1100
0.6 - 1.0	61	65	56	70	59	47	65	43	72	56	61	96	751
1.1 - 1.5	63	70	50	44	51	22	33	34	62	35	61	76	601
1.6 - 2.0	60	62	63	55	44	15	19	37	38	28	54	58	533
2.1 - 2.5	43	49	56	51	25	9	16	15	15	16	40	35	370
2.6 - 3.0	34	43	37	22	21	12	10	9	14	15	31	24	272
> 3.0	127	151	145	134	44	6	14	28	20	59	51	77	856
MISSING	54	12	12	6		126	44	14	29	48	56	8	409
TOTAL	558	558	540	558	540	558	558	510	558	540	558	540	6576

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PART II

RELATIONS BETWEEN TWO OR MORE
METEOROLOGICAL VARIABLES

PART II. RELATIONS BETWEEN TWO OR MORE METEOROLOGICAL VARIABLES

The following tables show the relationship between two or more variables through the use of joint frequency distribution. Groupings by months, in addition to five-year summaries, are presented. The data presented in a table for a particular month represent the data obtained for all of the similar months within the five-year period. For example, the data for January include the measurements of all of the Januarys for the years 1950 through 1954. The five-year summary table represents a summation of the twelve monthly tables.

(I) Wind and Temperature

1. Joint Frequency Distribution of Air Temperature and Wind Direction - 19-Foot Level

Tables 156 through 168: It is evident that there is an appreciable spread of temperature values for each direction on the monthly charts. As might be expected, however, there is a tendency for higher temperatures to occur with winds having a southerly component.

2. Joint Frequency Distribution of Air Temperature and Wind Speed - 19-Foot Level

Tables 169 through 181: The monthly charts indicate a tendency for lower temperatures to occur with lower wind speeds. The reason for this is that the wind at the 19-foot level and the ambient air temperature both decrease during the night and increase during the day. Nevertheless, there is a considerable amount of scatter in the data.

TABLE 156

**Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, July 1949 - 1953**

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
95 - 99					5	2	2					9
90 - 94		2	1		6	12	4	1	1	4		31
85 - 89	1	6	17	9	29	105	25	10	4	9		215
80 - 84	4	23	53	41	80	128	72	42	17	24	6	490
75 - 79	10	49	79	48	125	186	63	63	38	24	15	700
70 - 74	25	111	99	62	129	199	63	66	70	14	12	850
65 - 69	39	102	90	56	71	88	76	54	80	6		662
60 - 64	51	88	64	44	39	34	42	42	75		9	488
55 - 59	27	14	27	15	5	16	22	20	62			208
50 - 54	11			4	3	5	11	7	14			55
45 - 49	2							1				3
MISSING				1	8							9
TOTAL	170	395	430	280	500	775	380	306	361	81	42	3720

TABLE 157

**Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, August 1949 - 1953**

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
90 - 94			1		4	33	4	3	1			46
85 - 89				4	13	61	28	9		3		118
80 - 84	3	31	26	28	48	90	42	5	7	8	1	289
75 - 79	10	45	53	52	67	131	70	34	24	15	6	507
70 - 74	36	114	88	64	95	163	90	75	60	14	9	808
65 - 69	52	131	103	58	82	134	88	63	94	4	7	816
60 - 64	52	134	61	53	46	71	29	54	133	1		634
55 - 59	51	52	26	21	12	21	33	45	90			351
50 - 54	34	16	10	2	2	3	2	15	45	1		130
45 - 49	5	2	1			5		4	3			20
MISSING									1			1
TOTAL	243	525	369	282	369	712	386	307	458	46	23	3720

TABLE 158

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, September 1949 - 1953

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
95 - 99						5	2					7
90 - 94					9	10						19
85 - 89		1		4	16	19	3	2				45
80 - 84	3		2	5	19	27	7			1		64
75 - 79	4	3	5	14	47	62	26	9		1		171
70 - 74	9	32	22	36	76	84	47	17	8	7		338
65 - 69	13	67	37	36	100	109	76	43	35	12	1	529
60 - 64	27	133	64	51	106	125	96	108	74	15	4	803
55 - 59	17	52	29	31	58	83	58	105	84	8	8	533
50 - 54	24	27	20	38	51	82	63	79	66	1	19	470
45 - 49	21	9	10	18	12	45	45	63	32		19	274
40 - 44	11		1	4	3	24	25	42	14		7	131
35 - 39	1				8	2	13	16	2		3	45
30 - 34								1				1
MISSING	4	5	7	7	42	26	16	13	42	4	4	170
TOTAL	134	329	197	244	547	703	477	498	357	49	65	3600

TABLE 159

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, October 1949 - 1953

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
85 - 89				1	3							4
80 - 84				2	15	30	6				1	54
75 - 79	2		1	12	24	45	3	9	1		2	99
70 - 74	5	3	6	13	41	69	11	6	1	2	1	158
65 - 69	8	7	14	26	82	128	29	15	6	2	5	322
60 - 64	7	36	33	21	73	124	28	24	24	3	5	378
55 - 59	15	45	42	31	69	110	43	35	31	2	4	427
50 - 54	16	120	34	65	90	121	48	56	103	1	13	667
45 - 49	17	73	34	39	50	94	45	81	150	4	4	591
40 - 44	22	37	12	20	22	59	59	68	96	2		397
35 - 39	7	9	12	17	17	53	39	63	58			275
30 - 34	7	3	1	1	14	20	29	50	28			153
25 - 29	4	1				9	10	11	10			45
20 - 24						2	9	5	1			17
15 - 19	1						2					3
MISSING			1	16	77	29	4				3	130
TOTAL	111	334	190	264	577	893	365	423	509	16	38	3720

TABLE 160

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, November 1949 - 1953

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
75 - 79						5						5
70 - 74					9	4	1					14
65 - 69				1	29	31	3				2	66
60 - 64			1	8	45	30	9	2				95
55 - 59	4	1	3	28	63	45	27	7	1	1	3	183
50 - 54	3	9		5	63	74	31	11	2		3	201
45 - 49	1	10	8	17	100	95	42	20	24	1	9	327
40 - 44	2	2	14	21	49	135	89	60	72	4	14	462
35 - 39	8	20	12	6	29	106	126	98	78	1	27	511
30 - 34	14	15	15	36	84	93	156	100	112	1	10	636
25 - 29	23	12	13	18	62	82	92	157	108		4	571
20 - 24	8	7	6	13	24	17	69	69	38			251
15 - 19	1	3	2	6	10	10	41	53	26			152
10 - 14	1				8	4	26	23	7			69
5 - 9					1	3	4	5	1			14
0 - 4						2	13	9				24
-5 - -1					1	3	6	3	1			14
MISSING			1	1	2	1						5
TOTAL	65	79	75	160	579	740	735	617	470	8	72	3600

TABLE 161

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, December 1949 - 1953

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
60 - 64					5							5
55 - 59					32	10						42
50 - 54				3	44	13	3					63
45 - 49	1		2	17	44	51	11	3				129
40 - 44	2	11	21	48	60	63	21	9	5			240
35 - 39	7	23	54	38	84	112	53	12	16		2	401
30 - 34	15	34	90	82	90	137	168	93	63		2	774
25 - 29	13	8	35	48	42	120	117	55	51		4	493
20 - 24	8	9	24	14	60	114	141	83	46			499
15 - 19	15	18	21	28	37	41	96	89	26		3	374
10 - 14	13	6	8	16	15	32	60	78	22			250
5 - 9	3	3	6	7	9	33	40	51	6			158
0 - 4		1	1	3	5	28	44	36	15			133
-5 - -1			1	3		18	42	19	6			89
-10 - -6						4	10	5				19
-15 - -11						4	11	1				16
MISSING							12	20	3			35
TOTAL	77	113	263	307	527	780	829	554	259		11	3720

TABLE 162

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, January 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
65 - 69					1							1
60 - 64					11	1	1					13
55 - 59					2	6	3					11
50 - 54				5	22	19	2		2	1		51
45 - 49	1			10	28	32	10					81
40 - 44	3		4	20	49	34	10	1	1		1	123
35 - 39	5	23	18	43	104	82	54	12	11	1	11	364
30 - 34	19	85	51	74	139	131	90	59	101	2	36	787
25 - 29	13	34	63	63	94	68	98	116	70	2	7	628
20 - 24	12	27	32	34	57	81	96	101	68	3	4	515
15 - 19	6	38	49	26	32	33	100	93	63	2		442
10 - 14	2	7	10	13	12	12	70	67	79	1		273
5 - 9	9	7		7	7	8	63	45	43	3		192
0 - 4	3		1	1	2	8	29	50	36	1		131
-5 - -1		3	1			2	10	27	11			54
-10 - -6								21	1			22
-15 - -11								6	1			7
-20 - -16	1								4			5
MISSING				1		1	18					20
TOTAL	74	224	229	297	560	518	654	598	491	16	59	3720

TABLE 163

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, February 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
65 - 69						2						2
60 - 64						6						6
55 - 59				5	8	15		1				29
50 - 54				15	12	11	4		1			43
45 - 49		2	1	19	26	21	16	5		1		91
40 - 44		2	4	36	58	64	49	18	2	1		234
35 - 39	5	26	32	40	67	76	98	37	46	6		433
30 - 34	3	84	151	73	76	146	145	100	146	4	28	956
25 - 29	11	61	108	20	46	54	83	98	83		14	578
20 - 24	15	27	44	11	34	32	66	78	88			395
15 - 19	2	15	10	15	10	13	34	41	73	3		216
10 - 14		7	7	11	8	11	29	13	19	2		107
5 - 9	2	2		4	18	8	20	16	12	1		83
0 - 4					1	1	20	42	17			81
-5 - -1						4	18	15	12	1		50
-10 - -6						1	6	7	4			18
-15 - -11						3	4					7
-20 - -16						3						3
MISSING	4	7	7	2	2	1	10	6	13			52
TOTAL	42	233	364	251	366	472	602	477	516	19	42	3384

TABLE 164

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, March 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
70 - 74					5							5
65 - 69					2	3						5
60 - 64				1	13	5	1	1				21
55 - 59	1		4	9	43	9	8	1	2			77
50 - 54	2	4	10	28	61	23	9	9	1			147
45 - 49	2	9	26	56	65	27	20	21	3	3		232
40 - 44	3	41	54	62	54	33	49	24	21	6		347
35 - 39	7	68	105	60	52	77	123	62	59	9		622
30 - 34	17	122	148	55	55	70	125	117	148	3		860
25 - 29	11	80	89	43	31	35	70	112	127	1		599
20 - 24	12	29	28	5	6	28	94	118	75		1	396
15 - 19		4	2	1	5	19	71	67	55		3	227
10 - 14		2			2	5	45	20	16			90
5 - 9	2					3	26	11	6			48
0 - 4						4	6	7				17
-5 - -1								3				3
MISSING	2		1	1	1	1	13	4		1		24
TOTAL	59	359	467	321	395	342	660	577	513	23	4	3720

TABLE 165

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, April 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
80 - 84		1	1		2	7		2	1			14
75 - 79		7	1	5	10	15	2	4	10	2	3	59
70 - 74	1		4	14	17	43	8	9	7	3	3	109
65 - 69	1	9	6	17	16	36	26	10	1	2	3	127
60 - 64	1	6	19	20	32	64	26	16	2	2	5	193
55 - 59	3	20	28	42	28	65	32	14	10	3	2	247
50 - 54	7	65	68	38	36	56	45	50	38	8	4	415
45 - 49	4	74	106	39	37	46	84	50	44	8	14	506
40 - 44	6	95	118	18	19	35	112	91	42	5	15	556
35 - 39	9	61	72	29	5	34	113	104	113	1	26	567
30 - 34	5	39	41	17	2	16	105	105	96		8	434
25 - 29	5	2	12	17	3	12	19	20	17	2		109
20 - 24		2	7	5	1	2	3	2	7			29
15 - 19						3	1		6			10
MISSING	4	13	3	4	38	37	42	29	44	11		225
TOTAL	46	394	486	265	246	471	618	506	438	47	83	3600

TABLE 166

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, May 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
85 - 89				1	4	16	7	2	1			31
80 - 84			2	5	14	31	22	5	2		1	82
75 - 79			5	13	43	57	36	16	4	3	1	178
70 - 74		4	16	25	46	82	62	16	14	16	1	282
65 - 69		28	47	47	75	71	67	34	30	11	4	414
60 - 64	5	72	81	43	62	66	72	50	44	18	3	516
55 - 59	5	122	106	39	41	65	68	46	75	12	2	581
50 - 54	16	166	81	32	13	58	84	59	85	5	1	600
45 - 49	19	164	60	23	4	43	68	52	122	2	1	558
40 - 44	21	71	15	6	3	10	43	26	69			264
35 - 39	7	43	7	1	1	4	56	15	51	1		186
30 - 34		4	1				16	1	3			25
25 - 29							3					3
TOTAL	73	674	421	235	306	503	604	322	500	68	14	3720

TABLE 167

Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level, June 1950 - 1954

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
95 - 99					2	3						5
90 - 94				2	9	25	5	1		1		43
85 - 89			3	16	45	73	23	8	1	2	11	182
80 - 84	2	4	19	23	52	97	47	32	7	11	46	340
75 - 79	3	18	24	32	77	121	51	33	13	7	68	447
70 - 74	17	53	77	75	102	117	65	60	40	11	72	689
65 - 69	20	60	62	62	74	84	60	30	59	16	91	618
60 - 64	21	74	79	51	36	49	41	52	66	5	78	552
55 - 59	11	61	74	27	4	20	26	41	51	5	49	369
50 - 54	15	39	36	18	3	10	20	9	34		54	238
45 - 49	5	22	10	3	1	2	2	7	19		12	83
40 - 44	1	4	1				2	1	5			14
35 - 39									2			2
MISSING		1			11	2			2	2		18
TOTAL	95	336	385	309	416	603	342	274	299	60	481	3600

TABLE 168

**Joint Frequency Distribution of Air Temperature and Wind Direction
19-Foot Level - July 1949 - June 1954**

TEMP. °F	WIND DIRECTION (8 POINTS)										MISSING	TOTAL
	CALM	NE	E	SE	S	SW	W	NW	N	VARIABLE		
95 - 99					7	10	4					21
90 - 94		2	2	2	28	80	13	5	2	5		139
85 - 89	1	7	20	35	110	274	86	31	6	14	11	595
80 - 84	12	59	103	104	230	410	196	86	34	44	55	1333
75 - 79	29	122	168	176	393	622	251	168	90	52	95	2166
70 - 74	93	317	312	289	520	761	347	249	200	67	98	3253
65 - 69	133	404	359	303	532	686	425	249	305	53	113	3562
60 - 64	164	543	402	292	468	575	345	349	418	44	104	3704
55 - 59	134	367	339	248	365	465	320	315	406	31	68	3058
50 - 54	128	446	259	253	400	475	322	295	391	17	94	3080
45 - 49	78	365	258	241	367	461	343	307	397	19	59	2895
40 - 44	71	263	244	235	317	457	459	340	327	18	37	2768
35 - 39	56	273	312	234	367	546	675	419	436	19	69	3406
30 - 34	80	386	498	338	460	613	834	626	697	10	84	4626
25 - 29	80	198	320	209	278	380	492	569	466	5	29	3026
20 - 24	55	101	141	82	182	276	478	456	323	3	5	2102
15 - 19	25	78	84	76	94	119	345	343	249	5	6	1424
10 - 14	16	22	25	40	45	64	230	201	143	3		789
5 - 9	16	12	6	18	35	55	153	128	68	4		495
0 - 4	3	1	2	4	8	43	112	144	68	1		386
-5 - -1		3	2	3	1	27	76	67	30	1		210
-10 - -6						5	16	33	5			59
-15 - -11						7	15	7	1			30
-20 - -16	1					3			4			8
MISSING	14	26	20	33	181	98	115	72	105	18	7	689
TOTAL	1189	3995	3876	3215	5388	7512	6652	5459	5171	433	934	43824

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TABLE 169

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, July 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
95 - 99		1	6	2								9
90 - 94	1	2	16	8	4							31
85 - 89	1	11	76	98	25	1					3	215
80 - 84	5	77	206	151	32						19	490
75 - 79	14	113	288	219	31	1					34	700
70 - 74	24	180	426	185	12	1					22	850
65 - 69	34	219	312	83	7						7	662
60 - 64	52	183	188	42	9						14	488
55 - 59	27	81	88	7							5	208
50 - 54	11	22	19	3								55
45 - 49	2	1										3
MISSING		1	3	5								9
TOTAL	171	891	1628	803	120	3					104	3720

TABLE 170

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, August 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
90 - 94		4	23	18	1							46
85 - 89		15	52	51								118
80 - 84	5	38	137	98	10						1	289
75 - 79	8	91	245	127	18						18	507
70 - 74	32	199	397	157	14						9	808
65 - 69	53	269	366	112	10	1					5	816
60 - 64	54	245	251	76	8							634
55 - 59	54	149	122	23	3							351
50 - 54	32	48	45	5								130
45 - 49	5	6	9									20
MISSING			1									1
TOTAL	243	1064	1648	667	64	1					33	3720

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TABLE 171

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, September 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
95 - 99			1	5	1							7
90 - 94		1	5	8	5							19
85 - 89		6	18	12	6	2	1					45
80 - 84	3	7	28	12	11	3						64
75 - 79	4	18	41	73	33	2						171
70 - 74	9	48	117	122	40	2						338
65 - 69	13	90	204	180	39	1					2	529
60 - 64	26	183	342	214	34						4	803
55 - 59	18	145	218	124	26	1					1	533
50 - 54	24	120	251	51	5	6					13	470
45 - 49	20	79	147	15	6	2					5	274
40 - 44	11	28	76	10	1	1					4	131
35 - 39	1	19	23	2								45
30 - 34			1									1
MISSING	6	46	71	41	3						3	170
TOTAL	135	790	1543	869	210	20	1				32	3600

TABLE 172

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, October 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
85 - 89				4								4
80 - 84		1	17	26	9						1	54
75 - 79	2	8	22	51	16							99
70 - 74	5	20	57	58	17						1	158
65 - 69	8	41	138	117	12	1					5	322
60 - 64	7	49	154	116	43	4					5	378
55 - 59	15	53	193	123	32	4					7	427
50 - 54	17	108	289	173	65	2					13	667
45 - 49	17	113	227	152	67	3					12	591
40 - 44	21	79	165	94	35	3						397
35 - 39	7	65	126	48	22	7						275
30 - 34	6	29	81	24	13							153
25 - 29	4	13	20	8								45
20 - 24		5	12									17
15 - 19	1	1	1									3
MISSING		6	33	66	18	3	4					130
TOTAL	110	591	1535	1060	349	27	4				44	3720

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TABLE 173

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, November 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
75 - 79				1	2	2						5
70 - 74				4	9	1						14
65 - 69		1	6	37	20						2	66
60 - 64		4	14	57	15	5						95
55 - 59	2	6	47	78	37	7	3				3	183
50 - 54	2	10	53	65	57	10	1				3	201
45 - 49	1	19	72	130	87	7	2				9	327
40 - 44	2	39	163	158	72	11	3				14	462
35 - 39	8	43	164	178	79	10	1	1			27	511
30 - 34	15	50	205	214	119	18	5				10	636
25 - 29	23	72	139	181	114	21	19				2	571
20 - 24	8	32	87	63	42	17	2					251
15 - 19	2	23	69	29	22	7						152
10 - 14	1	14	31	14	7	2						69
5 - 9		2	9	1	2							14
0 - 4		2	10	7	4	1						24
-5 - -1		1	12	1								14
MISSING		4	1									5
TOTAL	64	322	1082	1218	688	119	36	1			70	3600

TABLE 174

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, December 1949 - 1953

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
60 - 64					2	1	1	1				5
55 - 59			1	9	19	13						42
50 - 54		1	6	16	34	6						63
45 - 49	1	2	23	44	51	8						129
40 - 44	2	13	79	101	38	6	1					240
35 - 39	7	30	124	154	81	5						401
30 - 34	16	70	193	343	142	10						774
25 - 29	10	47	140	216	71	9						493
20 - 24	5	39	122	222	98	13						499
15 - 19	15	37	114	142	55	8	1				2	374
10 - 14	14	38	97	76	17	7	1					250
5 - 9	3	24	64	49	9	8	1					158
0 - 4		12	62	44	8	6	1					133
-5 - -1	1	9	42	13	21	3						89
-10 - -6		3	10	6								19
-15 - -11		2	7	7								16
MISSING		7	22	6								35
TOTAL	74	334	1106	1448	646	103	6	1			2	3720

TABLE 175

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, January 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
65 - 69							1					1
60 - 64					3	8	2					13
55 - 59				3	8							11
50 - 54	1	1	4	15	23	7						51
45 - 49	1	6	23	21	25	4	1					81
40 - 44	3	6	44	46	22	1	1					123
35 - 39	5	24	114	125	81	14	1					364
30 - 34	20	83	219	288	127	15	3				32	787
25 - 29	13	71	161	221	134	16	6				6	628
20 - 24	12	50	138	215	77	15	4				4	515
15 - 19	6	61	118	159	74	20	4					442
10 - 14	3	31	82	102	47	8						273
5 - 9	9	18	50	78	35	2						192
0 - 4	3	32	44	33	19							131
-5 - -1		12	10	20	12							54
-10 - -6			2	16	4							22
-15 - -11			2	5								7
-20 - -16	1	1	3									5
MISSING			1	6	13							20
TOTAL	77	396	1015	1353	704	110	23				42	3720

TABLE 176

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, February 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
65 - 69				1	1							2
60 - 64				1	3	2						6
55 - 59			1	6	22							29
50 - 54			3	14	22	2	2					43
45 - 49		4	14	34	29	7	3					91
40 - 44		11	44	88	80	9	2					234
35 - 39	5	36	94	164	106	27	1					433
30 - 34	4	54	269	355	213	30	6				25	956
25 - 29	9	49	174	212	114	18	2					578
20 - 24	15	45	103	146	74	10	2					395
15 - 19	2	30	72	65	34	8	5					216
10 - 14	1	17	46	29	10	4						107
5 - 9	2	8	24	34	10	5						83
0 - 4		1	19	32	26	3						81
-5 - -1	1	12	16	10	9	2						50
-10 - -6		1	11	6								18
-15 - -11			2	5								7
-20 - -16			2	1								3
MISSING	4	32	14	1	1							52
TOTAL	43	300	908	1204	754	127	23				25	3384

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TABLE 177

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level - March 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
70 - 74						3	2					5
65 - 69				1	2	1	1					5
60 - 64		1	3	6	5	4	2					21
55 - 59	1	1	7	34	22	11	1					77
50 - 54	2	6	32	54	38	15						147
45 - 49	2	23	46	97	58	4	2					232
40 - 44	4	31	77	143	75	13	4					347
35 - 39	6	47	137	228	171	31	2					622
30 - 34	19	84	165	315	208	62	7					860
25 - 29	11	69	165	202	118	34						599
20 - 24	12	28	130	111	75	32	7				1	396
15 - 19	1	13	55	71	50	30	4				3	227
10 - 14		6	22	36	21	5						90
5 - 9	2	2	14	21	6	3						48
0 - 4		1	8	1	5	2						17
-5 - -1					3							3
MISSING	3	3	10	6	2							24
TOTAL	63	315	871	1326	859	250	32				4	3720

TABLE 178

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, April 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
80 - 84			3	5	6							14
75 - 79		1	18	24	14	2						59
70 - 74	1	3	21	33	37	13	1					109
65 - 69	1	6	20	60	36	3	1					127
60 - 64	1	9	42	74	56	11						193
55 - 59	4	33	68	85	53	4						247
50 - 54	7	32	124	164	76	12						415
45 - 49	4	36	135	167	119	32	6				7	506
40 - 44	5	44	145	172	118	53	3				16	556
35 - 39	6	49	162	178	116	33	2				21	567
30 - 34	5	25	143	133	98	30						434
25 - 29	4	24	40	28	12	1						109
20 - 24		7	14	8								29
15 - 19		1	3	6								10
MISSING	1	27	66	59	44	19	9					225
TOTAL	39	297	1004	1196	785	213	22				44	3600

TABLE 179

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, May 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
85 - 89			5	4	21	1						31
80 - 84		5	12	39	18	8						82
75 - 79		7	54	61	46	5	4				1	178
70 - 74		24	83	102	54	12	4				3	282
65 - 69	1	39	166	137	53	13	4				1	414
60 - 64	5	72	199	180	53	5	1				1	516
55 - 59	8	64	232	209	59	4	1	1			3	581
50 - 54	18	83	223	192	68	14	2					600
45 - 49	17	82	251	170	27	11						558
40 - 44	21	33	116	60	23	11						264
35 - 39	7	24	84	32	21	18						186
30 - 34		4	8	10	3							25
25 - 29				3								3
TOTAL	77	437	1433	1199	446	102	16	1			9	3720

TABLE 180

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, June 1950 - 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
95 - 99				1	4							5
90 - 94		2	9	27	5							43
85 - 89		13	40	81	46	2						182
80 - 84	2	27	97	149	61	4						340
75 - 79	3	59	154	171	55	4					1	447
70 - 74	20	90	281	238	53	1	1				5	689
65 - 69	32	105	259	192	17	2					11	618
60 - 64	21	127	238	134	13	1					18	552
55 - 59	11	84	170	82	19						3	369
50 - 54	16	50	112	43	13						4	238
45 - 49	5	20	32	9	11	4					2	83
40 - 44	1	8	5									14
35 - 39			2									2
MISSING		4	11	3								18
TOTAL	111	589	1410	1130	297	18	1				44	3600

TABLE 181

Joint Frequency Distribution of Air Temperature and Wind Speed
19-Foot Level, July 1949 - June 1954

TEMP. °F	WIND SPEED (MPH)										MISSING	TOTAL
	CALM	1 - 3	4 - 7	8 - 12	13 - 18	19 - 24	25 - 31	32 - 38	39 - 46	> 46		
95 - 99		1	7	8	5							21
90 - 94	1	9	53	61	15							139
85 - 89	1	45	191	250	98	6	1				3	595
80 - 84	15	155	500	480	147	15					21	1333
75 - 79	31	297	822	727	215	16	4				54	2166
70 - 74	91	564	1382	899	236	33	8				40	3253
65 - 69	142	770	1471	920	197	22	7				33	3562
60 - 64	166	873	1431	900	244	41	6	1			42	3704
55 - 59	140	616	1147	783	300	44	5	1			22	3058
50 - 54	130	481	1161	795	401	74	5				33	3080
45 - 49	75	391	979	839	480	82	14				35	2895
40 - 44	70	292	914	872	464	108	14				34	2768
35 - 39	52	337	1030	1109	677	145	7	1			48	3406
30 - 34	85	399	1284	1682	923	165	21				67	4626
25 - 29	74	345	839	1071	563	99	27				8	3026
20 - 24	52	206	606	765	366	87	15				5	2102
15 - 19	27	166	432	472	235	73	14				5	1424
10 - 14	19	106	278	257	102	26	1					789
5 - 9	16	54	161	183	62	18	1					495
0 - 4	3	48	143	117	62	12	1					386
-5 - -1	2	34	80	44	45	5						210
-10 - -6		4	23	28	4							59
-15 - -11		2	11	17								30
-20 - -16	1	1	5	1								8
MISSING	14	130	233	193	81	22	13				3	689
TOTAL	1207	6326	15183	13473	5922	1093	164	3			453	43824

214

(J) Wind and Precipitation

1. Joint Frequency Distribution of Wind Direction and Wind Speed during Hours of Precipitation - 150-Foot Level

Tables 182 through 188: It is apparent from these tables that precipitation may occur when the wind is blowing from any direction and that there is no pronounced maximum frequency of wind direction. However, during the spring months, there is a tendency for precipitation to occur more frequently with winds having a northeasterly component.

(K) Wind, Precipitation, and Stability

1. Joint Frequency Distribution of Wind Direction and Wind Speed during Hours of No Precipitation and Stability as Indicated - 150-Foot Level

Tables 189 through 201: An arbitrary definition of stability was adopted in order to facilitate the handling of the data. Stable conditions were defined as those under which the temperature was constant or increased with height. Unstable conditions were defined as those under which the temperature decreased with height.

These tables are based on only three years of data since stability measurements were unavailable in the first two years of the five-year period covered by this report. Unfortunately, in some months an appreciable amount of data is missing. The number of missing stability observations cannot be determined from these tables. However, this information is given in Tables 229 through 233.

There are interesting differences between the data based on stable and unstable conditions. For example, there are more observations of calm under stable conditions, but there is a proportionately large number of observations in the 1-3 and 4-7 miles per hour speed groupings in the unstable observations. This is probably due to the frequency of convection regimes which usually occur during sunny days. Under these conditions the instantaneous wind speed varies from one mile per hour to ten or twelve in a few minutes with very wide wind direction variations. The ten-minute average wind speed would be appreciably below twelve miles per hour. These charts also indicate that higher wind speeds are more frequent under unstable conditions.

210

2. Joint Frequency Distribution of Wind Direction and Wind
Speed during Hours of Precipitation and Stability as
Indicated - 150-Foot Level

Tables 202 through 214: These tables are similar to the previous set except that they represent data for periods during which precipitation was occurring. Unfortunately, three years of data provide a rather inadequate statistical sample. It is of interest to note that there is a relatively large number of cases with a stable lapse rate during precipitation in spite of the fact that one would expect to find a moist adiabatic lapse rate under these conditions. However, the data for most of the months indicate that the number of cases classified as unstable exceed those classified as stable.

TABLE 182

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
JULY 1949 - 1953	CALM	1											1
	NNE		1	2	4								7
	NE			1	8	1							10
	ENE		1		5	2							8
	E		1	2	12	1	1						17
	ESE			2	4	1	1						8
	SE				3	2	1						6
	SSE			2	3	2							7
	S			4	10	6							20
	SSW			2	6	3	1						12
	SW			2	2	5	1						10
	WSW			4	6	6	3	1					20
	W			4	7	2	1	1					15
	WNW			3	7	4							14
	NW			2	5	1	2						10
	NNW			1	5	5							11
	N				7	3							10
	VARIABLE		1	5									6
	MISSING			1	7		1					2	11
	TOTAL	1	4	37	101	44	12	2				2	203
AUGUST 1949 - 1953	CALM	2											2
	NNE				4	3	1						8
	NE				2	1							3
	ENE			2		1							3
	E			5	4	2	1						12
	ESE			4	1								5
	SE			2	3	4	1						10
	SSE		1	1	1	4	2						5
	S			4	7	1							12
	SSW		2	4	7	5	1						19
	SW			2	3	5							10
	WSW			6	3								9
	W			2	4	1							7
	WNW					3							3
	NW					1							1
	NNW		1		1		1						3
	N			1		3							4
	VARIABLE		2	2									4
	MISSING		1	8	9	6	1					2	27
	TOTAL	2	7	43	49	36	8					2	147

TABLE 183

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
SEPTEMBER 1949 - 1953	CALM	1											1
	NNE				3	1	2						6
	NE				3	3							6
	ENE			2	1	2							5
	E				3								3
	ESE			2	4								6
	SE				1	3	1						5
	SSE				2	3	1	1	1				8
	S			2	3	5	1						11
	SSW		1		6	4							11
	SW				8	2							10
	WSW			1	8	5							14
	W			2	7		1						10
	WNW			2	1		2						5
	NW				1		1						2
	NNW			5	5	6	2						18
	N		1		3	2	2						8
	VARIABLE			1									1
	MISSING												
	TOTAL	1	2	17	59	36	13	1	1				130
OCTOBER 1949 - 1953	CALM												
	NNE												
	NE		1	4	6	22	9						41
	ENE			2	1	4	5	4					17
	E		1					1					2
	ESE		1	2									3
	SE												
	SSE			1	1								2
	S		1	2	5	2		1					11
	SSW			3	1	3	4						11
	SW			1		2							3
	WSW				1								1
	W		1	2	4			1					8
	WNW					1	1	2					4
	NW					1	1	1					3
	NNW				2	2	1	1					6
	N			4	9	12	14	1					40
	VARIABLE												
	MISSING			1	12	8	10						31
	TOTAL		5	22	44	57	45	12					185

TABLE 184

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
NOVEMBER 1949 - 1953	CALM	2											2
	NNE			1	4		5						10
	NE				1		4	1					6
	ENE			3	3		4	3					13
	E			4	10	2	2						18
	ESE				6	2	1						9
	SE		1	1	1	4	1	1	1				10
	SSE				2	6	5	2	3				18
	S			4	8	11	6	7	4	1			41
	SSW		1		4	10	1	2		1			19
	SW				4	8	10			1			23
	WSW				6	7	2			1			16
	W			1	8	9	3						21
	WNW		2	2	7	7	7						25
	NW			2	1	6	2						11
	NNW			1	6	4	7	2					20
	N			1	6	12	18	4					41
	VARIABLE				1								1
	MISSING												
	TOTAL	2	4	20	78	88	78	22	8	4			304
DECEMBER 1949 - 1953	CALM												
	NNE			3	3	6							12
	NE		1	3	1	5	2						12
	ENE		1	2	7	7	4						21
	E		3	2	25	26	3						59
	ESE		4	8	31	12							55
	SE		1	3	13	8	2						27
	SSE		1	3	17	6	8	1					36
	S		2	6	21	16	12	10	2	1			70
	SSW			3	14	12	3	3	3				38
	SW		1	2	6	5	4	6					24
	WSW			2	9	9	1						21
	W		1	2	5	5	3						16
	WNW			4	1	6							11
	NW		1		8	14	2						25
	NNW		1	3	4	6	9	5					28
	N			1	4	6	5	3					19
	VARIABLE				1								1
	MISSING												
	TOTAL		17	47	170	149	58	28	5	1			475

TABLE 185

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
JANUARY 1950 - 1954	CALM	2											2
	NNE		3		8	10	2						23
	NE			6	5	3	2						16
	ENE			2	8	18	9	1					38
	E		3	6	4	7	2	1					23
	ESE	1	2	4	2	2	1					3	15
	SE		1	4	3	4	4	1					17
	SSE			3	9	9	3					1	25
	S			8	11	16	12	1	1			1	50
	SSW		1	9	11	15	10	1	1				48
	SW		3	3	4	10	7	3	1			4	35
	WSW		1	2	1	4	3					2	13
	W				3	7	5	1	4				20
	WNW		1	2	2	6	4						15
	NW			2		14	5	2					23
	NNW		1		15	4	2	3					25
	N		2	11	14	24	15	5					71
	VARIABLE												
	MISSING												
	TOTAL	3	18	62	100	153	86	19	7			11	459
FEBRUARY 1950 - 1954	CALM												
	NNE				4	15	11	3					33
	NE			1	3	2	4	5					15
	ENE			1	3			4	2			7	17
	E				3	6	1	1				3	14
	ESE				4	6	2	1					13
	SE			3	3	8	2	4					20
	SSE			1	2	5	2	4					14
	S			1	14	9	12		1				37
	SSW				2	4	7	1	1				15
	SW					3	3						6
	WSW			1	7	5	3	2		1			19
	W				3	1	5	6	3	1		2	21
	WNW				2		1					2	5
	NW			1	3	3						1	8
	NNW				3	4							7
	N			1	3	23	9	6					42
	VARIABLE			1									1
	MISSING						2					28	30
	TOTAL			11	59	94	64	37	7	2		43	317

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TABLE 186

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
MARCH 1950 - 1954	CALM	2											2
	NNE			1	4	22	20	5					52
	NE			2	6	17	10	4					39
	ENE			2	5	23	15	3					48
	E			1	17	21	15	6	1				61
	ESE				6	9	11	2					28
	SE		2	3	8	4	8	1					26
	SSE			3	12	10	6						31
	S	1	2	7	17	10	5	4					46
	SSW			2	7	12		4	1				26
	SW		1		5	11	2			1			20
	WSW	1			2	5	7	2		2			19
	W			1	3	7	8	5	4		1		29
	WNW		1	1	3	4	1		1				11
	NW		1		2	4		1					8
	NNW				1	5	3	3					12
	N			3	6	15	6	6					36
	VARIABLE												
	MISSING											2	2
	TOTAL	4	7	26	104	179	117	46	7	3	1	2	496
APRIL 1950 - 1954	CALM	1											1
	NNE		2		6	5	5	2					21
	NE			1	3	5	9	1	1				19
	ENE			5	6	11	10	2					34
	E			6	24	23	9	3					65
	ESE			3	4	9	3						19
	SE			1	4	2	1						8
	SSE			2	3	9	11	3					28
	S			6	3	4	2	2					17
	SSW				3	4	7	4					18
	SW		1	1	4	7	4	3					20
	WSW			2	3	14							19
	W		2		9	7	5						23
	WNW		1	1	2	7	3	1	3				18
	NW			1	7	5	4	1					18
	NNW		1		6	5		1					13
	N		1	2	11	14	8	5					41
	VARIABLE					1							1
	MISSING		1	6		1							8
	TOTAL	1	9	37	98	133	81	28	4				391

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TABLE 187

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation
150-Foot Level

MONTH	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
MAY 1950 - 1954	CALM	2											2
	NNE		1		8	9	7	3					28
	NE			5	11	22	4	9					51
	ENE			4	9	14	5	4	2				38
	E			2	17	9	1						29
	ESE			3	7	7							17
	SE			3	5	1							9
	SSE		1		1	1	1						4
	S			2	4	5	3	2		1			17
	SSW				1	5	2						8
	SW		2		1	4	2	1					10
	WSW		1		2	4	3						10
	W			2	4	6		5					17
	WNW		1		14	8	3	6					32
	NW			2	3	1		1					7
	NNW		2	4	9	3	1						19
	N		1	3	10	13							27
	VARIABLE		2	2									4
	MISSING												
	TOTAL	2	11	32	106	112	32	31	2	1			329
JUNE 1950 - 1954	CALM	1											1
	NNE			3	10			1					14
	NE			1	1	4	2						8
	ENE			1	6	4	7	3					21
	E		1	1	10	4	1						17
	ESE			1	8	2							11
	SE		1	2	5	3							11
	SSE				7	5	1						13
	S		1	2	2	4	1						10
	SSW			1	6	4							11
	SW		1	1	3	6	5	1					17
	WSW			1	6	3	2						12
	W			3	2	2	3	2					12
	WNW			2	2	5							9
	NW				3	2	3						8
	NNW			1	3	1	2	1					8
	N	1	1		2			1	3				8
	VARIABLE		1	2		1							4
	MISSING			2	5	6	1					3	17
	TOTAL	2	6	24	81	56	28	9	3			3	212

TABLE 188

Joint Frequency Distribution of Wind Direction
and Wind Speed During Hours of Precipitation
July 1949 - June 1954

LEVEL	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
150 - FOOT	CALM	14											14
	NNE		7	15	64	93	62	14					255
	NE		2	21	45	67	42	24	1				202
	ENE		1	24	53	82	54	21	4			7	248
	E		9	31	129	101	36	11	1			3	321
	ESE	1	6	27	77	50	19	3				3	186
	SE		6	23	50	43	21	7	1				151
	SSE		3	15	61	56	40	11	4			1	191
	S	1	6	48	105	89	54	27	8	3		1	342
	SSW		5	24	68	81	36	15	6	1			236
	SW		9	12	40	68	38	14	1	2		4	188
	WSW	1	2	19	54	62	24	5		4		2	173
	W		4	19	59	47	34	21	11	1	1	2	199
	WNW		6	17	41	51	22	9	4			2	152
	NW		2	10	33	52	20	6				1	124
	NNW		6	15	60	45	28	16					170
	N	1	6	27	75	127	77	31	3				347
	VARIABLE		6	13	2	2							23
	MISSING		2	18	33	21	15					37	126
	TOTAL	18	90	378	1049	1137	622	235	44	11	1	63	3648

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TABLE 189

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, July 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	14											14
	NNE			4	22	13							39
	NE			6	23	8							37
	ENE		4	17	55	1							77
	E		2	15	73	3							93
	ESE		1	10	36								47
	SE		2	8	19	2							31
	SSE		3	10	32	3							48
	S		3	14	81	34	1						133
	SSW		1	11	75	78	14						179
	SW		1	12	57	36	9						115
	WSW		3	6	38	15	1	1					64
	W		1	8	22	14	2	1					48
	WNW		1	4	23	29	1	1					59
	NW			2	18	19	1						40
	NNW		2	7	16	16							41
	N		1	3	19	10							33
	VARIABLE		1		1								2
	MISSING											3	3
	TOTAL	14	26	137	610	281	29	3				3	1103
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	7											7
	NNE		5	20	29	16							70
	NE		1	12	18	6							37
	ENE		1	8	11	1							21
	E		3	13	22	1							39
	ESE		3	11	7								21
	SE		5	17	7								29
	SSE		4	15	15	6							40
	S		5	11	26	15	6						63
	SSW		5	11	24	21	7						68
	SW		4	10	22	22	1						59
	WSW		5	14	40	15	3	1					78
	W		5	7	29	23	3	1					68
	WNW		4	7	17	6							34
	NW			4	12	7							23
	NNW		3	11	27	2							43
	N		3	14	30	3							50
	VARIABLE	1	8	4			1						14
	MISSING			1	3							1	5
	TOTAL	8	64	190	339	144	21	2				1	769

TABLE 190

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, August 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	20											20
	NNE		3	13	57	28							101
	NE		1	13	40	6							60
	ENE		5	15	39	4							63
	E		3	32	73	5							113
	ESE		6	11	35	2							54
	SE		1	16	58	2							77
	SSE		5	22	45	8							80
	S		2	22	90	5							119
	SSW		2	23	68	23	1						117
	SW			15	33	15	5						68
	WSW		1	7	22	7							37
	W		3	10	17	6	1						37
	WNW		2	10	23	17	5						57
	NW		1	21	18	15	1						56
	NNW		3	10	33	13							59
	N		2	7	41	21							71
	VARIABLE		1				1						2
	MISSING		5	2	5								12
	TOTAL	20	46	249	697	177	14						1203
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	8											8
	NNE		3	15	51	23	2						94
	NE		4	11	12	10							37
	ENE		1	13	23	2							39
	E		3	21	20	2							46
	ESE		5	16	9								30
	SE		4	19	14								37
	SSE		7	24	21	3							55
	S		4	28	31	15	1						79
	SSW		6	22	48	19	1						96
	SW		4	10	38	11							63
	WSW		5	17	18	13	2						55
	W		3	16	22	18	4	1					64
	WNW		2	10	10	4	3						29
	NW		3	9	19	4	1						36
	NNW		6	13	17	2							38
	N		5	7	38	10	1						61
	VARIABLE		13	1		1							15
	MISSING			1	1	1						2	5
	TOTAL	8	78	253	392	138	15	1				2	887

TABLE 191

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, September 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	8											8
	NNE		3	3	9	9							24
	NE		1	3	12	5							21
	ENE		1	3	13	4							21
	E		2	11	29	5							47
	ESE		1	3	44	8							56
	SE		1	7	43	8							59
	SSE			17	48	13	1						79
	S		1	14	97	50	10	4	1				177
	SSW			12	62	65	24	5					168
	SW		2	9	49	38	9						107
	WSW			7	36	25	3						71
	W			10	33	36	6	8	1				94
	WNW		1	6	30	60	4						101
	NW		2	3	28	45	1						79
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW		1	5	21	25	1						53
	N			8	8	15							31
	VARIABLE												
	MISSING				9	7	1						17
	TOTAL	8	16	121	571	418	60	17	2				1213
	CALM	4											4
	NNE			4	26	13	5						48
	NE			2	11	10							23
	ENE		1	3	10	9							23
	E		4	1	10	1							16
	ESE		1	1	2	1							5
	SE		1	7	8	3	1						20
	SSE		3	9	17	12	4						45
	S		4	16	26	21	7	6					80
	SSW		2	27	25	24	13	6					97
	SW		5	10	30	18	10						73
	WSW		2	5	21	19	7	1					55
	W		3	8	26	34	8	3	4				86
	WNW		4	8	26	18	8						64
	NW			5	14	17	2						38
	NNW		4	12	19	6	1						42
	N			10	27	13	2						52
	VARIABLE		3	2	1								6
	MISSING				1		1						2
	TOTAL	4	37	130	300	219	69	16	4				779

TABLE 192

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, October 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	9											9
	NNE		1	6	31	16	1	1					56
	NE		3	3	22	6							34
	ENE			3	13	10	1						27
	E		2	3	21	8							34
	ESE			4	35	2							41
	SE		1	6	39	11						2	59
	SSE		4	5	47	8						1	65
	S		3	11	71	40	9	3				2	139
	SSW		2	11	49	92	23	10					187
	SW			7	39	58	19					3	126
	WSW		2	15	42	27	5					2	93
	W			6	39	48							93
	WNW			6	44	44	7		1				102
	NW		1	6	17	26	3	2					55
	NNW		2	6	26	27	4						65
	N			2	21	30	5						58
	VARIABLE												
	MISSING												
	TOTAL	9	21	100	556	453	77	16	1			10	1243
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	3										2	5
	NNE		5	5	25	25	5	1					66
	NE		2	3	7	15	3						30
	ENE		2	2	15	4	1		1				25
	E		1	4	4								9
	ESE			4	8								12
	SE		1	2	10	1							15
	SSE		8	7	12	1						1	28
	S		3	7	14	16	5						45
	SSW		2	7	43	42	19	2				2	117
	SW		2	13	24	27	12	1					79
	WSW		3	5	17	18	10						53
	W		1	18	19	29	8						75
	WNW		1	10	9	15	6	3				1	45
	NW			3	16	19	9	1					48
	NNW		1	7	17	32	20	2				1	80
	N		2	9	31	26	14						82
	VARIABLE		6	1	1								8
	MISSING			1	1								2
	TOTAL	3	40	108	273	270	112	10	1			7	824

TABLE 193

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, November 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	9											9
	NNE			2	2	3							7
	NE			2	6	1							9
	ENE		1	4	11	1							17
	E			7	8	2							17
	ESE		2	2	8								12
	SE		1	4	16	6							27
	SSE			6	19	16	7	1	1				50
	S			8	44	62	14	2		1			131
	SSW			2	37	88	26	1	1	1			156
	SW		1	4	19	79	26						129
	WSW		2	2	28	51	12						95
	W		3	5	30	45	7	2	1				93
	WNW		2	4	29	57	21	2					115
	NW		1	4	14	30	4						53
	NNW		2	4	20	19	3	2	2				52
	N VARIABLE		4	3	22	27	4						60
	MISSING												
	TOTAL	9	19	63	313	487	124	10	5	2			1032
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	3											3
	NNE		4	4	5	5							18
	NE		1			1							2
	ENE				1	4							5
	E		1	4		6							11
	ESE			3	4	3							10
	SE			3	1	4							8
	SSE			6	17	3	3						29
	S			10	33	28	20	5	2	1			99
	SSW			4	13	26	40	5		2			90
	SW		1	1	15	24	10			2			53
	WSW		3	7	19	22	12	12	10				85
	W		1	10	38	39	16	8	1				113
	WNW		1	7	37	34	12	8					99
	NW		1	14	13	32	16	2					78
	NNW		4	10	23	34	12	1	1				85
	N VARIABLE		2	10	31	19	12	4					78
	MISSING		4	3									7
	TOTAL	3	23	96	250	284	153	45	14	5			873

TABLE 194

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, December 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	8											8
	NNE		3	8	3	9							23
	NE		1		4	5							10
	ENE			1	4	6							11
	E			1	10	12							23
	ESE			1	10	12	1						24
	SE			2	12	6							20
	SSE			4	13	8	4						29
	S		2	2	31	35	13	3	1	1			88
	SSW		1	2	16	66	54	3					142
	SW			2	27	55	40	4					128
	WSW		2	6	31	57	30	1					127
	W		3	2	32	65	17	1					120
	WNW		1	3	18	34	15						71
	NW		2	1	9	26	4	1					43
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW		1	3	6	20	1						31
	N		1	8	15	22							46
	VARIABLE												
	MISSING												
	TOTAL	8	17	46	241	438	179	13	1	1			944
	CALM	4											4
	NNE		3	2	4	2	2						13
	NE			3	3	1							7
	ENE		1	1	4	3							9
	E		2		3	4							9
	ESE			1	11	16	4						32
	SE			1	13	15	2						31
	SSE		2	4	11	5	4						26
	S		1	1	18	28	16	10					74
	SSW		1		12	23	35	3	2				76
	SW		1	2	14	19	30	8	2				76
	WSW		2	2	16	52	24	15	1				112
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	W		2	13	45	77	32	7	3				179
	WNW		1	7	25	41	17	4					95
	NW		1	4	18	24	7	4					58
	NNW		1	4	8	13	6	6	2				40
	N		1	2	17	14	1						35
	VARIABLE												
	MISSING												
	TOTAL	4	19	47	222	337	180	57	10				876

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TABLE 195

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, January 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	8											8
	NNE				9	7	1						17
	NE		2	1	8	1							12
	ENE		1	1	10	1							13
	E		2	3	22	9							36
	ESE			7	13	8							28
	SE		1	1	17	6							25
	SSE			1	21	6							28
	S		2	9	32	41	6	4					94
	SSW		2	2	9	22	30	4				2	71
	SW			3	11	12	4	1					31
	WSW			2	13	14	8	4	1				42
	W		2	4	19	31	8	3	1				68
	WNW		1	7	24	10	9						51
	NW		1	3	5	10	1						20
	NNW			3	6	6							15
	N			3	1	4	2						10
	VARIABLE												
	MISSING												
	TOTAL	8	14	50	220	188	69	16	2			2	569
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	7											7
	NNE		1	7	4	1							13
	NE		1	2	1								4
	ENE		3	1	9	4							17
	E		1	3	11	17							32
	ESE		2	3	6	23	5						39
	SE		2	4	11	10							27
	SSE		1	4	24	12	1						42
	S		1	6	23	30	6						66
	SSW		2	5	7	19	7	2				1	43
	SW			4	14	21	4	2				2	47
	WSW		1	9	19	15	5	9	1			6	65
	W		4	17	44	49	27	6	4			1	152
	WNW		1	7	29	34	25	3					99
	NW		4	6	16	38	24	1					89
	NNW		2	8	24	56	18						108
	N		2	10	29	13	8						62
	VARIABLE		5										5
	MISSING		1									1	2
	TOTAL	7	34	96	271	342	130	23	5			11	919

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TABLE 196

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, February 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	6											6
	NNE		1	2	8	9							20
	NE			7	7	4							18
	ENE			4	5	3							12
	E		1	2	31	7							41
	ESE		1	1	7	15	2						26
	SE		1	3	10	12	6						32
	SSE			1	10	12	3	2					28
	S		1	4	11	20							36
	SSW		2	3	17	12	35	3					72
	SW		2	3	15	31	10	1					62
	WSW		2	2	15	31	12	1					63
	W			5	34	34	9	10	3				95
	WNW		1	12	17	35	9	1					75
	NW		1	2	15	13	1	1					33
	NNW			4	23	22	4						53
	N		2	11	35	45	7						100
	VARIABLE												
	MISSING												
	TOTAL	6	15	66	260	305	98	19	3				772
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	1											1
	NNE		5	6	17	12	4						44
	NE		2	5	7	4							18
	ENE		2	5	20	33	23	5					88
	E		4	8	17	17	10	2					58
	ESE		2	3	7	9	1						22
	SE		1	6	8	6	1						22
	SSE		4	5	12	13	11						45
	S			1	14	28	14	1					58
	SSW			2	20	13	18	5					58
	SW			2	10	17	35	15					79
	WSW			1	22	25	28	16	4	3			99
	W		2	7	29	55	27	21	6	2			149
	WNW		2	2	23	27	23	9	1				87
	NW		2	2	13	17	4	2					40
	NNW			6	21	37	10	3	2				79
	N		3	8	22	46	12		1				92
	VARIABLE		4	2									6
	MISSING				2								2
	TOTAL	1	33	71	264	359	221	79	14	5			1047

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TABLE 197

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, March 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	4											4
	NNE		2	10	21	1							34
	NE			1	3	7	1	2					14
	ENE		2	5	13	5	2	1	1				29
	E		1	7	27	7	5						47
	ESE		1	2	18	11	2						34
	SE		1	4	16	10	3						34
	SSE		1	6	11	8	1		1				28
	S			4	22	9	4	3					42
	SSW			5	15	13	2		1				36
	SW			1	7	4	8	4					24
	WSW		1	8	21	17	10	1					58
	W		1	12	17	41	15						86
	WNW		3	14	36	44	21	3					121
	NW		1	5	12	37	7						62
	NNW			5	25	42	2	1					75
	N VARIABLE		3	14	41	47	1	3					109
	MISSING												
	TOTAL	4	17	103	305	303	84	18	3				837
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	5											5
	NNE		1	6	19	10	4	3					43
	NE		2	2	7	3	3						17
	ENE		1	5	30	17	18	1	1				73
	E			3	35	21	26	14	1				100
	ESE			2	18	23	5						48
	SE		1	4	12	6	1						24
	SSE		4	10	12	6	4	1					37
	S		2	8	12	19	9	3	4	1			58
	SSW		3	6	6	9	2	1					27
	SW		1	3	9	3	2	10	1				29
	WSW		1	3	7	10	24	19	1				65
	W		2	5	26	40	34	14	4	5			130
	WNW			7	20	34	18	4					83
	NW			5	14	21	22						62
	NNW		4	6	29	32	24	3					98
	N VARIABLE		3	11	38	30	12	6	1				101
	MISSING		1	6								1	7
	TOTAL	5	27	92	294	284	208	79	13	6		1	1009

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TABLE 198

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, April 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	2											2
	NNE			5	20	18							43
	NE		1	2	10	13	2						28
	ENE			11	31	11	2						55
	E		1	10	36	13							60
	ESE			3	18	9							30
	SE			1	5	14	1						21
	SSE			10	20	15	4						49
	S			1	8	15	3	3					30
	SSW			5	16	11	16	3	1				52
	SW			2	16	30	4	1					53
	WSW		1	2	12	25	7						47
	W		1	3	16	23	17	2					62
	WNW		1	4	17	33	9	1					65
	NW		1	1	12	12	4	1					31
	NNW		1	4	10	23	6	1					45
	N VARIABLE		1	3	14	31	2	1					52
	MISSING												
	TOTAL	2	8	67	261	296	77	13	1				725
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	2											2
	NNE			7	21	30	5						63
	NE		1	2	14	14	6	1					38
	ENE		2	4	20	34	11	1					72
	E			8	25	21	8	4					66
	ESE		1	4	7	9	5						26
	SE		2	4	10	12	6						34
	SSE			4	3	18	7	1					33
	S		1	1	13	16	17	2					50
	SSW			1	1	17	17	5	1				42
	SW		1	2	8	23	20	12	1				67
	WSW		1	7	15	20	13	6	4				66
	W		2	6	30	27	34	18	12				129
	WNW			3	12	28	16	12	2				73
	NW		1	3	8	24	11	3					50
	NNW			7	14	23	26	8					78
	N VARIABLE		1	12	31	18	27	5					94
	MISSING		4	2	1								7
	TOTAL	2	17	77	233	334	229	78	20				990

TABLE 199

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, May 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	11											11
	NNE		4	6	37	22	4	1					74
	NE		3	10	23	15							51
	ENE		1	9	50	8							68
	E		2	12	57	10							81
	ESE		1	10	20	2							33
	SE			6	10	7							23
	SSE		1	4	25	3	5	2					40
	S			10	26	32	7	4					79
	SSW		1	5	36	30	10	3					85
	SW		2	4	9	19	8	1					43
	WSW		1	2	24	34	6	1					68
	W		3	7	32	37	9	8	2				98
	WNW		1	5	20	25	4	2					57
	NW			5	8	14	4						31
	NNW		2		9	18	3						32
	N		2	3	19	16							40
	VARIABLE												
	MISSING											7	7
	TOTAL	11	24	98	405	292	60	22	2			7	921
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	3											3
	NNE		1	8	50	40	20	7					126
	NE		1	7	34	24	2						68
	ENE		2	4	35	37	1						79
	E		2	9	34	15							60
	ESE		1	5	7	9							22
	SE			8	4	4							16
	SSE		1	11	8	4							24
	S			5	8	17	12	7					49
	SSW		2	12	15	18	13	2					62
	SW			10	10	14	10	1	1				46
	WSW			6	13	14	6	4	1				44
	W		2	6	33	29	13	19	4				106
	WNW		2	10	18	14	7	1					52
	NW		2	4	6	7							19
	NNW			8	16	18	2						44
	N			5	29	15	1	2					52
	VARIABLE		6	18	1								25
	MISSING					1						8	9
	TOTAL	3	22	136	321	280	87	43	6			8	906

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TABLE 200

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level, June 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	6											6
	NNE		2	6	23	18							49
	NE		2	8	23	14							47
	ENE			4	51	18							73
	E		2	12	70	12							96
	ESE		2	5	45	6							58
	SE		2	8	36	7	1						54
	SSE			2	48	10							60
	S		2	11	56	44	8						121
	SSW			6	63	44	12	3					128
	SW			1	33	47	26	1					108
	WSW			4	31	49	8						92
	W			5	28	48	6	2					89
	WNW		1	11	19	16	5						52
	NW			3	15	11	3	2					34
	NNW			5	20	16	2						43
	N		1	4	15	12		1					33
	VARIABLE				2								2
	MISSING											2	2
	TOTAL	6	14	95	578	372	71	9				2	1147
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	4											4
	NNE		3	14	39	4	3						63
	NE			7	23	14							44
	ENE		1	9	33	16	1						60
	E		5	16	31	10	2						64
	ESE		2	9	19	8							38
	SE		3	9	21	7	1						41
	SSE		6	24	18	9	3						60
	S		2	13	18	23	9	2					67
	SSW		3	21	33	21	8	1					87
	SW			7	18	17	7	1					50
	WSW		1	4	15	21	10	1					52
	W		3	9	17	14	7						50
	WNW		1	8	16	9	4	1					39
	NW		1	3	13	9	1						27
	NNW		6	10	7	5	5						33
	N		1	1	11	9	4	4					30
	VARIABLE		18	3	1								22
	MISSING											7	7
	TOTAL	4	56	167	333	196	65	10				7	838

TABLE 201

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of No-Precipitation and Stability as Indicated
150-Foot Level - July 1951 - June 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	>46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	105											105
	NNE		19	65	242	153	6	2					487
	NE		14	56	181	85	3	2					341
	ENE		15	77	295	72	5	1	1				466
	E		18	115	457	93	5						688
	ESE		15	59	289	75	5						443
	SE		11	66	281	91	11					2	462
	SSE		14	88	339	110	25	5	2			1	584
	S		16	110	569	387	75	26	2	2		2	1189
	SSW		11	87	463	544	247	35	3	1		2	1393
	SW		8	63	315	424	168	13				3	994
	WSW		15	63	313	352	102	9	1			2	857
	W		17	77	319	428	97	37	8				983
	WNW		15	86	300	404	110	10	1				926
	NW		11	56	171	258	34	7					537
	NNW		14	56	215	247	26	4	2				564
	N		17	69	251	280	21	5					643
	VARIABLE		2		3		1						6
	MISSING		5	2	14	7	1					12	41
	TOTAL	105	237	1195	5017	4010	942	156	20	3		24	11709
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	51										2	53
	NNE		31	98	290	181	50	11					661
	NE		15	56	137	102	14	1					325
	ENE		17	55	211	164	55	7	2				511
	E		26	90	212	115	46	20	1				510
	ESE		17	62	105	101	20						305
	SE		20	84	119	68	12					1	304
	SSE		40	123	170	92	37	2					464
	S		23	107	236	256	122	36	6	2			788
	SSW		26	118	247	252	180	32	3	2		3	863
	SW		19	74	212	216	141	50	5	2		2	721
	WSW		24	80	222	244	144	84	22	3		6	829
	W		19	86	242	264	139	45	3			1	799
	WNW		30	122	358	434	213	98	38	7		1	1301
	NW		15	62	162	219	97	13					568
	NNW		31	102	222	260	124	23	5			1	768
	N		23	99	334	216	94	21	2				789
	VARIABLE	1	72	42	5	1	1						122
	MISSING		2	3	8	2	1					20	36
	TOTAL	52	450	1463	3492	3187	1490	443	87	16		37	10717

2-1.

TABLE 202

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, July 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM												
	NNE		1		2								3
	NE				1								1
	ENE												
	E				4								4
	ESE				2		1						3
	SE				2		1						3
	SSE				2	1							3
	S			1	3	2							6
	SSW				1	2							3
	SW			2	1	2							3
	WSW			1	1	2							4
	W							1					1
	WNW			1	1	2							4
	NW			1	1		2						4
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW					3							3
	N												
	VARIABLE		1	2									3
	MISSING												
	TOTAL		2	8	21	12	4	1					48
	CALM	1											1
	NNE			2	2								4
	NE			1		1							9
	ENE				3	2							5
	E				3	1	1						5
	ESE												
	SE					1							1
	SSE			2	1								3
	S				1	2							3
	SSW				2		1						3
	SW				1	3	1						5
	WSW			1		2	3	1					7
	W			1		1							2
	WNW				2	2							4
	NW			1	3								4
	NNW			1	4	1							6
	N				5	3							8
	VARIABLE			2									2
	MISSING												
	TOTAL	1		11	34	19	6	1					72

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TABLE 203

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, August 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	2											2
	NNE												
	NE				1								1
	ENE			1									1
	E			2		1							3
	ESE			1									1
	SE			2	3	3	1						9
	SSE		1		1		1						3
	S			3	6								9
	SSW		2	3	4	4	1						14
	SW			2	2								4
	WSW			4	3								7
	W			2	3	1							6
	WNW					2							2
	NW					1							1
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW		1										1
	N			1		1							2
	VARIABLE			1									1
	MISSING												
	TOTAL	2	4	22	23	13	3						67
	CALM												
	NNE												
	NE				1	1							2
	ENE					1							1
	E			2	3		1						6
	ESE			3	1								4
	SE					1							1
	SSE			1			1						2
	S			1									1
	SSW			1	3								4
	SW					2							2
	WSW			2									2
	W				1								1
	WNW					1							1
	NW				1								1
	NNW					2							2
	N		2	1									3
	VARIABLE												
	MISSING												
	TOTAL		2	11	10	8	2						33

TABLE 204

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, September 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM				2								2
	NNE				2	1							3
	NE												
	ENE			1									1
	E				1								1
	ESE			1	2								3
	SE					1							1
	SSE				1								1
	S			1	2		1						4
	SSW				1	2	1						4
	SW					2							2
	WSW					1							1
	W				2								2
	WNW			1			1						2
	NW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW				2								2
	N				1								1
	VARIABLE			1									1
	MISSING												
	TOTAL			5	16	7	3						31
	CALM	1											1
	NNE				1		2						3
	NE				1	2							3
	ENE				1	2							3
	E												
	ESE			1	1								2
	SE				1	2	1						4
	SSE				1	2	1	1	1				6
	S			1		1							2
	SSW		1		2	1							4
	SW				1								1
	WSW				6	2							8
	W			1	3		1						5
	WNW			1	1		1						3
	NW				1		1						2
	NNW			4	1	5	2						12
	N				2	2	2						6
	VARIABLE												
	MISSING												
	TOTAL	1	1	8	23	19	11	1	1				65

TABLE 205

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, October 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM			1									1
	NNE		1										1
	NE												
	ENE		1										1
	E												
	ESE												
	SE												
	SSE												
	S			1				1					2
	SSW												
	SW				1								1
	WSW												
	W				2								2
	WNW												
	NW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW				1								1
	N												
	VARIABLE												
	MISSING												
	TOTAL		2	2	4			1					9
	CALM												
	NNE			3	6	22	9						40
	NE			1	1	4	5	4					15
	ENE		1					1					2
	E												
	ESE												
	SE			1									1
	SSE												
	S		1			1							2
	SSW			1			3						4
	SW					1							1
	WSW												
	W		1	2	2			1					6
	WNW												
	NW						1	1					2
	NNW				1	2	1	1					5
	N			4	9	11	14	1					39
	VARIABLE												
	MISSING			1									1
	TOTAL		3	13	19	41	33	9					118

TABLE 206

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, November 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM												
	NNE												
	NE												
	ENE												
	E			1	2								3
	ESE												
	SE												
	SSE					2	2	1	1				6
	S			2	1	1	2	2					8
	SSW				1	4		1					6
	SW				2	5	5						12
	WSW				2								2
	W												
	WNW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NW												
	NNW												
	N				2	3							5
	VARIABLE				1								1
	MISSING												
	TOTAL			3	11	15	9	4	1				43
	CALM	2											2
	NNE				4		4						8
	NE				1		4	1					6
	ENE			2	3		4	3					12
	E			1	6	2	2						11
	ESE				5	2	1						8
	SE												
	SSE		1			4	1	1	1				8
	S			2	6	9	4	5	4	1			31
	SSW				3	2	1						9
	SW		1		2	2	4			1			9
	WSW				3	6	2			1			12
	W												
	WNW		2	1	8	8	2						18
	NW			1	6	7	7						23
	NNW			1	1	3	1						6
	N												
	VARIABLE			1	5	3	6	2					17
	MISSING			1	1	7	6	2					17
	TOTAL	2	4	9	54	59	52	16	7	4			207

TABLE 207

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, December 1951 - 1953

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM												
	NNE			2	1								3
	NE		1										1
	ENE				2								2
	E		2			1							3
	ESE		2	2	2	1							7
	SE				1								1
	SSE		1		4	1	1						7
	S			1	1	2	1			1			6
	SSW					2							2
	SW				1			1					2
	WSW												
	W				3								3
	WNW			1									1
	NW				1								1
	NNW			1			1	2					4
	N				1								1
	VARIABLE												
	MISSING												
	TOTAL		6	7	17	7	3	3		1			44
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM												
	NNE				1	6							7
	NE			1		4	2						7
	ENE			1		4	3						8
	E		1	1	1	9	2						14
	ESE		2	2	16	8							28
	SE				7	5	2						14
	SSE			1	5	2	6						14
	S		1		10	11	3	3					28
	SSW			1	3	5			1				10
	SW				1	3	2	1					7
	WSW				3	1	1						5
	W		1	2	1	4	3						11
	WNW			1	1	5							7
	NW				2	9	2						13
	NNW		1	1		1	8	3					14
	N				2	6	4	3					15
	VARIABLE				1								1
	MISSING												
	TOTAL		6	11	54	83	38	10	1				203

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TABLE 208

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, January 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	1											1
	NNE					3							3
	NE												
	ENE				1								1
	E			1	2								3
	ESE												
	SE			1	1	2							4
	SSE				1	1	2						4
	S			3	2	3	2						10
	SSW			2	1	1			1				5
	SW					1	1						2
	WSW						1						1
	W			1			1						2
	WNW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NW												
	NNW			1		2							3
	N												
	VARIABLE												
	MISSING												
	TOTAL	1		9	6	15	7		1				39
	CALM		1		6	2	1						10
	NNE			2	2	2	1						7
	NE				4	9	5						18
	ENE			5	2	4							11
	E		2	2	2		1				3		10
	ESE												
	SE		1	2	2	1	1	1					8
	SSE				7	3	1					1	12
	S			4	1	3	2					1	11
	SSW			5	2	3	3						13
	SW		1	2	3	3	4					4	17
	WSW			2	1	2	3					2	10
	W				1	2	2		1				6
	WNW					2	2						4
	NW			1		11	3						15
	NNW				5	2							7
	N			2	7	10	1	1					21
	VARIABLE												
	MISSING												
	TOTAL		5	27	45	59	30	2	1			11	180

TABLE 209

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, February 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM					1	1						2
	NNE												
	NE												
	ENE				2								2
	E												
	ESE												
	SE			1		1		2					4
	SSE					2							2
	S				2								2
	SSW					1	1		1				3
	SW												
	WSW					1							1
	W												
	WNW												
	NW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW					2							2
	N					8	3	1					12
	VARIABLE												
	MISSING												
	TOTAL			1	4	16	5	3	1				30
	CALM												
	NNE				4	9	7	3					23
	NE				1	2	3	5					11
	ENE				1								1
	E				2	1	1						4
	ESE				2	2							4
	SE							1					1
	SSE												9
	S			1	2	2	2	2					20
	SSW				2	2	1						5
	SW					1	2						3
	WSW				2	4	3	2		1			12
	W												
	WNW				2	1	4	5	3	1			14
	NW				2	2							4
	NNW												
	N				1	11	5	4					21
	VARIABLE			1									1
	MISSING												
	TOTAL			2	27	45	33	22	4	2			135

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TABLE 210

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, March 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM				1	3	6	3					13
	NNE				1			2					3
	NE												
	ENE				1								1
	E				5	1							6
	ESE					1	2						3
	SE				4	1	2						7
	SSE			1	1		3						5
	S			2	3	1							6
	SSW			1	1	2		1					5
	SW					1							1
	WSW												
	W												
	WNW					1							1
	NW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW												
	N					1	1	1					3
	VARIABLE												
	MISSING												
	TOTAL			4	17	12	14	7					54
	CALM												
	NNE				2	10	11	2					25
	NE			2	1	2	6	2					13
	ENE			2		9	7	3					21
	E			1	2	8	1	6	1				19
	ESE				2	5	3	1					11
	SE		1	2	2	2	6	1					14
	SSE				9	6	1						16
	S			3	7	4		1					15
	SSW			1	3	7		1	1				13
	SW				2	5				1			8
	WSW				1	3	2	1		2			9
	W				2	4	4				1		11
	WNW				3	2							5
	NW		1		2	3							6
	NNW				1	3	3	2					9
	N			3	2	6	4	5					20
	VARIABLE												
	MISSING												
	TOTAL		2	14	41	79	48	25	2	3	1		215

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TABLE 211

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, April 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM												
	NNE				1								1
	NE						1						1
	ENE												
	E			2	5								7
	ESE			1	1								2
	SE												
	SSE				1								1
	S			1									1
				1		1							2
	SSW												
	SW				2	2	1	2					7
	WSW			1		1							1
	W												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	WNW				2								2
	NW			1	2		1						4
	NNW												
	N				3	1							4
	VARIABLE		1		3	4	1						9
	MISSING												
	TOTAL		1	7	20	9	4	2					43
	CALM												
	NNE		2										19
	NE			1	5	5	5	1					9
	ENE												
	E			2	5	4	10	1					22
	ESE			3	12	17	6						38
						3	1						4
	SE												
	SSE			1		1							2
	S			1									13
							4	3					1
	SSW												
	SW				1	1	3	2					7
	WSW		1		1	4	3						11
					2	12							14
	W												
	WNW		1		5	2	2						10
	NW						1	1	3				5
					3	4		1					8
	NNW												
	N				2	2							4
	VARIABLE			1	8	9	5	3					26
	MISSING												
	TOTAL		4	9	46	70	46	15	3				193

TABLE 212

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, May 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	2											2
	NNE				2								2
	NE			2	1	1							4
	ENE			2	2	4							8
	E			1	1	3							5
	ESE			1	3	2							6
	SE			1	3								4
	SSE					1							1
	S			1	4	2		1					8
	SSW				1	4	1						6
	SW		1			1	1						3
	WSW					2	3						5
	W					1							1
	WNW				1			1					2
	NW				2		1						3
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW				1	1							2
	N			2									2
	VARIABLE												
	MISSING												
	TOTAL	2	1	10	21	22	6	2					64
	CALM												
	NNE				4	3							7
	NE			2	8	18	2						30
	ENE			2	6	8	2						18
	E			1	15	6	1						23
	ESE			2	4	5							11
	SE			2	2	1							5
	SSE		1		1		1						3
	S			1		1	1						3
	SSW						1						1
	SW					2	1	1					4
	WSW												
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	W			1	2	2							5
	WNW		1		5	1		2					9
	NW			1	1								2
	NNW		2	1	3	2							8
	N			2		2							4
	VARIABLE		1										1
	MISSING												
	TOTAL		5	15	51	51	9	3					134

TABLE 213

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level, June 1952 - 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM												
	NNE			2	3			1					6
	NE				1	1							2
	ENE				1		1	1					3
	E				3								3
	ESE				3	1							4
	SE		1		1	1							3
	SSE				5	1							6
	S				1	1							2
	SSW				3	3							6
	SW				1		3						4
	WSW					2							2
	W							1					1
	WNW			1	1	1							3
	NW				1								1
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	NNW			1	1								
	N												
	VARIABLE		1			1							2
	MISSING											1	1
	TOTAL		2	4	25	12	4	3				1	51
	CALM												
	NNE				5								5
	NE			1		2	1						4
	ENE			1	2	2	2	2					9
	E		1		4	3	1						9
	ESE				5	1							6
	SE			1	2	1							4
	SSE					1	1						2
	S			1		2							3
	SSW			1	1	1							3
	SW				1	4	1						6
	WSW				3	1	2						6
	W					1	3	1					5
	WNW			1		3							4
	NW				2	2	1						5
	NNW				2	1	1	1					5
	N				1			1	3				5
	VARIABLE			1									1
	MISSING											2	2
	TOTAL		1	7	28	25	13	5	3			2	84

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TABLE 214

Joint Frequency Distribution of Wind Direction and Wind Speed
During Hours of Precipitation and Stability as Indicated
150-Foot Level - July 1951 - June 1954

	DIRECTION (16 POINTS)	WIND SPEED (MPH)										MISSING	TOTAL
		CALM	1-3	4-7	8-12	13-18	19-24	25-31	32-38	39-46	> 46		
STABLE - TEMPERATURE CONSTANT OR INCREASING WITH HEIGHT	CALM	5											5
	NNE		1	5	12	7	7	4					36
	NE		2	2	7	3	1	2					17
	ENE			4	6	4	1	1					16
	E		3	6	22	6							37
	ESE		2	7	15	7	3						34
	SE		1	5	16	9	4	2					37
	SSE		2	2	15	9	9	1	1				39
	S			16	25	13	6	4		1			65
	SSW		2	6	15	27	5	4	2				61
	SW		1	4	7	11	10	1					34
	WSW			6	7	8	3						24
	W			2	12	1	1	2					18
	WNW			5	2	7	2						16
	NW			2	6	1	3	1					13
	NNW		1	2	9	6	2	2					22
	N		1	2	8	20	5	2					38
	VARIABLE		2	6	1	1							10
	MISSING											1	1
	TOTAL	5	18	82	185	140	62	26	3	1		1	523
UNSTABLE - TEMPERATURE DECREASING WITH HEIGHT	CALM	4											4
	NNE		3	6	40	57	39	6					151
	NE			10	24	40	29	13					116
	ENE		1	10	25	41	33	10					120
	E		2	14	50	51	16	6	1				140
	ESE		4	10	38	26	6	1				3	88
	SE		3	9	16	19	11	4	1				63
	SSE		1	6	27	24	21	7	3			1	90
	S		2	13	31	42	16	9	5	1		1	120
	SSW		2	10	22	22	13	4	2	1			76
	SW		2	2	12	30	18	4		2		4	74
	WSW			5	21	33	16	4		4		2	85
	W		3	7	25	25	21	7	4	1	1		94
	WNW		3	4	20	23	11	3	3				67
	NW		1	4	17	34	9	2					67
	NNW		3	8	25	22	21	9					88
	N			13	38	69	41	20	3				184
	VARIABLE		3	5	1								9
	MISSING			1								2	3
	TOTAL	4	33	137	432	558	321	109	22	9	1	13	1639

(L) Wind and Solar Radiation Intensity on a Horizontal Surface

The tabulations in this section are based on the IBM cards for the period from 0400 through 2000. This is the period in which sunshine is present during at least part of the year. In the winter months, sunrise occurs appreciably after 0400 and sunset appreciably before 2000. It is for this reason that in the tables of this section the first category of solar radiation intensity, 0.00 - 0.09, has such a large number of cases.

1. Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface and Wind Speed during Period 0400-2000 - 150-Foot Level

Tables 215 through 221: The variables in these tables are the intensity of solar radiation on a horizontal surface averaged over each hour and the 10-minute average of wind speed beginning five minutes of the hour and ending five minutes past the hour. Solar radiation intensity for a particular hour was allocated to the time at which the observation period ended. For example, the solar radiation for 1100 represents the average solar radiation from the period 1000 to 1100. This value of solar radiation intensity was compared with the wind speed average beginning at 1055 and ending at 1105.

These data indicate the relation between two types of energy available for the creation of atmospheric turbulence: kinetic energy and thermal energy. Although, unquestionably, the wind increases during the day as the solar radiation increases, the joint frequency distribution presented fails to provide a clear cut relationship between the two variables.

2. Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface and 150/19-Foot Wind Speed Ratio during Period 0400-2000

Tables 222 through 228: In general, one would expect that during times of high solar radiation intensity, the high degree of momentum interchange in the lower layers of the atmosphere would result in relatively small wind speed ratios. An examination of the data in the tables shows that low wind speed ratios do frequently occur in conjunction with high solar radiation intensities. During cloudy days when there are winds exceeding 10 mph present, one finds low wind ratios with low radiation intensities. These cases are presented in the upper left-hand corner of these tables. The entries for high wind ratios and low solar radiation intensity values represent transitional values which occur shortly after sunrise and shortly before sunset. There are relatively few entries in the lower right-hand corner for cases of high wind speed ratio and high solar radiation intensity values. The cases that do occur are in all probability associated with very light winds.

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It is of interest to note that during the four years covered by these tables, the wind ratio was less than one on 434 readings, indicating that the anemometer at the 150-foot level was measuring a lower wind speed than the anemometer at the 19-foot level. These observations occurred with solar radiation intensities ranging from 0 to the 1.50-1.59 category, or bright sunshine.

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TABLE 215

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
JULY 1951 - 1953	0.00-0.09	26	104	145	20	11	1					12	319
	0.10-0.19	9	47	64	13	1	1					4	139
	0.20-0.29	7	23	30	4	3						2	69
	0.30-0.39	28	51	50	17	4						11	161
	0.40-0.49	19	29	37	20	3						5	113
	0.50-0.59	9	18	17	11	5						5	65
	0.60-0.69	21	28	45	20	6	1					6	127
	0.70-0.79	10	32	22	7	5						5	81
	0.80-0.89	4	13	9	1		1					1	29
	0.90-0.99	3	15	9	3								30
	1.00-1.09	5	12	15	1		2						35
	1.10-1.19	4	27	12	4	2	1					4	54
	1.20-1.29	13	27	30	12	4						5	91
	1.30-1.39	10	26	25	12	3						6	82
	1.40-1.49	5	13	27	9	5						6	65
	1.50-1.59	2		2	1								5
	1.60-1.69												
	MISSING	1	11	10	1								23
	TOTAL	176	476	549	156	52	7					72	1488
AUGUST 1950 - 1954	0.00-0.09	33	198	235	29	4							499
	0.10-0.19	13	52	52	6								123
	0.20-0.29	22	48	44	7	3							124
	0.30-0.39	20	63	49	11	2						1	146
	0.40-0.49	15	58	45	15	1	1					1	136
	0.50-0.59	15	54	45	16	2							132
	0.60-0.69	22	49	51	11	1							134
	0.70-0.79	6	32	20	8	1							67
	0.80-0.89	10	19	24	10	2							65
	0.90-0.99	7	23	9	3								42
	1.00-1.09	8	18	13	3	2							44
	1.10-1.19	15	38	37	11	1							102
	1.20-1.29	11	30	26	10	4							81
	1.30-1.39	12	25	19	10	3							69
	1.40-1.49		7	5	4	1							17
	1.50-1.59				1								1
	1.60-1.69												
	MISSING	1	5	7	9	2	1		1				26
	TOTAL	210	719	681	164	29	2		1			2	1808

TABLE 216

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
SEPTEMBER 1950 - 1953	0.00-0.09	28	175	352	88	26	3	2					674
	0.10-0.19	11	53	63	19	6	1						153
	0.20-0.29	15	45	46	22	4	1						133
	0.30-0.39	19	42	55	18	13	2	2					151
	0.40-0.49	11	41	39	14	5	3	3					116
	0.50-0.59	9	27	40	29	6	1	1					113
	0.60-0.69	10	26	37	21	16							110
	0.70-0.79	7	26	27	13	10	1	1					85
	0.80-0.89	6	19	25	21	7	3						81
	0.90-0.99	2	9	18	7	3	1						40
	1.00-1.09	9	9	18	15	10	2						63
	1.10-1.19	6	27	28	21	8	4	3					97
	1.20-1.29	7	20	28	20	6	2	2					85
	1.30-1.39	1	4	6	1	2							14
	1.40-1.49			1	1								2
	1.50-1.59												
	1.60-1.69												
	MISSING	2	1										3
	TOTAL	143	524	783	310	122	24	14					1920
OCTOBER 1950 - 1953	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
	0.00-0.09	36	175	380	224	30	15	4				10	874
	0.10-0.19	5	40	39	34	13	1					3	135
	1.20-0.29	15	33	48	24	6						2	128
	0.30-0.39	13	29	50	21	19	2					4	138
	0.40-0.49	11	16	28	21	14						3	93
	0.50-0.59	13	19	34	18	10						3	97
	0.60-0.69	7	23	50	19	12	2					2	115
	0.70-0.79	5	19	27	35	13	2	1				1	103
	0.80-0.89	9	26	47	17	17	2						118
	0.90-0.99	10	26	28	12	4	1					3	84
	1.00-1.09		9	13	6	5	1	1					35
	1.10-1.19	1	4	5	6	2						1	19
	1.20-1.29												
	1.30-1.39												
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING	5	11	12	13	4							45
	TOTAL	130	430	761	450	149	26	6				32	1984

TABLE 217

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	< 45		
NOVEMBER 1950 - 1953	0.00-0.09	43	135	392	262	150	47	26	10	8			1073
	0.10-0.19	12	27	63	51	21	17	5					196
	0.20-0.29	4	26	32	31	20	4	5	1				123
	0.30-0.39	7	17	26	29	14	3	2	1				99
	0.40-0.49	8	8	19	23	20	5	2	1				86
	0.50-0.59	3	15	26	20	14	5	3					86
	0.60-0.69	9	15	30	21	15	6	1					97
	0.70-0.79	9	13	32	23	10	7						94
	0.80-0.89	2	10	11	14	9	3						49
	0.90-0.99	1	1	4	1								7
	1.00-1.09				1								1
	1.10-1.19												
	1.20-1.29												
	1.30-1.39												
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING			3	5	1							9
	TOTAL	98	267	638	481	274	97	44	13	8			1920
DECEMBER 1950 - 1953	0.00-0.09	73	202	414	351	162	46	9	2	2			1261
	0.10-0.19	15	24	60	55	28	5	5	1				193
	1.20-0.29	16	16	42	33	24	5	1	1				138
	0.30-0.39	3	19	32	28	13	2						97
	0.40-0.49	5	9	27	15	15	4	1					76
	0.50-0.59	5	18	23	13	13	2	2	1				77
	0.60-0.69	1	13	27	23	12	6						82
	0.70-0.79	4	12	17	10	9	1						53
	0.80-0.89		2	4	1								7
	0.90-0.99												
	1.00-1.09												
	1.10-1.19												
	1.20-1.29												
	1.30-1.39												
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING												
	TOTAL	122	315	646	529	276	71	18	5	2			1984

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TABLE 218

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
JANUARY 1951 - 1954	0.00-0.05	60	224	460	299	129	33	10	3			14	1232
	0.10-0.19	9	31	57	62	8	1	2				4	174
	0.20-0.29	12	28	56	35	19	3	3				2	158
	0.30-0.39	10	19	23	32	10	5					2	101
	0.40-0.49	8	20	28	28	10	5					1	100
	0.50-0.59	3	14	17	17	13	1						65
	0.60-0.69	6	18	12	14	11	4						65
	0.70-0.79	4	16	16	14	6	1						57
	0.80-0.89	3	3	6	8	1							21
	0.90-0.99	1		1									2
	1.00-1.09												
	1.10-1.19												
	1.20-1.29												
	1.30-1.39												
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING		2	4	1	2							9
	TOTAL	116	375	680	510	209	53	15	3			23	1984
FEBRUARY 1951 - 1954	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
	0.00-0.09	33	132	314	282	130	47	8	1	1	1		949
	0.10-0.19	12	22	48	47	28	11	1	1				170
	1.20-0.29	7	12	42	33	13	9	5	1				122
	0.30-0.39	8	26	30	33	24	8	5	1				135
	0.40-0.49	10	17	24	16	15	4	1	2				89
	0.50-0.59	7	16	10	16	16	3	3					71
	0.60-0.69	4	11	23	12	12	3	1					66
	0.70-0.79	7	9	11	18	10	6	1	1			1	64
	0.80-0.89	4	8	19	18	9	5	1					64
	0.90-0.99	3	4	17	8	4	1	1					38
	1.00-1.09	1	4	6	9	4	1	1					26
	1.10-1.19			2	1			2					5
	1.20-1.29												
	1.30-1.39												
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING		3	2	4								9
	TOTAL	96	264	548	497	265	98	30	7	1	1	1	1808

TABLE 219

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
MARCH 1951 - 1954	0.00-0.09	30	135	299	225	146	39	28	1	1	1	1	906
	0.10-0.19	5	29	53	55	28	15	3	1	1		1	191
	0.20-0.29	5	22	40	42	18	7	5	1	1			141
	0.30-0.39	10	18	46	36	25	8	2	1		1		147
	0.40-0.49	5	10	33	27	9	4	1	1	1		4	95
	0.50-0.59	5	9	26	17	15	3	2	1			4	82
	0.60-0.69	12	13	39	27	20	6		1			1	119
	0.70-0.79	3	6	19	18	10	2						58
	0.80-0.89	2	10	12	10	7	2					1	44
	0.90-0.99	1	3	5	1	1							11
	1.00-1.09	2	4	7	6	6	1					1	27
	1.10-1.19	2	12	18	21	17	3		1			4	78
	1.20-1.29	1	15	13	14	12	3	2		2			62
	1.30-1.39		5	5	3	1	2						16
	1.40-1.49												
	1.50-1.59												
	1.60-1.69												
	MISSING			5		2							7
	TOTAL	83	291	620	502	317	95	43	8	6	2	17	1984
APRIL 1951 - 1954	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
	0.00-0.09	13	116	258	178	77	27	6	4			1	680
	0.10-0.19	7	26	60	44	32	12	3	1				185
	1.20-0.29	8	19	39	43	25	13						147
	0.30-0.39	6	19	50	35	21	8	4	1			1	145
	0.40-0.49	1	25	40	23	11	9	9					118
	0.50-0.59	5	23	32	26	11	5	5				1	108
	0.60-0.69	12	19	28	17	17	7	1					101
	0.70-0.79	1	9	21	21	8	3	1					64
	0.80-0.89	4	9	18	9	4	3						47
	0.90-0.99		5	4	4	2							15
	1.00-1.09	1	2	7	3	1	2						16
	1.10-1.19	3	11	22	9	11	1	1				1	59
	1.20-1.29	5	7	17	16	9	3	2				2	61
	1.30-1.39	6	11	16	16	12	1	2					64
	1.40-1.49		6	10	6	10	2	3					37
	1.50-1.59				2								2
	1.60-1.69												
	MISSING	2	21	26	13	7	2						71
	TOTAL	74	328	648	465	258	98	37	6			6	1920

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TABLE 220

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
MAY 1951 - 1954	0.00-0.09	19	92	196	80	27	7	1				9	431
	0.10-0.19	7	39	69	30	6	2	1				3	157
	0.20-0.29	4	29	46	24	17	5					5	130
	0.30-0.39	7	31	56	35	23	5	3				4	164
	0.40-0.49	7	26	40	33	11	4	2				2	125
	0.50-0.59	5	17	45	25	16	7	3				2	120
	0.60-0.69	7	18	40	22	7	3	3				3	103
	0.70-0.79	8	12	21	11	3	3					1	59
	0.80-0.89	2	6	14	8	5							35
	0.90-0.99	1	1	1	2							1	6
	1.00-1.09	1	2	7	4	2	1						17
	1.10-1.19	6	9	13	10	4	3	1				1	47
	1.20-1.29	5	16	13	16	5		1	1				57
	1.30-1.39	5	15	22	10	10	3	2					67
	1.40-1.49	3	14	19	9	5	4	5	1			3	63
	1.50-1.59	3	6	7	1	2	1						20
	1.60-1.69			1									1
	MISSING	16	74	153	85	36	11	5	1			1	382
	TOTAL	106	407	763	405	179	59	27	3			35	1984
JUNE 1951 - 1954	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	<45		
	0.00-0.09	18	113	185	53	14	3	3				3	392
	0.10-0.19	12	61	98	21	7		1					200
	1.20-0.29	8	31	37	13	9	1					1	100
	0.30-0.39	23	67	72	31	7	4					4	208
	0.40-0.49	21	52	56	15	8	2					1	155
	0.50-0.59	16	36	41	11	6	2						112
	0.60-0.69	25	31	63	16	7	5						147
	0.70-0.79	13	29	42	17	5	1					1	108
	0.80-0.89	4	16	15	4	3		1				1	44
	0.90-0.99	1	2	1	3								7
	1.00-1.09	1	7	7	6	3							24
	1.10-1.19	7	17	20	12	9	1						66
	1.20-1.29	11	33	31	17	11	1						104
	1.30-1.39	9	29	33	18	10	1						100
	1.40-1.49	10	15	24	11	14	5	1				1	81
	1.50-1.59	4	5	5	2	4							20
	1.60-1.69		1				1						2
	MISSING	2	9	28	11								50
	TOTAL	185	554	758	261	117	27	6				12	1920

TABLE 221

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Wind Speed
150-Foot Level During Period 0400 - 2000
August 1950 - June 1954

MONTH	LANGLEYS PER MINUTE	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	< 45		
	0.00-0.05	412	1801	3630	2091	906	268	97	21	12	2	50	9290
	0.10-0.19	117	451	726	437	178	66	21	4	1		15	2016
	0.20-0.29	123	332	502	311	161	48	19	4	1		12	1513
	0.30-0.39	154	401	539	326	175	47	18	4		1	27	1692
	0.40-0.49	121	311	416	250	122	41	19	4	1		17	1302
	0.50-0.59	95	266	356	219	127	29	19	2			15	1128
	0.60-0.69	136	264	445	223	136	43	6	1			12	1266
	0.70-0.79	77	215	275	195	90	27	4	1			9	893
	0.80-0.89	50	141	204	121	64	19	2				3	604
	0.90-0.99	30	89	97	44	14	3	1				4	282
	1.00-1.09	28	67	93	54	33	10	2				1	288
	1.10-1.19	44	145	157	95	54	13	7	1			11	527
	1.20-1.29	53	148	158	105	51	9	7	1	2		7	541
	1.30-1.39	43	115	126	70	41	7	4				6	412
	1.40-1.49	18	55	86	40	35	11	9	1			10	265
	1.50-1.59	9	11	14	7	6	1						48
	1.60-1.69		1	1			1						3
	MISSING	29	137	250	142	54	14	5	2			1	634
	TOTAL	1539	4950	8075	4730	2247	657	240	46	17	3	200	22704

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TABLE 222

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
JULY 1951 - 1953	0.00 - 0.09	2	5	27	53	40	27	50	77	38	319
	0.10 - 0.19	2	6	18	26	29	8	13	27	10	139
	0.20 - 0.29	3	9	25	14	6	3	1	4	4	69
	0.30 - 0.39	8	25	55	24	24	1	4	5	15	161
	0.40 - 0.49	4	23	40	24	8	6		2	6	113
	0.50 - 0.59	1	17	25	13	1	1			7	65
	0.60 - 0.69	3	22	59	23	10	2			8	127
	0.70 - 0.79	2	22	42	10					5	81
	0.80 - 0.89		6	14	4	2	1			2	29
	0.90 - 0.99		13	14	2	1					30
	1.00 - 1.09	1	10	20	4						35
	1.10 - 1.19	3	13	23	9	1			1	4	54
	1.20 - 1.29	5	26	45	8	2				5	91
	1.30 - 1.39	2	24	44	3	3				6	82
	1.40 - 1.49	3	15	35	5	1				6	65
	1.50 - 1.59		3	2							5
	1.60 - 1.69										
	MISSING		1	6	5	5	4	1	1		23
	TOTAL	39	240	494	227	133	53	69	117	116	1488
AUGUST 1950 - 1953	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	0.00 - 0.09	4	6	37	47	55	51	67	170	62	499
	0.10 - 0.19		3	20	13	23	16	17	23	8	123
	0.20 - 0.29	3	7	25	27	22	10	9	13	8	124
	0.30 - 0.39	7	24	55	28	11	5	9	3	4	146
	0.40 - 0.49	3	28	47	24	14	11	4	4	1	136
	0.50 - 0.59	4	26	58	25	8	3	4	2	2	132
	0.60 - 0.69	9	31	46	29	11	2	3		3	134
	0.70 - 0.79	2	12	37	12	3				1	67
	0.80 - 0.89	2	17	33	10	2	1				65
	0.90 - 0.99	2	11	21	4	2			1	1	42
	1.00 - 1.09	2	12	16	13	1					44
	1.10 - 1.19	7	30	47	12	5	1				102
	1.20 - 1.29	2	25	33	10	10			1		81
	1.30 - 1.39	7	17	30	11	2		1	1		69
	1.40 - 1.49		4	9	2			1	1		17
	1.50 - 1.59			1							1
	1.60 - 1.69										
	MISSING		1	3	3	9		6	4		26
	TOTAL	54	254	518	270	178	100	121	223	90	1808

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TABLE 223

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
SEPTEMBER 1950 - 1953	0.00 - 0.09	2	7	49	85	84	74	92	238	43	674
	0.10 - 0.19		4	23	28	29	21	15	30	3	153
	0.20 - 0.29		9	43	36	18	9	3	8	7	133
	0.30 - 0.39	2	22	64	27	16	3	6	8	3	151
	0.40 - 0.49	4	15	57	26	9	2	2	1		116
	0.50 - 0.59	4	21	60	22	5			1		113
	0.60 - 0.69	3	20	58	24	3	1			1	110
	0.70 - 0.79	2	12	54	11	2		3	1		85
	0.80 - 0.89	3	15	49	10	4					81
	0.90 - 0.99		12	23	5						40
	1.00 - 1.09	3	17	34	7	2					63
	1.10 - 1.19	2	22	60	11	1	1				97
	1.20 - 1.29	3	17	57	6	1		1			85
	1.30 - 1.39		2	8	2	2					14
	1.40 - 1.49			1	1						2
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING			1		1			1		3
	TOTAL	28	195	641	301	177	111	122	288	57	1920
OCTOBER 1950 - 1953	0.00 - 0.09	9	14	97	134	107	112	105	236	60	874
	0.10 - 0.19	1	8	45	24	20	10	5	15	7	135
	0.20 - 0.29	2	13	59	30	11	3		4	6	128
	0.30 - 0.39	5	27	58	26	13	2		1	6	138
	0.40 - 0.49	2	13	51	18	5				4	93
	0.50 - 0.59	3	15	51	18	3	1			6	97
	0.60 - 0.69	3	22	72	14	2				2	115
	0.70 - 0.79	4	17	64	11	3	1	1		2	103
	0.80 - 0.89	3	24	74	12	4				1	118
	0.90 - 0.99	6	34	29	8	1			1	5	84
	1.00 - 1.09	1	7	23	3	1					35
	1.10 - 1.19	2	4	11		1				1	19
	1.20 - 1.29										
	1.30 - 1.39										
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING		7	8	12	5	6	2	4	1	45
	TOTAL	41	205	642	310	176	135	113	261	101	1984

TABLE 224

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
NOVEMBER 1950 - 1953	0.00 - 0.09	5	23	349	215	132	103	71	127	48	1073
	0.10 - 0.19	1	14	101	39	17	7	5	4	8	196
	0.20 - 0.29	1	16	81	18	3	1	1		2	123
	0.30 - 0.39	2	17	57	15	3	1			4	99
	0.40 - 0.49	2	18	52	10	1				3	86
	0.50 - 0.59	1	25	54	3				1	2	86
	0.60 - 0.69	4	27	54	8	1				3	97
	0.70 - 0.79	5	27	51	6					5	94
	0.80 - 0.89	1	15	33							49
	0.90 - 0.99		2	5							7
	1.00 - 1.09		1								1
	1.10 - 1.19										
	1.20 - 1.29										
	1.30 - 1.39										
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING		1	3	4	1					9
	TOTAL	22	186	840	318	158	112	77	132	75	1920
DECEMBER 1950 - 1953	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	0.00 - 0.09	8	43	428	320	172	94	62	101	33	1261
	0.10 - 0.19		28	106	39	5	8	1	4	2	193
	0.20 - 0.29	2	28	80	21	2	1	1	1	2	138
	0.30 - 0.39	1	12	64	14	1	1	1	3		97
	0.40 - 0.49	2	21	44	7	1	1				76
	0.50 - 0.59	3	23	38	11	1	1				77
	0.60 - 0.69		24	46	10	2					82
	0.70 - 0.79	1	18	29	3					2	53
	0.80 - 0.89		4	3							7
	0.90 - 0.99										
	1.00 - 1.09										
	1.10 - 1.19										
	1.20 - 1.29										
	1.30 - 1.39										
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING										
	TOTAL	17	201	838	425	184	106	65	109	39	1984

TABLE 225

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
JANUARY 1951 - 1954	0.00 - 0.09	8	92	445	268	130	75	59	86	69	1232
	0.10 - 0.19	2	28	95	26	10	3	1	3	6	174
	0.20 - 0.29	6	25	91	25	6	1			4	158
	0.30 - 0.39	5	23	52	13	5		1		2	101
	0.40 - 0.49	4	27	55	8	2			2	2	100
	0.50 - 0.59	2	21	37	5						65
	0.60 - 0.69	2	25	33	4					1	65
	0.70 - 0.79	5	27	24	1						57
	0.80 - 0.89	2	10	7	2						21
	0.90 - 0.99			2							2
	1.00 - 1.09										
	1.10 - 1.19										
	1.20 - 1.29										
	1.30 - 1.39										
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING		3	3	3						9
	TOTAL	36	281	844	355	153	79	61	91	84	1984
FEBRUARY 1951 - 1954	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	0.00 - 0.09	2	55	416	194	89	60	56	60	17	949
	0.10 - 0.19	3	32	90	23	10	3	3	5	1	170
	0.20 - 0.29	1	21	83	15	2					122
	0.30 - 0.39	2	32	83	15	1	1			1	135
	0.40 - 0.49	5	26	52	5	1					89
	0.50 - 0.59	4	20	37	8	2					71
	0.60 - 0.69	4	27	34	1						66
	0.70 - 0.79	2	23	33	4	1				1	64
	0.80 - 0.89		33	28	3						64
	0.90 - 0.99	1	22	15							38
	1.00 - 1.09	1	10	14	1						26
	1.10 - 1.19		2	3							5
	1.20 - 1.29										
	1.30 - 1.39										
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING		2	6	1						9
	TOTAL	25	305	894	270	106	64	59	65	20	1808

TABLE 226

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
MARCH 1951 - 1954	0.00 - 0.09	5	60	336	223	92	47	60	57	26	906
	0.10 - 0.19	1	27	113	28	14	3	1	2	2	191
	0.20 - 0.29	1	30	77	21	7	1	2		2	141
	0.30 - 0.39	6	45	82	10	2	1		1		147
	0.40 - 0.49	1	35	48	5	1				5	95
	0.50 - 0.59	2	33	40	2	1				4	82
	0.60 - 0.69	2	44	68	1	3				1	119
	0.70 - 0.79	3	28	27							58
	0.80 - 0.89	2	18	18	3	2				1	44
	0.90 - 0.99		8	3							11
	1.00 - 1.09		11	15						1	27
	1.10 - 1.19	2	26	44	2					4	78
	1.20 - 1.29	1	32	27	2						62
	1.30 - 1.39		11	5							16
	1.40 - 1.49										
	1.50 - 1.59										
	1.60 - 1.69										
	MISSING			4	2			1			7
	TOTAL	26	408	907	299	122	52	64	60	46	1984
APRIL 1951 - 1954	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	0.00 - 0.09	4	47	246	144	74	53	36	45	31	680
	0.10 - 0.19	2	31	103	27	10	2	1	2	7	185
	0.20 - 0.29	2	36	87	12	4	3			3	147
	0.30 - 0.39	5	48	78	9	3				2	145
	0.40 - 0.49	3	45	62	7		1				118
	0.50 - 0.59	5	47	52	3					1	108
	0.60 - 0.69	9	51	40						1	101
	0.70 - 0.79	2	28	32	2						64
	0.80 - 0.89	2	24	19	1					1	47
	0.90 - 0.99		8	7							15
	1.00 - 1.09		10	6							16
	1.10 - 1.19	3	29	24	1	1				1	59
	1.20 - 1.29	6	32	21						2	61
	1.30 - 1.39	9	30	23	2						64
	1.40 - 1.49		22	14		1					37
	1.50 - 1.59		1	1							2
	1.60 - 1.69										
	MISSING	1	15	40	5	4	1	2	3		71
	TOTAL	53	504	855	213	97	60	39	50	49	1920

TABLE 227

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
MAY 1951 - 1954	0.00 - 0.09	2	23	116	95	50	38	37	51	19	431
	0.10 - 0.19		23	71	31	12	6	2	6	6	157
	0.20 - 0.29	1	23	68	22	3	4		3	6	130
	0.30 - 0.39	4	34	92	23	5	1	1		4	164
	0.40 - 0.49	2	31	70	15	2		1	2	2	125
	0.50 - 0.59	5	27	74	11	1				2	120
	0.60 - 0.69	3	39	53	4					4	103
	0.70 - 0.79	2	20	32	4					1	59
	0.80 - 0.89		12	20	2		1				35
	0.90 - 0.99		3	2						1	6
	1.00 - 1.09	1	10	6							17
	1.10 - 1.19	2	17	24		1				3	47
	1.20 - 1.29		22	29	4	2					57
	1.30 - 1.39	3	21	38	4	1					67
	1.40 - 1.49	2	22	34	1	1				3	63
	1.50 - 1.59	1	11	7	1						20
	1.60 - 1.69			1							1
	MISSING	9	58	129	68	43	34	19	15	7	382
	TOTAL	37	396	866	285	121	84	60	77	58	1984
JUNE 1951 - 1954	0.00 - 0.09	2	13	57	85	62	36	42	73	22	392
	0.10 - 0.19	2	12	39	60	38	9	11	21	8	200
	0.20 - 0.29	4	18	38	23	6	5		2	4	100
	0.30 - 0.39	9	33	96	46	13	3		2	6	208
	0.40 - 0.49	5	44	72	23	5	2			4	155
	0.50 - 0.59	5	27	61	10	8				1	112
	0.60 - 0.69	10	33	69	28	4	2	1			147
	0.70 - 0.79	4	24	53	21	3		1		2	108
	0.80 - 0.89	2	12	24	4	1				1	44
	0.90 - 0.99		3	2		2					7
	1.00 - 1.09		9	12	3						24
	1.10 - 1.19	1	19	37	5	2				2	66
	1.20 - 1.29	4	33	59	7		1				104
	1.30 - 1.39	1	31	51	11	3				3	100
	1.40 - 1.49	4	17	53	3	2	1			1	81
	1.50 - 1.59	2	7	10	1						20
	1.60 - 1.69			2							2
	MISSING	1	9	28	7	1			3	1	50
	TOTAL	56	344	763	337	150	59	55	101	55	1920

TABLE 228

Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and 150/19-Foot Wind Speed Ratio
August 1950 - June 1954

LANGLEYS PER MINUTE	WIND SPEED RATIO								MISSING	TOTAL
	<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
0.00 - 0.09	53	388	2603	1863	1087	770	737	1321	468	9290
0.10 - 0.19	14	216	824	364	217	96	75	142	68	2016
0.20 - 0.29	26	235	757	264	90	41	17	35	48	1513
0.30 - 0.39	56	342	836	250	97	19	22	23	47	1692
0.40 - 0.49	37	326	650	172	49	23	7	11	27	1302
0.50 - 0.59	39	302	587	131	30	6	4	4	25	1128
0.60 - 0.69	52	365	632	146	36	7	4		24	1266
0.70 - 0.79	34	258	478	85	12	1	5	1	19	893
0.80 - 0.89	17	190	322	51	15	3			6	604
0.90 - 0.99	9	116	123	19	6			2	7	282
1.00 - 1.09	9	97	146	31	4				1	288
1.10 - 1.19	22	162	273	40	12	2		1	15	527
1.20 - 1.29	21	187	271	37	15	1	1	1	7	541
1.30 - 1.39	22	136	199	33	11		1	1	9	412
1.40 - 1.49	9	80	146	12	5	1	1	1	10	265
1.50 - 1.59	3	22	21	2						48
1.60 - 1.69			3							3
MISSING	11	97	231	110	69	45	31	31	9	634
TOTAL	434	3519	9102	3610	1755	1015	905	1574	790	22704

(M) Wind and Stability

1. Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and Temperature Difference between 144-Foot and 5.5-Foot Levels

Tables 229 through 233: During stable conditions the vertical motions are suppressed. Since the interchange of momentum is small, one would therefore expect to find high values of wind speed ratio with extreme inversion conditions and low values during unstable conditions. The data in these tables indeed show that the wind speed ratio and the stability as indicated by the temperature difference between the 144-foot and 5.5-foot levels are so related. However, there is an appreciable amount of scatter in the data.

2. Joint Frequency Distribution of 150-Foot Wind Speed and Temperature Difference between 144-Foot and 5.5-Foot Levels

Tables 234 through 238: When high surface winds are present, there is a considerable amount of turbulence and the lower layer of the atmosphere is well mixed. Under such conditions the temperature difference between the 144-foot and 5.5-foot levels should be small. These tables clearly show this to be the case. Extreme temperature differences rarely occur with winds exceeding 30 mph.

TABLE 229

Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and Temperature Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO							MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9		
JULY 1951 - 1953	<-2.0									
	-1.9--1.5	2	6	6	1					15
	-1.4--1.0	9	63	84	15	12	3		1	187
	-0.9--0.5	18	103	161	32	16	2		4	342
	-0.4- 0.0	1	47	159	83	38	12	15	13	376
	0.1- 0.5		12	65	99	45	24	18	25	294
	0.6- 1.0	1	1	21	37	45	25	20	21	178
	1.1- 1.5		1	7	16	23	11	20	33	112
	1.6- 2.0				3	14	16	24	39	104
	2.1- 2.5			1	3	5	13	15	36	80
	2.6- 3.0				1	3	4	11	35	63
	>3.0	8	2	5	5	11	13	26	115	241
	MISSING	5	12	21	27	30	7	9	16	113
	TOTAL	44	247	530	322	242	130	158	338	2232
AUGUST 1951 - 1953	<-2.0									
	-1.9--1.5	1	3	6		3		1		14
	-1.4--1.0	4	41	65	14	5			1	130
	-0.9- 0.5	34	117	176	44	27	2	4	4	419
	-0.4--0.0	6	73	162	79	43	24	26	11	438
	0.1- 0.5	4	9	49	64	48	30	26	41	285
	0.6- 1.0		1	7	19	22	24	21	60	166
	1.1- 1.5	3	1	4	3	17	16	31	54	145
	1.6- 2.0	1		3	4	3	10	26	65	121
	2.1- 2.5	1	1	1	3	1	5	11	51	87
	2.6- 3.0	2	1			3	4	14	39	77
	>3.0	17	3	4	5	16	17	23	123	309
	MISSING	1	2	10	7	6	1	3	10	41
	TOTAL	74	252	487	242	194	133	186	459	2232
SEPTEMBER 1951 - 1953	<-2.0									
	-1.9--1.5		1	4						5
	-1.4--1.0	6	37	74	7	2		1		127
	-0.9--0.5	10	89	220	41	18	3	3	2	389
	-0.4- 0.0	6	20	154	95	46	20	16	23	382
	0.1- 0.5		6	70	84	46	31	24	35	299
	0.6- 1.0			12	23	39	20	23	30	149
	1.1- 1.5				7	19	17	23	46	116
	1.6- 2.0			1		5	22	26	63	121
	2.1- 2.5		1			3	18	22	64	118
	2.6- 3.0		1		3	3	7	15	49	83
	>3.0	1	1	1	2	11	18	34	166	299
	MISSING	1	3	21	10	7	5	9	14	72
	TOTAL	24	159	557	272	199	161	196	492	2160

TABLE 230

Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and Temperature Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
OCTOBER 1951 - 1953	<-2.0										
	-1.9--1.5										
	-1.4--1.0	6	50	68	12	7					143
	-0.9--0.5	16	89	223	32	14	3		1	9	387
	-0.4--0.0	5	36	208	140	43	17	9	12	6	476
	0.1--0.5	1	3	61	80	60	23	9	14	2	253
	0.6--1.0		1	10	30	53	33	24	33	5	189
	1.1--1.5	1		1	11	17	25	24	45	3	127
	1.6--2.0			1	7	12	21	25	56	4	126
	2.1--2.5	1			2	8	19	25	46	8	109
	2.6--3.0	1	1		1	2	7	11	33	5	61
	>3.0	7	1	1	7	12	28	55	155	57	323
	MISSING		7	6	6	5	3	3	6	2	38
	TOTAL	38	188	579	328	233	179	185	401	101	2232
NOVEMBER 1951 - 1953	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	<-2.0			1							1
	-1.9--1.5		1								1
	-1.4--1.0	5	25	62	6	4					102
	-0.9--0.5	10	71	219	61	6	1			14	382
	-0.4--0.0	3	47	353	157	54	11	10	13	27	675
	0.1--0.5	1	10	95	132	62	18	14	11	15	358
	0.6--1.0		2	9	31	42	48	17	26	4	179
	1.1--1.5			1	4	29	33	21	34	16	138
	1.6--2.0				3	17	13	28	33	7	101
	2.1--2.5	1	1			4	2	18	33	7	66
	2.6--3.0					2	2	11	23	2	40
	>3.0		1		3	10	10	18	53	17	112
	MISSING		2		1	1				1	5
	TOTAL	20	160	740	398	231	198	137	226	110	2160
DECEMBER 1951 - 1953	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
	<-2.0										
	-1.9--1.5										
	-1.4--1.0	3	10	8	2	1					24
	-0.9--0.5	4	50	139	60	6			2		261
	-0.4--0.0	4	90	504	230	56	12	2	4	5	907
	0.1--0.5	1	18	120	153	58	40	15	13	5	423
	0.6--1.0	4	5	25	42	37	28	16	17	4	178
	1.1--1.5		2	7	7	22	16	21	16	1	92
	1.6--2.0			5	11	6	11	14	9	4	60
	2.1--2.5	1	1	8	2	6	5	6	14	1	44
	2.6--3.0		1	1	2	6	2	5	5	3	25
	>3.0		1	5		6	5	7	25	4	53
	MISSING		8	45	37	25	12	8	22	8	165
	TOTAL	17	186	867	546	229	131	94	127	35	2232

TABLE 231

Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and Temperature Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
JANUARY 1952 - 1954	<-2.0										
	-1.9--1.5			1							1
	-1.4--1.0	2	23	35	3						63
	-0.9--0.5	12	88	227	64	16		3	3	9	422
	-0.4- 0.0	3	65	331	170	55	11	7	18	27	687
	0.1- 0.5	1	19	87	66	32	22	12	12	6	257
	0.6- 1.0		5	28	21	28	15	12	24	7	140
	1.1- 1.5		1	3	4	8	5	7	19	1	48
	1.6- 2.0			3	5	6	4	2	11	1	32
	2.1- 2.5			2	2	2	1	5	7	1	20
	2.6- 3.0	1		3	1	1	3	1	9	1	20
	>3.0			2	1			2	12		17
	MISSING	9	68	211	87	34	19	28	47	22	525
	TOTAL	28	269	933	424	182	80	79	162	75	2232
FEBRUARY 1952 - 1954	<-2.0										
	-1.9--1.5	3	11	9							23
	-1.4--1.0	7	66	66	3	2					144
	-0.9- 0.5	9	94	228	15	1	1		1	1	350
	-0.4--0.0	2	74	483	168	28	7	2	1	4	769
	0.1- 0.5	1	6	116	97	35	16	11	6	2	290
	0.6- 1.0	2	4	11	20	38	20	10	15		120
	1.1- 1.5				4	11	21	16	15	1	68
	1.6- 2.0			1	1	8	19	30	18	2	79
	2.1- 2.5	1	2	3	2	5	8	10	7	2	40
	2.6- 3.0		1		1	1	3	2	12	2	22
	>3.0	1		4	3	9	15	11	26	10	79
	MISSING		19	13	9	5	7	2	1		56
	TOTAL	26	277	934	323	143	117	94	102	24	2040
MARCH 1952 - 1954	<-2.0		2								2
	-1.9--1.5	1	32	24							57
	-1.4--1.0	4	71	62	3	1					141
	-0.9--0.5	14	111	228	23	6	1	2		2	387
	-0.4- 0.0		122	368	176	37	5	6	4	7	725
	0.1- 0.5	1	33	105	98	49	16	10	13	4	329
	0.6- 1.0	1	8	17	23	39	24	16	17	8	153
	1.1- 1.5		2	3	9	26	19	28	28	7	122
	1.6- 2.0				4	14	12	23	23	4	80
	2.1- 2.5	2	1	3	2	6	6	10	11	6	47
	2.6- 3.0				2	5	3	3	11		24
	>3.0	2	2	4	3	4	9	4	19	1	48
	MISSING	4	12	47	13	6	7	7	16	5	117
	TOTAL	29	396	861	356	193	102	109	142	44	2232

TABLE 232

Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and Temperature Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
		<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0		
APRIL 1952 - 1954	<-2.0		3	3							6
	-1.9--1.5	1	38	22	2		1		1		65
	-1.4--1.0	11	117	76	2	1	1				208
	-0.9--0.5	13	168	203	14	2				12	412
	-0.4- 0.0	12	85	341	92	22	8	4	3	31	598
	0.1- 0.5		12	90	79	23	13	6	8	3	234
	0.6- 1.0		3	10	28	30	17	8	15	2	113
	1.1- 1.5		5	7	12	19	12	11	10	3	79
	1.6- 2.0	1		4	5	6	17	13	9	1	56
	2.1- 2.5	1		1	2	10	8	6	8	1	37
	2.6- 3.0				4	2	11	2	6	1	26
	>3.0	4		4	11	17	17	28	29	7	117
	MISSING	9	22	58	25	24	25	15	24	7	209
	TOTAL	52	453	819	276	156	130	93	113	68	2160
MAY 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0	MISSING	TOTAL
	<-2.0	1									1
	-1.9--1.5	2	16	21	1						40
	-1.4--1.0	6	87	114	7	4				2	220
	-0.9- 0.5	14	142	224	30	3	1			3	417
	-0.4--0.0	2	63	248	102	32	11	2	6	10	476
	0.1- 0.5		15	96	76	27	15	10	12	8	259
	0.6- 1.0		3	20	38	33	25	9	20	1	149
	1.1- 1.5	2	3	6	14	21	21	18	27	5	117
	1.6- 2.0			1	6	9	23	18	26	4	87
	2.1- 2.5	1	1		2	6	10	17	23	6	66
	2.6- 3.0	1	1	1	2	9	6	12	19	6	57
	>3.0	6	2	5	6	10	16	23	40	28	136
	MISSING	1	21	81	35	17	6	13	30	3	207
	TOTAL	36	354	817	319	171	134	122	203	76	2232
JUNE 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	<1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	>3.0	MISSING	TOTAL
	<-2.0										
	-1.9--1.5		2							1	3
	-1.4--1.0	7	52	53	8		1			5	126
	-0.9--0.5	16	138	248	30	9				6	447
	-0.4- 0.0	7	34	223	123	32	7	4	4	14	448
	0.1- 0.5	1	11	99	111	39	20	17	11	7	316
	0.6- 1.0	1	6	35	62	64	19	17	21	3	228
	1.1- 1.5	1	2	14	32	28	30	24	29	5	165
	1.6- 2.0			3	10	17	16	27	50	8	191
	2.1- 2.5			1	3	5	17	10	35	8	79
	2.6- 3.0			1	1	5	4	9	21	2	43
	>3.0	4			3	12	8	27	60	20	134
	MISSING	1	2	4	8	4	2	4	4	11	40
	TOTAL	38	247	681	391	215	124	139	235	90	2160

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TABLE 233

Joint Frequency Distribution of 150/19-Foot Wind Speed Ratio and
Temperature Difference Between 144-Foot and 5.5-Foot Levels
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED RATIO								MISSING	TOTAL
	< 1.0	1.0-1.2	1.3-1.5	1.6-1.8	1.9-2.1	2.2-2.4	2.5-2.9	> 3.0		
<-2.0	1	5	4							10
-1.9--1.5	10	110	93	4	3	1	1	1	1	224
-1.4--1.0	70	642	767	82	39	5	1	2	7	1615
-0.9--0.5	170	1260	2496	446	124	14	12	17	76	4615
-0.4-0.0	51	756	3534	1615	486	145	103	112	155	6957
0.1-0.5	11	154	1053	1139	524	268	172	201	75	3597
0.6-1.0	9	39	205	374	470	298	193	299	55	1942
1.1-1.5	7	17	53	123	240	226	244	356	63	1329
1.6-2.0	2		22	59	117	184	256	402	56	1098
2.1-2.5	9	8	20	23	61	112	155	335	70	793
2.6-3.0	5	6	6	18	42	56	96	262	50	541
> 3.0	50	13	35	49	118	156	258	823	366	1868
MISSING	31	178	517	265	164	94	101	190	175	1715
TOTAL	426	3188	8805	4197	2388	1559	1592	3000	1149	26304

TABLE 234

Joint Frequency Distribution of 150-Foot Wind Speed and Temperature
Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45		
JULY 1951 - 1953	<-2.0												
	-1.9 - -1.5	1	6	7		1							15
	-1.4 - -1.0	37	64	69	15	2							187
	-0.9 - -0.5	68	143	103	21	6	1						342
	-0.4 - 0.0	20	99	166	67	21	2					1	376
	0.1 - 0.5	8	73	140	57	13	2					1	294
	0.6 - 1.0	9	47	78	38	4	2						178
	1.1 - 1.5	3	35	56	16	1						1	112
	1.6 - 2.0	5	30	59	9							1	104
	2.1 - 2.5	4	30	42	4								80
	2.6 - 3.0	4	20	34	5								63
	>3.0	31	95	104	11								241
	MISSING	32	28	57	11	12						100	240
	TOTAL	222	670	915	254	60	7					104	2232
AUGUST 1951 - 1953	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45	MISSING	TOTAL
	<-2.0												
	-1.9 - -1.5	1	5	4	3	1							14
	-1.4 - -1.0	17	63	40	9	1							130
	-0.9 - -0.5	99	174	115	23	6						2	419
	-0.4 - 0.0	37	166	158	66	10	1						438
	0.1 - 0.5	24	95	130	31	5							285
	0.6 - 1.0	12	66	76	11	1							166
	1.1 - 1.5	11	64	61	9								145
	1.6 - 2.0	8	35	70	8								121
	2.1 - 2.5	4	34	48	1								87
	2.6 - 3.0	8	23	44	2								77
	>3.0	55	136	117	1								309
	MISSING	3	16	21	1								41
	TOTAL	279	877	884	165	24	1					2	2232
SEPTEMBER 1951 - 1953	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45	MISSING	TOTAL
	<-2.0												
	-1.9 - -1.5		2	3									5
	-1.4 - -1.0	17	35	39	27	6	3						127
	-0.9 - -0.5	44	121	115	61	34	7	7					389
	-0.4 - 0.0	15	99	155	80	27	4	2					382
	0.1 - 0.5	7	52	120	72	31	11	6					299
	0.6 - 1.0	2	26	65	42	13	1						149
	1.1 - 1.5	5	28	60	22	1							116
	1.6 - 2.0	2	13	92	14								121
	2.1 - 2.5	3	17	84	14								118
	2.6 - 3.0	2	12	58	11								83
	>3.0	19	82	172	26								299
	MISSING	3	14	36	10	8	1						72
	TOTAL	119	501	999	379	120	27	15					2160

TABLE 235

**Joint Frequency Distribution of 150-Foot Wind Speed and Temperature
Difference Between 144-Foot and 5.5-Foot Levels**

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45		
OCTOBER 1951 - 1953	< -2.0												
	-1.9 - -1.5												
	-1.4 - -1.0	12	47	56	18	10						4	143
	-0.9 - -0.5	37	102	123	71	42	7	1					387
	-0.4 - 0.0	17	74	148	150	70	10	4				3	476
	0.1 - 0.5	6	33	89	78	31	15	1					253
	0.6 - 1.0	6	25	87	59	12							189
	1.1 - 1.5	4	29	56	37	1							127
	1.6 - 2.0	2	23	80	19							2	126
	2.1 - 2.5	3	14	72	17	1						2	109
	2.6 - 3.0	4	10	37	10								61
	> 3.0	30	62	184	40	1						6	323
	MISSING	1	4	15	17	1							38
	TOTAL	122	423	947	516	169	32	6				17	2232
NOVEMBER 1951 - 1953	< -2.0			1									1
	-1.9 - -1.5			1									1
	-1.4 - -1.0	8	17	37	27	13							102
	-0.9 - -0.5	29	62	111	84	64	21	9	1	1			382
	-0.4 - 0.0	22	89	221	159	115	33	18	10	7	1		675
	0.1 - 0.5	5	38	105	147	51	7	3	1	1			358
	0.6 - 1.0	2	22	84	57	14							179
	1.1 - 1.5	3	20	69	42	4							138
	1.6 - 2.0	7	14	43	34	3							101
	2.1 - 2.5	3	9	36	17	1							66
	2.6 - 3.0	2	4	27	7								40
	> 3.0	16	20	52	24								112
	MISSING	3	2										5
	TOTAL	100	297	787	598	265	61	30	12	9	1		2160
DECEMBER 1951 - 1953	< -2.0												
	-1.9 - -1.5												
	-1.4 - -1.0												
	-0.9 - -0.5	16	22	93	67	50	10	2	1				24
	-0.4 - 0.0	27	103	271	283	152	53	15	3				261
	0.1 - 0.5	14	37	108	164	87	9	1	1	2			907
	0.6 - 1.0	11	13	67	69	18							423
	1.1 - 1.5	2	10	52	25	3							178
	1.6 - 2.0	2	4	26	25	3							92
	2.1 - 2.5	1	7	19	12	5							60
	2.6 - 3.0	4	3	12	5	1							44
	> 3.0	7	14	28	4								25
	MISSING	21	49	61	32	2							53
	TOTAL	105	276	744	689	321	72	18	5	2			165
TOTAL		105	276	744	689	321	72	18	5	2			2232

TABLE 236

Joint Frequency Distribution of 150-Foot Wind Speed and Temperature Difference Between 144-Foot and 5.5-Foot Levels

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45		
JANUARY 1952 - 1954	< -2.0			1									1
	-1.9 - -1.5	6	16	17	22	2							63
	-1.4 - -1.0	36	90	108	124	46	5	7				6	422
	-0.9 - -0.5												
	-0.4 - 0.0	35	125	205	191	90	19	5				17	687
	0.1 - 0.5	13	45	91	66	35	5	1				1	257
	0.6 - 1.0	8	18	67	32	12	3						140
	1.1 - 1.5	1	19	22	5	1							48
	1.6 - 2.0	2	9	17	4								32
	2.1 - 2.5	2	6	9	1		2						20
	2.6 - 3.0	3	1	12	1		2	1					20
	> 3.0		5	7	3	2							17
	MISSING	24	92	185	109	77	20	6	5			7	525
	TOTAL	130	426	741	558	265	56	20	5			31	2232
FEBRUARY 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45	MISSING	TOTAL
	< -2.0												
	-1.9 - -1.5	2	5	3	8	3	1	1					23
	-1.4 - -1.0	16	27	38	41	17	2	3					144
	-0.9 - -0.5	22	50	94	92	51	26	8	2	4	1		350
	-0.4 - 0.0	9	66	249	206	153	61	19	6				769
	0.1 - 0.5	4	33	84	90	63	13	3					290
	0.6 - 1.0	5	29	43	39	2		1	1				120
	1.1 - 1.5	1	16	39	11	1							68
	1.6 - 2.0	2	10	47	20								79
	2.1 - 2.5	7	8	19	6								40
	2.6 - 3.0	2	9	8	3								22
	> 3.0	12	24	29	14								79
	MISSING	1	6	39	10								56
	TOTAL	83	283	692	540	290	103	35	9	4	1		2040
MARCH 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45	MISSING	TOTAL
	< -2.0			1	1								2
	-1.9 - -1.5	1	10	23	17	6							57
	-1.4 - -1.0	11	27	44	39	11	6	2	1				141
	-0.9 - -0.5	30	64	106	102	57	20	6	1			1	387
	-0.4 - 0.0	18	101	208	156	143	63	26	2	6	2		725
	0.1 - 0.5	6	49	115	95	47	11	6					329
	0.6 - 1.0	9	31	56	45	7	4	1					153
	1.1 - 1.5	9	30	58	23	2							122
	1.6 - 2.0	3	21	36	20								80
	2.1 - 2.5	7	9	20	11								47
	2.6 - 3.0	2	14	6	2								24
	> 3.0	6	22	15	5								48
	MISSING	9	26	40	22	17	1	2					117
	TOTAL	111	404	728	538	290	105	43	4	6	2	1	2232

TABLE 237

**Joint Frequency Distribution of 150-Foot Wind Speed and Temperature
Difference Between 144-Foot and 5.5-Foot Levels**

MONTH	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45		
APRIL 1952 - 1954	< -2.0				2	4							6
	-1.9 - -1.5		4	22	21	14	2	2					65
	-1.4 - -1.0	8	51	73	40	25	9	2					208
	-0.9 - -0.5	15	51	123	108	81	20	13	1				412
	-0.4 - 0.0	11	51	169	177	116	52	12	10				598
	0.1 - 0.5	4	19	85	79	39	8						234
	0.6 - 1.0	5	27	46	28	7							113
	1.1 - 1.5	3	22	37	14	2	1						79
	1.6 - 2.0	2	10	31	11	2							56
	2.1 - 2.5	1	11	17	8								37
	2.6 - 3.0	1	5	11	9								26
	> 3.0	7	32	60	18								117
	MISSING	26	59	67	27	14	7	5				4	209
	TOTAL	83	342	741	542	304	99	34	11			4	2160
MAY 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45	MISSING	TOTAL
	< -2.0				1								1
	-1.9 - -1.5	3	6	19	8	4							40
	-1.4 - -1.0	19	62	72	49	14	2	1	1				220
	-0.9 - -0.5	34	97	163	71	26	15	9				2	417
	-0.4 - 0.0	10	80	190	104	55	24	6				7	476
	0.1 - 0.5	5	46	109	48	28	13	3	1			6	259
	0.6 - 1.0	2	30	77	29	8	2	1					149
	1.1 - 1.5	7	29	60	19	2							117
	1.6 - 2.0	4	18	48	17								87
	2.1 - 2.5	6	16	39	5								66
	2.6 - 3.0	2	19	30	6								57
	> 3.0	31	36	54	15								136
	MISSING	4	27	101	48	15	6	6					207
	TOTAL	127	466	962	420	152	62	26	2			15	2232
JUNE 1952 - 1954	TEMP. DIFF. °C 144 FT MINUS 5.5 FT LEVEL	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45	MISSING	TOTAL
	< -2.0												
	-1.9 - -1.5			2								1	3
	-1.4 - -1.0	18	46	46	15	1							126
	-0.9 - -0.5	66	157	137	55	28	3					1	447
	-0.4 - 0.0	19	79	201	81	44	11	5				8	448
	0.1 - 0.5	6	49	166	66	22	4	1				2	316
	0.6 - 1.0	4	51	103	44	21	4	1					228
	1.1 - 1.5		41	91	22	10	1						165
	1.6 - 2.0	2	34	82	13								131
	2.1 - 2.5	2	19	49	8	1							79
	2.6 - 3.0	1	9	30	3								43
	> 3.0	19	33	76	6								134
	MISSING	8	6	23	3								40
	TOTAL	145	524	1006	316	127	23	7				12	2160

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TABLE 238

Joint Frequency Distribution of 150-Foot Wind Speed and
Temperature Difference Between 144-Foot and 5.5-Foot Level
July 1951 - June 1954

TEMPERATURE DIFFERENCE °C 144-FT MINUS 5.5-FT LEVEL	WIND SPEED (MPH)										MISSING	TOTAL
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45		
<-2.0			2	4	4							10
-1.9--1.5	8	38	85	57	29	3	3				1	224
-1.4--1.0	169	469	538	305	102	22	8	2				1615
-0.9--0.5	496	1133	1391	879	491	135	62	6	5	1	16	4615
-0.4--0.0	240	1132	2341	1720	996	333	112	31	13	3	36	6957
0.1--0.5	102	569	1342	993	452	98	25	3	3		10	3597
0.6--1.0	75	385	849	493	119	16	4	1				1942
1.1--1.5	49	343	661	245	28	2					1	1329
1.6--2.0	41	221	631	194	8						3	1098
2.1--2.5	43	180	454	104	8	2					2	793
2.6--3.0	35	129	309	64	1	2	1					541
> 3.0	233	561	898	167	3						6	1868
MISSING	135	329	645	290	146	35	19	5			111	1715
TOTAL	1626	5489	10146	5515	2387	648	234	48	21	4	186	26304

(N) Wind Speed and Wind Ratio

1. Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio

Tables 239 through 243: With high winds and considerable turbulence present in the lower layers, the momentum interchange is high. One would, therefore, expect the wind speed ratios to be relatively small during periods of high wind speeds. These data show that as the wind speed becomes higher, there is a tendency for the wind speed ratio to become smaller.

During clear nights when the terrestrial radiation losses are high, a strong inversion develops and the wind flow is characterized by a marked suppression of fluctuations in both speed and direction. Under these conditions the wind speed at the 150-foot level ranges from about 8 to 16 miles per hour, while the wind speed at the 19-foot level may be only 2 or 3 miles per hour. A relatively high wind speed ratio results. The wind direction records in these cases may be classified as Brookhaven Type D.

A secondary maximum frequency of wind speed ratio at the higher end of the scale is found in most of these tables for wind speeds in the 5-9, 10-14, and 15-19 miles-per-hour groupings. It is this type of stable regime which accounts for the secondary maximum.

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TABLE 239

Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio

MONTH	WIND SPEED RATIO	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45		
JULY 1949 - 1953	<1.0	57	13	5									75
	1.0 - 1.2	78	185	90	5	1							359
	1.3 - 1.5	57	230	304	168	50	5						814
	1.6 - 1.8		129	298	102	23	5						557
	1.9 - 2.1	47	125	174	69	6							421
	2.2 - 2.4		80	141	12	1							234
	2.5 - 2.9		62	183	23	4							272
	>3.0	21	263	321	16	2							623
	MISSING	94	87	66	11							107	365
	TOTAL	354	1174	1582	406	87	10					107	3720
AUGUST 1949 - 1953													
	TOTAL	364	1357	1506	330	46	4		1			112	3720
SEPTEMBER 1949 - 1953													
	TOTAL	196	853	1726	608	155	29	16				17	3600

TABLE 240

Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio

MONTH	WIND SPEED RATIO	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45		
OCTOBER 1949 - 1953	<1.0	29	6	13	1	1							50
	1.0 - 1.2	36	101	98	40	4	1						280
	1.3 - 1.5	17	182	317	259	155	33	8	3				974
	1.6 - 1.8		96	242	172	52	14	1					577
	1.9 - 2.1	24	43	154	144	18	2						385
	2.2 - 2.4		56	186	85	4							331
	2.5 - 2.9		28	188	99	5							320
	>3.0	9	196	343	84								632
	MISSING	50	40	18	6	3						54	171
	TOTAL	165	748	1559	890	242	50	9	3			54	3720
NOVEMBER 1949 - 1953													
	TOTAL	140	461	1210	1043	520	144	52	20	9	1		3600
DECEMBER 1949 - 1953													
	TOTAL	189	551	1253	1030	526	129	32	8	2			3720

TABLE 241

Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio

MONTH	WIND SPEED RATIO	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45		
JANUARY 1950 - 1954	<1.0	31	12	5									48
	1.0 - 1.2	31	129	152	87	24	5	1	1				430
	1.3 - 1.5	33	159	374	490	314	77	39	14	3	2		1505
	1.6 - 1.8		95	283	231	92	26	9	1				737
	1.9 - 2.1	36	57	127	78	7							305
	2.2 - 2.4		38	98	16	4							156
	2.5 - 2.9		42	67	22	2							133
	>3.0	20	111	97	14								242
	MISSING	56	42	20	1							45	164
	TOTAL	207	685	1223	939	443	108	49	16	3	2	45	3720
FEBRUARY 1950 - 1954													
	TOTAL	157	463	1086	894	450	164	46	13	4	1	106	3384
MARCH 1950 - 1954													
	TOTAL	157	579	1151	910	564	227	86	15	6	2	23	3720

TABLE 242

Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio

MONTH	WIND SPEED RATIO	WIND SPEED (MPH)										MISSING	TOTAL
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	>45		
APRIL 1950 - 1954	<1.0	51	36	7	1								95
	1.0 - 1.2	38	137	243	164	85	17	3	1				688
	1.3 - 1.5	11	120	356	436	303	112	60	14	2			1414
	1.6 - 1.8		80	229	124	49	22	8	2				514
	1.9 - 2.1	15	51	115	80	11	7	1					280
	2.2 - 2.4		58	97	26	9	2						192
	2.5 - 2.9		33	85	27	2							147
	>3.0	13	87	72	9								181
	MISSING	25	12	14	17	9	6					6	89
	TOTAL	153	614	1218	884	468	166	72	17	2		6	3600
MAY 1950 - 1954													
	TOTAL	189	697	1537	800	259	112	49	11	3	1	62	3720
JUNE 1950 - 1954													
	TOTAL	282	927	1524	580	211	46	12	1			17	3600

2.19

TABLE 243

Joint Frequency Distribution of 150-Foot Wind Speed
and 150/19-Foot Wind Speed Ratio
July 1949 - June 1954

WIND SPEED RATIO	WIND SPEED (MPH)										MISSING	TOTAL
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	> 45		
< 1.0	430	139	60	6	1							636
1.0-1.2	561	1515	1599	753	229	67	17	3				4744
1.3-1.5	363	2008	4088	4027	2524	846	346	95	25	7		14329
1.6-1.8		1131	3089	1967	940	234	55	6	4			7426
1.9-2.1	329	759	1697	1195	169	22	3					4174
2.2-2.4		656	1626	440	57	7	1					2787
2.5-2.9		478	1621	528	32	3	1					2663
> 3.0	205	1851	2550	344	4	3		1				4958
MISSING	665	572	245	54	15	7					549	2107
TOTAL	2553	9109	16575	9314	3971	1189	423	105	29	7	549	43824

(O) Air Temperature and Humidity

1. Joint Frequency Distribution of Temperature and Relative Humidity

Tables 244 through 256: In addition to the monthly grouping the data were subdivided into the six-hourly periods: 0100-0600, 0700-1200, 1300-1800, and 1900-2400. An examination of these tables indicates that there is a substantial difference in the distribution from one six-hourly grouping to another. The five-year summary shown in Table 256, however, does not subdivide the observations into the four six-hourly groupings.

Simultaneous occurrence of high temperature and high relative humidity is frequently detrimental to some types of scientific equipment and to some technical installations. These tables are included to provide information on the frequency of occurrence of this type of unfavorable condition.

The last column of Table 256 shows the frequency distribution of hourly temperature readings for the five-year period. It is of interest to note that the temperature readings are distributed in accordance with a bimodal distribution, with one maximum occurring in the range from 60° to 64° F and the second maximum occurring in the range from 30° to 34° F.

2. Joint Frequency Distribution of Temperature and Dew Point

Tables 257 through 269: The dew point readings were calculated from the relative humidity values determined from a hygromograph and the air temperature readings. The accuracy of these measurements are, therefore, not as great as that obtained with the use of a dry- and wet-bulb psychrometer. The dew points calculated were based on vapor pressure over water for temperatures of 32° and above, and vapor pressure over ice for air temperatures of less than 32° F.

3. Number of Cases during Each Month of Wet-Bulb Temperatures in Excess of Specified Values for a Given Dry-Bulb Temperature

Tables 270 through 273: In this group of tables the wet-bulb temperatures were calculated from the relative humidity values of the hygromograph using the aqueous vapor pressure over water from the Smithsonian Meteorological Tables, Fifth Revised Edition, pages 165-166. These data indicate the frequency under which especially unfavorable conditions may occur. It is noteworthy that during the five years of data, there was no observation of wet-bulb temperature higher than 84° F.

TABLE 244
Joint Frequency Distribution of Temperature and Relative Humidity
July 1949 - 1953

[illegible]

TABLE 245
Joint Frequency Distribution of Temperature and Relative Humidity
August 1949 - 1953

TEMP. °F	RELATIVE HUMIDITY IN PER CENT DURING THE HOURS																												MISS- ING	TOTAL	
	0100 - 0600							0700 - 1200							1300 - 1800							1900 - 2400									
	<40	40-49	50-59	60-69	70-79	80-89	>90	<40	40-49	50-59	60-69	70-79	80-89	>90	<40	40-49	50-59	60-69	70-79	80-89	>90	<40	40-49	50-59	60-69	70-79	80-89	>90			
90 - 94								1	6							12	18	7	2											46	
85 - 89									24							4	41	22	5											118	
80 - 84								2	23	15	5	1	1			16	63	51	43											289	
75 - 79						6		9	24	49	44	23	13	10		17	59	59	55	34	15	9								1	507
70 - 74			1	5	5	12	90	11	42	45	53	38	33	45		10	55	57	42	29	16	10									808
65 - 69				14	27	32	162		11	30	44	35	41	44		9	12	26	22	15	16	27									816
60 - 64				3	21	42	174			5	6	19	25	23	43		3	5	7	1	7	3									634
55 - 59					2	18	33	164			2	3	7	6	5																351
50 - 54					4	15	75					2									1	2									130
45 - 49						4	11																							1	20
MISSING																														1	1

TABLE 246
Joint Frequency Distribution of Temperature and Relative Humidity
September 1949 - 1953

[illegible]

Joint Frequency Distribution of Temperature and Relative Humidity
June 1950 - 1954

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TABLE 256

Joint Frequency Distribution of Temperature and Relative Humidity
July 1949 - June 1954

TEMP. °F	RELATIVE HUMIDITY IN PER CENT							MISSING	TOTAL
	< 40	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 100		
95-99	7	13	1						21
90-94	28	65	39	7					139
85-89	69	192	226	89	17	2			595
80-84	110	323	327	326	174	44	12	17	1333
75-79	219	411	434	368	282	289	146	17	2166
70-74	248	472	492	480	404	491	646	20	3253
65-69	237	328	382	484	554	593	957	27	3562
60-64	140	321	337	435	460	661	1321	29	3704
55-59	164	251	366	343	404	491	998	41	3058
50-54	161	268	360	410	362	383	1090	46	3080
45-49	114	222	406	396	414	452	870	21	2895
40-44	60	197	323	452	420	473	787	56	2768
35-39	42	182	325	550	637	577	1071	22	3406
30-34	8	103	272	526	813	994	1898	12	4626
25-29	12	76	203	428	658	736	907	6	3026
20-24	9	50	119	313	509	585	504	13	2102
15-19	1	17	116	247	340	348	346	9	1424
10-14		4	65	130	243	215	118	14	789
5-9	4	3	52	88	177	97	57	17	495
0-4		2	37	84	110	119	33	1	386
-5 - -1			3	44	93	64	6		210
-10 - -6				20	26	13			59
-15 - -11				5	13	12			30
-20 - -16				5	3				8
MISSING	7	8	26	19	28	20	8	573	689
TOTAL	1640	3508	4911	6249	7141	7659	11775	941	43824

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TABLE 259

Joint Frequency Distribution of Temperature and Dew Point
September 1949 - 1953

TEMPERATURE °F	DEW POINT (°F)																	MISSING	TOTAL
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4		
95 - 99			1	4	2														7
90 - 94				11	5	3													19
85 - 89				11	17	14	3												45
80 - 84			1	8	26	19	10												64
75 - 79			4	19	45	37	34	25	7										171
70 - 74			9	31	64	49	57	98	21	5	4								338
65 - 69				49	130	75	80	100	72	20	3								529
60 - 64					223	209	118	116	98	37	1	1							803
55 - 59						149	154	86	82	36	18	4	4						533
50 - 54							177	142	79	45	15	12							470
45 - 49								143	90	25	10	6							274
40 - 44									83	35	8	5							131
35 - 39										23	22								45
30 - 34											1								1
MISSING																		170	170
TOTAL			15	133	512	555	633	710	532	226	82	28	4					170	3600

TABLE 260

Joint Frequency Distribution of Temperature and Dew Point
October 1949 - 1953

TEMPERATURE °F	DEW POINT (°F)																	MISSING	TOTAL
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4		
85 - 89			2				2												4
80 - 84			4	6	4	15	15	10											54
75 - 79			4	9	26	14	17	18	3	8									99
70 - 74			6	12	16	28	34	26	17	19									158
65 - 69				29	78	32	44	47	48	28	16								322
60 - 64					46	71	57	58	68	45	23	7	2					1	378
55 - 59						50	92	72	66	83	32	26	6						427
50 - 54							155	121	138	129	67	37	19	1					667
45 - 49								147	159	113	93	47	27	5					591
40 - 44									111	106	101	31	32	16					397
35 - 39										71	101	41	27	35					275
30 - 34											58	35	34	26					153
25 - 29												16	17	12					45
20 - 24													12	4	1				17
15 - 19														3					3
MISSING																		130	130
TOTAL			16	56	170	210	416	499	610	602	491	240	176	102	1			131	3720

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TABLE 261
Joint Frequency Distribution of Temperature and Dew Point
November 1949 - 1953

TEMPERATURE °F	DEW POINT (°F)																						MISSING	TOTAL	
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4	-5--1	-10--6	-15--11	-20--16	-25--21			-30--26
75 - 79						1	4																		5
70 - 74						6	5	1		2															14
65 - 69					1	17	13	10	12	13															66
60 - 64					1	29	26	6	15	13	4												1		95
55 - 59						34	36	24	28	32	17	9	3												183
50 - 54							47	15	23	43	41	23	6	3											201
45 - 49								49	59	63	99	35	15	6	1										327
40 - 44									45	104	150	119	39	2	2								1		462
35 - 39										69	158	184	88	4	7								1		511
30 - 34											169	266	166	30	4								1		636
25 - 29												159	245	129	22	13	3								571
20 - 24													51	117	62	16	3						2		251
15 - 19														38	71	39	2						2		154
10 - 14															21	42	5	1							69
5 - 9																9	2	3							14
0 - 4																	1	3	19	1					24
-5 - -1																		8	4	2					14
MISSING																								5	5
TOTAL					2	87	131	105	182	334	638	795	613	329	190	119	16	15	23	3			13	3600	

TABLE 262
Joint Frequency Distribution of Temperature and Dew Point
December 1949 - 1953

TEMPERATURE °F	DEW POINT (°F)																							MISSING	TOTAL
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4	-5--1	-10--6	-15--11	-20--16	-25--21	-30--26		
60 - 64						3	1		1																5
55 - 59						10	20	6	6																42
50 - 54							22	12	15	13	1														63
45 - 49								38	25	17	44	5													129
40 - 44									98	73	40	24	5												240
35 - 39										160	127	95	15	4											401
30 - 34											337	298	114	25											774
25 - 29												186	217	79	10	1									493
20 - 24													152	247	87	7	4	2							499
15 - 19														109	168	75	20							2	374
10 - 14															79	125	43	3							250
5 - 9																32	97	26	3						158
0 - 4																	31	89	12					1	133
-5 - -1																		25	60	4					89
-10 - -6																			5	14					19
-15 - -11																				4	12				16
MISSING																								35	35
TOTAL						13	43	56	145	263	549	608	503	464	344	240	195	145	80	22	12		38	3720	

TABLE 263

Joint Frequency Distribution of Temperature and Dew Point
January 1950 - 1954

TEMPERATURE °F	DEW POINT (°F)																							MISSING	TOTAL
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4	-5-1	-10-6	-15-11	-20-16	-25-21	-30-26		
65-69						1																			1
60-64					1	6	6																		13
55-59						6	3	2																	11
50-54							36	6	2	1														6	51
45-49								59	14	3	3	1	1												81
40-44									46	38	32	6	1												123
35-39										130	109	107	13	5											364
30-34											382	309	76	17	3										737
25-29												282	240	87	18	1									628
20-24													169	231	80	20	12							3	515
15-19														123	208	72	12	2							442
10-14															43	149	57	10						14	273
5-9																14	109	43	4	5				17	192
0-4																	21	73	25	2					131
-5-1																		5	25	14					54
-10-6																			20	12					22
-15-11																					3	4			7
-20-16																						4	1		5
MISSING																								20	20
TOTAL					1	13	45	67	62	172	526	707	500	463	352	276	211	133	74	31	15	8	1	65	3740

TABLE 264

Joint Frequency Distribution of Temperature and Dew Point
February 1950 - 1954

TEMPERATURE °F	DEW POINT (°F)																							MISSING	TOTAL
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4	5--1	-10- -6	-15- -11	-20- -16	-25- -21	-30- -26		
65 - 69						2																			2
60 - 64						5	1																		6
55 - 59							21	3		5															29
50 - 54							14	7	3	7	10	2													43
45 - 49								10	8	24	38	11													91
40 - 44									32	56	79	58	9												234
35 - 39										86	150	115	60	16	5	1									433
30 - 34											364	398	153	35	6										926
25 - 29												189	258	91	40										578
20 - 24													145	148	85	17									395
15 - 19														75	94	43	4								216
10 - 14															24	50	25	8							107
5 - 9																6	42	33	2						83
0 - 4																	2	44	29	6					81
5 - -1																		6	37	7					50
-10 - -6																			3	14	1				18
-15 - -11																					7				7
-20 - -16																						2	1		3
MISSING																								52	52
TOTAL						7	36	20	43	178	641	773	625	305	254	117	73	91	71	27	10	1		52	3384

Joint Frequency Distribution of Temperature and Dew Point
May 1950 - 1954

[illegible]

Joint Frequency Distribution of Temperature and Dew Point
June 1950 - 1954

[illegible]

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TABLE 269

Joint Frequency Distribution of Temperature and Dew Point
July 1949 - June 1954

TEMPERATURE °F	DEW POINT (°F)																						MISSING	TOTAL	
	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	40-44	35-39	30-34	25-29	20-24	15-19	10-14	5-9	0-4	-5--1	-10--6	-15--11	-20--16	-25--21			-30--26
95 - 99		1	7	7	6																				21
90 - 94		7	36	60	33	3																			139
85 - 89	1	21	148	192	156	48	22	7																	595
80 - 84	4	46	294	306	307	254	67	26	10	2														17	1333
75 - 79		65	391	338	487	412	256	132	54	14														17	2166
70 - 74			501	709	559	489	489	308	128	37	11	2												20	3253
65 - 69				792	901	652	471	334	230	101	37	11		6										27	3562
60 - 64					1137	979	580	397	341	162	57	17	3		2									29	3704
55 - 59						845	814	448	403	283	136	73	15											41	3058
50 - 54							958	647	525	418	300	132	44	8	1	1								46	3080
45 - 49								766	727	539	504	212	96	28	2									21	2895
40 - 44									699	729	675	400	153	51	5									56	2768
35 - 39										902	1101	852	374	133	16	2	4							22	3406
30 - 34											1780	1742	811	251	27	2	1							12	4626
25 - 29												1029	1220	571	163	34	3							6	3026
20 - 24													613	931	443	81	19	2						13	2102
15 - 19														398	645	327	40	5						9	1424
10 - 14															183	418	150	24						14	789
5 - 9																68	281	115	9	5				17	495
0 - 4																	61	216	99	9				1	386
-5 - -1																		44	139	27					210
-10 - -6																			8	38	13				59
-15 - -11																				4	22	4			30
-20 - -16																					2	5	1		8
MISSING																								689	689
TOTAL	5	140	1377	2404	3586	3682	3657	3065	3117	3187	4601	4470	3329	2377	1487	933	559	406	255	83	37	9	1	1057	43824

TABLE 270

Number of Cases During Each Month of Wet-Bulb Temperatures Exceeding 64°F
at Indicated Dry-Bulb Temperatures
July 1949 - June 1954

DRY BULB TEMPERATURES DEGREES F	MONTH												MISSING	TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN		
70	90	105	19	6						4	9	81	4	318
71	113	76	18	8						9	6	78	4	332
72	107	91	21	6						6	11	94	5	341
73	134	98	25	7						5	6	83	3	361
74	134	90	13	6						7	14	92	4	360
75	111	74	14	7						3	14	69	1	293
76	124	74	24	7						7	17	78	4	335
77	108	80	14	11						5	12	80	3	313
78	93	77	20	8						5	12	63	5	283
79	84	65	13	9						3	16	61	4	255
80	117	73	9	10						4	11	76	3	303
81	91	57	13	9						5	8	64	6	253
82	101	56	13	6							7	79	4	266
83	102	54	11								13	70	3	253
84	59	29	10	3							12	41	1	155
85	67	32	13	2							10	55		179
86	52	24	16								11	38		141
87	45	15	8								5	38		111
88	33	23	3								2	22		83
89	13	24	5									29		71
90	10	24	6									16		56
91	6	13	2									10		31
92	7	5	4									8		24
93	2	4	2									3		11
94	6		5									6		17
95	2		7									3		12
96	3											2		5
97	4													4
TOTAL	1818	1283	308	105						63	196	1339	54	5166

TABLE 271

Number of Cases During Each Month of Wet-Bulb Temperatures Exceeding 69°F
at Indicated Dry-Bulb Temperatures
July 1949 - June 1954

DRY BULB TEMPERATURES DEGREES F	MONTH												MISSING	TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN		
70	18	37	2	1								10	4	72
71	45	48	3									18	4	118
72	59	51	4	2								23	5	144
73	84	54	6	2							1	32	3	182
74	88	40	3	3						1	2	45	4	186
75	62	33	3	2							4	43	1	148
76	85	36	5	3							2	46	4	181
77	58	38	1	2							3	49	3	154
78	49	38	4	2							4	37	5	139
79	46	36	2	2							3	33	4	126
80	66	32	2	4							2	52	3	161
81	53	29	2	2							3	46	6	141
82	57	31	2	2							3	54	4	153
83	74	31	3								7	53	3	171
84	43	20	3	2							6	37	1	112
85	55	19	7	2							5	50		138
86	40	16	4								6	36		102
87	40	14	3								4	37		98
88	26	22	2									22		72
89	13	24	3									29		69
90	10	24	5									16		55
91	6	13	2									10		31
92	7	5	4									8		24
93	2	4	2									3		11
94	6		5									6		17
95	2		5									3		10
96	3											2		5
97	4													4
TOTAL	1101	695	87	31						1	55	800	54	2824

(P) Air Temperature and Soil Temperature

1. Average Hourly Values of the Difference between Air and Soil Temperatures

Tables 274 and 275: The differences between the temperature of the air and the temperature of the soil at one centimeter and, similarly, the temperature of the air and the temperature of the soil at 10 centimeters were calculated. The average hourly values of these differences were tabulated in Tables 274 and 275. From these tables it is evident that the major portion of the entries are negative, indicating that the average hourly values of the soil temperature were greater than that of the air. The greatest differences, as may be expected, occurred in the early morning when the air cools off more rapidly than the soil. In the afternoon these differences were reduced or changed in sign. In Table 275 it is of interest to note that the average hourly values indicate higher temperatures for the air than for the soil for some part of the day in every month except the coldest months - December and January. In those months the average hourly values were all negative, indicating that the soil was warmer.

2. Frequency Distribution of Differences in Temperatures of the Air and the Soil

Tables 276 through 279: Frequency distributions for each month of the differences between the temperature of the air at 5.5 feet and the temperature of the soil at one centimeter below the surface, and similarly, the temperature of the air at 5.5 feet and the temperature of the soil at ten centimeters below the surface, are shown in Tables 276 through 279. An examination of these charts shows that there were appreciably more observations indicating the soil warmer than the air. The greatest range of differences occurred during the winter, especially at times of cold air outbreaks. Under these conditions the air was more than 30° colder than the soil one centimeter or ten centimeters below the surface.

TABLE 274
Average Hourly Values of Air Temperature Minus 1 Centimeter Soil Temperature (°F)
July 1953 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	-6.3	-6.2	-5.4	-4.7	-4.9	-8.6	-7.5	-1.8	-7.3	-3.3	-7.7	-4.3	1
2	-6.6	-6.1	-5.8	-4.6	-5.2	-8.5	-7.9	-2.0	-7.8	-3.5	-7.8	-4.1	2
3	-6.1	-6.6	-5.8	-4.5	-5.7	-8.8	-8.6	-2.3	-8.3	-3.8	-7.3	-3.7	3
4	-6.0	-6.3	-5.7	-4.8	-6.2	-9.2	-8.9	-3.0	-8.7	-3.9	-7.6	-4.3	4
5	-6.1	-6.6	-6.2	-5.3	-6.3	-9.3	-9.2	-3.3	-9.0	-3.8	-7.1	-4.0	5
6	-5.1	-5.6	-5.7	-5.6	-6.3	-9.1	-9.4	-3.7	-9.2	-3.3	-5.8	-3.0	6
7	-3.8	-3.4	-4.3	-4.7	-5.8	-9.3	-9.3	-3.5	-8.3	-1.8	-3.7	-1.8	7
8	-1.0	-1.1	-2.3	-1.3	-4.3	-8.9	-9.0	-1.9	-6.0	-0.5	-1.6	-0.1	8
9	-0.7	-0.4	0.4	1.1	-2.8	-7.5	-7.9	0.1	-3.7	0.9	-1.7	-0.5	9
10	-1.6	-1.0	0.2	2.0	-1.7	-6.3	-6.7	2.0	-2.4	1.6	-2.5	-1.6	10
11	-2.5	-2.0	-0.4	1.9	-1.3	-5.5	-5.4	3.0	-1.8	1.6	-3.7	-3.1	11
12	-3.3	-3.2	-1.0	1.4	-0.9	-5.0	-4.4	4.0	-1.7	1.5	-4.8	-4.3	12
13	-3.9	-3.4	-1.8	1.3	-0.4	-3.9	-3.9	4.8	-1.9	1.2	-5.5	-4.4	13
14	-3.5	-3.3	-1.1	1.5	0.1	-3.3	-3.7	5.2	-1.7	1.7	-5.7	-4.5	14
15	-3.2	-2.7	0.0	1.9	-0.2	-3.3	-3.9	4.9	-1.5	1.8	-5.0	-3.7	15
16	-2.5	-2.0	0.8	1.4	-0.7	-4.2	-4.4	4.3	-2.3	1.9	-3.9	-2.9	16
17	-2.1	-1.9	0.5	-0.3	-2.1	-5.4	-5.7	2.6	-2.9	1.6	-2.9	-2.9	17
18	-2.5	-3.5	-1.8	-2.1	-2.6	-5.8	-6.2	0.9	-4.2	0.6	-3.3	-2.8	18
19	-4.1	-5.3	-3.3	-2.3	-3.3	-6.1	-6.4	0.3	-5.0	-0.4	-4.6	-3.9	19
20	-5.4	-5.7	-4.4	-2.9	-3.6	-6.4	-6.9	0.0	-5.3	-1.0	-5.4	-4.5	20
21	-5.6	-5.7	-4.7	-3.4	-3.9	-6.9	-7.1	-0.4	-5.8	-1.5	-6.2	-4.9	21
22	-5.6	-6.1	-4.7	-3.4	-4.2	-7.1	-7.0	-1.2	-6.0	-2.1	-6.7	-5.0	22
23	-5.9	-6.1	-4.0	-3.7	-4.5	-7.6	-6.8	-1.6	-6.7	-2.0	-7.2	-4.4	23
24	-6.2	-6.2	-4.1	-4.2	-4.6	-8.0	-7.1	-1.9	-7.2	-2.0	-7.6	-4.5	24

TABLE 275

Average Hourly Values of Air Temperature Minus 10 Centimeters Soil Temperature (°F)
July 1953 - June 1954

HOUR	MONTH												HOUR
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
1	-7.4	-7.9	-7.0	-6.5	-6.3	-8.7	-7.7	-1.9	-7.4	-3.4	-8.5	-5.0	1
2	-7.7	-7.8	-7.3	-6.5	-6.6	-8.7	-8.1	-1.9	-7.8	-3.5	-8.4	-4.7	2
3	-7.1	-8.5	-7.4	-6.5	-7.3	-9.1	-8.9	-2.3	-8.4	-3.9	-7.9	-4.8	3
4	-6.9	-8.2	-7.3	-6.8	-7.9	-9.5	-9.4	-2.8	-8.8	-3.9	-8.3	-5.1	4
5	-7.0	-8.4	-7.9	-7.3	-8.0	-9.6	-9.6	-3.2	-9.1	-3.9	-7.9	-4.4	5
6	-5.6	-7.0	-7.4	-7.7	-7.9	-9.5	-9.9	-3.6	-9.3	-3.3	-6.0	-3.0	6
7	-3.6	-3.7	-5.2	-6.3	-7.5	-9.8	-9.9	-3.5	-8.4	-1.4	-3.1	-1.0	7
8	-0.1	-0.3	-2.0	-1.6	-5.4	-9.2	-9.5	-1.8	-6.0	0.5	0.0	2.0	8
9	1.1	2.1	2.4	2.3	-3.0	-8.0	-8.3	0.4	-3.3	2.8	1.3	3.2	9
10	1.4	3.2	4.0	4.8	-1.0	-6.4	-6.8	2.5	-1.4	4.2	1.4	2.9	10
11	0.9	3.2	4.8	6.0	0.5	-5.4	-5.4	4.2	-0.5	5.0	1.4	2.4	11
12	0.6	2.6	4.6	5.7	1.4	-4.8	-4.2	5.2	0.4	5.4	0.4	1.8	12
13	-0.5	1.5	3.5	5.1	1.8	-3.5	-3.4	6.1	0.6	5.2	-0.2	1.2	13
14	-0.8	0.5	3.4	4.5	1.8	-3.1	-3.0	6.5	0.9	5.2	-1.0	0.3	14
15	-1.6	-0.1	3.1	3.8	0.8	-3.2	-3.2	6.1	0.2	4.8	-1.5	-0.2	15
16	-1.6	-0.5	2.4	2.1	-0.5	-4.2	-3.9	5.1	-0.6	4.1	-1.3	-0.8	16
18	-2.1	-1.5	1.2	-0.6	-2.6	-5.4	-5.4	3.1	-1.7	3.1	-1.5	-2.1	18
18	-2.8	-3.6	-2.1	-3.1	-3.7	-6.0	-6.0	1.3	-3.6	1.6	-2.7	-2.5	18
19	-4.9	-6.4	-4.1	-3.5	-4.2	-6.3	-6.4	0.4	-4.4	-0.1	-4.6	-4.1	19
20	-6.6	-7.3	-5.5	-4.4	-4.8	-6.6	-7.0	0.2	-5.0	-0.9	-5.7	-5.0	20
21	-6.9	-7.4	-5.8	-5.0	-5.1	-7.2	-7.3	-0.2	-5.6	-1.5	-6.7	-5.6	21
22	-6.8	-7.9	-6.1	-5.1	-5.5	-7.6	-7.4	-1.0	-5.8	-2.1	-7.4	-5.7	22
23	-7.1	-7.9	-5.3	-5.4	-5.7	-7.9	-7.1	-1.3	-6.6	-2.1	-7.9	-5.2	23
24	-7.3	-8.0	-5.7	-5.8	-6.0	-8.3	-7.4	-1.7	-7.1	-2.2	-8.4	-5.2	24

TABLE 276

Frequency Distribution of Temperature Difference Between Air at 5.5 Ft Above
Ground Surface and Soil at 1 Centimeter Below Ground Surface
November 1952 - June 1953

TEMP. DIFF. (°F) AIR TEMP. MINUS 1 CM SOIL TEMPERATURE	MONTH								TOTAL
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
15					1	1			2
14					2	1			3
13		1	3		4	2		2	12
12		3	7	3	2	2		5	22
11		1	9	8	8	2	2	2	32
10	1	5	3	13	8	2	14	5	51
9	4	6	5	14	10	3	12	5	59
8	4	14	9	18	10	3	15	14	87
7	5	8	5	12	19	5	22	14	90
6	15	11	10	20	21	8	27	23	135
5	16	8	12	28	24	21	13	22	144
4	16	9	15	26	12	28	19	25	150
3	20	16	10	39	31	24	23	33	196
2	14	22	19	37	30	24	24	26	196
1	29	52	54	30	29	48	42	49	333
0	37	87	35	56	43	47	40	37	382
- 1	25	78	97	56	69	66	42	41	474
- 2	29	54	48	22	50	60	50	37	350
- 3	39	64	40	23	47	60	77	42	392
- 4	34	43	19	19	45	50	53	53	316
- 5	20	30	33	20	46	81	64	44	338
- 6	12	38	39	25	25	66	41	52	298
- 7	18	29	40	20	23	30	21	30	211
- 8	16	31	27	28	18	20	27	52	219
- 9	11	12	27	15	14	13	21	31	144
-10	11	27	27	17	21	15	22	34	174
-11	10	22	16	14	12	12	14	27	127
-12	7	26	23	19	11	9	15	5	115
-13	3	11	19	15	6	7	13	5	79
-14	6	4	16	8	7	2	15	2	60
-15	13	5	15	13	1		10	3	60
-16	1	1	11	6	3		5		27
-17	2	5	5	3	2	1	1		19
-18		4	5	3		2			14
-19		3	3	7					13
-20			4	4					8
-21			3	3					6
-22			3	4					7
-23			2	3					5
-24			5	4					9
-25			5	2					7
-26			3	2					5
-27			2	2					4
-28			3						3
-29			4						4
-30			2						2
-31				1					1
-32			2	3					5
-33				1					1
-34				1					1
-35				1					1
-36				3					3
-37				1					1
MISSING	206	14			90	5			315
TOTAL	624	744	744	672	744	720	744	720	5712

TABLE 277

Frequency Distribution of Temperature Difference Between Air at 5.5 Ft Above
Ground Surface and Soil at 1 Centimeter Below Ground Surface
July 1953 - June 1954

TEMP DIFF (°F) AIR TEMP MINUS 1 CM SOIL TEMPERATURE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
27								1					1
26								1					1
25								6					6
24								6					6
23								8					8
22								4					4
21								4					4
20			1					1	3				5
19			2										2
18			3				1	3					7
17			4			1	3	1		1			10
16			1				2	2		1			6
15						2	2	4		4			12
14			3			2	1	4	2	8			20
13			1			1	2	2	3	6			15
12			3	5		4	2	14	5	9			42
11			9	3	3		2	16	1	9			43
10			7	3	14	5	1	17	4	19			70
9			8	16	13	3	8	16	3	28			95
8			9	25	11	5	8	16	8	37	4	1	124
7		1	8	23	9	6	11	14	10	21	6		109
6		2	9	28	16	18	8	10	15	29	7	3	145
5	5	4	10	32	26	27	10	9	11	44	13	13	204
4	13	9	19	20	17	20	7	14	17	26	17	21	200
3	9	23	34	24	31	26	14	37	16	20	22	30	286
2	20	20	24	28	34	32	14	26	25	22	26	34	305
1	35	40	42	44	26	30	36	38	37	30	31	43	432
0	47	32	27	30	22	26	47	50	30	27	30	51	419
-1	73	60	46	53	34	47	41	55	49	46	34	66	604
-2	51	52	37	36	28	35	42	36	36	33	32	54	472
-3	68	76	45	43	41	32	56	55	66	30	52	67	631
-4	53	69	33	44	31	31	50	29	46	32	48	55	521
-5	79	64	50	50	39	39	38	37	49	38	50	58	591
-6	77	74	55	57	58	38	26	29	48	19	61	62	604
-7	64	53	44	38	63	37	14	13	31	26	47	34	464
-8	55	56	41	68	78	40	20	16	27	21	39	33	494
-9	16	40	36	21	43	27	21	10	19	24	45	31	333
-10	27	38	34	19	24	29	19	14	31	25	56	22	338
-11	22	26	26	19	18	24	16	11	10	20	23	5	220
-12	12	5	18	6	12	7	19	7	25	18	27	7	163
-13	4		8	8	8	12	20	6	14	11	25	5	121
-14	1		8	1	6	13	34	7	18	18	21	6	133
-15			5		4	3	29	1	12	11	24	4	93
-16			3		1	4	17	1	13	5	4	5	53
-17					3	6	9	3	6	2		4	33
-18					1	4	9	2	3			4	23
-19					3	5	4	2	4			1	19
-20					3	5	10	3	7			1	29
-21						3	14	3	4				24
-22						4	6	3	5				18
-23						10	9	3	7				29
-24						5	5	1	4				15
-25						6	6		3				15
-26						7	4	1	6				18
-27						4	4		3				11
-28						4	7		3				14
-29						5	3		3				11
-30						6	7		1				14
-31						7							7
-32						7	2		1				10
-33						14							14
-34						11	3						14
-35						5	1						6
MISSING	13		7										20
TOTAL	744	744	720	744	720	744	744	672	744	720	744	720	8760

TABLE 278

Frequency Distribution of Temperature Difference Between Air at 5.5 Ft Above
Ground Surface and Soil at 10 Centimeters Below Ground Surface
November 1952 - June 1953

TEMP. DIFF. (°F) AIR TEMP. MINUS 10 CM SOIL TEMPERATURE	MONTH								TOTAL
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
24						1			1
23					4				4
22			2		2	1			5
21			4	1	5	1			11
20		1	1	5	2				9
19			2		2	3			7
18		1	4	2	4	1			12
17			3	3	1	2			9
16		4	1	3	4	1			13
15	1	3	1		8	2	3		18
14	1	5	5	7	7	5	2		32
13	2	4	1	6	10	4	9		36
12	10	2	1	11	12	7	15	1	59
11	7	1	3	9	5	5	12	8	50
10	11	2	2	14	7	11	22	11	80
9	12	6	9	24	5	10	23	12	101
8	11	12	5	16	9	12	16	9	90
7	10	5	3	15	16	14	20	23	106
6	14	13	9	20	28	17	23	19	143
5	11	5	15	23	31	31	22	22	160
4	8	15	13	27	22	21	19	22	147
3	15	28	14	29	34	26	34	39	219
2	23	32	15	20	27	32	28	20	197
1	29	59	52	28	30	57	32	45	332
0	25	50	42	44	36	33	46	32	308
- 1	34	61	89	65	51	60	40	42	442
- 2	17	38	47	21	31	49	40	44	287
- 3	45	48	36	23	37	58	38	43	328
- 4	38	37	13	11	28	33	53	33	246
- 5	44	40	29	14	43	50	48	42	310
- 6	31	32	33	19	29	56	39	44	283
- 7	36	32	29	17	26	30	23	36	229
- 8	28	32	41	17	26	36	20	32	232
- 9	16	24	21	14	16	20	19	26	156
-10	20	24	21	17	16	14	21	37	170
-11	13	14	16	18	13	6	16	26	122
-12	20	25	17	16	7	4	14	27	130
-13	21	26	23	11	5	3	12	10	111
-14	9	6	10	9	6		8	7	55
-15	3	12	20	10	5		12	6	68
-16	11	8	20	11	2		6	2	60
-17	7	8	13	10	2		3		43
-18	6	6	11	6	3		4		36
-19	1	9	6	5	2		2		25
-20	11		4	2					17
-21	3		3	2					8
-22	1		3	5					9
-23	1		6	12					19
-24			2	4					6
-25			3	3					6
-26			4	5					9
-27			3	3					6
-28			3	4					7
-29			1						1
-30			1						1
-31			5						5
-32			1	1					2
-33			1	3					4
-34			1	2					3
-35			1						1
-36				1					1
-37				3					3
-39				1					1
MISSING	18	14			85	4			121
TOTAL	624	744	744	672	744	720	744	720	5712

TABLE 279
Frequency Distribution of Temperature Between Air at 5.5 Ft Above
Ground Surface and Soil at 10 Centimeters Below Ground Surface
July 1953 - June 1954

TEMP. DIFF. (°F) AIR TEMP. MINUS 10 CM. SOIL TEMPERATURE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
31								1					1
30								1					1
29								4					4
28								2					2
27								2					2
26								3					3
25								7					7
24								9					9
23				4				1					5
22								1					1
21				2				2					4
20				2				2					4
19				2				3	1	5			11
18				4			3	3	4	5			19
17				4	3	1	1	2	4	8			23
16				1	3	1	2	3	2	8			20
15				3	11	5	1	2	5	13			44
14				7	11	10	1	7	2	11			50
13				5	15	7	2	9	2	13	1		56
12				2	6	6	3	2	18	6	19	3	65
11			3	4	9	5	1	15	6	14	1		59
10			5	7	16	7	5	16	8	24	9	1	103
9			7	14	16	9	3	16	10	25	9	4	121
8	4	14	25	18	10	8	12	8	6	28	9	17	159
7	7	9	20	12	13	18	8	9	8	22	17	18	161
6	9	16	19	14	11	20	5	12	13	27	19	33	198
5	16	23	24	13	23	16	10	13	18	27	21	35	239
4	16	16	15	18	21	24	11	20	15	17	16	35	224
3	32	28	30	28	18	23	14	34	23	31	32	30	323
2	33	16	23	27	20	33	29	27	26	25	28	31	318
1	35	45	20	26	25	21	37	32	41	36	36	41	395
0	38	27	21	26	21	30	46	55	32	35	34	25	390
- 1	59	44	42	32	31	38	37	48	42	33	37	54	497
- 2	36	34	30	29	22	34	43	38	30	27	31	48	402
- 3	48	58	41	46	31	36	52	48	56	23	41	68	548
- 4	40	48	29	42	32	27	27	27	40	26	44	28	410
- 5	63	48	37	53	36	34	40	31	37	21	28	60	488
- 6	75	53	30	27	40	35	28	32	37	22	39	50	468
- 7	60	33	32	47	45	38	19	14	33	22	51	26	420
- 8	43	53	46	49	68	32	18	15	29	17	34	22	426
- 9	26	38	29	30	42	31	21	9	20	21	36	26	329
-10	33	28	33	37	53	32	16	10	16	27	43	24	352
-11	28	31	27	25	21	26	16	9	19	10	25	14	251
-12	13	28	25	21	35	14	14	11	23	19	25	6	234
-13	9	20	16	15	14	7	20	4	24	18	23	3	173
-14	6	15	13	9	9	16	21	11	21	11	13	3	148
-15	1	4	11	8	7	8	25	4	14	18	19	4	123
-16	1		5	2	7	3	29		13	7	9	1	77
-17			4		4	4	16	3	6	3	9	3	52
-18			3		3	5	10	2	2	2		2	29
-19			2		3	4	9	3	7		2	2	32
-20					5	4	6	1	5			2	23
-21						7	12	2	6			4	31
-22						4	10	4	7				25
-23						7	8	3	2				20
-24						9	7	1	6				23
-25						5	3	3	3				14
-26						4	4		4				12
-27						8	4		3				15
-28						5	5		3				13
-29						1	3		3				7
-30						9	5		1				15
-31						3	3						6
-32						8	4		1				13
-33						11	5						16
-34						10							10
-35						10	1						11
-36						3	3						6
MISSING	13		7										20
TOTAL	744	744	720	744	720	744	744	672	744	720	744	720	8760

(Q) Solar Radiation and Stability

1. Joint Frequency Distribution of Solar Radiation Intensity
on a Horizontal Surface and Temperature Difference
between 144-Foot and 5.5-Foot Levels during
Period 0400-2000

Tables 280 through 286: Only data taken during the period from 0400 through 2000 were used in the construction of these tables. As in the previous tables dealing with solar radiation intensity, some of the observations during the winter months were made during darkness, since the sun rises appreciably after 0400 and sets before 2000. This accounts for the relatively high frequency of solar radiation intensity in the category from 0.00 to 0.09.

The data in these tables indicate that there is a relationship between the magnitude of the solar radiation intensity and the temperature difference, i.e., high intensity of solar radiation tends to occur with extreme cases of atmospheric instability. Nevertheless, there was a considerable amount of scatter in the data.

It is of interest to note that on occasion stable conditions existed even though appreciable sunshine was present. Conversely, super-adiabatic conditions were recorded with relatively low sunshine intensities.

TABLE 280

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
JULY 1951 - 1953	0.00 - 0.09				5	58	57	33	29	28	19	13	41	36	319
	0.10 - 0.19				11	21	26	19	13	11	8	4	6	20	139
	0.20 - 0.29			2	17	17	13	7	1					12	69
	0.30 - 0.39			12	50	34	28	10	5	2	1			19	161
	0.40 - 0.49			9	26	28	17	11	8	1				13	113
	0.50 - 0.59			7	18	22	6	1	1					10	65
	0.60 - 0.69			10	37	35	18	9	4	1				13	127
	0.70 - 0.79		1	3	30	27	7	5	1					7	81
	0.80 - 0.89			5	14	9								1	29
	0.90 - 0.99			12	15	3									30
	1.00 - 1.09			11	17	6		1							35
	1.10 - 1.19			16	23	6	3	2						4	54
	1.20 - 1.29		1	34	33	11	5	1						6	91
	1.30 - 1.39		3	38	24	8								9	82
	1.40 - 1.49		7	23	18	10								7	65
	1.50 - 1.59		2	2		1									5
	1.60 - 1.69														
	MISSING		1	3	4	6	3		1	1				4	23
	TOTAL		15	187	342	302	183	99	63	44	28	17	47	161	1488
AUGUST 1951 - 1953	0.00 - 0.09				1	60	73	52	53	42	23	24	74	9	411
	0.10 - 0.19				10	38	18	12	12	6	1	1	1	6	105
	0.20 - 0.29				18	37	30	12	7		1			3	108
	0.30 - 0.39		1	4	47	44	17	7	1						121
	0.40 - 0.49			3	48	39	17	4	2					1	114
	0.50 - 0.59			6	47	40	11	1	1					2	108
	0.60 - 0.69		2	6	47	42	9	1						1	108
	0.70 - 0.79			3	29	19	7								58
	0.80 - 0.89			8	21	21	4								54
	0.90 - 0.99		1	7	27	5	1								41
	1.00 - 1.09			14	18	4									36
	1.10 - 1.19			30	37	16								2	85
	1.20 - 1.29		6	30	26	5								1	68
	1.30 - 1.39		3	12	36	4									55
	1.40 - 1.49		1	7	4	1									13
	1.50 - 1.59				1										1
	1.60 - 1.69														
	MISSING				1		1								2
	TOTAL		14	130	418	375	188	89	76	48	25	25	75	25	1488

TABLE 281

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
SEPTEMBER 1951 - 1953	0.00 - 0.09				13	81	70	38	45	46	55	31	99	15	493
	0.10 - 0.19				13	41	19	14	9	5	5	2		4	112
	0.20 - 0.29				16	27	22	6	3	1	1			4	80
	0.30 - 0.39			3	48	28	14	11	4					6	114
	0.40 - 0.49			2	27	28	19	2						6	84
	0.50 - 0.59			3	32	36	10	1						3	85
	0.60 - 0.69			3	37	27	15	2						1	85
	0.70 - 0.79			6	36	14	7	1						1	65
	0.80 - 0.89			8	30	18	3							2	61
	0.90 - 0.99			12	19	5									36
	1.00 - 1.09		1	25	24	4								2	56
	1.10 - 1.19			35	49	3									87
	1.20 - 1.29		2	24	38	1								4	69
	1.30 - 1.39		1	6	3		1							1	12
	1.40 - 1.49		1												1
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING														
	TOTAL		5	127	385	313	180	75	61	52	61	33	99	49	1440
OCTOBER 1951 - 1953	0.00 - 0.09				16	146	93	73	51	56	53	26	128	13	655
	0.10 - 0.19			2	35	23	17	10	8	7	1		1		104
	0.20 - 0.29			2	41	27	10	6	2	1	1		1	2	93
	0.30 - 0.39			8	39	30	19	9						2	107
	0.40 - 0.49			6	30	22	10	2							70
	0.50 - 0.59			6	38	25	6	2	1					2	80
	0.60 - 0.69			14	46	21	9							2	92
	0.70 - 0.79			18	37	15	1							2	73
	0.80 - 0.89			31	48	9									88
	0.90 - 0.99			32	27	1								1	61
	1.00 - 1.09			18	9	2									29
	1.10 - 1.19			6	8	2									16
	1.20 - 1.29														
	1.30 - 1.39														
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING				9	10					1				20
	TOTAL			143	383	333	165	102	62	64	56	26	130	24	1488

TABLE 282

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
NOVEMBER 1951 - 1953	0.00 - 0.09				73	296	133	80	63	38	33	25	53	1	795
	0.10 - 0.19			1	56	42	30	9	7					3	148
	0.20 - 0.29			4	43	27	10	4						1	89
	0.30 - 0.39			5	31	38	1								75
	0.40 - 0.49			5	26	25	3	2							61
	0.50 - 0.59	1		12	36	15	3	2							69
	0.60 - 0.69		1	24	34	7	5								71
	0.70 - 0.79			28	35	4	2	3							72
	0.80 - 0.89			16	18	3	5	1							43
	0.90 - 0.99			3	3		1								7
	1.00 - 1.09						1								1
	1.10 - 1.19														
	1.20 - 1.29														
	1.30 - 1.39														
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING				2	3	4								9
	TOTAL	1	1	98	357	460	198	101	70	38	33	25	53	5	1440
DECEMBER 1951 - 1953	0.00 - 0.09				62	410	182	75	40	30	20	11	26	100	956
	0.10 - 0.19				39	69	25	5		3		1	1	7	150
	0.20 - 0.29			4	34	48	11	3			2		1		103
	0.30 - 0.39			4	26	30	6	2		1		1			70
	0.40 - 0.49				19	27	8	4	1						59
	0.50 - 0.59			6	23	20	2	3	2						56
	0.60 - 0.69			5	26	17	7	2							57
	0.70 - 0.79			5	8	11	4	4	1						33
	0.80 - 0.89						3	1							4
	0.90 - 0.99														
	1.00 - 1.09														
	1.10 - 1.19														
	1.20 - 1.29														
	1.30 - 1.39														
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING														
	TOTAL			24	237	632	248	99	44	34	22	13	28	107	1488

TABLE 283

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
JANUARY 1952 - 1954	0.00 - 0.09				138	315	121	62	22	14	11	8	7	230	928
	0.10 - 0.19				54	32	10	3		1			1	38	139
	0.20 - 0.29			2	40	30	8	4		1				30	115
	0.30 - 0.39			7	29	14	5		2					18	75
	0.40 - 0.49			10	31	12	5	2						11	71
	0.50 - 0.59			11	24	5	5							7	52
	0.60 - 0.69			10	19	6	3	2						9	49
	0.70 - 0.79		1	14	12	2	2	2						7	39
	0.80 - 0.89			8		1								3	13
	0.90 - 0.99			1		1									2
	1.00 - 1.09														
	1.10 - 1.19														
	1.20 - 1.29														
	1.30 - 1.39														
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING				4									1	5
	TOTAL		1	63	351	418	159	75	24	16	11	8	8	354	1488
FEBRUARY 1952 - 1954	0.00 - 0.09				61	329	124	47	27	33	22	11	25	19	698
	0.10 - 0.19				51	50	11	9	2		1			1	125
	0.20 - 0.29			3	44	28	12	1	1					3	92
	0.30 - 0.39		2	9	60	25	1							2	99
	0.40 - 0.49			18	32	18	1	3	1					2	75
	0.50 - 0.59			12	25	8	1	2						3	51
	0.60 - 0.69		3	23	23	6	1							2	58
	0.70 - 0.79		2	23	17	4	1	1						3	51
	0.80 - 0.89		4	26	11	3	2							3	49
	0.90 - 0.99		3	23	5	1								2	34
	1.00 - 1.09		9	6	2	6									23
	1.10 - 1.19			1	3	1									5
	1.20 - 1.29														
	1.30 - 1.39														
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING														
	TOTAL		23	144	334	479	154	63	31	33	23	11	25	40	1360

TABLE 284

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
MARCH 1952 - 1954	0.00 - 0.09				62	273	116	53	51	32	17	5	13	56	678
	0.10 - 0.19			1	57	48	11	5	1				1	5	129
	0.20 - 0.29			3	44	40	11	3	1					3	105
	0.30 - 0.39		7	25	35	31	10	3			1			1	113
	0.40 - 0.49			14	32	20	6	1						4	77
	0.50 - 0.59		1	11	33	17	4							3	69
	0.60 - 0.69		1	18	33	28	12	4							96
	0.70 - 0.79		1	11	23	3	4	2						1	45
	0.80 - 0.89		3	8	9	4	1	1							26
	0.90 - 0.99		1	1	4	1									7
	1.00 - 1.09		3	6	2	1	2								14
	1.10 - 1.19	2	16	21	12	4	2							1	58
	1.20 - 1.29		20	12	12	5	3								52
	1.30 - 1.39		4	10		1									15
	1.40 - 1.49														
	1.50 - 1.59														
	1.60 - 1.69														
	MISSING				2	2									4
	TOTAL	2	57	141	360	478	182	72	53	32	18	5	14	74	1488
APRIL 1952 - 1954	0.00 - 0.09		3	2	49	202	63	40	26	24	6	6	30	49	500
	0.10 - 0.19			2	49	48	19	5	4	1	1			8	137
	0.20 - 0.29		2	3	50	29	8	3	4	2	1			7	109
	0.30 - 0.39			19	47	28	3	1	1					8	107
	0.40 - 0.49		2	12	47	17	8	1						8	95
	0.50 - 0.59		3	17	31	13	9	1	2					2	78
	0.60 - 0.69		2	24	29	14	1							6	76
	0.70 - 0.79			17	26	4			2					3	52
	0.80 - 0.89			11	12	11	1		2					3	40
	0.90 - 0.99		1	10	1	1								2	15
	1.00 - 1.09		1	7	4									1	13
	1.10 - 1.19		5	23	18	1								4	51
	1.20 - 1.29	1	10	22	10	1								8	52
	1.30 - 1.39	1	17	23	6	2								6	55
	1.40 - 1.49	3	14	12	2										31
	1.50 - 1.59	1	1												2
	1.60 - 1.69														
	MISSING		1	4	1	7	1							13	27
	TOTAL	6	62	208	382	378	113	51	41	27	8	6	30	128	1440

TABLE 285

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
MAY 1952 - 1954	0.00 - 0.09			2	23	114	79	47	24	27	15	8	24	42	403
	0.10 - 0.19			6	41	48	21	9	2	2		1	2	15	143
	0.20 - 0.29				47	32	13	11					1	4	114
	0.30 - 0.39		1	22	61	31	14	10	3					11	153
	0.40 - 0.49		2	12	46	26	8			1				20	115
	0.50 - 0.59		2	7	47	29	10							11	106
	0.60 - 0.69			21	40	24	5	4						3	97
	0.70 - 0.79		1	10	26	7	1	2	1					6	54
	0.80 - 0.89		1	6	13	7	4							3	34
	0.90 - 0.99			2	2	1									5
	1.00 - 1.09		2	9	5	1									17
	1.10 - 1.19		2	18	21	3	2								46
	1.20 - 1.29		5	25	14	7	1							3	55
	1.30 - 1.39	1	5	35	15	4	1							2	63
	1.40 - 1.49		9	37	8	4								1	59
	1.50 - 1.59		10	6					1					3	20
	1.60 - 1.69			1											1
	MISSING			1	2										3
	TOTAL	1	40	220	411	338	159	83	31	30	15	9	27	124	1488
JUNE 1952 - 1954	0.00 - 0.09			2	5	80	52	44	36	21	17	7	20	8	292
	0.10 - 0.19				16	38	30	29	9	9	3	5	1	3	143
	0.20 - 0.29			1	25	32	10	4		1	1				74
	0.30 - 0.39			9	46	53	25	13	9	3	1			3	162
	0.40 - 0.49			8	50	23	14	6	7	3	2	1		1	115
	0.50 - 0.59			3	40	25	13	2							83
	0.60 - 0.69			4	45	30	13	10	3					1	106
	0.70 - 0.79			3	36	18	12	4	6	1				1	81
	0.80 - 0.89			2	19	7	1	1	1						31
	0.90 - 0.99				5	1									6
	1.00 - 1.09			2	11	4	1								18
	1.10 - 1.19			12	27	7	3	3							52
	1.20 - 1.29			18	46	13	4	3	1						85
	1.30 - 1.39			26	45	13	3	1							88
	1.40 - 1.49		3	30	22	7	5								67
	1.50 - 1.59			6	4	2	1								13
	1.60 - 1.69					1									1
	MISSING				3	12	2	2	1	1			2		23
	TOTAL		3	126	445	366	189	122	73	39	24	13	23	17	1440

TABLE 286

Joint Frequency Distribution of Solar Radiation Intensity on a Horizontal Surface
and Temperature Difference Between 144-Foot and 5.5-Foot Levels
During Period 0400 - 2000 - July 1951 - June 1954

MONTH	LANGLEYS PER MINUTE	TEMPERATURE (°C) AT 144-FOOT LEVEL MINUS TEMPERATURE AT 5-FOOT LEVEL												MISSING	TOTAL
		<-2.0	-1.9--1.5	-1.4--1.0	-0.9--0.5	-0.4--0.0	0.1--0.5	0.6--1.0	1.1--1.5	1.6--2.0	2.1--2.5	2.6--3.0	>3.0		
	0.00 - 0.09		3	4	508	2364	1163	644	467	391	291	175	540	578	7128
	0.10 - 0.19			8	432	498	237	129	67	45	20	14	14	110	1574
	0.20 - 0.29		2	30	419	374	158	64	19	6	7		3	69	1151
	0.30 - 0.39		11	127	519	386	143	66	25	6	3	1		70	1357
	0.40 - 0.49		4	99	414	285	116	38	19	5	2	1		66	1049
	0.50 - 0.59	1	6	101	394	255	80	15	7					43	902
	0.60 - 0.69		9	162	416	257	98	34	7	1				38	1022
	0.70 - 0.79		5	141	315	128	48	24	11	1				31	704
	0.80 - 0.89		9	129	195	93	24	4	3					15	472
	0.90 - 0.99		6	103	108	20	2							5	244
	1.00 - 1.09		16	98	92	28	4	1						3	242
	1.10 - 1.19	2	23	162	198	43	10	5						11	454
	1.20 - 1.29	1	44	165	179	43	13	4	1					22	472
	1.30 - 1.39	2	33	150	129	32	5	1						18	370
	1.40 - 1.49	3	35	109	54	22	5							8	236
	1.50 - 1.59	1	13	14	5	3	1		1					3	41
	1.60 - 1.69			1		1									2
	MISSING		2	8	28	40	11	2	2	2	1		2	18	116
	TOTAL	10	221	1611	4405	4872	2118	1031	629	457	324	191	559	1108	17536

PART III

COMPARISON OF CHICAGO AND ARGONNE DATA

Part III. COMPARISON OF CHICAGO AND ARGONNE DATA

In this section of the report the meteorological measurements made by the Meteorology Group at the Argonne National Laboratory are compared with those made by the U. S. Weather Bureau Airport Station at the Chicago Midway Airport. The meteorological measurements compared are temperature, relative humidity, pressure, wind speed, wind direction and precipitation.

The Chicago Midway Airport is located about nine miles from the shores of Lake Michigan and is in a fairly well-built-up area. Its location may be considered urban. On the other hand, the location of the Argonne Meteorology Laboratory is in an area which is not built-up and may, therefore, be considered as a country-type environment. The differences between these two climatic types, the urban and rural, are brought out in the following tabulations.

(R) Temperature

1. Frequency Distributions of Differences in Hourly Temperature at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 287 through 293: The hourly observations at the Chicago Midway Airport are taken at twenty minutes past the hour, while the Argonne observations represent ten-minute averages centered on the hour. Temperature differences may arise because of this twenty-minute difference in observation time. However, an examination of these tables leaves little doubt that the temperature was usually higher at the Chicago Midway Airport than at the Argonne Meteorology Laboratory.

There are many reasons for this temperature difference. First, the nature of the terrain is different, since the Airport area is surrounded by brick and concrete structures whereas the Argonne site is covered by vegetation. Brick and concrete structures become much warmer during sunny days than a vegetative cover. Second, the pollution of the air around the Airport is much greater. The pall around an urban area cuts down the amount of terrestrial radiation at night, thus keeping the city climate warmer than the surrounding suburban areas. Third, there are innumerable heat sources within the city due to the heating of buildings. It has been estimated that a quantity equal to roughly one-third of the amount of solar radiation is produced by man-made heat sources over a large city. These sources, together with the increased air pollution, tend to keep the temperature in cities higher. Fourth, in the low levels of the atmosphere up to the heights of buildings, there is a marked reduction in ventilation - another factor tending to keep the temperature in the city higher.

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Some of the largest temperature differences, i.e., those exceeding 9°F, have occurred during frontal passages or thunderstorms. A separation of fourteen miles between the two stations is more than ample to account for such large differences. The greatest differences in temperature occurred during the daylight hours in the summer months when thunderstorms were at a maximum. The frequency of these large differences fell off during the colder months of the year.

It is of interest to note in Table 293, the five-year summary of temperature difference data, the temperatures at Argonne were higher on only 2,020 of the 43,824 hourly observations. This represents 4.6% of the observations.

The last column in this group of tables represents the weighted sum of the temperature differences, i.e., the product of the temperature difference times the frequency of occurrence. Of course, this quantity divided by the number of observations is the average hourly temperature difference. An examination of this column indicates that there was a diurnal variation in the temperature difference with the maximum occurring at 0700 or 0800 in the morning and another maximum at 2100. Two minima occurred, one at 1700 and another at 0400. This diurnal temperature difference wave shows up on the monthly charts as well.

A major error in this diurnal temperature wave was produced by the difference in observation times at the two stations - on-the-hour at Argonne and twenty-minutes-past-the-hour at the Chicago Midway Airport. When the error due to the difference in observation time is removed, one finds that a minimum temperature difference occurred in the forenoon and a maximum in the late afternoon. This may be interpreted to mean that the rural area heats up more rapidly than the urban area in the mornings and cools off more rapidly in the late afternoon.

2. Joint Frequency Distribution of Temperature at Argonne
Meteorology Laboratory and Difference in Temperature
at Chicago Midway Airport and Argonne Meteorology
Laboratory

Tables 294 through 300: These tables show the relation between the temperature differences at the two stations and the temperature at Argonne. One feature which stands out both in the monthly tables and the five-year summary is the paucity of entries in the lower left-hand portion of the charts. This means that the chances were quite low for the air at Argonne to be much warmer than the air at the Chicago Midway Airport when the hourly temperature reading at Argonne was below the monthly average temperature.

In Table 300 a calculation of the average hourly temperature difference as a function of the temperature at Argonne shows that this value varied from a maximum of 4.3°F for Argonne temperatures of 85-89°F to a minimum of 2.4°F for temperatures of 50-54°F and back to a high of 4.2°F for temperatures of -10°F to -6°F. The five-year average of the temperature difference values was 2.8°F.

3. Monthly Frequency Distributions of Difference in Daily Maximum and Daily Minimum Temperatures at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 301 and 302: These tables indicate the differences in daily maximum and daily minimum temperatures which occurred in the two places. Both the maximum and minimum temperatures were higher at the Chicago Midway Airport on most of the days. The maximum was higher at Argonne at only 5% and the minimum was higher at only 3½ % of the days.

4. Comparison of Maximum, Average, and Minimum Temperatures

a. Monthly Maximum Temperature

Table 303: The highest temperature which occurred in each month at the two stations is presented in this table. Each of the maxima for the Chicago Midway Airport was higher than those at the Argonne Meteorology Laboratory. The differences ranged from one to eight degrees Fahrenheit. The five-year maximum was 104°F at the Chicago Midway Airport and 97°F at Argonne.

b. Monthly Average of Daily Maximum Temperature

Table 304: The average of the daily maximum temperature at the two stations for each month is presented in this table. The differences of the values at the two stations ranged from 0° to 4°F. Large differences occurred most frequently in the warmer months.

c. Monthly Average Temperature

Table 305: The monthly average temperatures for the two stations are presented in this table. To calculate the average temperature, all of the hourly observations were totaled and the total was divided by the number of observations. Monthly average temperatures differed by 1° to 5°F at the two locations.

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d. Monthly Average of Daily Minimum Temperature

Table 306: The daily average minimum temperature for each month at the two stations is compared. Differences ranged from -1° to 6° F. These differences are of the same order of magnitude as the differences in average daily maximum temperature.

e. Monthly Minimum Temperature

Table 307: The lowest temperatures for each month at the two locations are compared in this table. Differences ranged from 0° to 9° F. These differences are comparable to the differences in monthly maximum temperatures. The lowest temperature in the five years of study was -19° F at Argonne and -15° F at the Chicago Midway Airport.

TABLE 287
Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISSING	TOTAL	SUM OF TEMP. DIFF.
	≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥ 9			
JULY 1949 - 1953																						
HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		

TABLE 288

Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISSING	TOTAL	SUM OF TEMP. DIFF.		
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8				≥ 9	
SEPTEMBER 1949 - 1953	1						1		3	9	11	28	30	23	19	10	6	1	1	1	7	150	0324	
	2								4	8	13	31	30	22	19	9	3	1	1	2	7	150	0313	
	3							3	2	8	15	23	37	22	20	7	5		1		7	150	0295	
	4						1		6	7	12	27	38	26	12	6	8				7	150	0284	
	5					1		1	2	8	12	29	31	27	15	10	2	4	1		7	150	0310	
	6																							
	7							1	2	7	15	24	25	27	19	15	3	2	1	2	7	150	0362	
	8								1	1	4	19	25	22	19	27	19	3		3	7	150	0508	
	9									2	4	9	18	23	27	20	19	8	9	4	7	150	0601	
	10									2	5	11	32	27	29	17	13	5	1		8	150	0476	
										1	6	16	29	40	24	15	4	4	3		8	150	0440	
	11								2	4	10	19	28	33	19	12	12	4			7	150	0402	
	12									4	9	26	34	26	19	13	8	4			7	150	0385	
	13									9	6	14	29	28	25	19	8	2	2	1	7	150	0429	
	14				1			1		1	16	24	19	29	29	10	8	1	3	1	7	150	0393	
	15								1	8	14	15	22	32	25	14	9	3			7	150	0390	
	16																							
	17	1							2	6	8	28	23	25	34	7	8	2			7	150	0372	
	18								6	9	16	25	24	26	22	9	4				7	150	0269	
	19							1	3	2	4	17	23	28	26	15	8	5	1	1	7	150	0405	
	20										5	11	13	27	33	27	15	8	1	1	7	150	0425	
								1		4	9	18	25	23	28	19	10	4	1	1	7	150	0443	
	21						2		2	4	13	18	25	22	23	20	10	1	3		7	150	0401	
	22						1			2	8	10	16	27	25	18	15	13	2	3	7	150	0391	
23			1						4	10	11	16	28	25	19	17	6	2	1	7	150	0367		
24				1				4	4	5	13	25	20	24	21	17	3	3		7	150	0340		
TOTAL		1	2	1	1	1	6	16	45	134	252	491	649	638	538	338	197	62	33	25	170	3600	09325	
OCTOBER 1949 - 1953		CHICAGO MINUS ARGONNE TEMPERATURE °F																				SUM OF TEMP. DIFF.		
	HOUR	≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥ 9	MISSING	TOTAL		
	1						1	1	7	9	19	23	22	23	23	6	9	3	2	2	5	155	0337	
	2						1	1	6	16	18	19	24	17	26	8	4	5	4	1	5	155	0327	
	3					1		3	4	12	21	17	35	19	15	9	4	7	1	1	6	155	0305	
	4				1			4	6	10	21	21	26	23	15	14	1	5	1	1	6	155	0290	
	5							1	6	15	22	22	27	17	16	7	7	6	2	1	6	155	0305	
	6																							
	7							1	5	10	25	20	29	21	14	9	6	7	1	1	6	155	0321	
	8					1		2	2	8	8	16	21	30	21	17	12	4	3	4	6	155	0472	
	9								1	3	4	15	26	37	22	17	16	4	1	2	6	155	0491	
	10					1				4	8	10	27	40	26	15	5	7	4	1	7	155	0476	
					1			2	1	1	7	18	29	30	25	20	12	2			7	155	0437	
	11						1			3	2	13	23	34	27	22	15	9			6	155	0377	
	12				1					4	4	11	22	41	29	24	10	3			6	155	0336	
	13									2	10	11	20	39	29	17	17	4			6	155	0348	
	14							2	6	6	17	20	28	31	20	14	3	2			6	155	0325	
	15							3	1	6	9	10	21	36	29	21	11	2			6	155	0295	
	16																							
	17						4	4	3	12	11	22	32	29	24	8	1				5	155	0269	
	18					1		1	2	9	11	22	27	40	18	5	4		2		4	155	0291	
	19									4	6	9	21	22	30	21	16	11	6	3	4	155	0442	
	20									3	7	13	24	15	27	30	14	11	4	1	4	155	0433	
									2	3	8	17	15	19	23	23	19	10	6	2	4	155	0443	
	21							1	5	5	14	23	20	25	21	14	11	4	3	5	4	155	0441	
22	1					1	1	6	7	13	17	33	19	18	11	10	6	4	3	5	155	0387		
23								5	4	6	16	26	22	22	21	12	7	8	1	5	155	0358		
24								2	7	8	18	24	23	22	17	10	11	5	3	5	155	0351		
TOTAL		1		1	3	3	15	34	103	187	337	481	657	639	500	298	173	91	37	30	130	3720	08857	

TABLE 289

Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISSING	TOTAL	SUM OF TEMP. DIFF.	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8				≥ 9
NOVEMBER 1949 - 1953	1							1	2	5	20	23	32	29	17	8	6	4	3	1		150	0370
	2								7	13	28	24	33	20	8	7	3	4			150	0376	
	3								2	8	13	25	30	31	17	9	9	3	2	1	150	0379	
	4									10	14	20	28	31	19	17	5	2	4		150	0403	
	5							1		9	12	21	38	27	20	12	5	2	2	1	150	0377	
	6								4	2	14	36	26	28	16	10	6	4	1	3		150	0377
	7						2			6	9	21	30	37	20	9	6	4	2	4		150	0422
	8					1	1			2	7	20	31	36	22	17	7	3	2	1		150	0440
	9							1	3	2	9	19	37	40	20	11	5	1	2			150	0390
	10						1		2	5	4	28	39	33	18	12	3	3	1		1	150	0371
	11							1	2	4	16	32	31	34	21	5	2		1		1	150	0314
	12								2	4	18	30	41	30	17	5	1	1			1	150	0300
	13								2	3	15	29	40	37	15	6	1		1		1	150	0317
	14			1					1	1	19	23	46	37	16	4	1				1	150	0306
	15					1			1	3	17	25	40	41	19	2	1					150	0310
	16						1	1	2	5	14	30	45	38	11	3						150	0277
	17								1	4	10	27	35	43	12	11	4					150	0369
	18									6	11	29	33	30	14	10	8	6		3		150	0402
	19						1	1		4	16	31	26	28	14	11	6	5	6	1		150	0396
	20								1	3	21	27	35	21	14	11	5	7	4	1		150	0385
	21								1	1	4	10	34	31	29	12	14	3	6	3	2	150	0394
	22								2		3	16	26	29	28	23	5	11	2	3	2	150	0401
	23									2	4	14	25	31	33	15	10	6	6	3	1	150	0399
	24									2	14	32	34	29	16	5	11	5	1	1		150	0393
TOTAL				1		2	6	10	29	106	326	641	812	783	408	215	119	69	42	26	5	3600	8868
DECEMBER 1949 - 1953	1							1	2	4	13	20	31	47	21	8	5	1	2		1	155	0392
	2								3	2	9	21	38	48	15	10	7				1	155	0382
	3								3	5	8	21	37	42	19	12	4		3		1	155	0394
	4								2	7	10	17	41	39	14	11	4	5	2	2	1	155	0409
	5								3	5	9	18	43	29	22	12	7	1	1	2	3	155	0403
	6									5	7	19	42	42	14	15	4				3	155	0412
	7								2	2	12	15	29	43	29	7	7	4	1		4	155	0425
	8							1		3	4	20	24	52	19	15	7	4	1	1	4	155	0456
	9								2	2	8	21	34	45	20	8	9	2		2	2	155	0424
	10								1	3	11	17	29	48	21	12	6	2	2	2	1	155	0442
	11									3	13	17	33	40	27	12	5	1	2	1	1	155	0431
	12									3	12	24	38	40	25	7	1	1	1	2	1	155	0401
	13								2	3	14	23	34	41	26	8		1	1	1		155	0375
	14								1	4	13	19	42	42	23	4	4	1	1		1	155	0374
	15								1	5	14	23	24	48	31	5	2	1			1	155	0376
	16								2	7	14	21	37	42	26	1	3	1			1	155	0344
	17								2	2	17	20	33	37	26	9	4	2		1	1	155	0395
	18								2	5	12	20	38	39	19	4	11	1	3		1	155	0397
	19								1	4	12	21	38	44	15	10	4	3		2	1	155	0397
	20								1	7	8	18	34	50	22	5	6	1	2		1	155	0399
	21									2	11	20	38	40	19	10	6	4	2	1	1	155	0427
	22								1	6	5	21	33	55	15	11	3	3	1		1	155	0406
	23								2	6	9	20	31	49	15	13	5	3	1		1	155	0403
	24			1					1	5	8	15	32	46	25	9	8	3	1		1	155	0425
	TOTAL				1				2	35	100	253	471	833	1048	508	218	122	45	31	18	35	3720

TABLE 290

Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISSING	TOTAL	SUM OF TEMP. DIFF.	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8				≥ 9
JANUARY 1950 - 1954	1									1	14	15	40	43	17	14	5	4	1		1	155	0427
	2									3	12	17	43	44	17	7	8	2		1	1	155	0407
	3								1	2	12	22	35	42	23	9	4	2	1	1	1	155	0406
	4									2	13	22	39	37	23	12	2	2	1	1	1	155	0405
	5								1	3	9	24	40	41	20	12	2	1		1	1	155	0390
	6								1	1	9	22	43	39	20	9	5	4	1		1	155	0413
	7									2	7	18	35	53	22	8	4	4	1		1	155	0433
	8										4	12	39	47	33	10	4	3	1	1	1	155	0478
	9				1					1	5	12	26	63	23	12	5	4	1	1	1	155	0474
	10									2	5	10	34	40	42	10	8	3		1		155	0493
	11							1		1	3	20	30	52	30	6	7	3		2		155	0464
	12								1	2	4	16	52	45	22	5	1	2	4	1		155	0427
	13									1	10	16	43	49	23	8	3	2				155	0412
	14									2	9	18	37	47	24	14	2			1	1	155	0419
	15									1	14	14	35	49	30	8	2	1			1	155	0409
	16									6	7	19	47	47	19	6	3				1	155	0372
	17									4	6	19	42	44	29	7	3				1	155	0400
	18	1							1	3	5	13	36	54	22	9	10				1	155	0423
	19								2		7	14	43	45	26	10	7				1	155	0427
	20								1	1	7	20	29	46	33	6	5	5	1		1	155	0448
	21								1	2	6	20	33	45	29	8	6	4			1	155	0437
	22							1	1		9	22	34	39	29	10	7		2		1	155	0426
	23			1					1		7	23	36	49	17	13	5	2			1	155	0409
	24							1			10	21	34	48	19	9	10	2			1	155	0425
TOTAL		1	1		1			3	11	40	194	429	905	1108	592	222	118	50	14	11	20	3720	10224
FEBRUARY 1950 - 1954	1									1	2	19	41	34	21	11	2	7		1	2	141	0411
	2									4	19	38	37	24	10	3	2	2			2	141	0400
	3								1		8	20	32	42	24	4	5	3			2	141	0375
	4									2	10	20	24	44	18	9	7	3	2		2	141	0394
	5								1	1	8	19	41	24	20	16	5	4			2	141	0388
	6								1	1	8	24	32	33	20	11	6	2	1		2	141	0377
	7									2	7	13	41	33	13	17	8	4		1	2	141	0414
	8								1		6	16	39	41	19	6	7	1	2	1	2	141	0397
	9								1	2	3	13	43	37	22	11	2		4	1	2	141	0405
	10									1	7	19	39	37	18	9	6	1		2	2	141	0388
	11									1	11	21	35	39	13	11	3	2	1	1	3	141	0364
	12									2	10	24	35	36	17	10	2	2	1		2	141	0352
	13						1		1	3	11	20	40	28	20	11	2	2			2	141	0336
	14						1			5	9	22	31	38	18	14		1			2	141	0338
	15				1				1	3	9	14	46	44	7	12	1	1			2	141	0328
	16								4	2	3	25	43	37	17	5		1			3	141	0305
	17			1					1	1	7	18	49	41	14	4	2				3	141	0317
	18										3	14	30	44	27	13	5				3	141	0398
	19				1	1					5	16	33	42	19	14	7	2	1		2	141	0418
	20										6	15	29	44	24	13	6		1	1	2	141	0419
	21									1	3	15	30	42	30	10	7		1		2	141	0420
	22										4	17	36	35	24	17	3	3			2	141	0414
	23									1	3	14	34	36	23	18	7		2	1	2	141	0438
	24									2		15	34	40	21	13	8	4		2	2	141	0444
TOTAL				2	2	1	2		12	31	147	432	875	908	473	269	104	45	18	11	52	3384	09240

TABLE 291

Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																	MISSING	TOTAL	SUM OF TEMP. DIFF.					
		≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7				8	≥9			
MARCH 1950 - 1954	1									1	9	18	31	37	30	17	10			1		1	155	0463		
	2									10	17	37	39	29	11	8				1		1	155	0448		
	3									2	4	17	42	40	24	19	1	3	2			1	155	0453		
	4									2	7	23	32	38	33	11	4	2	1	1		1	155	0441		
	5									2	6	24	35	37	27	14	8	1	1				155	0444		
	6										6	18	42	33	25	19	9		2	1			155	0475		
	7									1	21	26	50	25	16	11	3	1	1				155	0507		
	8									1	15	31	45	37	11	8		3	2				155	0520		
	9									3	19	42	43	24	14	6	2	2			1		1	155	0454	
	10									3	4	16	40	47	23	16	4	1				1		155	0437	
	11							1		3	9	18	35	46	20	18	4	1						155	0421	
	12							1		7	8	24	42	33	28	8	2	1				1			155	0368
	13							1	3	4	9	15	38	38	32	10	2	1	1			1			155	0397
	14						1	2	6	1	10	18	38	44	20	10	3	1				1			155	0358
	15			1		1		2	2	7	9	14	48	32	27	6	2	2				2			155	0341
	16				2				4	4	9	27	33	50	19	4	1				2			155	0321	
	17			1				1	2	4	11	23	40	50	14	4	3				2			155	0326	
	18							1	2	6	17	40	42	28	8	6			1		2			155	0410	
	19							1		6	16	40	37	29	13	7	3	1			2			155	0455	
	20								1	4	19	38	39	19	20	8	6				1			155	0475	
	21				1				1	1	4	13	39	42	19	15	12	7			1			155	0480	
	22					1				2	22	32	47	20	11	12	6			1			1	155	0481	
	23								1	6	13	34	42	22	23	6	5	1	1		1			155	0497	
	24									1	2	17	36	37	30	19	8	3	1		1			155	0491	
TOTAL				2	3	2	3	11	19	47	143	444	891	988	604	317	145	53	16	8	24	3720	10463			
APRIL 1950 - 1954	1								1	1	10	18	37	25	23	13	8	3	1	1	9	150	0407			
	2								4	8	22	29	35	23	6	6	7	1			9	150	0396			
	3							1	1	3	8	16	30	39	21	13	7	1	1		9	150	0391			
	4									2	6	18	45	28	17	16	7	1		1	9	150	0396			
	5									2	5	21	43	31	18	13	5	3			9	150	0386			
	6									1	6	17	45	31	18	16	2	4	1		9	150	0399			
	7								1	1	6	14	31	36	29	12	6	3	2		9	150	0430			
	8									1	4	12	33	37	19	21	8	1	3	2	9	150	0466			
	9									2	8	16	38	32	29	8	2	4	1		9	150	0386			
	10			1			1			3	9	21	32	38	19	9	6	2			9	150	0356			
	11							1	2	3	12	24	37	29	22	8	2	1			9	150	0322			
	12							3	2	8	14	27	34	23	16	9	3	1		10	150	0277				
	13					1	1	1	3	9	15	27	38	20	14	6	6			9	150	0258				
	14	1			1		1	2	5	10	17	27	24	20	22	10		1		9	150	0234				
	15		1			2	1	5	6	9	13	27	27	27	16	5	1			10	150	0199				
	16					3	1	5	8	10	15	21	28	27	14	5	3			10	150	0197				
	17		2		2	2	2	3	5	10	8	25	47	26	6	2				10	150	0141				
	18	1		2			1	2	4	4	7	9	27	34	30	14	3	1		10	150	0205				
	19						1		2	3	9	6	25	36	28	17	8	2	2	10	150	0285				
	20							1	1	1	2	5	9	16	33	35	20	10	7	2	10	150	0361			
	21								1	1	1	12	19	39	25	22	9	5	4	1	1	150	0374			
	22								1	3	2	20	38	30	27	11	4	4		10	150	0395				
	23									1	1	5	23	29	31	19	17	7	2	5	1	150	0437			
	24									1	1	11	11	39	32	23	11	4	7	1	9	150	0410			
	TOTAL		4	3	3	3	8	11	30	46	106	218	494	846	715	468	241	102	53	18	6	225	3600	08108		

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TABLE 292

Frequency Distributions of Differences in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISSING	TOTAL	SUM OF TEMP. DIFF.	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8				≥ 9
MAY 1950 - 1954	1		1						3	3	8	13	35	27	25	24	11	3		2		155	0472
	2								1	6	6	17	34	31	35	17	5	1	2			155	0448
	3									1	9	24	37	38	25	13	4	4				155	0428
	4								1	2	13	27	38	23	31	11	6	2	1			155	0405
	5									2	5	21	29	38	25	21	11	2	1			155	0484
	6									5	8	11	27	21	34	28	14	4	3			155	0535
	7									2	4	16	23	22	25	29	19	8	6	1		155	0598
	8									2	9	16	25	27	32	21	12	4	1	1		155	0482
	9					1		1	3	4	9	19	29	29	27	24	3	5	2			155	0446
	10						1	2	5	5	10	16	32	28	27	14	11	3	1			155	0412
	11	1				2	2	1	6	5	5	24	21	31	28	16	8	4		1		155	0387
	12				2		3	4	5	8	8	24	22	23	30	16	6	1	2	1		155	0358
	13	1						3	4	7	3	16	16	21	36	16	17	10	4	1		155	0358
	14	1				3	2		3	3	12	17	31	18	25	15	7	2	4			155	0327
	15			1		4			3	7	14	11	15	26	29	17	16	8	3		1	155	0317
	16			1					5	8	11	16	21	26	24	17	19	4	2			155	0291
	17		2	2		1		3	8	6	12	15	16	28	25	20	16	2				155	0232
	18				1			4	2	6	7	19	26	21	22	32	8	4		1		155	0265
	19	1							7	6	9	9	25	29	34	22	7	4	2			155	0293
	20			1				1	2	4	7	10	13	27	36	25	11	11	5	1	1	155	0418
	21			1						1	7	7	15	23	38	26	19	11	5	1	1	155	0475
	22									3	6	23	29	27	31	19	11	2	2	2		155	0494
	23					1			2	1	4	19	30	32	28	20	11	3	2	2		155	0498
	24									2	5	18	27	35	29	18	13	5	2	1		155	0520
TOTAL		6	6	2	6	12	18	42	77	133	224	452	670	694	632	419	206	74	32	15		3720	09943
JUNE 1950 - 1954		CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISSING	TOTAL	SUM OF TEMP. DIFF.	
	≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥ 9				
	1				1				2	2	11	25	24	35	21	11	8	7	1	1	1	150	0419
	2								5	5	11	19	35	31	21	12	6	3		1	1	150	0377
	3								4	5	8	27	36	30	16	14	4	4	1		1	150	0370
	4				1			1	5	2	12	19	32	29	24	9	12	2	1		1	150	0384
	5								2	2	13	16	25	32	28	11	16	3	1		1	150	0448
	6									3	9	9	25	20	23	34	14	10	2			150	0548
	7									6	9	20	21	23	16	25	19	5	5	1	1	150	0652
	8									2	2	10	17	31	36	24	16	9	2	1		150	0583
	9					1		1	3	2	12	12	26	37	26	18	8	3			1	150	0570
	10							1	3	7	6	15	19	38	29	18	10	3			1	150	0586
	11					1	1		1	4	5	8	16	25	29	31	21	7			1	150	0546
	12							2	4	13	13	13	24	38	26	10	6				1	150	0485
	13				1	1	1		2	4	8	13	20	20	25	26	17	5	5	1	1	150	0506
	14					1		3	1	4	11	14	24	18	20	26	17	8	3			150	0488
	15						1	3	3	5	7	22	21	15	21	22	12	11	4	3		150	0489
	16						1	3	3	10	8	14	19	18	31	21	11	4	7			150	0456
	17						1	1	3	5	12	18	17	28	20	18	16	8	3			150	0464
	18	1				1		1	1	4	10	24	21	21	20	19	13	9	3	2		150	0459
	19							3	4	7	15	21	26	21	19	12	9	6	4	2	1	150	0394
	20							1		6	14	15	22	30	22	19	10	4	4	2	1	150	0464
	21								2	4	5	15	23	28	23	27	13	3	3	3	1	150	0517
	22						1	1		3	9	17	23	27	14	25	15	4	6	4	1	150	0520
	23	1								3	6	23	24	22	22	25	12	4	4	3	1	150	0497
24							1	1	6	8	13	29	24	27	20	11	5	3	1	1	150	0474	
TOTAL		2			3	5	6	21	40	96	212	382	539	595	598	503	324	159	68	29	18	3600	11696

TABLE 293

Frequency Distributions of Difference in Hourly Temperature at
Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

HOUR	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISS- ING	TOTAL	SUM OF TEMP. DIFF.
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9			
1		1		1		2	1	22	41	138	246	393	380	270	156	85	40	14	9	27	1826	4905
2						1	3	22	60	123	254	398	410	281	128	67	32	15	5	27	1826	4719
3					1		7	20	55	121	263	446	409	245	124	58	33	12	4	28	1826	4572
4				2		1	5	23	56	141	276	431	370	242	138	67	27	9	10	28	1826	4530
5	1				1		4	17	55	126	266	428	370	253	152	77	31	11	5	29	1826	4703
6							2	17	39	124	242	414	360	252	193	86	41	17	10	29	1826	5088
7					1	2	2	7	24	71	182	328	403	281	204	155	77	34	25	30	1826	6128
8				1	1	2	2	6	20	53	170	330	435	323	207	133	59	33	22	29	1826	6091
9				1	2	1	2	10	32	64	175	361	446	317	194	92	65	22	10	32	1826	5672
10			1	1		3	7	9	29	84	194	359	421	316	197	104	46	16	7	30	1826	5486
11	1				3	5	7	18	37	111	231	347	418	290	180	103	34	6	7	28	1826	5070
12			1	3	2	4	12	18	50	125	261	404	368	291	147	63	31	10	6	30	1826	4647
13	2		1	3	4	7	6	26	61	129	231	379	378	259	172	90	28	15	6	29	1826	4704
14	5		2	6	3	9	15	26	55	152	228	359	373	273	165	73	32	17	4	29	1826	4506
15		1	2	1	10	6	15	32	79	135	220	370	391	275	140	71	32	10	6	30	1826	4433
16	2	1	1	2	5	12	21	40	86	127	258	375	382	269	116	69	20	8	2	30	1826	4093
17	3	4	6	4	4	10	19	33	74	142	244	389	418	227	121	62	21	12	4	29	1826	4047
18	5	2	1	1	3	10	14	29	54	112	245	342	392	268	151	102	39	17	10	29	1826	4749
19	1				1	5	16	23	57	120	231	367	399	270	151	84	39	21	12	29	1826	4868
20		1		1		1	9	13	45	118	204	337	409	295	178	97	53	23	14	28	1826	5332
21		1		1		2	3	15	32	97	226	340	401	286	191	111	57	22	14	27	1826	5489
22	1	1			1	3	7	11	36	95	225	360	402	288	176	114	37	27	14	28	1826	5360
23	1	2			1		5	17	38	93	224	358	419	255	209	96	43	24	14	27	1826	5341
24			2				8	15	33	103	223	370	411	275	171	108	55	16	9	27	1826	5294
TOTAL	22	14	17	28	43	86	192	469	1148	2704	5519	8985	9565	6601	3961	2167	974	411	229	689	43824	119827

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TABLE 294

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISS- ING	TOTAL		
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			≥ 9	
JULY 1949 - 1953	95 - 99		1			1				2				1		3	1					9	
	90 - 94			1	1						3	6	5	3	1	4	6	1				31	
	85 - 89	1			2		2	5	3	9	8	8	15	28	48	34	28	14	6	4		215	
	80 - 84	1				1	4	3	4	14	15	31	53	81	101	80	56	29	10	7		490	
	75 - 79				1	3	5	2	7	26	41	84	101	129	115	94	54	25	9	4		700	
	70 - 74	1					1	5	11	19	57	107	200	171	133	73	34	22	8	8		850	
	65 - 69								1	11	42	92	127	145	109	69	41	16	8	1		662	
	60 - 64						1		3	4	38	56	98	94	79	57	38	11	7	2		488	
	55 - 59									1	7	15	38	42	38	27	21	14	3	2		208	
	50 - 54									2	2	7	7	6	6	10	3	7	3	2		55	
	45 - 49															2	1					3	
	MISSING																				9		9
	TOTAL	3	1	1	4	5	13	15	29	88	213	406	644	700	630	453	283	139	54	30	9	3720	
AUGUST 1949 - 1953	90 - 94			1			2			1	1		2	4	5	11	19					46	
	85 - 89	1			1			1	2	3	8	14	9	11	18	17	19	9	5			118	
	80 - 84	1	1	1	1	1	2	3	2	6	24	24	30	32	52	51	30	24	3	1		289	
	75 - 79	1		1		3	1	3	5	15	21	39	76	92	98	77	39	26	6	4		507	
	70 - 74						1	1	6	21	38	86	164	198	138	80	43	19	11	2		808	
	65 - 69	1							4	13	51	118	161	192	118	82	44	17	10	5		816	
	60 - 64								3	11	29	71	140	124	127	73	36	13	4	3		634	
	55 - 59								1	8	8	35	57	68	67	52	27	20	4	4		351	
	50 - 54									2	4	5	21	25	23	24	16	4	5	1		130	
	45 - 49										1	4	4	3	4	1	1	2				20	
	MISSING																				1		1
		TOTAL	4	1	3	2	4	6	8	23	80	185	396	664	749	650	468	274	134	48	20	1	3720

TABLE 295

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISS- ING	TOTAL
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥ 9		
SEPTEMBER 1949 - 1953	95 - 99														4	2	1					7
	90 - 94													3	6	4	6					19
	85 - 89									1	1		2	5	9	9	10	4	4			45
	80 - 84										1	1	4	12	16	13	7	4	3	3		64
	75 - 79								1	4	9	16	19	33	42	17	21	5	3	1		171
	70 - 74							3	2	17	33	43	51	63	45	45	19	11	3	3		338
	65 - 69	1			1			3	13	28	58	84	92	104	85	40	13	4	2	1		529
	60 - 64						2	3	7	26	49	166	206	139	113	56	23	9	2	2		803
	55 - 59						1	3	3	25	37	71	118	118	69	45	34	8	3	1		533
	50 - 54		2	1		1	2	5	9	16	33	62	88	85	66	51	31	7	5	6		470
	45 - 49						1	2	4	12	20	26	48	43	55	26	21	9	3	4		274
	40 - 44								6	5	9	16	14	20	21	22	8	1	5	4		131
	35 - 39										2	6	7	13	6	8	3					45
	30 - 34														1							1
	MISSING																				170	170
	TOTAL	1	2	1	1	1	6	16	45	134	252	491	649	638	538	338	197	62	33	25	170	3600
OCTOBER 1949 - 1953	85 - 89													1	2	1						4
	80 - 84									1		2	11	13	11	11	5					54
	75 - 79						1		4	6	5	3	13	15	27	16	9					99
	70 - 74					1	3	1	4	8	9	17	24	37	21	18	12	2	1			158
	65 - 69	1		1	1		5	6	15	34	52	51	45	50	26	26	3	5	1			322
	60 - 64				1		2	4	36	38	60	60	66	57	23	15	12	3	1			378
	55 - 59						1	11	10	35	58	83	75	64	56	16	10	6	1	1		427
	50 - 54					1	2	4	16	22	60	102	133	135	93	57	24	14	3	1		667
	45 - 49			1	1		6	7	21	41	77	136	108	94	48	28	12	3	7			591
	40 - 44							2	6	11	19	48	77	73	67	38	30	12	9	5		397
	35 - 39							3	9	23	24	53	49	43	24	19	14	7	7			275
	30 - 34							2	2	10	14	24	29	27	16	8	13	4	4			153
	25 - 29												8	8	9	7	7	4	2			45
	20 - 24													2	3	5	3	3	1			17
	15 - 19															1			2			3
	MISSING																				130	130
	TOTAL	1		1	3	3	15	34	103	187	337	481	657	639	500	298	173	91	37	30	130	3720

TABLE 296

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISS- ING	TOTAL	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			≥ 9
NOVEMBER 1949 - 1953	75 - 79												2	2	1							5
	70 - 74											4	2	1								14
	65 - 69										7	15	24	11	5	1	2	1				66
	60 - 64					1			1	1	13	26	21	19	5	4	1	1	2			95
	55 - 59						2	1		12	19	40	49	46	8	4	2					183
	50 - 54							2	2	6	18	49	64	26	23	8	3					201
	45 - 49			1			2		3	9	36	69	86	62	34	14	4	7				327
	40 - 44							1	6	21	38	74	110	110	48	28	16	6	2	2		462
	35 - 39					1	1	3	7	14	43	79	90	126	71	32	17	17	7	3		511
	30 - 34						1	2	6	28	79	117	129	109	75	31	22	12	17	8		636
	25 - 29							1	2	10	56	115	112	144	62	31	17	10	4	7		571
	20 - 24								1	1	7	29	59	65	38	23	11	8	6	3		251
	15 - 19									2	2	13	34	37	22	21	12	4	4	1		152
	10 - 14										2	2	19	15	9	10	9	3		2		69
	5 - 9										1	2	2	2	4							14
	0 - 4								1	2	6	7	4	1	2	1						24
	-5 - -1										1	4	4	4		1						14
MISSING																			5		5	
	TOTAL			1		2	6	10	29	106	326	641	812	783	408	215	119	69	42	26	5	3600
DECEMBER 1949 - 1953	60 - 64											2		2	1							5
	55 - 59									2	4	10	21	5								42
	50 - 54									2	5	10	31	7	5	2	1					63
	45 - 49								3	1	11	19	35	37	20					1		129
	40 - 44			1					2	12	23	48	40	67	32	11	3	1				240
	35 - 39								1	3	37	83	84	108	51	19	11	3	1			401
	30 - 34								4	22	45	77	162	311	110	29	8	4	1	1		774
	25 - 29							1	7	13	43	58	88	146	84	26	15		2			493
	20 - 24							1	6	19	24	45	141	147	55	30	15	7	5	4		499
	15 - 19								5	7	38	55	95	85	43	23	13	6	3	1		374
	10 - 14								4	9	16	25	53	56	37	29	10	7	2	2		250
	5 - 9									3	2	9	33	30	32	16	19	7	5	2		158
	0 - 4									3	2	8	19	22	22	18	20	7	7	5		133
	-5 - -1								2	4		3	27	13	13	11	5	2	3	1		89
	-10 - -6								1		3	3	3	2	2	1		1	2	1		19
	-15 - -11											1	1	10	1	1	2					16
	MISSING																			35		35
	TOTAL			1				2	35	100	253	471	833	1048	508	218	122	45	31	18	35	3720

TABLE 297

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISS- ING	TOTAL	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			≥ 9
JANUARY 1950 - 1954	65 - 69										1											1
	60 - 64	1									1	3	4	3	1							13
	55 - 59		1									1	6	2			1					11
	50 - 54									1	9	12	19	7	2		1					51
	45 - 49							1	1	4	8	26	26	8	5	1		1				81
	40 - 44				1				1	2	17	15	29	33	16	7	1		1			123
	35 - 39							2	6	10	31	67	98	91	42	8	5	2	1	1		364
	30 - 34								3	12	25	91	227	271	123	26	9					787
	25 - 29									4	26	48	152	221	122	30	16	6	2	1		628
	20 - 24									5	18	49	122	180	93	18	18	7	2	3		515
	15 - 19									1	22	28	85	126	85	49	26	16	4			442
	10 - 14										17	27	45	69	45	42	19	6	1	2		273
	5 - 9									1	12	26	41	38	29	29	9	5		2		192
	0 - 4										2	18	26	38	20	10	9	6	1	1		131
	-5 - -1										3	12	12	15	4		4	1	2	1		54
	-10 - -6										2	6	7	3	2	2						22
	-15 - -11												4	1	2							7
-20 - -16												2	2	1							5	
MISSING																				20	20	
	TOTAL	1	1		1			3	11	40	194	429	905	1108	592	222	118	50	14	11	20	3720
FEBRUARY 1950 - 1954	65 - 69												2									2
	60 - 64												2	4								6
	55 - 59											6	12	8	2	1						29
	50 - 54					1				1	1	4	3	11	13	6	3					43
	45 - 49			1						1	1	4	11	26	28	10	7	1	1			91
	40 - 44			1	2		1			1	1	16	21	60	71	31	22	6		1		234
	35 - 39									3	7	18	68	132	123	54	13	12	3			433
	30 - 34									2	2	29	143	262	302	142	53	14	5	2		956
	25 - 29										3	14	95	163	146	84	48	16	4	4	1	578
	20 - 24								1	2	14	32	92	94	69	54	17	13	6	1		395
	15 - 19						1			3	6	8	32	60	33	39	24	5	2	3		216
	10 - 14										5	10	22	21	20	16	8	4	1			107
	5 - 9									1	8	12	7	14	14	7	3	2		1		83
	0 - 4									1	1	15	11	28	12	5	4	2	1	1		81
	-5 - -1									1	1	6	9	11	6	3	2	1	4	2	4	50
	-10 - -6										1	4	7	2	1			3				18
	-15 - -11												2	4								7
-20 - -16												2	1								3	
MISSING																				52	52	
	TOTAL			2	2	1	2		12	31	147	432	875	908	473	269	104	45	18	11	52	3384

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TABLE 298

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISS- ING	TOTAL	
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			≥ 9
MARCH 1950 - 1954	70 - 74										1	2	1	1								5
	65 - 69												3	2								5
	60 - 64				2				1		3	1	6	5	2		1					21
	55 - 59			1				2	3	1	4	14	21	16	11	4						77
	50 - 54			1	1	1		1	3	2	4	19	41	37	21	14	1		1			147
	45 - 49					1			5	6	5	14	29	52	52	41	17	8	2			232
	40 - 44								5	13	24	46	78	88	59	24	7	2	1			347
	35 - 39						1	2	1	11	28	79	165	184	81	40	21	6	2	1		622
	30 - 34								1	8	38	104	203	270	147	59	23	5	2			860
	25 - 29								1	8	17	71	134	167	108	60	25	4	2	2		599
	20 - 24										6	42	94	82	70	53	31	15	2	1		396
	15 - 19										3	20	70	52	35	25	13	6	1	2		227
	10 - 14										2	15	14	15	11	15	9	8	1			90
	5 - 9											2	3	14	12	5	4	5	3			48
	0 - 4											1	6	1	3	1	2		1	2		17
-5 - -1												2	1								3	
MISSING																				24	24	
	TOTAL			2	3	2	3	11	19	47	143	444	891	988	604	317	145	53	16	8	24	3720
APRIL 1950 - 1954	80 - 84								1	1	2	1	2	4	3							14
	75 - 79	1		1	1		1	4	4	3	3	7	12	6	9	6	1					59
	70 - 74	3	1		1			1	3	2		17	22	26	24	8		1				109
	65 - 69					1	1	1	4	8	5	19	28	23	23	10	3		1			127
	60 - 64		1		1	2	1	2	4	10	9	33	47	33	25	19	4		1	1		193
	55 - 59		1				1	4	3	11	13	24	73	61	33	13	6	3				247
	50 - 54			1			4	8	14	21	52	67	87	67	51	24	10	6	1			415
	45 - 49					3	3	5	7	33	37	71	127	108	57	34	12	4	5			506
	40 - 44							5	5	7	46	94	151	138	61	30	13	5	1			556
	35 - 39								1	5	20	82	182	126	80	30	24	13	2	2		567
	30 - 34									5	30	68	98	94	60	42	18	11	5	3		434
	25 - 29										1	11	16	19	28	17	7	8	2			109
	20 - 24												1	5	14	7	1	1				29
	15 - 19													5		1	3	1				10
	MISSING																				225	225
	TOTAL	4	3	3	3	8	11	30	46	106	218	494	846	715	468	241	102	53	18	6	225	3600

TABLE 299

Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
and Difference in Temperature at Chicago Midway Airport and
Argonne Meteorology Laboratory

MONTH	ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISS- ING	TOTAL
		≤ -9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥ 9		
MAY 1950 - 1954	85 - 89				1		1					1	3	3	8	10	3	1				31
	80 - 84							1	2		3	2	6	20	22	16	8	2				82
	75 - 79		2			2			1	5	3	8	18	50	37	33	7	6	5	1		178
	70 - 74	5	2		2	2	4	3	7	6	6	25	39	45	57	44	24	8	1	2		282
	65 - 69	1	1	1	1	5	5	7	8	15	27	59	61	64	61	54	28	10	5	1		414
	60 - 64			1	2	1	4	12	18	29	32	67	78	97	84	47	27	12	3	2		516
	55 - 59		1			2	3	12	18	34	57	92	117	96	87	40	14	6	1	1		581
	50 - 54						1	5	15	24	59	105	134	104	61	55	23	8	5	1		600
	45 - 49							2	8	19	31	68	129	108	111	46	24	6	6			558
	40 - 44									1	5	17	47	62	59	38	27	5	3			264
	35 - 39										1	8	38	40	35	29	19	10	1	5		186
	30 - 34														4	8				2		25
	25 - 29													1	2	7	2		2	2		3
	TOTAL	6	6	2	6	12	18	42	77	133	224	452	670	694	632	419	206	74	32	15		3720
JUNE 1950 - 1954	95 - 99															1	1	1	2			5
	90 - 94							1					2		4	14	9	9	4			43
	85 - 89					1	1			1	2	4	2	18	28	47	40	21	13	4		182
	80 - 84	1				1			1	5	10	14	27	37	88	70	54	22	10			340
	75 - 79				1	1	4	7	4	13	21	33	43	66	101	86	46	16	3	2		447
	70 - 74				1	1		6	16	22	53	84	110	112	106	84	47	26	11	10		689
	65 - 69				1	1		4	12	18	50	85	100	126	74	68	42	24	7	6		618
	60 - 64						1	2	2	17	35	69	107	99	90	59	34	24	9	4		552
	55 - 59	1						1	3	14	29	41	78	78	49	33	27	11	4			369
	50 - 54								1	6	11	44	54	38	36	23	15		5	3		238
	45 - 49								1		1	8	16	20	20	10	5	2				83
	40 - 44													1	2	6	4	1				14
	35 - 39															2						2
	MISSING																				18	18
	TOTAL	2			3	5	6	21	40	96	212	382	539	595	598	503	324	159	68	29	18	3600

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TABLE 300
 Joint Frequency Distribution of Temperature at Argonne Meteorology Laboratory
 and Difference in Temperature at Chicago Midway Airport
 and Argonne Meteorology Laboratory
 July 1949 - June 1954

ARGONNE TEMP. °F	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISSING	TOTAL
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9		
4		1			1				2				1	4	6	3	1	2		21	
5			2	1		2	1		1	4	6	9	10	16	33	40	10	4		139	
6	2			4	1	4	6	5	14	19	27	31	66	113	118	100	49	28	8	595	
7	3	1	1	1	3	6	7	10	27	55	75	133	199	293	241	160	81	26	11	1333	
8	2	2	2	3	9	12	16	26	72	103	190	282	393	431	330	177	78	26	12	2166	
9	9	3		4	4	9	20	49	95	196	380	619	657	527	353	179	89	35	25	3253	
10	4	1	2	4	7	11	21	57	127	293	523	640	718	503	350	176	77	34	14	3562	
11	1	1	1	6	4	11	23	75	136	269	554	775	676	550	330	176	73	29	14	3704	
12	1	3	2		2	10	32	39	142	236	432	665	604	420	235	142	68	16	9	3058	
13		2	3	1	6	9	25	61	105	261	485	690	550	393	271	128	48	28	14	3080	
14			2	1	5	7	21	41	105	204	408	685	577	451	208	105	46	17	12	2895	
15			2	3		1	8	32	73	197	379	606	663	396	226	115	33	23	11	2768	
16					1	2	7	22	59	203	496	849	860	463	205	131	68	21	19	3406	
17						1	2	18	79	256	614	1105	1390	693	263	104	50	33	18	4626	
18							2	10	38	157	408	665	852	498	221	103	39	20	13	3026	
19							1	8	27	69	197	509	573	341	188	98	54	24	13	2102	
20					1			5	13	71	124	316	365	218	158	92	38	14	9	1424	
21								4	9	40	79	153	176	122	112	55	28	5	6	789	
22								1	12	27	46	91	98	89	61	38	19	8	5	495	
23								2	6	25	45	83	74	52	34	33	14	9	9	386	
24								3	5	10	33	56	39	20	14	10	7	7	6	210	
25								1	1	9	16	12	6	4	3		4	2	1	59	
26											2	7	15	3	1	2				30	
27												4	3	1						8	
MISSING																				689	689
TOTAL	22	14	17	28	43	86	192	469	1148	2704	5519	8985	9565	6601	3961	2167	974	411	229	689	43824

TABLE 301

Monthly Frequency Distributions of Difference in Daily Maximum Temperature
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

TEMP. DIFF. (°F) CHICAGO MINUS ARGONNE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
9										1			1
8	2	1		1		1		1			1	1	8
7	10	4	3	2	1	2	1		2		3	11	39
6	14	12	7	1	2	2	3	2	4	1	6	16	70
5	24	20	17	14	5	4	6	7	9	7	13	27	153
4	34	28	21	20	17	28	25	20	20	13	28	30	284
3	24	33	29	21	30	38	41	37	41	30	23	20	367
2	23	28	31	35	41	32	43	41	42	32	24	21	393
1	13	18	26	24	34	27	24	19	16	22	22	17	262
0	5	6	5	18	15	14	10	6	9	10	22	4	124
-1	3	2	2	8	4	5		3	5	11	7	3	53
-2	2	2	1	3					3	6	4		21
-3	1			2				1	1	5	1		11
-4		1						1		1			3
-6											1		1
MISSING			8	6	1	2	2	3	3	11			36
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

TABLE 302

Monthly Frequency Distributions of Difference in Daily Minimum Temperature
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

TEMP. DIFF. (°F) CHICAGO MINUS ARGONNE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
11					1								1
10					1				1		1		3
9	1		2	2	1			1				1	8
8	3	3	2	3	2	3	3	1	1		3	3	27
7	9	7	8	7	5	6	8	4	4	6	2	2	68
6	8	14	4	13	6	4	5	8	11	10	15	10	108
5	16	14	18	13	11	13	21	17	17	12	23	21	196
4	15	30	19	12	24	24	24	27	22	16	13	21	247
3	39	27	33	27	23	32	30	31	34	28	35	32	371
2	29	33	21	21	31	29	28	25	38	33	33	20	341
1	19	16	20	19	23	23	21	21	21	16	18	16	233
0	10	8	9	16	14	12	10	1	3	12	10	16	121
-1	5	1	4	10	8	3	1	2		3	2	4	43
-2	1		1	6		2	1			2		2	15
-3			1				1					1	3
-4		1											1
-5										1			1
MISSING		1	8	6		4	2	3	3	11		1	39
TOTAL	155	155	150	155	150	155	155	141	155	150	155	150	1826

TABLE 303
Monthly Maximum Temperatures (°F) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO TEMP.	102	95	85	87	71	61	67	42	64	76	93	92
	ARGONNE TEMP.	97	91	M	M	70	60	65	39	62	M	87	86
	DIFFERENCE	5	4	M	M	1	1	2	3	2	M	6	6
JULY 1950 - JUNE 1951	CHICAGO TEMP.	93	93	85	87	81	50	53	56	69	84	91	92
	ARGONNE TEMP.	89	87	81	84	77	48	51	M	65	81	86	87
	DIFFERENCE	4	6	4	3	4	2	2	M	4	3	5	5
JULY 1951 - JUNE 1952	CHICAGO TEMP.	91	92	90	90	64	65	58	52	64	84	92	101
	ARGONNE TEMP.	88	89	88	86	61	62	54	50	61	83	90	95
	DIFFERENCE	3	3	2	4	3	3	4	2	3	1	2	6
JULY 1952 - JUNE 1953	CHICAGO TEMP.	98	94	96	86	74	57	56	55	76	80	93	104
	ARGONNE TEMP.	91	87	89	83	72	56	55	54	73	78	87	96
	DIFFERENCE	7	7	7	3	2	1	1	1	3	2	6	8
JULY 1953 - JUNE 1954	CHICAGO TEMP.	95	99	101	90	74	56	53	69	68	85	91	100
	ARGONNE TEMP.	90	95	96	85	71	54	50	67	66	81	84	95
	DIFFERENCE	5	4	5	5	3	2	3	2	2	4	7	5

TABLE 304
Monthly Average of Daily Maximum Temperatures (°F) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO TEMP.	88	85	71	67	48	39	39	33	40	49	72	80
	ARGONNE TEMP.	85	83	69	64	47	38	37	31	38	M	69	76
	DIFFERENCE	3	2	2	3	1	1	2	2	2	M	3	4
JULY 1950 - JUNE 1951	CHICAGO TEMP.	83	80	73	69	42	28	31	35	43	56	73	77
	ARGONNE TEMP.	80	76	70	67	41	26	28	32	41	54	71	74
	DIFFERENCE	3	4	3	2	1	2	3	3	2	2	2	3
JULY 1951 - JUNE 1952	CHICAGO TEMP.	83	79	73	65	40	35	35	39	42	61	68	85
	ARGONNE TEMP.	80	77	70	63	37	32	32	37	40	61	67	82
	DIFFERENCE	3	2	3	2	3	3	3	2	2	0	1	3
JULY 1952 - JUNE 1953	CHICAGO TEMP.	88	83	78	60	52	37	35	40	47	55	72	85
	ARGONNE TEMP.	84	79	74	57	49	35	32	37	44	54	69	81
	DIFFERENCE	4	4	4	3	3	2	3	3	3	1	3	4
JULY 1953 - JUNE 1954	CHICAGO TEMP.	86	87	80	71	53	39	35	45	43	64	67	86
	ARGONNE TEMP.	82	83	76	68	50	36	33	42	40	61	64	82
	DIFFERENCE	4	4	4	3	3	3	2	3	3	3	3	4

TABLE 305
Monthly Average Temperatures (°F) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO TEMP.	78	74	60	57	40	32	29	27	33	42	60	69
	ARGONNE TEMP.	75	72	M	54	39	31	28	24	31	M	58	67
	DIFFERENCE	3	2	M	3	1	1	1	3	2	M	2	2
JULY 1950 - JUNE 1951	CHICAGO TEMP.	71	70	64	58	34	20	24	27	35	46	62	67
	ARGONNE TEMP.	70	67	61	56	33	18	22	25	33	44	59	64
	DIFFERENCE	1	3	3	2	1	2	2	2	2	2	3	3
JULY 1951 - JUNE 1952	CHICAGO TEMP.	73	70	62	55	33	27	27	32	35	51	58	74
	ARGONNE TEMP.	69	67	60	52	30	24	24	30	32	49	56	71
	DIFFERENCE	4	3	2	3	3	3	3	2	3	2	2	3
JULY 1952 - JUNE 1953	CHICAGO TEMP.	77	72	65	49	43	33	30	32	39	46	61	74
	ARGONNE TEMP.	73	62	62	45	40	29	27	29	36	44	59	70
	DIFFERENCE	4	3	3	4	3	4	3	3	3	2	2	4
JULY 1953 - JUNE 1954	CHICAGO TEMP.	76	76	67	59	44	32	28	38	35	54	57	75
	ARGONNE TEMP.	72	71	63	56	41	28	24	34	31	51	54	71
	DIFFERENCE	4	5	4	3	3	4	4	4	4	3	3	4

TABLE 306

Monthly Average of Daily Minimum Temperatures (°F) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO TEMP.	68	65	49	47	32	24	20	19	26	34	49	58
	ARGONNE TEMP.	66	62	47	44	31	25	19	17	24	M	48	57
	DIFFERENCE	2	3	2	3	1	-1	1	2	2	M	1	1
JULY 1950 - JUNE 1951	CHICAGO TEMP.	61	60	57	49	26	11	16	20	27	38	51	57
	ARGONNE TEMP.	60	58	54	47	25	09	14	17	25	36	49	53
	DIFFERENCE	1	2	3	2	1	2	2	3	2	2	2	4
JULY 1951 - JUNE 1952	CHICAGO TEMP.	62	61	53	45	26	18	19	26	29	41	49	64
	ARGONNE TEMP.	59	58	50	43	23	15	17	23	26	39	46	61
	DIFFERENCE	3	3	3	2	3	3	2	3	3	2	3	3
JULY 1952 - JUNE 1953	CHICAGO TEMP.	67	63	53	38	34	27	23	23	32	39	51	63
	ARGONNE TEMP.	62	59	50	32	29	23	18	19	28	35	47	59
	DIFFERENCE	5	4	3	6	5	4	5	4	4	4	4	4
JULY 1953 - JUNE 1954	CHICAGO TEMP.	66	65	55	48	36	24	20	30	27	43	47	65
	ARGONNE TEMP.	62	60	51	44	32	21	16	25	23	39	42	61
	DIFFERENCE	4	5	4	4	4	3	4	5	4	4	5	4

TABLE 307

Monthly Minimum Temperatures (°F) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO TEMP.	57	50	38	30	15	04	01	-02	00	21	37	46
	ARGONNE TEMP.	54	50	M	M	13	M	00	-08	-02	M	36	46
	DIFFERENCE	3	0	M	M	2	M	1	6	2	M	1	0
JULY 1950 - JUNE 1951	CHICAGO TEMP.	51	46	40	33	-02	-10	-15	-15	12	29	40	43
	ARGONNE TEMP.	50	45	38	33	-02	-15	-19	M	10	28	37	39
	DIFFERENCE	1	1	2	0	0	5	4	M	2	1	3	4
JULY 1951 - JUNE 1952	CHICAGO TEMP.	53	52	37	31	11	-12	-03	17	08	26	38	47
	ARGONNE TEMP.	47	47	35	30	09	-16	-04	13	06	25	35	45
	DIFFERENCE	6	5	2	1	2	4	1	4	2	1	3	2
JULY 1952 - JUNE 1953	CHICAGO TEMP.	55	53	42	25	13	16	03	00	16	29	38	49
	ARGONNE TEMP.	50	47	39	16	08	11	-05	-07	11	23	35	44
	DIFFERENCE	5	6	3	9	5	5	8	7	5	6	3	5
JULY 1953 - JUNE 1954	CHICAGO TEMP.	55	55	40	36	18	00	-07	09	07	19	32	49
	ARGONNE TEMP.	50	51	35	30	14	-04	-11	03	01	16	28	46
	DIFFERENCE	5	4	5	6	4	4	4	6	6	3	4	3

(S) Relative Humidity Comparisons

The data obtained by the hair element of the hygrothermograph at Argonne are compared with the data obtained by the Weather Bureau station, which uses a wet and dry-bulb psychrometer. Because of the relative inaccuracy of the hair-type instrument, the data from the Chicago station are, no doubt, more accurate.

1. Frequency Distributions of Difference in Hourly Relative Humidity at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 308 through 314: These tables show that during a major portion of the time the relative humidity at the Argonne site was higher than that at the Chicago Midway Airport. Since the specific humidity, i.e., the ratio of weight of moisture to weight of air, is relatively conservative, it is not surprising to find the relative humidity higher at the location where the temperature is lower.

Table 314 summarizes the differences of relative humidity for each hour of the day, based on five years of data. The last column in this table, as well as in the other tables of this group, represents the weighted sum of the relative humidity differences, that is, the summation of the differences multiplied by their frequency of occurrence. It is of interest to note that this frequency distribution also shows a diurnal wave with a double amplitude. This double diurnal wave is also apparent in the tables summarizing the data for each of the months.

The double diurnal wave is really spurious and is caused by the difference in observation times at the two stations. When the data are corrected for this difference in observation times, the magnitude of the average hourly relative humidity difference exhibits a diurnal wave with a single maximum just before midnight and a minimum in the mid-afternoon.

In this set of tables, a class interval of 5% was used for the relative humidity differences, with one exception. A class interval of 4% was used in the -4 to -1 grouping. This grouping inequality was tolerated for the sake of expediency in constructing the tables by IBM techniques.

2. Monthly Frequency Distributions of Differences in Daily Maximum and Daily Minimum Relative Humidity

Tables 315 and 316: These tables are based on only four years of data since maximum and minimum relative humidity values were not tabulated for the first year. It is apparent that most of the daily maximum and minimum relative humidity values were higher at Argonne than at the Chicago Midway Airport station.

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3. Comparison of Maximum, Average, and Minimum Relative Humidity Values

a. Monthly Maximum Relative Humidity

Table 317: This table shows that during every monthly period there was at least one day on which the relative humidity at Argonne reached 100% and was extremely high and appreciably over 90% at the Chicago Midway Airport. The differences between the Chicago and the Argonne data for this table are not significant.

b. Monthly Average of Daily Maximum Relative Humidity Values

Table 318: From this table, it is apparent that the average maximum of the daily relative humidity values was consistently higher at the Argonne site.

c. Monthly Average Relative Humidity Values

Table 319: These values were obtained by averaging all the hourly observations within any particular month and dividing by the number of observations. This table points out that the relative humidity tended toward a maximum in the cold months, although the difference in the average relative humidity between the cold months and the warm months was small.

d. Monthly Average of Daily Minimum Relative Humidity Values

Table 320: In this table, as well as in Table 319, there is a maximum in the colder months, i.e., the average of the daily minimum relative humidity values was higher during the wintertime than during the remaining part of the year. Again, the values at Argonne were consistently higher.

e. Monthly Minimum Relative Humidity

Table 321: Although the monthly minima tended to be lower in summer than in winter, on occasion very low relative humidity values occurred in winter. For example, the lowest relative humidity value in the five-year period, 13%, occurred at the Chicago Midway Airport in January 1954. The lowest value at the Argonne Station, 14%, was recorded in April 1952.

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TABLE 308

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		< -25	-24--20	-19--15	-14--10	-9--5	-4--1	0--4	5--9	10--14	15--19	20--24	≥ 25			
JULY 1949 - 1953	1	6	10	14	31	41	20	16	11	4		2			155	- 1153
	2	2	10	17	33	35	19	25	8	4	1	1			155	- 1070
	3	2	7	15	35	34	22	21	10	6	1	2			155	- 0942
	4	1	1	19	31	35	28	19	11	8		2			155	- 0816
	5		6	17	33	33	26	23	8	3	6				155	- 0895
	6		8	25	36	36	17	19	8	4	2				155	- 1177
	7	1	10	25	39	31	18	17	8	3	3				155	- 1224
	8	1	4	21	35	41	24	21	5	1	2				155	- 1096
	9		1	16	25	53	20	28	10	1	1				155	- 0865
	10	1	3	11	29	44	27	28	11	1					155	- 0831
	11		3	6	33	35	36	20	12	6	2	1		1	155	- 0646
	12		2	7	28	48	28	16	11	9	5		1		155	- 0607
	13	1	1	12	23	34	35	24	13	4	5	2	1		155	- 0497
	14		1	9	24	38	32	30	11	6	2	1	1		155	- 0512
	15	2	2	4	28	41	24	26	17	8	2	1			155	- 0541
	16	2	1	8	19	43	30	23	20	5	4				155	- 0508
	17		3	11	20	46	30	20	18	1	4	2			155	- 0587
	18	1	4	13	26	39	29	24	14	2	2		1		155	- 0752
	19	1	7	11	35	42	15	25	14	3	1	1			155	- 0906
	20	2	8	15	33	37	30	18	11	1					155	- 1084
	21	5	10	17	38	34	21	21	7	1	1				155	- 1292
	22	3	10	21	32	38	23	16	9	3					155	- 1267
	23	4	11	26	28	39	16	20	8	1	2				155	- 1300
	24	6	15	17	33	30	22	21	7	1	2	1			155	- 1268
	TOTAL	41	138	357	727	927	592	521	262	86	48	16	4	1	3720	-21836
AUGUST 1949 - 1953	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.	
	HOUR	< -25	-20--24	-19--15	-14--10	-9--5	-4--1	0--4	5--9	10--14	15--19	20--24				≥ 25
	1	3	3	28	35	40	25	16	3	1	1				155	- 1294
	2	2	6	23	46	37	23	13	3	1	1				155	- 1342
	3	2	8	20	39	41	26	11	7	1					155	- 1273
	4		5	17	44	40	27	16	6						155	- 1200
	5	1	2	22	33	52	22	14	7	1				1	155	- 1152
	6	2	7	22	42	33	27	14	7					1	155	- 1322
	7	7	8	25	32	44	15	19	3	1				1	155	- 1467
	8	4	7	22	39	41	25	14	2	1					155	- 1419
	9	1	9	17	30	44	27	20	5	1				1	155	- 1159
	10	2	3	7	42	42	31	18	10						155	- 1004
	11		2	9	25	42	38	20	13	5				1	155	- 0691
	12			7	24	42	38	26	14	4					155	- 0570
	13		2	5	27	38	34	26	11	11	1				155	- 0508
	14	1	2	9	27	34	33	22	15	10		1	1		155	- 0529
	15	1	1	7	23	41	33	31	13	4	1				155	- 0586
	16	2	1	6	17	37	36	29	13	10	3		1		155	- 0413
	17	1		5	16	51	28	30	15	5	4				155	- 0433
	18	2	4	10	28	42	30	22	11	5	1				155	- 0837
	19	2	9	16	35	51	20	11	7	4					155	- 1253
	20	3	12	25	39	36	22	15	1	2					155	- 1476
	21	3	11	28	37	47	20	8	1						155	- 1613
	22	6	17	25	34	39	23	9	2						155	- 1669
	23	3	12	34	40	38	17	5	5	1					155	- 1644
	24	5	11	24	44	36	16	16	3						155	- 1554
	TOTAL	53	142	413	798	988	636	425	177	68	12	1	2	5	3720	-26408

TABLE 309

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		<-25	-24--20	-19--15	-14--10	-9--5	-4--1	0--4	5--9	10--14	15--19	20--24	>25			
SEPTEMBER 1949 - 1953	1	3	8	21	25	46	26	10	4					7	150	- 1211
	2	2	8	19	32	43	27	10	1		1			7	150	- 1234
	3	2	7	25	31	43	29	8						7	150	- 1320
	4	1	6	21	42	40	19	10	5					7	150	- 1291
	5	1	9	15	41	40	22	11		1				7	150	- 1352
	6	5	5	32	38	32	18	11	2					7	150	- 1484
	7	4	17	28	28	39	16	8	2	1				7	150	- 1601
	8	1	17	22	29	45	21	3	2	2	1			7	150	- 1413
	9		6	13	30	48	24	16	2	2	1			8	150	- 1014
	10	1	1	12	26	43	30	22	4	2	1			8	150	- 0815
	11		3	6	20	41	34	30	8	1				7	150	- 0659
	12		1	5	13	43	39	32	9	1				7	150	- 0525
	13	1	1	2	18	38	39	23	16	2		3		7	150	- 0436
	14			2	16	37	39	31	12	5	1			7	150	- 0365
	15			3	17	33	44	25	13	6	2			7	150	- 0335
	16			4	9	31	43	33	16	7				7	150	- 0226
	17		1	3	10	29	28	49	14	5	3		1	7	150	- 0148
	18	1		11	22	31	35	26	9	4	4			7	150	- 0549
	19		4	19	25	41	26	20	5	2	1			7	150	- 0934
	20	5	8	11	37	42	22	12	3	2			1	7	150	- 1207
	21	4	10	21	28	35	21	16	5		2		1	7	150	- 1197
	22	4	11	17	25	44	18	18	3	1	1	1		7	150	- 1217
	23	7	7	18	28	39	24	15	2	1	2			7	150	- 1218
	24	7	6	18	31	36	25	12	5	3				7	150	- 1202
	TOTAL	49	136	348	621	939	669	451	142	48	20	4	3	170	3600	-22953
OCTOBER 1949 - 1953	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		<-25	-20--24	-19--15	-14--10	-9--5	-4--1	0--4	5--9	10--14	15--19	20--24	>25			
	1	2	7	15	33	33	25	14	16	3	2			5	155	- 0954
	2	2	9	12	35	34	18	22	9	7	2			5	155	- 0912
	3	1	3	19	35	35	23	20	5	6	1	1		6	155	- 0964
	4	1	1	19	38	34	26	15	12	1	1	1		6	155	- 0981
	5	2	5	15	41	29	23	23	8	1	2			6	155	- 1029
	6	1	4	14	39	42	22	18	4	5				6	155	- 1034
	7	3	10	28	35	43	17	7	5	1				6	155	- 1473
	8	2	8	26	41	42	16	6	6	2				6	155	- 1440
	9		2	17	37	46	29	13	3	1				7	155	- 1095
	10		1	7	27	52	34	19	4	3		1		7	155	- 0803
	11	1		1	27	46	36	26	9	2				7	155	- 0650
	12	1	2	4	16	43	50	23	4	4	2			6	155	- 0579
	13			3	16	39	40	30	17	3	1			6	155	- 0387
	14		1	2	9	49	38	26	15	5	3	1		6	155	- 0282
	15		1	2	11	37	33	38	14	9	4			6	155	- 0169
	16				10	23	39	36	28	10	4	1		4	155	0095
	17			2	6	29	33	46	22	9	3		1	4	155	0036
	18		5	7	19	30	32	37	14	4	1		2	4	155	- 0443
	19	4	6	12	25	27	25	31	11	7	1		2	4	155	- 0695
	20	4	6	14	28	26	24	31	13	2	1		2	4	155	- 0811
	21	4	7	18	29	27	25	23	14	2	1		1	4	155	- 0975
	22	5	6	13	26	38	18	21	16	6		1		5	155	- 0877
	23	6	7	13	31	29	20	24	14	5	1			5	155	- 0946
	24	4	7	18	28	33	21	22	13	4				5	155	- 1021
	TOTAL	43	98	281	642	866	667	571	276	102	30	6	8	130	3720	-18389

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TABLE 310

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		<-25	-24--20	-19--15	-14--10	-9--5	-4--1	0-4	5-9	10-14	15-19	20-24	≥25			
NOVEMBER 1949 - 1953	1	1	5	15	22	30	38	27	7	5					150	- 0807
	2	3	5	7	24	40	32	24	8	5	2				150	- 0762
	3	3	4	13	22	35	38	19	13	2	1				150	- 0834
	4	3	4	10	27	37	31	26	8	3	1				150	- 0870
	5	1	3	15	30	43	23	26	5	3	1				150	- 0897
	6	1	4	18	24	38	34	19	8	3	1				150	- 0924
	7	2	10	12	30	41	30	18	5	1	1				150	- 1107
	8	5	11	15	25	44	28	16	3	2				1	150	- 1246
	9	2	6	11	27	40	39	14	8					3	150	- 0994
	10	1	3	7	17	45	38	21	13	2				3	150	- 0697
	11		1	6	14	28	44	30	21	2	1			3	150	- 0363
	12			5	17	36	34	37	18	2				1	150	- 0399
	13			5	12	31	46	31	19	4	1			1	150	- 0325
	14		1	9	11	30	35	40	19	4				1	150	- 0331
	15	1		6	7	27	35	42	22	9	1				150	- 0154
	16		1	4	5	31	37	39	12	15	4	1			150	0009
	17		4		11	35	38	37	14	9	1	1			150	- 0257
	18	1	2	8	15	32	46	32	6	6	2				150	- 0483
	19	3	2	10	17	36	28	39	9	6					150	- 0630
	20	1	3	7	27	34	33	31	8	6					150	- 0662
	21	1	2	10	26	37	32	26	10	6					150	- 0677
	22	1	4	11	24	38	28	33	7	2		1	1		150	- 0743
	23	4	2	10	24	40	32	24	11	3					150	- 0811
	24	2	3	12	20	43	29	29	9	2	1				150	- 0796
	TOTAL	36	80	226	478	871	828	680	263	102	18	3	2	13	3600	-15760
DECEMBER 1949 - 1953	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT															
	HOUR	<-25	-20--24	-19--15	-14--10	-9--5	-4--1	0-4	5-9	10-14	15-19	20-24	≥25	MISSING	TOTAL	SUM OF REL. HUM. DIFF.
	1	4	6	14	30	58	21	17	2	2				1	155	- 1255
	2	2	9	15	31	45	30	15	6	1				1	155	- 1179
	3	5	10	14	24	46	32	14	8	1				1	155	- 1240
	4	7	2	11	29	53	28	21	1		1			2	155	- 1156
	5	8	7	15	24	42	32	17	7					3	155	- 1187
	6	7	5	17	35	36	31	16	4	1				3	155	- 1239
	7	5	10	13	37	37	26	21	3					3	155	- 1338
	8	6	11	16	39	38	23	17	3					2	155	- 1460
	9	7	4	18	28	44	34	16	2					2	155	- 1280
	10	7	3	12	29	43	35	21	3	1				1	155	- 1150
	11	3	4	10	22	38	39	28	9	1				1	155	- 0873
	12	1	3	11	22	41	32	26	13	3	2			1	155	- 0712
	13	5	1	7	17	45	27	28	17	6				2	155	- 0626
	14	2	4	4	23	37	30	35	14	4				2	155	- 0563
	15	2	2	9	19	38	27	33	20	3		1		1	155	- 0547
	16	2	4	4	20	38	30	31	13	12				1	155	- 0468
	17	3	2	8	24	36	39	28	8	5	1			1	155	- 0722
	18	3	4	12	25	50	25	25	4	5	1			1	155	- 0942
	19	4	2	16	17	48	38	19	6	3	1			1	155	- 0941
	20	3	3	14	25	44	38	19	7	1				1	155	- 1024
	21	3	7	10	36	47	29	15	6	1				1	155	- 1151
	22	4	8	11	22	55	25	21	4	4				1	155	- 1118
	23	6	11	7	29	42	32	17	7	3				1	155	- 1174
	24	6	6	10	38	39	29	17	8	1				1	155	- 1183
	TOTAL	105	128	278	645	1040	732	517	175	58	6	1		35	3720	-24528

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TABLE 311

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		< -25	-24 - -20	-19 - -15	-14 - -10	-9 - -5	-4 - -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25			
JANUARY 1950 - 1954	1	5	6	16	26	46	36	13	5	1				1	155	- 1215
	2	6	10	15	27	45	26	20	4				1	1	155	- 1239
	3	5	6	23	25	40	35	12	6	1	1			1	155	- 1255
	4	6	6	12	32	48	33	9	5	1	1		1	1	155	- 1204
	5	5	7	16	26	46	32	11	6	3	1		1	1	155	- 1140
	6	4	6	14	28	50	29	18	4	1				1	155	- 1192
	7	5	4	15	34	47	27	13	6	3				1	155	- 1214
	8	5	8	17	41	37	25	13	6	1				2	155	- 1345
	9	6	6	17	27	49	29	10	7	3				1	155	- 1251
	10	5	5	16	31	43	30	13	9	2				1	155	- 1169
	11	6	1	15	29	43	32	13	10	3	1			2	155	- 1057
	12	3	3	16	23	41	32	23	8	2	1			3	155	- 0890
	13		5	7	30	43	23	32	12					3	155	- 0803
	14	1	3	8	22	39	35	28	12	3	1			3	155	- 0650
	15		2	7	27	47	26	22	18	2				4	155	- 0689
	16		4	10	22	38	29	27	15	8				2	155	- 0589
	17	4	4	11	24	48	31	18	8	4	1			2	155	- 0942
	18	5	10	9	30	39	28	21	8	3				2	155	- 1097
	19	4	5	19	22	41	32	17	11	1				3	155	- 1093
	20	4	8	22	21	42	27	19	9					3	155	- 1201
	21	4	8	16	32	40	29	13	9	1				3	155	- 1173
	22	5	7	20	30	38	35	14	4					2	155	- 1289
	23	10	2	14	31	40	33	19	3		1			2	155	- 1251
	24	7	9	16	26	45	27	16	5	2				2	155	- 1303
	TOTAL	105	135	351	666	1035	721	414	190	45	8		3	47	3720	-26251
FEBRUARY 1950 - 1954	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		< -25	-20 - -24	-19 - -15	-14 - -10	-9 - -5	-4 - -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25			
	1	6	5	14	34	33	30	12	4	1				2	141	- 1193
	2	3	7	12	36	36	31	10	2	1	1			2	141	- 1176
	3	2	9	15	28	40	34	7	3			1		2	141	- 1152
	4	6	5	15	27	40	29	13	2	2				2	141	- 1179
	5	6	5	17	26	42	30	10	3					2	141	- 1207
	6	3	8	14	32	43	23	12	3	1				2	141	- 1198
	7	6	5	11	33	48	26	8	1	1				2	141	- 1212
	8	3	7	16	33	50	12	16	2					2	141	- 1249
	9	2	7	15	25	44	28	15	3					2	141	- 1104
	10	2		14	15	59	25	18	3	2	1			2	141	- 0863
	11	2	1	9	23	43	22	25	10	2	1			3	141	- 0710
	12	1	3	7	17	50	26	20	7	5	2	1		2	141	- 0634
	13			4	19	43	31	24	10	4	3	1		2	141	- 0452
	14			4	21	38	30	28	9	6	2		1	2	141	- 0412
	15			3	15	47	27	23	12	7	2	3		2	141	- 0351
	16		1	3	18	36	38	18	9	6	6	1	2	3	141	- 0292
	17			6	17	44	29	22	11	6	2	1		3	141	- 0401
	18		6	9	18	50	24	22	6	2		1		3	141	- 0759
	19		3	18	28	42	28	18	2					2	141	- 1006
	20	2	4	12	25	46	32	13	3	1	1			2	141	- 0962
	21	1	5	14	29	43	30	12	4		1			2	141	- 1074
	22	6	4	12	24	53	23	12	4	1				2	141	- 1091
	23	5	7	11	31	43	32	8	2					2	141	- 1184
	24	4	11	11	31	40	23	19						2	141	- 1189
	TOTAL	60	103	266	605	1053	663	385	115	48	22	9	3	52	3384	-22050

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TABLE 312

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		< -25	-24 -- -20	-19 -- -15	-14 -- -10	-9 -- -5	-4 -- -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25			
MARCH 1950 - 1954	1	1	5	21	36	51	24	13	3					1	155	- 1179
	2	2	9	17	30	56	21	17	2					1	155	- 1278
	3	1	13	22	31	49	19	16	3					1	155	- 1396
	4	2	12	12	41	43	21	20	3					1	155	- 1286
	5	3	10	18	37	46	21	17	3						155	- 1350
	6	4	8	19	40	40	23	20	1						155	- 1366
	7	4	17	18	35	38	28	11	4						155	- 1496
	8	5	6	15	38	46	29	7	6	2				1	155	- 1333
	9	1	1	9	32	50	37	13	8	2	1			1	155	- 0884
	10	1	1	5	23	52	32	29	5	6				1	155	- 0728
	11		2	7	18	52	40	22	9	1	3			1	155	- 0678
	12	1	2	7	23	47	34	26	10	1	3			1	155	- 0712
	13		2	6	19	47	40	25	11	1	1	1		2	155	- 0621
	14	1		8	16	44	39	31	10	2	1		1	2	155	- 0538
	15	1		2	23	43	35	26	17	1	3	2		2	155	- 0443
	16	2	1	3	13	38	40	34	13	3	4	1	1	2	155	- 0315
	17	2	2	4	18	37	39	28	11	6	3		2	3	155	- 0419
	18	2	1	6	20	51	38	18	11	2	1		2	3	155	- 0635
	19	1	3	6	35	56	23	18	8	2		1		2	155	- 0900
	20	1	5	22	27	57	17	16	7	1				2	155	- 1174
	21	4	7	15	30	52	25	14	3	3				2	155	- 1225
	22	3	7	19	33	42	24	21	4					2	155	- 1264
	23	2	10	19	31	40	34	12	5		1			1	155	- 1260
	24	3	10	20	31	44	28	16	2					1	155	- 1349
	TOTAL	47	134	300	680	1121	711	470	159	33	21	5	6	33	3720	-23829
APRIL 1950 - 1954	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT															
	HOUR	< -25	-20 -- -24	-19 -- -15	-14 -- -10	-9 -- -5	-4 -- -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25	MISSING	TOTAL	SUM OF REL. HUM. DIFF.
	1	6	7	20	32	33	18	16	8	2				8	150	- 1180
	2	3	11	20	26	43	18	17	3	1				8	150	- 1215
	3	4	16	10	37	35	16	14	5	2	3			8	150	- 1195
	4	5	11	24	31	31	21	10	4	5				8	150	- 1291
	5	5	6	17	31	41	21	13	6	2				8	150	- 1179
	6	5	11	21	29	34	21	14	6	1				8	150	- 1293
	7	3	10	22	30	30	24	14	5	3			1	8	150	- 1204
	8	4	6	20	35	32	18	18	5	1	3			8	150	- 1156
	9		8	15	34	35	20	16	9	4	1			8	150	- 0969
	10	2	4	18	29	37	19	18	8	3	2	1		9	150	- 0894
	11	2	4	7	26	36	30	21	8	5	2			9	150	- 0701
	12	1	1	10	14	38	32	28	8	5	4			9	150	- 0509
	13	1		12	17	37	25	26	13	9	1			9	150	- 0490
	14		2	5	23	35	23	24	18	6	4	1		9	150	- 0349
	15		1	7	22	32	27	26	12	8	3	2	2	8	150	- 0332
	16	1	2	6	25	29	18	32	12	10	5	1	1	8	150	- 0326
	17		1	7	24	32	16	31	13	13	3		2	8	150	- 0263
	18		3	6	22	34	28	22	17	8	1	1	1	7	150	- 0408
	19		2	5	28	35	23	33	13	3		1		7	150	- 0542
	20		5	9	29	45	24	21	7	2	1			7	150	- 0850
	21		5	21	30	36	26	12	10		1	2		7	150	- 0994
	22	1	8	16	35	35	20	18	7	2			1	7	150	- 1061
	23	2	8	19	37	33	19	16	5	2			1	8	150	- 1188
	24	2	13	21	28	28	25	13	8	2	2			8	150	- 1147
	TOTAL	47	145	338	674	836	532	473	210	99	36	9	9	192	3600	-20736

TABLE 313

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
		< -25	-24 - -20	-19 - -15	-14 - -10	-9 - -5	-4 - -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25			
MAY 1950 - 1954	1	2	12	17	34	30	18	20	9	3				10	155	- 1129
	2	2	8	22	25	28	31	16	10	3				10	155	- 1040
	3	2	10	20	22	35	22	20	7	6	1			10	155	- 1000
	4		8	19	27	32	24	18	14	2	1			10	155	- 0925
	5	1	14	21	23	37	21	15	10	2	1			10	155	- 1122
	6	5	14	21	29	39	15	13	4	5				10	155	- 1339
	7	4	10	20	32	41	18	12	6	2				10	155	- 1276
	8	1	4	13	37	34	24	23	8		1			10	155	- 0970
	9	1	2	11	32	39	24	21	12	3				10	155	- 0809
	10		3	6	32	38	28	20	11	5	2			10	155	- 0665
	11		1	8	31	33	25	25	10	9	3			10	155	- 0564
	12	2	2	7	34	32	23	21	11	6	7			10	155	- 0597
	13		2	9	27	36	26	22	10	8	4		1	10	155	- 0519
	14	2	2	6	24	34	33	22	7	9	2		1	11	155	- 0490
	15		2	6	20	47	32	14	6	12	2	3		11	155	- 0488
	16	2		6	22	39	28	23	10	11	3	1		10	155	- 0436
	17	1	2	3	19	42	30	17	21	5	4	1		10	155	- 0353
	18	1		5	26	30	31	22	13	11	3	1	2	10	155	- 0304
	19	2		12	15	35	22	30	17	8	2	1	1	10	155	- 0390
	20	3	2	9	27	34	16	29	18	3	1	3		10	155	- 0595
	21	3	6	16	34	26	25	13	13	6	2	1		10	155	- 0914
	22	1	10	23	28	32	24	11	10	3	3			10	155	- 1092
	23	6	7	24	29	30	23	12	12	1	1			10	155	- 1206
	24	4	11	19	30	35	17	24	3	2				10	155	- 1229
	TOTAL	45	132	323	659	838	580	463	252	125	43	13	5	242	3720	-19452
JUNE 1950 - 1954		CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT														
	HOUR	< -25	-20 - -24	-19 - -15	-14 - -10	-9 - -5	-4 - -1	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25	MISSING	TOTAL	SUM OF REL. HUM. DIFF.
	1	8	11	20	32	30	26	14	4	3				2	150	- 1374
	2	6	12	12	39	34	23	12	8	1		1		2	150	- 1313
	3	5	8	21	39	34	17	11	9	2	1	1		2	150	- 1312
	4	6	7	19	33	38	20	12	8	3	1		1	2	150	- 1213
	5	4	13	23	35	37	15	9	9		3			2	150	- 1380
	6	9	8	23	41	37	15	8	4	1	1	1		2	150	- 1538
	7	8	5	16	46	47	14	7	1		3		1	2	150	- 1478
	8	9	6	17	40	46	16	10	3	3					150	- 1453
	9	3	6	14	50	41	22	9	4		1				150	- 1320
	10	2	5	11	38	57	19	9	6	2	1				150	- 1190
	11	1	2	17	40	45	18	18	6	3					150	- 1083
	12		2	16	38	43	27	14	8	1		1			150	- 0983
	13	1	4	12	39	37	28	18	6	4	1				150	- 0973
	14	2	4	14	32	44	25	13	9	5	2				150	- 0948
	15	3	5	15	29	42	17	18	13	4	4				150	- 0891
	16	1	2	15	28	48	25	17	7	5	1	1			150	- 0878
	17	1	3	11	33	52	20	20	8	2					150	- 0955
	18	2	1	16	36	45	27	12	9	1			1		150	- 1025
	19	4	4	14	23	50	23	17	6	5	2	1		1	150	- 0958
	20	5	8	11	43	30	23	15	9	4	1			1	150	- 1128
	21	7	11	25	31	34	21	11	6	2	1			1	150	- 1416
	22	11	14	16	44	26	17	11	8	2				1	150	- 1538
	23	11	14	25	28	30	19	15	5	2				1	150	- 1550
	24	3	20	25	29	32	13	18	5	1	2			2	150	- 1450
	TOTAL	112	175	408	866	959	490	318	161	56	25	6	3	21	3600	-29347

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TABLE 314

Frequency Distributions of Difference in Hourly Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

HOUR	CHICAGO MINUS ARGONNE RELATIVE HUMIDITY IN PER CENT												MISSING	TOTAL	SUM OF REL. HUM. DIFF.
	≤ -25	-20 -- -24	-15 -- -19	-10 -- -14	-5 -- -9	-1 -- -4	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	≥ 25			
1	47	85	215	370	471	307	188	76	25	3	2		37	1826	- 13944
2	35	104	191	384	476	299	201	64	24	8	2	1	37	1826	- 13760
3	34	101	217	368	467	313	173	76	27	9	5		38	1826	- 13883
4	38	68	198	402	471	307	189	79	25	6	3	2	39	1826	- 13412
5	37	87	211	380	488	288	189	72	16	14		1	40	1826	- 13890
6	46	88	240	413	460	275	182	55	22	4	1		40	1826	- 15106
7	52	116	233	411	486	259	155	49	16	7		2	40	1826	- 16090
8	46	95	220	432	496	261	164	51	15	7			39	1826	- 15580
9	23	58	173	377	533	333	191	73	17	5			43	1826	- 12744
10	24	32	126	338	555	348	236	87	29	7	2		42	1826	- 10809
11	15	24	101	308	482	394	278	125	40	13	1		45	1826	- 08675
12	10	21	102	269	504	395	292	121	43	26	2	1	40	1826	- 07717
13	9	18	84	264	468	394	309	155	56	18	7	2	42	1826	- 06637
14	9	20	80	248	459	392	330	151	65	18	6	5	43	1826	- 05969
15	10	16	71	241	475	360	324	177	73	24	12	2	41	1826	- 05526
16	12	17	69	208	431	393	342	168	102	34	7	6	37	1826	- 04347
17	12	22	71	222	481	361	346	163	70	29	5	6	38	1826	- 05444
18	18	40	112	287	473	373	283	122	53	16	3	9	37	1826	- 08234
19	25	47	158	305	504	303	278	109	44	8	5	3	37	1826	- 10248
20	33	72	171	361	473	308	239	96	25	5	3	3	37	1826	- 12174
21	39	89	211	380	458	304	184	88	22	9	3	2	37	1826	- 13701
22	50	106	204	357	478	278	205	78	24	4	3	2	37	1826	- 14226
23	66	98	220	367	443	301	187	79	19	8		1	37	1826	- 14732
24	53	122	211	369	441	275	223	68	18	7	1		38	1826	- 14691
TOTAL	743	1546	3889	8061	11473	7821	5688	2382	870	289	73	48	941	43824	-271539

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TABLE 315

Monthly Frequency Distributions of Difference in Daily Maximum Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1950 - June 1954

REL. HUM. DIFF. (%) CHICAGO MINUS ARGONNE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
20 - 24	1												1
15 - 19	1				1								2
10 - 14	1			1	1					1			4
5 - 9	6		1	1	4	1	1		2	2			18
0 - 4	6	5	7	7	12	7	6	6	9	7	9	3	84
-5 - -1	29	33	28	19	31	33	36	31	28	22	24	24	338
-10 - -6	33	48	32	41	40	40	41	32	36	28	31	30	432
-15 - -11	22	28	27	33	16	26	22	22	30	36	28	33	323
-20 - -16	19	9	20	15	9	11	15	15	15	16	27	17	188
-25 - -21	4		5	7	2	4	1	6	4	5	3	9	50
-30 - -26	2	1			3	1	2			3	2	4	18
MISSING					1	1		1					3
TOTAL	124	124	120	124	120	124	124	113	124	120	124	120	1461

TABLE 316

Monthly Frequency Distributions of Difference in Daily Minimum Relative Humidity
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1950 - June 1954

REL. HUM. DIFF. (%) CHICAGO MINUS ARGONNE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
20 - 24								1	2				3
15 - 19	1	1		1							1		4
10 - 14	2	5		2	1	1			2	2	2	2	19
5 - 9	9	7	12	10	8	10	4	4	7	13	11	5	100
0 - 4	18	33	15	22	27	19	9	16	16	29	18	15	237
-5 - -1	39	33	52	54	44	30	26	27	48	28	29	33	443
-10 - -6	38	27	28	28	30	32	42	34	33	30	39	36	397
-15 - -11	16	17	11	5	6	14	30	19	15	14	17	24	188
-20 - -16	1	1	2	1	3	4	5	5		3	5	4	34
-25 - -21						8	4	4	1		1	1	19
-30 - -26						5	4				1		10
MISSING				1	1	1		3		1			7
TOTAL	124	124	120	124	120	124	124	113	124	120	124	120	1461

TABLE 317
Monthly Maximum Relative Humidity (%) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	98 100 - 2	97 100 - 3	100 100 0	100 100 0	100 100 0	100 100 0	100 100 0	99 100 - 1	99 100 - 1	99 100 - 1	95 100 - 5	99 100 - 1
JULY 1950 - JUNE 1951	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	99 100 - 1	100 100 0	99 100 - 1	96 100 - 4	99 100 - 1	100 100 0	99 100 - 1	100 100 0	98 100 - 2	100 100 0	97 100 - 3	97 100 - 3
JULY 1951 - JUNE 1952	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	100 100 0	99 100 - 1	99 100 - 1	98 100 - 2	98 100 - 2	99 100 - 1	98 100 - 2	97 100 - 3	97 100 - 3	95 100 - 5	98 100 - 2	99 100 - 1
JULY 1952 - JUNE 1953	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	98 100 - 2	99 100 - 1	99 100 - 1	98 100 - 2	97 100 - 3	100 100 0	99 100 - 1	99 100 - 1	100 100 0	99 100 - 1	99 100 - 1	100 100 0
JULY 1953 - JUNE 1954	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	100 100 0	98 100 - 2	93 100 - 7	97 100 - 3	96 100 - 4	95 100 - 5	99 100 - 1	98 100 - 2	96 100 - 4	94 100 - 6	94 100 - 6	96 100 - 4

TABLE 318
Monthly Average of Daily Maximum Relative Humidity Values (%)
at Chicago Midway Airport and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	88 89 - 1	89 89 0	89 89 0	89 89 0	87 89 - 2	89 89 0	89 89 0	90 89 - 1	85 89 - 4	86 89 - 3	81 89 - 8	87 89 - 2
JULY 1950 - JUNE 1951	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	89 89 0	90 96 - 6	91 96 - 5	85 94 - 9	86 94 - 8	88 94 - 6	86 92 - 6	88 92 - 4	83 92 - 9	87 98 - 11	85 96 - 11	87 99 - 12
JULY 1951 - JUNE 1952	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	89 99 - 10	92 99 - 7	89 99 - 10	89 98 - 9	85 92 - 7	85 95 - 10	86 94 - 8	84 96 - 12	85 95 - 10	78 86 - 8	84 86 - 10	87 97 - 10
JULY 1952 - JUNE 1953	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	88 99 - 11	90 98 - 8	88 97 - 9	74 83 - 9	81 91 - 10	90 96 - 6	90 99 - 9	83 93 - 10	88 95 - 7	83 88 - 5	86 94 - 8	85 96 - 11
JULY 1953 - JUNE 1954	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	87 98 - 11	81 92 - 11	77 91 - 14	78 90 - 12	82 85 - 3	82 94 - 12	81 93 - 12	80 90 - 10	81 89 - 8	82 96 - 14	77 89 - 12	83 95 - 12

TABLE 319
Monthly Average Relative Humidity (%) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	69 70 - 1	67 76 - 9	64 M M	70 70 0	70 73 3	75 80 - 5	75 78 - 3	77 80 - 3	70 75 - 5	69 M M	59 61 - 2	65 69 - 4
JULY 1950 - JUNE 1951	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	65 70 - 5	69 76 - 7	74 80 - 6	66 72 - 6	70 75 - 5	77 81 - 4	74 83 - 7	76 83 - 7	68 74 - 6	69 77 - 8	64 M M	67 76 - 9
JULY 1951 - JUNE 1952	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	68 76 - 8	75 82 - 7	68 76 - 8	72 80 - 8	70 77 - 7	72 82 - 10	75 82 - 7	70 79 - 9	70 78 - 8	59 61 - 2	65 70 - 5	67 76 - 9
JULY 1952 - JUNE 1953	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	67 75 - 8	69 76 - 7	67 72 - 5	52 55 - 3	64 70 - 6	79 85 - 6	78 88 - 10	68 77 - 9	71 79 - 8	64 69 - 5	66 72 - 7	64 76 - 12
JULY 1953 - JUNE 1954	CHICAGO REL. HUM. ARGONNE REL. HUM. DIFFERENCE	63 74 - 11	60 71 - 11	53 64 - 11	58 66 - 8	62 67 - 5	69 82 - 13	68 81 - 13	65 74 - 9	62 68 - 6	64 75 - 11	55 65 - 10	63 73 - 10

TABLE 320

Monthly Average of Daily Minimum Relative Humidity Values (%)
at Chicago Midway Airport and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO REL. HUM.	49	45	41	48	54	60	60	63	55	52	39	43
	ARGONNE REL. HUM. DIFFERENCE				DATA NOT TABULATED								
JULY 1950 - JUNE 1951	CHICAGO REL. HUM.	43	46	54	44	52	64	60	64	53	50	44	49
	ARGONNE REL. HUM. DIFFERENCE	49 - 6	52 - 6	57 - 3	46 - 2	53 - 1	66 - 2	68 - 8	70 - 6	56 - 3	52 - 2	50 - 6	52 - 3
JULY 1951 - JUNE 1952	CHICAGO REL. HUM.	48	54	46	52	52	57	62	56	54	40	46	50
	ARGONNE REL. HUM. DIFFERENCE	50 - 2	54 0	46 0	55 - 3	55 - 3	65 - 8	68 - 6	57 - 1	56 - 2	37 3	43 3	52 - 2
JULY 1952 - JUNE 1953	CHICAGO REL. HUM.	45	48	44	34	47	68	65	51	54	45	46	46
	ARGONNE REL. HUM. DIFFERENCE	46 - 1	47 1	45 - 1	34 0	47 0	71 - 3	72 - 7	60 - 9	61 - 7	50 - 5	54 - 8	55 - 9
JULY 1953 - JUNE 1954	CHICAGO REL. HUM.	42	39	31	38	45	53	53	48	45	47	36	43
	ARGONNE REL. HUM. DIFFERENCE	50 - 8	46 - 7	40 - 9	44 - 6	53 - 8	67 - 14	66 - 13	57 - 9	49 - 4	55 - 8	44 - 8	51 - 3

TABLE 321

Monthly Minimum Relative Humidity (%) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO REL. HUM.	28	30	19	23	32	39	33	43	33	22	23	20
	ARGONNE REL. HUM. DIFFERENCE	DATA NOT TABULATED											
JULY 1950 - JUNE 1951	CHICAGO REL. HUM.	28	28	33	24	26	31	20	40	28	21	24	27
	ARGONNE REL. HUM. DIFFERENCE	38 -10	38 -10	39 - 6	26 - 2	27 - 1	46 -15	56 -36	50 -10	28 0	28 - 7	29 - 5	26 1
JULY 1951 - JUNE 1952	CHICAGO REL. HUM.	27	38	33	31	30	29	43	35	29	14	21	29
	ARGONNE REL. HUM. DIFFERENCE	31 - 4	34 4	32 1	36 - 5	31 - 1	40 -11	40 3	30 5	18 11	14 0	20 1	26 3
JULY 1952 - JUNE 1953	CHICAGO REL. HUM.	27	26	24	16	26	38	46	29	34	15	23	25
	ARGONNE REL. HUM. DIFFERENCE	31 - 4	30 - 4	27 - 3	22 - 6	29 - 3	32 6	51 - 5	45 -16	43 - 9	31 -16	36 -13	39 -14
JULY 1953 - JUNE 1954	CHICAGO REL. HUM.	29	20	17	17	14	36	13	26	26	21	20	26
	ARGONNE REL. HUM. DIFFERENCE	40 -11	33 -13	31 -14	24 - 7	20 - 6	51 -15	33 -20	42 -16	32 - 6	32 -11	27 - 7	37 -11

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(T) Pressure

The hourly pressure readings obtained at the Argonne Meteorology Laboratory and the Chicago Midway Airport are compared in this section. The Argonne mercurial barometer is located at 746 feet above sea level, and the barometer at the Chicago Midway Airport is located at 623 feet above sea level.

1. Frequency Distributions of Difference in Hourly Station Pressure at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 322 through 328: Some surprisingly large differences in pressure between the two stations were measured. Some of the large differences are due to difference in times of observations at the two stations - Argonne observations were taken on the hour, while Chicago Midway Airport observations were taken twenty minutes past the hour. Other large differences may be explained by the occurrence of transient phenomena, such as the location of a front between the stations or thunderstorm activity.

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TABLE 322

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
JULY 1949 - 1953	1		3	2	12	38	41	31	19	8					1	155
	2	2		3	13	34	45	36	17	3	1				1	155
	3	1		3	7	37	45	32	18	10	1				1	155
	4	1		4	6	34	43	37	19	8	2				1	155
	5			5	6	24	42	44	21	8	3	1			1	155
	6	1		1	5	23	39	43	29	11	2				1	155
	7			2	7	21	42	38	34	6	4				1	155
	8				13	26	40	41	21	10	1		1		2	155
	9			4	14	28	46	31	20	8	2				2	155
	10		1	8	12	32	40	34	15	7	4				2	155
	11		2	9	25	28	39	28	13	8		1			2	155
	12	1	1	7	18	37	38	31	15	3	3				1	155
	13		3	5	27	37	41	19	14	5	2				2	155
	14	2	2	9	26	38	35	23	12	7					1	155
	15	1	3	12	22	41	35	21	12	7					1	155
	16	1	2	9	33	42	32	18	11	6					1	155
	17		1	12	24	42	37	22	13	3	1					155
	18			5	21	44	37	27	18	1	2					155
	19			5	21	34	52	23	17	2	1					155
	20			2	11	31	53	36	17	5						155
	21		1	2	12	27	50	33	26	4						155
	22			1	15	33	40	40	21	5						155
	23	1	1	3	15	31	41	31	26	5					1	155
	24		1	4	14	36	42	31	18	6	1	1			1	155
	TOTAL	11	21	117	379	798	995	750	446	146	30	3	1		23	3720
AUGUST 1949 - 1953	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
	1		1	14	17	41	35	31	11	3	2					155
	2		1	9	22	39	41	24	17		2					155
	3		1	9	23	32	41	28	14	6	1					155
	4	1	1	4	24	33	27	39	21	4	1					155
	5		1	1	20	25	42	34	23	5	3	1				155
	6			3	12	32	38	35	24	9	2					155
	7			4	10	35	41	41	15	7	2					155
	8			2	17	39	44	31	13	7	2					155
	9		1	3	21	36	43	30	10	9	1				1	155
	10		1	8	22	38	38	27	12	8	1					155
	11			12	28	44	36	19	11	5						155
	12		1	12	32	33	36	22	13	5					1	155
	13		10	15	26	46	25	19	9	3	2					155
	14		4	25	28	36	34	17	8	3						155
	15		4	19	30	37	41	12	8	3	1					155
	16		1	19	30	40	36	17	9	3						155
	17		1	15	29	41	41	16	8	4						155
	18		2	13	26	46	41	12	10	3	2					155
	19		4	9	28	33	47	23	6	4		1				155
	20		1	4	27	33	45	29	10	5	1					155
	21		2	7	25	34	44	26	13	4						155
	22	1	2	5	24	35	48	25	9	5	1					155
	23		4	3	23	34	43	29	12	5	2					155
	24	1	2	6	22	36	39	33	9	6	1					155
	TOTAL	3	45	221	566	878	946	619	295	116	27	2			2	3720

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TABLE 323

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
SEPTEMBER 1949 - 1953	1	2		5	15	26	29	34	21	11	6				1	150
	2	2		3	12	26	31	35	23	10	7				1	150
	3	1		3	12	16	39	29	28	16	3	2			1	150
	4			3	7	23	28	37	27	16	7		1		1	150
	5				7	12	28	35	33	22	8	4			1	150
	6				6	10	26	31	43	19	12	1	1		1	150
	7	1			4	14	29	42	33	17	8		1		1	150
	8			1	8	12	32	35	34	22	4	1			1	150
	9			2	9	23	25	39	34	10	7				1	150
	10		2	2	17	18	27	43	31	8	1				1	150
	11		1	10	19	22	32	34	24	6	1				1	150
	12	2	3	5	23	26	35	34	16	4	1				1	150
	13	2	4	18	18	27	41	26	11	2					1	150
	14	2	2	19	18	25	43	29	8	4						150
	15	3	1	8	25	30	43	27	10	2	1					150
	16	1	4	5	25	27	38	35	9	5	1					150
	17	2		3	16	34	41	30	19	3	1	1				150
	18		1	2	18	30	26	49	19	3	1	1				150
	19		1	2	9	20	29	48	29	8	2	2				150
	20			2	9	18	38	39	28	13	3					150
	21			2	12	25	28	36	32	13	1				1	150
	22		1	1	14	21	38	36	24	11	2	1			1	150
	23		1	2	13	24	32	43	21	11	1	1			1	150
	24			6	12	17	27	38	30	14	4		1		1	150
	TOTAL	18	21	104	328	526	785	864	587	250	82	14	4		17	3600
OCTOBER 1949 - 1953	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
	1			1	8	10	25	43	34	25	5	2	1	1		155
	2			3	6	15	30	45	30	19	5	1	1			155
	3			2	3	10	29	40	32	23	11	3	2			155
	4				2	13	18	35	41	28	11	5	2			155
	5		1		2	12	17	36	32	29	14	9	3			155
	6			1		5	18	32	38	34	18	7	2			155
	7					10	13	25	49	31	16	7	4			155
	8				1	7	22	33	46	21	16	6	1	1	1	155
	9		1	1	4	7	25	36	44	22	7	5	1	1	1	155
	10			4	4	15	37	32	45	5	10	2			1	155
	11		2	3	12	24	35	43	19	6	8	1		1	1	155
	12		1	8	21	38	33	34	13	6					1	155
	13		2	7	16	44	24	35	20	3	3					155
	14		1	6	17	28	47	26	18	10	2					155
	15		1	4	15	30	37	37	17	12	1	1				155
	16	1		1	8	31	34	43	22	11	4					155
	17			2	7	20	42	40	24	14	4	2				155
	18				4	13	26	44	42	12	12	1		1		155
	19	1		1	2	11	32	46	37	17	5	2		1		155
	20		1	1	4	12	30	38	40	15	10	3		1		155
	21	1		1	4	12	24	51	35	18	6	2	1			155
	22			1	8	13	28	46	30	17	10	1	1			155
	23			1	6	12	31	41	39	17	7	1				155
	24				6	12	30	38	35	24	6	4				155
	TOTAL	3	10	48	160	404	687	919	782	419	191	65	19	7	6	3720

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TABLE 324

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY												MISSING	TOTAL HOURS	
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19			≥.20
NOVEMBER 1949 - 1953	1			1	5	11	28	27	29	30	16	1		1	1	150
	2			1	6	13	26	28	30	31	12		1	1	1	150
	3			1	6	13	27	25	31	33	10	2	1		1	150
	4				5	8	25	35	25	24	19	5	3		1	150
	5			1	2	12	23	31	23	33	11	12		1	1	150
	6			1	3	7	26	27	22	22	23	12	5	1	1	150
	7				1	9	19	28	20	39	23	9	1		1	150
	8					11	22	22	32	25	26	9		2	1	150
	9				5	9	26	24	30	28	22	4	1		1	150
	10	1		2	4	10	24	25	35	30	15	2	1		1	150
	11	1	2	3	10	23	34	25	32	15	3	1			1	150
	12	2		4	15	29	32	30	23	10	3				2	150
	13			3	9	26	38	28	31	10	4				1	150
	14	3	1	2	6	19	37	29	30	16	3	1	2		1	150
	15		2	1	4	19	27	44	25	19	5	2	1		1	150
	16	1	1	1	7	8	31	38	24	25	9	3	1		1	150
	17		1	3	5	8	24	34	31	23	16	2	2		1	150
	18	1	1		1	5	16	37	45	23	19		1		1	150
	19			1	1	13	19	40	37	27	9	2			1	150
	20	1	2	1	4	10	21	30	46	21	8	5			1	150
	21			1	4	12	21	32	35	32	9	2	1		1	150
	22		1	1	3	7	24	32	39	28	12	1	1		1	150
	23			2	5	8	25	28	35	32	12	1	1		1	150
	24			1	4	13	21	35	32	33	9			1	1	150
	TOTAL	10	11	31	115	303	616	734	742	609	298	76	23	7	25	3600
DECEMBER 1949 - 1953	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY												MISSING	TOTAL HOURS	
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19			≥.20
	1		1	1	2	6	26	34	37	29	13	5	1			155
	2				6	8	20	32	33	37	11	6	2			155
	3				2	16	22	31	38	30	8	7	1			155
	4				2	12	28	30	35	30	12	5	1			155
	5				2	15	22	25	42	27	10	10	1	1		155
	6				1	13	10	30	41	26	24	9	1			155
	7			1	1	6	19	28	43	28	21	8				155
	8				1	7	17	31	25	32	29	12	1			155
	9				1	9	14	27	35	35	26	7	1			155
	10				3	12	21	39	34	35	9	2				155
	11			4	10	15	38	42	27	15	4					155
	12			6	11	22	33	47	21	12	3					155
	13			2	8	14	37	51	28	13	1		1			155
	14				5	11	30	49	30	18	10		2			155
	15				1	6	20	54	37	22	12	3				155
	16				2	10	21	38	37	24	18	4	1			155
	17				2	9	19	39	37	32	15	2				155
	18			1	1	9	16	23	47	37	15	6				155
	19				1	10	19	32	39	32	17	5				155
	20				3	11	29	23	45	23	14	6		1		155
	21			1	3	6	29	32	39	27	15	3				155
	22				4	12	22	31	33	32	16	4	1			155
	23				3	11	24	34	33	36	8	4	2			155
	24				4	15	27	36	29	28	10	5	1			155
	TOTAL		1	16	79	265	563	838	845	660	321	113	17	2		3720

TABLE 325

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
JANUARY 1950 - 1954	1				2	6	17	47	42	21	12	4	4			155
	2					4	12	31	51	22	27	5	3			155
	3		2		4	7	19	30	41	33	13	5		1		155
	4		1	3	2	5	22	33	43	29	9	6	2			155
	5			2	3	3	14	27	47	31	17	10	1			155
	6					3	12	40	35	33	20	8	3	1		155
	7				2	5	14	29	46	31	16	11	1			155
	8			1	2	3	12	23	41	40	22	5	3	3		155
	9				1	6	8	26	50	34	21	5	4			155
	10		1	1	2	9	13	31	40	33	16	8		1		155
	11	1	2	2	3	20	30	43	36	14	4					155
	12	1		4	3	28	35	42	36	6						155
	13		2	1	2	19	31	45	38	12	3	2				155
	14			1	5	14	19	33	40	28	13	2				155
	15		1		2	10	20	36	38	33	9	5		1		155
	16	1		2		10	16	32	37	31	17	9				155
	17				5	10	16	21	49	29	16	5	4			155
	18				2	7	16	32	35	38	22	2	1			155
	19			1	2	8	18	35	34	33	19	4		1		155
	20				2	6	30	32	37	28	12	7		1		155
	21			1	2	7	25	37	34	27	9	10	2	1		155
	22			1	2	9	29	37	27	22	17	4	4	2	1	155
	23				1	10	24	40	37	21	13	7	1	1		155
	24				5	11	25	38	39	22	11	2	2			155
	TOTAL	3	9	20	54	220	477	820	953	651	338	126	35	13	1	3720
FEBRUARY 1950 - 1954	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
	1	1		2	7	14	26	29	25	23	9	3	2			141
	2		1	1	5	16	20	40	32	12	9	2	2	1		141
	3		1	1	7	13	21	41	28	15	9	2	2	1		141
	4		1	1	5	13	17	35	30	17	13	6	1	2		141
	5		1		4	11	25	36	23	18	15	6	1	1		141
	6			2	2	9	21	28	32	21	17	5	3	1		141
	7	1		2	3	9	24	28	25	23	16	5	4	1		141
	8				6	10	16	29	31	26	13	7	2	1		141
	9			2	5	14	19	28	34	16	18	3	2			141
	10			3	7	9	25	30	26	22	14	4		1		141
	11		2		12	16	25	32	34	10	6	3	1			141
	12		2	5	16	26	33	29	14	8	7	1				141
	13			4	19	19	37	33	12	12	4	1				141
	14		2	5	6	12	44	29	22	13	6	1	1			141
	15		1	3	5	21	27	38	24	11	8		3			141
	16			2	8	13	28	35	23	21	8	2	1			141
	17		1	1	2	13	26	22	40	23	7	6				141
	18			1	5	9	17	32	39	17	13	7	1			141
	19			2	4	15	18	34	31	25	8	3	1			141
	20			3	8	17	13	30	37	16	10	4	3			141
	21			1	5	15	23	33	28	18	13	4	1			141
	22		2	3	7	13	26	25	28	20	10	5	2			141
	23		3	2	7	14	24	32	24	16	16	2	1			141
	24			2	5	16	19	36	26	21	11	4	1			141
	TOTAL	2	17	48	160	337	574	764	668	424	260	86	35	9		3384

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TABLE 326

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
MARCH 1950 - 1954	1	1		2	4	16	31	35	36	16	9	4			1	155
	2	1	2	2	1	20	35	46	28	14	4	1			1	155
	3	1	1	2	5	14	31	42	36	13	8	1			1	155
	4		1		4	16	24	38	33	24	13	1			1	155
	5		1		5	5	22	42	37	24	16	2			1	155
	6					8	19	41	45	22	9	9	1		1	155
	7			1	2	11	25	41	33	26	13	1	1		1	155
	8				4	5	26	48	31	27	9	3	1		1	155
	9			3	4	11	22	51	38	16	7	3				155
	10			4	4	17	29	43	36	11	9	2				155
	11	1	1	4	6	24	31	44	24	12	6	1	1			155
	12		2	2	12	23	48	31	25	10	2					155
	13		2	4	15	27	46	31	17	7	4	2				155
	14	1	1	4	10	23	45	33	21	12	2	1	2			155
	15		1	3	11	28	28	48	16	12	6	1	1			155
	16		2	3	6	17	36	44	24	12	6	4		1		155
	17			2	3	18	23	49	31	17	9	3				155
	18		2		5	15	37	39	33	16	5	3				155
	19			1	5	12	32	32	43	22	7		1			155
	20		2	1	1	13	30	38	42	16	11	1				155
	21	1		3	5	11	30	39	34	21	9	1			1	155
	22	1	2	2	5	14	26	51	24	17	12				1	155
	23	1		1	12	11	32	41	34	15	5	2			1	155
	24	1		3	3	19	29	41	30	20	7	1			1	155
	TOTAL	9	20	47	132	378	737	988	751	402	188	47	8	1	12	3720

	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
APRIL 1950 - 1954	1	1	3	7	20	31	38	32	16	1						150
	2	1		3	17	28	48	31	18	4						150
	3	2	1	9	10	27	42	35	17	7						150
	4		1	7	11	21	48	30	20	9	2			1		150
	5	1		5	8	22	30	42	26	11	5					150
	6	1	2		7	15	43	34	33	15						150
	7		1	3	12	20	37	46	23	6	2					150
	8		1	5	8	28	43	36	19	8	2					150
	9	1	1	2	13	26	43	39	19	5	1					150
	10		2	5	15	33	46	28	17	3	1					150
	11	1	4	7	28	38	32	29	9		1			1		150
	12	1	3	6	20	37	44	26	9	4						150
	13	1	2	13	21	38	35	27	12	1						150
	14	1	2	11	32	34	36	25	5	4						150
	15		2	8	26	31	38	29	11	5						150
	16		1	4	27	29	32	35	17	5						150
	17		2	6	17	29	39	35	15	5		1		1		150
	18	2	1	3	13	29	41	40	16	3	2				1	150
	19			2	13	26	35	37	26	10	1					150
	20		5	3	6	24	38	46	23	3	2					150
	21		2	4	13	26	46	37	21	1						150
	22		2	8	10	35	42	32	15	6						150
	23	2	5	5	10	31	38	34	15	9				1		150
	24			9	13	34	47	31	15	1						150
	TOTAL	15	43	135	370	692	961	816	417	126	20		1	4		3600

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TABLE 327

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
MAY 1950 - 1954	1	1	5	11	27	41	32	29	5	2					2	155
	2	2	6	8	21	36	44	23	11	2					2	155
	3		6	8	20	36	38	29	13	3					2	155
	4	2	3	7	14	39	40	25	13	9	2				1	155
	5		2	7	14	26	41	32	19	12	1				1	155
	6	1	2	2	13	31	55	29	14	6				1	1	155
	7		4	3	15	36	43	25	19	7	1				2	155
	8	2	2	8	23	29	43	25	13	6	2				2	155
	9	1	5	9	22	37	35	29	10	3	1		1		2	155
	10	3	4	11	24	35	36	24	13	2			1		2	155
	11	4	3	21	26	35	32	19	9	3				1	2	155
	12	2	4	18	35	34	35	17	6	1	1				2	155
	13	2	7	14	42	34	25	18	9		1				3	155
	14	3	10	12	39	40	17	20	9	2					3	155
	15	2	10	13	29	39	30	18	7	3	1				3	155
	16	2	7	14	34	34	27	17	14	2	1				3	155
	17	2	6	10	32	40	25	21	12	3	1				3	155
	18		6	8	33	33	38	25	5	4					3	155
	19		4	7	31	33	36	26	11	4					3	155
	20		3	5	19	32	43	32	13	4			1		3	155
	21	2	2	6	19	29	47	31	12	2	2				3	155
	22	1	5	4	21	41	48	20	9	2			1		3	155
	23	1	3	10	26	33	48	19	8	2	2				3	155
	24	2	3	12	22	52	30	21	7	2					4	155
	TOTAL	35	112	228	601	855	888	574	261	86	16		4	2	58	3720
JUNE 1950 - 1954	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY															
	HOUR	≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20	MISSING	TOTAL HOURS
	1	1	3	13	26	37	33	14	5	1					17	150
	2	3	3	13	31	31	30	15	4	2		1			17	150
	3	2	1	10	23	36	31	24	2	4					17	150
	4	2	5	11	14	32	38	18	10	2	1				17	150
	5	2	2	4	17	31	32	27	13	3	1			1	17	150
	6	2	3	5	17	28	28	37	8	4	1				17	150
	7	2	1	10	18	28	35	27	7	5					17	150
	8	1	1	12	23	32	32	22	10						17	150
	9	1	3	10	26	35	34	14	8	2	1				16	150
	10	3	2	13	27	31	32	17	6	2		1			16	150
	11	1	6	13	30	38	27	14	2	3		1			15	150
	12	2	6	20	29	33	20	16	7	2					15	150
	13	5	4	27	34	30	15	11	5	3	1				15	150
	14	9	7	14	29	35	23	9	6	1	1				16	150
	15	6	6	19	26	38	15	11	6	5	2				16	150
	16	3	10	20	27	26	21	14	10	1	1		1		16	150
	17	3	9	16	27	34	26	9	5	4	1				16	150
	18	5	4	10	33	32	21	19	6	4					16	150
	19	2	11	9	31	30	27	15	7	2					16	150
	20	1	5	10	28	27	33	19	8	2	1				16	150
	21	2	4	8	24	39	27	21	8	1					16	150
	22	2	4	13	25	32	36	13	7	1				1	16	150
	23	4	3	12	25	33	32	14	10	1					16	150
	24	4	4	11	19	38	33	17	5	2				1	16	150
	TOTAL	68	107	303	609	786	681	417	165	57	11	3	1	3	389	3600

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TABLE 328

Frequency Distributions of Difference in Hourly Station Pressure
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

MONTH	HOUR	CHICAGO MINUS ARGONNE PRESSURE IN INCHES OF MERCURY													MISSING	TOTAL HOURS
		≤.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	≥.20		
	1	7	16	59	145	277	361	386	280	170	72	19	8	2	23	1826
	2	11	13	46	140	270	382	386	294	156	78	16	9	2	23	1826
	3	7	13	48	122	257	385	386	298	193	64	22	6	2	23	1826
	4	6	13	40	96	249	358	392	317	200	92	28	10	3	22	1826
	5	3	8	25	90	198	338	411	339	223	104	55	6	4	22	1826
	6	5	7	15	66	184	335	407	364	222	128	51	16	4	22	1826
	7	4	6	26	75	204	341	398	347	226	122	41	12	1	23	1826
	8	3	4	29	106	209	349	376	316	224	126	43	9	7	25	1826
	9	3	11	36	125	241	340	374	332	188	114	27	10	1	24	1826
	10	7	13	61	141	259	368	373	310	166	80	21	2	2	23	1826
	11	9	25	88	209	327	391	372	240	97	33	8	2	3	22	1826
	12	11	23	97	235	366	422	359	198	71	20	1			23	1826
	13	10	36	113	237	361	395	343	206	71	25	5	1		23	1826
	14	21	32	108	221	315	410	322	209	118	37	5	7		21	1826
	15	12	32	90	196	330	361	375	211	134	46	12	5	1	21	1826
	16	10	28	80	207	287	352	366	237	146	65	22	4	1	21	1826
	17	7	21	70	169	298	359	338	284	160	72	21	7		20	1826
	18	8	17	43	162	272	332	379	315	161	93	20	3	2	20	1826
	19	3	20	40	148	245	364	391	317	186	69	19	2	2	20	1826
	20	2	19	32	122	234	403	392	346	151	72	26	4	3	20	1826
	21	6	11	37	128	243	394	408	317	168	64	22	5	1	22	1826
	22	5	19	40	138	265	407	388	266	166	80	16	10	3	23	1826
	23	9	20	41	146	252	394	386	294	170	66	18	5	2	23	1826
	24	8	10	54	129	299	369	395	275	179	60	17	5	2	24	1826
	TOTAL	177	417	1318	3553	6442	8910	9103	6912	3946	1782	535	148	48	533	43824

(U) Wind

The hourly observations of wind speed and direction at the Chicago Midway Airport U. S. Weather Bureau Station and the Meteorology Laboratory at Argonne are compared in the following series of tables. It should be pointed out, however, that the elevation of the two anemometers used for this section of the report differs. The one at Argonne is located at nineteen feet above the ground. The anemometer at the Chicago Midway Airport is located at 37.75 feet above the ground. Because of this difference in height, the wind speed was usually higher at the Airport. The average wind speed difference between the two stations was 2.1 miles per hour; however, at times there was considerable variation in this quantity, as is indicated by the tables below.

1. Frequency Distributions of Difference in Hourly Wind Speed at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 329 through 335: An examination of these tables shows that the wind speed values were higher at the Chicago Midway Airport than at the Argonne station during a major portion of the observation times. Table 335 shows that the Argonne speed values were higher on only 16.1% of the readings (7072 observations) and were equal to the Airport values on 11.0% of the readings (4834 observations).

These tables indicate that the wind speed differences were also subject to a diurnal variation. The time difference between hourly readings, i.e., on-the-hour readings at Argonne as compared with 20-minutes-past-the-hour readings at the Airport, masked the true diurnal variation. When the data were corrected for this time difference, a pronounced maximum appeared in the wind speed difference readings for the hours of darkness - the late afternoon, evening, and early morning readings. This maximum may be explained, at least in part, by the difference in elevation of the two anemometers. During the hours of darkness the atmosphere is usually stable and the wind speed increases with height more markedly than under unstable conditions. It is, therefore, not surprising that the Airport, with its anemometer at 37.75 feet above ground, exhibited relatively higher wind speeds during the hours of darkness than Argonne, with its anemometer located at 19 feet above ground.

2. Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport and Argonne Meteorology Laboratory

Tables 336 through 342: The correlation between the wind direction at the two places is quite high; however, there is a considerable spread in the data. For a given wind direction at one location, the wind

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may have been from almost any direction at the other. The greatest differences occurred when the wind speeds were quite small. With higher wind speeds, the direction differences were smaller.

3. Monthly Frequency Distributions of Difference in Daily Peak Gust Speeds at Chicago Midway Airport and Argonne Meteorology Laboratory

Table 343: The daily peak gusts were higher at the Chicago Midway Airport for more than 80% of the days. Only one year of data is presented in this table, since the Airport did not tabulate their daily peak gusts in the first four years of this study.

4. Monthly Wind Speed Comparisons

a. Monthly Average of Daily Peak Gusts at Chicago Midway Airport and Argonne Meteorology Laboratory

Table 344: Only one year and five months of peak gust data for the Chicago Midway Airport were tabulated for comparison. However, the peak gusts for each month of the Argonne data in the five-year period of study are presented. When monthly averages of the daily peak gust were computed, the values for the Chicago Midway Airport were higher than those for the Argonne Meteorology Laboratory. In the seventeen months of comparative data, the differences did not exceed five miles per hour.

b. Monthly Average Wind Speeds at Chicago Midway Airport and Argonne Meteorology Laboratory

Table 345: These averages are based on all of the hourly observations during each month. As is to be expected from the previous tables, the average speeds were higher at the Airport station. Also of interest are the higher average wind speeds in the winter and spring, as compared to those in the summer and fall.

c. Comparison of Monthly Peak Gusts at Chicago Midway Airport and Argonne Meteorology Laboratory

Table 346: Since peak gusts are frequently associated with convective activity and the maximum gusts from a particular convective cell are confined to a relatively small area underneath the cell, it is not surprising that the peak gusts at Argonne were frequently higher than those at the Chicago Midway Airport. Most of the monthly peak gusts, both at the Chicago Midway Airport and the Argonne Meteorology Laboratory, were in the 30-60 mph range.

TABLE 329

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.	
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9				
JULY 1949 - 1953	1					2	5	11	14	17	31	24	22	8	9	4	1	1	1	5	155	0212	
	2				1		3	9	17	22	30	22	22	12	6	3	2		1	5	155	0212	
	3				2		3	9	18	28	23	22	15	17	4	4	3		1	5	155	0198	
	4				2		2	5	7	19	26	24	23	20	11	6	4		1	5	155	0198	
	5		1			1	3	9	12	17	36	21	19	9	10	7	4	1		5	155	0248	
	6					1	1	2	2	11	13	31	30	30	7	6	8	4	3	1	5	155	0318
	7							9	4	19	28	26	23	21	9	7	1	3		5	155	0329	
	8				1		2	1	3	10	20	25	28	28	11	11	6	3		2	4	155	0306
	9						2	4	12	17	23	21	21	21	16	9	2	2	1	4	155	0361	
	10			1			3	1	7	7	15	18	25	28	20	16	5	3	3		3	155	0344
	11					1		3	5	14	11	17	26	23	26	10	8	2	3	2	4	155	0360
	12		1				1	2	3	8	9	12	30	26	20	24	10	2	1	2	4	155	0422
	13					2	3	4	4	9	12	19	30	16	15	19	8	6	2	2	4	155	0361
	14				1	1		3	7	4	13	21	18	34	17	10	11	2	6	3	4	155	0399
	15				3	1		1	1	6	25	20	23	19	26	8	8	5	2	3	4	155	0361
	16						2	3	4	9	18	20	24	26	16	11	8	7	1	2	4	155	0354
	17			1		2	3	1	7	6	11	17	21	31	21	12	11	5	1	1	4	155	0362
	18				1		1	5	2	6	14	26	20	23	25	10	8	5		5	4	155	0379
	19				1	1	1		2	12	10	27	28	21	26	11	3	5	1	2	4	155	0356
	20							3	6	7	21	22	26	29	17	3	8	4	2	3	4	155	0337
	21							2	3	9	21	30	23	24	15	10	6	4	2	2	4	155	0339
	22							2	2	12	22	33	27	22	15	4	7		4	1	4	155	0296
	23								9	13	16	25	36	21	16	6	1	4	2	1	5	155	0282
	24						2	2	4	11	27	23	32	15	15	7	8	2	1	1	5	155	0273
TOTAL			2	2	7	12	25	56	129	250	424	581	606	558	407	238	162	76	42	39	104	3720	07607
AUGUST 1949 - 1953	1					1	2	7	13	28	27	21	16	25	7	4	1	2		2	155	0266	
	2						3	4	11	15	18	25	32	16	14	11	1	3	1	1	2	155	0248
	3						3	3	6	16	29	18	24	21	23	7	1	1		2	155	0231	
	4							1	9	10	28	25	24	22	20	8		1		2	155	0267	
	5					1	2		5	14	21	18	38	24	21	8		1		2	155	0263	
	6								3	7	18	25	36	24	16	12	7			2	155	0358	
	7								5	4	22	24	30	26	24	8	5	1	1	3	2	155	0357
	8							5	5	8	23	20	33	16	16	12	8	6	1	1	155	0317	
	9				1	2		9	10	17	22	17	25	20	21	6	1	1	1	2	155	0333	
	10			1			1	4	8	9	9	14	22	21	26	17	12	7	2	1	1	155	0410
	11						1	4	7	7	18	17	19	24	23	16	13	4		1	1	155	0378
	12					2	1	3	2	9	11	19	26	20	21	12	14	10	4		1	155	0425
	13				1			5	5	7	13	23	30	21	18	16	7	3	6			155	0371
	14					2	1	1	4	6	16	17	23	32	18	14	9	3	4	4	1	155	0417
	15						2	1	3	6	22	16	19	17	20	21	14	8	4	1	1	155	0450
	16				1		2	5	7	9	19	20	16	20	21	15	9	5	2	4		155	0360
	17						1	4	7	9	20	21	22	24	21	17	12	4		2		155	0413
	18					2	2	5	3	16	15	32	23	30	9	9	5	2	2			155	0411
	19					1		3	4	9	15	17	23	25	22	15	7	7	4	2	1	155	0411
	20						1		9	7	16	24	28	26	16	10	3	6	3	4	2	155	0364
	21								3	9	18	20	28	24	20	12	8	6	3	2	2	155	0405
	22							1	2	12	14	32	27	18	25	5	10	6		1	2	155	0357
	23						1	1	3	14	16	26	22	22	25	7	12		2	2	2	155	0351
	24					1		3	7	16	18	18	31	24	13	9	8	2	1	2	2	155	0295
TOTAL				2	4	6	18	51	133	227	445	503	623	531	498	289	183	95	45	34	33	3720	08458

TABLE 330

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.	
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9				
SEPTEMBER 1949 - 1953	1						1	6	13	20	24	21	23	19	11	5	3	1	2	1	150	0317	
	2			1			7	4	11	15	20	23	31	12	11	7	3	1	3	1	150	0314	
	3						2	7	12	13	27	25	22	16	11	4	1	4	4	2	150	0332	
	4						1	9	14	17	14	28	28	13	11	7	2	1	2	2	150	0306	
	5						2	4	4	15	19	21	28	21	12	10	6	4	1	1	2	150	0277
	6							2	2	9	26	21	20	23	10	16	10	8	1		2	150	0355
	7						1	2	1	4	14	16	22	30	19	15	18	3	2	1	2	150	0439
	8							2	2	7	12	15	24	22	25	21	13	5	2		2	150	0452
	9						1	1	2	5	8	19	19	30	31	13	7	3	5	4	2	150	0462
	10						2	2	3	7	13	17	24	24	19	18	11	5	3		2	150	0401
	11						2	3	5	8	11	16	28	28	16	12	10	9	1		1	150	0376
	12							4	10	16	13	25	25	23	13	8	4	6	2		1	150	0421
	13			1		1	1	7	6	11	13	17	15	22	23	15	10	5		1	2	150	0324
	14							6	6	7	14	20	19	18	21	16	12	4	2	4	1	150	0392
	15					1	2	4	3	13	15	13	14	21	20	20	11	9	1	2	1	150	0398
	16				1			1	4	9	14	15	24	27	14	16	13	6	4	2		150	0424
	17					1		1		4	16	23	24	20	23	12	10	8	6	2		150	0453
	18						1		2	3	9	16	24	23	26	21	10	4	6	4	1	150	0506
	19							1	3	6	10	17	24	26	17	17	16	6	1	5	1	150	0476
	20					1	1		1	4	9	17	30	26	28	13	8	6	2	3	1	150	0452
	21							1	4	1	13	29	24	21	26	8	10	7	3	2	1	150	0424
	22			1		1		2	3	10	11	23	24	26	25	9	5	4	2	3	1	150	0362
	23							1	4	11	18	19	28	28	16	10	5	3	1	4	2	150	0348
	24					1		2	3	8	27	30	26	18	11	15	6	1	1		1	150	0281
TOTAL			3	1	6	14	51	88	202	353	462	563	583	465	334	222	113	57	51	32	3600	09292	
OCTOBER 1949 - 1953	1					5	5	5	18	18	20	25	14	15	12	5	6	5	1	1	155	0290	
	2					2	3	9	14	24	20	25	16	17	8	6	5	3	2	1	155	0290	
	3					2	5	9	11	16	29	25	17	14	16	3	1	3	3	1	155	0292	
	4			1		1	4	7	10	17	19	31	22	15	10	5	6	2	4	1	155	0339	
	5					1	6	5	12	18	30	21	24	12	7	10	3	3	2	1	155	0307	
	6						1	4	5	6	20	23	27	25	23	5	7	1	1	5	2	155	0344
	7						1	4	2	9	10	31	20	27	19	10	8	4	4	4	2	155	0395
	8							3	6	9	21	13	26	18	25	20	4	3	4	1	2	155	0376
	9						1	3	1	6	17	21	26	30	16	11	7	8	2	3	3	155	0402
	10							3	4	6	11	24	30	23	18	13	12	5	2	1	3	155	0403
	11				1		1	3	6	7	16	24	20	20	21	15	13	4	1		3	155	0359
	12						1	2	5	8	12	31	17	24	21	14	6	4	4	2	4	155	0381
	13					3	1	4	7	13	18	22	26	19	12	13	9	2	2	1	3	155	0279
	14					3		1	5	7	21	24	25	20	25	8	7	2	3	2	2	155	0339
	15			1		1	2	1	3	9	18	21	22	30	17	9	13	2	2	1	3	155	0348
	16						1	3	9	11	18	20	20	22	22	10	6	4	6	2	1	155	0353
	17					1	1	1	2	7	22	21	27	20	25	13	6	5	3		1	155	0372
	18						1	1	2	7	17	22	16	26	24	16	14	2	1	5	1	155	0447
	19						1	2	4	5	13	16	30	22	22	17	8	2	4	8	1	155	0480
	20				1			3	6	7	16	22	22	20	24	11	8	6	4		1	155	0407
	21							1	6	10	20	15	25	21	13	18	13	5	5	1	2	155	0407
	22							2	3	18	17	27	22	16	16	13	6	5	3	5	2	155	0358
	23						3	4	2	13	21	20	26	15	18	11	5	9	4	3	1	155	0362
	24			2		1	1	1	6	13	11	26	27	17	20	12	8	3	2	3	2	155	0334
TOTAL			3	3	9	27	69	119	236	412	541	581	508	454	292	189	97	73	63	44	3720	08664	

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TABLE 331

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9			
NOVEMBER 1949 - 1953	1	1			1		1	7	15	20	14	20	14	18	12	14	5		5	3	150	0359
	2		1			3	4	1	6	17	22	22	13	23	10	13	3	3	6	3	150	0394
	3			1	1	1	4	7	10	18	23	21	10	19	10	10	6	1	5	3	150	0341
	4			1	1	1	2	6	6	19	15	13	29	23	10	6	7	2	6	3	150	0389
	5			1		3	3	6	7	14	21	21	19	14	18	11	4	3	2	3	150	0359
	6					1	1	11	9	16	21	20	21	16	7	6	10	5	3	3	150	0369
	7					6	5	9	9	14	26	16	20	18	14	6	3	3	7	3	150	0373
	8			1		2	3	3	10	11	7	21	24	18	18	11	8	4	5	3	150	0446
	9	1		1	2	3	2	4	4	12	21	17	17	20	16	8	6	3	9	4	150	0412
	10	2			1	3	2	3	11	13	17	20	29	13	12	12	5	2	3	2	150	0360
	11				1	2	2	7	7	4	19	20	15	21	13	9	10	2	3	3	150	0336
	12	1	1		2	3	6	5	12	17	13	16	22	18	17	4	5	3	1	4	150	0286
	13			1	2	2	6	8	5	13	19	17	22	17	12	9	6	3	3	4	150	0326
	14				2	1	6	14	5	13	16	14	16	22	18	8	6	1	5	3	150	0354
	15	1		1		2	5	5	5	10	13	25	21	20	11	14	7	3	4	3	150	0399
	16			1		1		4	6	12	12	27	16	24	17	9	10	2	4	2	150	0322
	17				2	1	4	5	5	15	20	14	23	24	13	12	6	3	1	2	150	0385
	18				1		3	5	9	9	18	23	19	20	14	10	2	4	11	2	150	0457
	19			1	2	2	2	2	9	18	15	22	13	11	27	12	6	4	4	2	150	0431
	20			2	1	1	2	5	9	15	16	26	21	13	12	14	7		4	2	150	0368
	21				1		2	5	10	14	14	21	29	18	17	8	2	1	5	3	150	0394
	22	1			1		4	3	14	18	12	28	18	14	15	11	4	2	2	3	150	0336
	23					1	4	4	10	8	20	21	20	21	15	12	5	4	2	3	150	0404
	24					1	2	10	9	9	22	21	23	22	12	6	5	3	2	3	150	0357
TOTAL	5	4	6	7	22	33	85	137	205	344	432	470	488	432	331	236	130	63	100	70	3600	08957
DECEMBER 1949 - 1953	1			1	1	1	4	12	14	18	18	15	25	13	13	13	5	1			155	0289
	2			1		3	6	9	8	12	24	19	21	21	10	5	7	7	2		155	0350
	3				3	2	5	7	12	21	24	18	19	15	9	11	5	2	2		155	0293
	4			1	1	2	4	7	13	15	28	18	23	15	9	7	6	4	2		155	0316
	5			1	1	2	2	12	11	14	17	25	20	17	10	13	4	1	5		155	0348
	6	1		1	2	4	1	9	11	15	12	22	23	14	18	9	5	3	5		155	0356
	7		1	1	1	1	3	8	9	20	23	28	16	15	10	8	6	1	4		155	0317
	8				1	3	4	3	12	15	24	15	29	20	13	7	4	3	2		155	0353
	9			1	2	2	1	8	7	9	18	19	27	26	17	9	1	2	5		155	0401
	10			2	3	1	1	8	9	15	26	32	13	20	13	5	4		3		155	0307
	11				1	1	4	7	10	12	13	18	27	17	18	18	4	3	1	1	155	0269
	12			1	2	1	1	3	5	14	18	21	24	18	25	12	4	3	2	1	155	0300
	13				2	2	4	6	6	11	17	23	22	24	16	11	5	3	1	1	155	0250
	14		1		1	2	3	5	6	15	26	17	25	17	9	9	7	4	4	4	155	0261
	15				1	3	7	8	10	17	14	19	22	18	17	9	5	3	2		155	0344
	16			1	1		3	9	10	9	18	19	18	22	14	19	5	2	3	3	155	0289
	17		1			1	7	5	13	16	17	32	22	13	10	6	6	4	2		155	0322
	18			1	2	4	9	9	10	16	23	20	20	16	9	6	5	3	2		155	0257
	19	1			1	5	4	7	8	15	30	20	17	18	12	7	3	4	2		155	0289
	20				3	10	6	10	10	21	17	18	23	16	11	9	7	2	2		155	0315
	21			1	3	3	4	5	16	18	11	20	25	17	14	6	3	3	3		155	0283
	22				4	6	10	13	14	25	22	13	15	11	10	5	3	4			155	0315
	23			1	3	3	2	10	10	19	20	23	22	16	13	7	3	1	2		155	0283
	24				3	2	5	7	8	14	20	22	25	21	13	7	1	5	2		155	0336
TOTAL	2	3	10	17	33	64	115	187	265	396	489	523	502	408	301	179	100	63	61	2	3720	07443

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TABLE 332

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.		
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9					
JANUARY 1950 - 1954	1					2	4	8	16	13	14	29	21	19	9	7	4	3	4	2	155	0341		
	2				1	1	5	10	21	16	17	27	15	10	14	7	3	2	4	2	155	0278		
	3				1	2	5	10	12	10	19	27	23	23	9	5	5	1	1	2	155	0303		
	4					5	5	6	12	14	21	28	23	15	12	3	3	4	2	2	155	0297		
	5				4	3	3	6	8	17	20	30	16	12	14	11	4	2	3	2	155	0325		
	6					1	2	7	8	13	14	21	20	19	16	12	5	8	1	6	2	155	0333	
	7					1	2	3	5	13	17	21	23	19	14	15	8	5	3	3	2	155	0337	
	8			1			4		10	8	14	24	29	9	21	9	8	6	7	4	2	155	0379	
	9						3	3	4	10	13	25	20	24	23	8	10	7	2	2	1	155	0374	
	10					1	2	4	6	12	18	20	26	27	14	13	5	4	2	1	155	0299		
	11						3	5	5	14	19	15	26	29	11	9	2	7	4	2	1	155	0289	
	12				1		1	6	5	14	9	25	29	23	15	15	4	3	3	1	1	155	0315	
	13					2	3	2	6	18	23	14	22	19	21	11	6	3	2	2	1	155	0287	
	14			1			3	1	8	10	17	21	26	18	20	10	6	4	6	3	1	155	0350	
	15						3	7	4	6	19	20	31	15	15	16	8	7	1	2	1	155	0343	
	16					1	1		4	7	12	24	21	24	18	18	10	7	3	1	3	155	0278	
	17				1		1		1	3	4	9	18	15	25	26	20	11	7	6	2	155	0375	
	18			1			2	1	3	8	10	11	22	21	23	14	10	13	2	5	7	2	155	0379
	19						2	5	9	10	10	15	15	31	20	14	4	8	5	5	2	155	0409	
	20					1	2	4	8	10	19	15	24	20	17	14	7	8	1	3	2	155	0343	
	21				1	1	2	1	5	6	14	16	26	27	20	12	8	8	2	3	2	155	0392	
	22			1				4	3	9	24	13	22	22	17	18	6	7	3	4	2	155	0398	
	23						1	6	4	17	14	24	20	23	16	14	4	5	3	2	2	155	0323	
	24				1		1	3	5	12	18	24	26	19	12	14	8	5	1	4	2	155	0349	
TOTAL			2	4	5	19	49	93	154	282	385	462	596	509	403	293	159	125	66	72	42	3720	08096	
FEBRUARY 1950 - 1954	1				1	1	2	3	7	13	18	18	20	18	16	3	9	9		2	1	141	0272	
	2	1				3	3	6	14	10	24	18	16	12	8	12	8		4	1	141	0300		
	3		1			4	5	7	14	16	16	23	14	19	6	5	7		1	1	141	0246		
	4			1	2	1	9	8	14	20	9	19	20	16	10	3	2	5	1	1	141	0224		
	5			1	2	3	3	6	11	19	14	28	24	10	7	4	4		3	1	141	0231		
	6					4	2	6	11	17	23	18	20	18	7	5	5	3	1	1	141	0279		
	7				1	3	5	7	11	18	15	23	20	12	10	7	5	1	2	1	141	0264		
	8	1		1	1	1	3	3	6	14	20	21	19	9	14	14	7	3	2	2	1	141	0241	
	9			1		4	3	12	10	15	20	19	20	18	3	7	5	1	1	2	141	0232		
	10					2	4	5	9	11	16	17	22	17	22	8	4	2	1	1	141	0216		
	11					1	2	5	3	5	15	11	19	20	24	15	9	5	5		1	141	0223	
	12			1		2	3	4	4	6	9	18	11	25	22	15	13	2	5	1	1	141	0231	
	13				1	3	2	5	7	12	22	10	23	25	16	9	2	1	2		1	141	0204	
	14				2	2	2	6	6	11	20	18	22	14	12	15	3	3	1	2	1	141	0211	
	15			1	1		2	11	6	7	16	15	20	26	15	9	3	4	1	3	1	141	0245	
	16					1	3	6	4	11	16	22	27	15	13	10	6	2	3		1	141	0237	
	17			1		2	1	11	5	8	15	21	23	22	9	11	7	1	3		1	141	0222	
	18					2		1	7	9	18	20	27	18	14	6	9	3	2	4	1	141	0306	
	19					3	1	3	8	6	15	23	21	20	13	12	9	3	1	1	1	141	0271	
	20	1			1	2	2	7	6	12	11	21	19	20	20	5	5	3	2	4	1	141	0263	
	21					2	1	2	8	8	15	25	15	19	11	17	10	4	1	2	1	141	0311	
	22			1		2		5	5	10	13	19	22	17	17	11	8	5	3	2	1	141	0309	
	23						3		10	10	15	21	17	16	18	13	8	4	3	2	1	141	0316	
	24					1	3	5	10	8	17	15	11	26	15	13	7	4	3	2	1	141	0297	
TOTAL	3	7	8	10	34	57	110	167	259	391	437	501	462	360	229	147	97	42	38	25	3384	06151		

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TABLE 333

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.	
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9				
MARCH 1950 - 1954	1		1		1	3	4	4	9	5	13	23	20	27	14	13	12	1	2	3		155	0311
	2		1		3	2	4	8	8	19	19	23	18	18	8	11	6	4	3		155	0329	
	3	1			1	1	1	6	4	12	16	21	20	21	18	12	10	3	4	4		155	0340
	4			1				5	4	7	18	25	20	24	21	9	10	4	4	3		155	0377
	5				2	1	2	4	9	13	19	16	32	13	15	9	11	3		5	1	155	0294
	6				1		1	5	7	14	19	23	17	15	20	15	6	5	2	4	1	155	0330
	7				1	1		3	5	7	14	20	23	24	20	13	7	3	6	6	1	155	0409
	8				1	1	2	1	2	9	15	15	21	24	18	18	9	11	3	3	1	155	0295
	9	1			1	3	3	2	7	18	34	13	21	20	18	4	1	3	4	2		155	0205
	10				2	1	2	6	13	16	12	21	23	20	14	12	4	6	3			155	0248
	11				1	3	5	5	9	18	16	26	18	17	17	10	3	5	4			155	0232
	12				1	1	5	6	15	12	25	20	23	10	17	6	6	3	2	3		155	0203
	13				2	1	5	6	2	12	12	24	16	21	18	15	9	4	5		3	155	0195
	14				1	1	8	4	9	10	23	24	24	18	7	8	5	6		7		155	0250
	15		1		1	3	6	10	15	16	12	17	26	9	14	9	5	6		5		155	0190
	16				2		2	3	8	10	19	17	22	12	24	13	13	4	6			155	0202
	17				1	3	5	6	11	11	29	14	23	15	14	7	7	3	3	2		155	0203
	18					3	1	1	2	10	12	10	20	20	27	18	15	8	4	1	3	155	0337
	19				2		3	2	6	11	17	22	21	19	22	13	9	1	3	4		155	0342
	20			1	3	1	2	5	7	13	12	17	23	22	18	14	6	6	1	4		155	0316
	21				1	1	2	3	9	6	18	24	26	16	24	8	6	3	2	6		155	0345
	22				1	1	4	6	8	8	22	26	19	22	12	7	8	6	3	1		155	0261
	23				1	2	2	4	4	8	23	16	24	23	21	10	7	4	3	1		155	0304
	24	1				2	5	6	9	10	5	20	27	19	17	18	8	2	4	2		155	0320
TOTAL	3	3	12	30	38	71	110	209	281	432	486	530	459	405	251	169	97	58	72	4	3720	06838	

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.	
	≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9				
APRIL 1950 - 1954	1				1	3	6	13	13	21	15	17	23	16	9	4	3	3	1	2	150	0231	
	2				1	2	3	9	13	19	19	22	17	16	5	10	8	1	3	2	150	0303	
	3		1			2	7	12	15	18	16	16	20	14	11	7	5	2	2	2	150	0255	
	4				1	3	3	12	17	23	13	17	22	13	9	5	5		4	2	150	0240	
	5				1	6	5	11	11	20	25	14	20	18	5	7	2		3	2	150	0219	
	6	2			1	3	3	9	13	19	19	24	21	12	5	7	7		2	3	150	0244	
	7				1	1	6	9	11	17	24	26	15	18	11	3		4		3	150	0235	
	8			2		2	4	12	4	16	18	17	22	9	11	4	5	2		3	150	0176	
	9			1		1	3	3	11	17	21	18	22	19	13	8	4	3	3	1	150	0209	
	10					4	6	8	8	19	19	17	22	16	6	16	7	1		1	150	0159	
	11			1	1	2	5	9	11	9	24	29	15	15	13	4	5	2	1	2	1	150	0146
	12				3	4	2	4	15	10	18	25	23	12	13	9	4	2	1	3	2	150	0184
	13	1			2	1	7	5	8	16	18	22	19	12	18	6	4	6	2	2	1	150	0195
	14	1			1	4	2	6	7	18	19	15	17	18	18	14	6	2		1	150	0194	
	15	2	1	1	1	4	4	4	12	11	15	23	15	18	18	6	7	6	1		1	150	0179
	16		1			4	3	6	11	21	16	21	19	20	9	7	4		2	2	1	150	0128
	17			3		1	7	7	9	15	21	15	25	9	18	12	2	2	1	1	2	150	0159
	18			1	1	3	2	6	12	10	30	16	18	22	11	7	4	2	3		2	150	0171
	19				1	1	2	4	10	11	18	21	28	17	13	8	7	5	1	1	2	150	0252
	20				1	3	2	7	4	12	17	21	25	16	13	9	7	4	3	4	2	150	0281
	21					1	3	1	6	11	6	17	23	21	17	18	7	8	4	2	2	150	0275
	22					3	3	6	6	5	21	27	16	21	13	5	10	6	3	3	2	150	0289
	23	1				4	3	4	8	11	15	17	20	18	8	17	8	5	2	7	2	150	0317
	24	1		1		1	3	3	8	14	18	27	11	21	11	7	6	6	3	7	2	150	0290
TOTAL	8	7	15	16	47	79	133	230	314	462	486	469	431	329	208	140	91	39	52	44	3600	05331	

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TABLE 334

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory

	HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																			MISS- ING	TOTAL	SUM OF WIND SPEED DIFF.	
		≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9				
MAY 1950 - 1954	1						3	7	8	10	14	25	26	17	19	10	5	4	3	4		155	0315	
	2					2	1	7	7	19	20	15	20	20	20	6	9	5	3	2		155	0292	
	3					1	1	3	13	17	21	22	21	14	16	8	7	4	3	4		155	0279	
	4		1			2	4	3	4	13	25	26	24	16	16	7	9	1	3	1		155	0253	
	5						6	3	8	13	23	24	18	19	10	13	11	2	4	1		155	0281	
	6	1					2	4	6	12	14	15	25	25	18	12	7	8		5		155	0357	
	7				1		2	5	5	9	19	26	30	18	13	14	6	2	3	2		155	0307	
	8				1		2	3	9	15	15	15	22	31	17	18	3	1	2	1		155	0306	
	9				1	3	2	1	8	17	16	24	20	25	11	9	6	4	4	2	2	1	155	0279
	10				2	3	4	5	7	10	11	14	31	23	16	14	7	4		3	1	155	0294	
	11						3	2	10	16	8	21	17	27	25	8	8	6	1	2	1	155	0339	
	12			1	1		6	10	6	17	20	18	21	29	5	14	3		3	1	1	155	0337	
	13		1		1		2	3	7	8	13	32	21	24	10	13	10	2	4	1	3	155	0313	
	14					4	1	3	8	13	18	11	19	27	15	14	8	7	2	4	1	155	0349	
	15				1		3	2	5	14	9	24	20	20	18	13	9	9	3	5		155	0406	
	16				1	2	3	4	7	16	11	20	24	17	22	12	10	2	2	2		155	0305	
	17					2	5	11	15	14	24	22	16	15	8	11	4	6	2	2		155	0317	
	18					1	2	14	16	20	20	24	19	16	9	6	6		2			155	0280	
	19			1		2	3	7	12	21	21	30	17	16	16	3	5	1				155	0287	
	20					2	5	5	12	18	26	21	28	14	15	6	2		1			155	0297	
	21				1	3	4	6	18	21	20	25	20	12	10	10	3	1	1			155	0266	
	22				1	2	7	8	14	22	22	24	13	19	14	3	2	2	2			155	0260	
	23					6	9	16	21	22	19	28	11	10	7	4	1	1	1			155	0273	
	24				1	1	2	5	9	8	14	23	30	21	18	10	7	3	1	2		155	0299	
TOTAL	1	2	2	12	19	52	98	191	319	405	512	551	506	396	268	182	93	49	53	9	3720	07291		
JUNE 1950 - 1954	1			1		1	4	13	11	17	25	21	21	13	7	7	4		2	3	150	0246		
	2					2	7	7	16	17	15	19	23	15	14	6	3	1	1	3	150	0270		
	3					4	4	6	11	21	24	24	14	19	7	5	2		3	4	150	0237		
	4						5	9	6	15	26	25	20	20	7	4	1	2	2	4	150	0267		
	5						5	9	14	11	18	27	23	16	7	10	5	1		4	150	0296		
	6					2	3	7	10	16	16	23	20	22	11	8	4	1	3	4	150	0341		
	7				1		2	5	9	23	15	26	19	20	14	7	4		1	4	150	0323		
	8					2	2	2	10	14	21	25	25	16	17	7	3	2	1	3	150	0357		
	9					1	6	5	23	21	21	26	18	12	7	2	2	2	4	1	150	0344		
	10		1	1		1	1	8	11	12	19	25	20	17	12	8	1	5	5	3	150	0348		
	11					1	1	5	2	13	12	18	32	18	24	9	8	3	1	1	2	150	0322	
	12						4	3	11	17	19	17	30	18	14	6	5	1	2	3	150	0355		
	13					1	2	2	4	9	22	20	21	17	19	12	11	5	2	2	1	150	0349	
	14					1	2	8	7	6	16	18	10	19	22	13	9	9	4	5	1	150	0390	
	15			2		1	2	2	6	11	16	13	27	22	13	16	8	5	2	4		150	0349	
	16						3	4	8	7	18	16	23	15	16	15	8	6	3	4		150	0336	
	17		1	1	1	1	5	4	9	11	13	26	11	25	19	12	8	3	1	1		150	0274	
	18					2	3	9	13	11	19	32	18	15	12	10	4	2				150	0313	
	19				1	2	2	4	6	18	26	22	21	22	16	2	4	2	2			150	0344	
	20	1				1	4	2	15	11	29	23	22	17	12	8	5					150	0306	
	21						3	3	13	10	18	22	20	21	19	12	3	1	2			150	0379	
	22				1	1	2	8	10	17	17	23	21	9	15	13	7	1	5			150	0382	
	23					3	4	4	13	17	30	16	19	19	12	7	3	2	1			150	0299	
	24		1			2	2	3	8	8	18	16	21	23	23	6	9	5	1	3	1	150	0315	
TOTAL	1	3	5	3	16	42	84	149	249	385	485	536	501	433	291	188	96	37	52	44	3600	07742		

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TABLE 335

Frequency Distributions of Difference in Hourly Wind Speed
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1949 - June 1954

HOUR	CHICAGO MINUS ARGONNE WIND SPEED (MPH)																				TOTAL	SUM OF WIND SPEED DIFF.
	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	MISS- ING		
1		2	2	3	7	23	46	106	155	217	254	259	241	195	115	89	46	21	25	20	1826	3449
2	1	1	2	5	6	19	56	90	162	209	250	272	228	190	111	90	56	26	32	20	1826	3580
3	1	2		2	13	21	52	97	160	227	262	266	210	213	110	72	43	23	30	22	1826	3347
4		1	3	3	7	24	47	88	141	237	245	270	269	198	108	67	38	29	29	22	1826	3473
5		1	2	5	8	30	43	90	141	212	260	303	242	166	118	101	40	16	25	23	1826	3448
6	4		1	2	5	21	34	75	126	207	250	282	266	192	126	85	69	21	35	25	1826	3984
7		1	4	4	7	8	39	66	99	207	269	293	257	213	143	90	37	31	33	25	1826	4085
8	1	2	3	4	8	23	38	62	134	198	224	283	251	210	173	89	50	32	19	22	1826	4004
9	2	2	3	5	11	23	22	76	121	202	245	242	284	235	138	81	45	31	33	25	1826	4014
10	2	1	5	4	15	29	42	84	128	164	224	302	261	205	164	92	47	23	16	18	1826	3789
11		2	1	7	14	30	56	82	137	178	240	263	263	222	132	88	60	19	14	18	1826	3629
12	1	2	3	8	13	19	46	78	123	187	229	273	253	235	154	82	49	28	20	23	1826	3860
13	1	2	6	6	22	33	51	80	131	208	237	267	239	200	146	85	47	26	18	21	1826	3454
14	1	2	5	3	22	23	50	87	112	216	222	242	251	206	149	91	52	33	43	16	1826	3906
15	3	3	5	7	12	31	55	71	114	194	209	261	240	214	155	109	73	23	32	15	1826	4012
16		2	9	6	12	23	57	87	145	201	243	247	249	195	147	90	45	31	24	13	1826	3588
17		2	5	4	13	27	51	72	111	210	234	269	253	222	138	99	53	33	18	12	1826	3857
18		1	2	5	11	16	37	85	108	181	237	277	261	229	138	107	44	29	45	13	1826	4243
19	2		1	7	7	21	31	66	105	180	250	284	249	222	178	87	55	31	36	14	1826	4348
20	1		2	7	9	17	50	65	118	186	247	285	273	213	129	89	64	20	36	15	1826	4049
21			2	8	11	14	29	68	112	199	245	276	263	215	152	105	52	25	33	17	1826	4220
22		3	2	5	6	14	47	61	135	215	276	276	229	197	127	97	57	29	33	17	1826	3923
23	1		1	3	9	20	36	71	146	203	260	272	255	205	138	83	49	28	28	18	1826	3862
24	2	1	3	2	13	22	40	86	125	196	264	285	251	198	136	88	39	26	30	19	1826	3746
TOTAL	23	33	72	115	261	531	1055	1893	3089	4834	6876	8649	9603	10499	11325	12156	1210	634	687	453	43824	91870

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TABLE 336

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
JULY 1949 - 1953	CALM	10		4	3	13	3	21	6	28	20	12	4	12	9	16	5	4	170
	NNE		68	54	24	17	3	1	1			1		3	8	12	37	229	
	NE	2	48	53	36	42	7	3	1			2		1	2		4	5	206
	ENE	9	7	35	41	62	18	7	2	3	1						1	2	188
	E	6	7	17	38	90	59	43	8	7	1	3		2					281
	ESE				6	21	18	33	12	12	4	1				2			109
	SE				7	13	13	22	42	25	6	3		1					132
	SSE	2		2	1	6	6	15	34	54	26	7	3	3	2	2			163
	S							9	22	131	75	16	1	3				1	258
	SSW	2				1		3	14	95	178	90	22	4			2		412
	SW	1	1		1	5	1	5	6	34	114	145	57	15	1	1	2	1	390
	WSW		1		3	4	4	5		11	24	62	66	45	6	3		1	235
	W	2	2	2		2		3	1	3	10	29	49	80	45	17	1	1	247
	WNW		1	2		1	1	2	1	2	3	6	1	23	51	45	5	3	147
	NW		1	2	2	2							5	5	20	63	14	4	118
	NNW		6	4	8	6	2	1		2			2	6	13	37	33	18	138
	N	1	13	10	14	16	3	5					1	5	8	25	22	51	174
VARIABLE		2	11	14	9	5	4	6	5	2	6	2	2	5	3	3	2	81	
MISSING																			
TOTAL	35	157	200	204	320	145	183	164	415	465	386	214	210	165	223	104	130	3720	
AUGUST 1949 - 1953	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	5	3	5	4	10	13	23	12	51	19	19	6	21	14	27	6	5	243
	NNE	1	104	98	36	19	4	5						2		12	12	51	344
	NE	2	52	75	49	22	3	2		1	2	1	1	1		4	3	11	229
	ENE	4	8	49	46	44	8	11	1	1	1		1	1		5		4	184
	E	7	3	28	42	62	25	33	9	5	1		1	1		1			218
	ESE	3	1	7	7	20	16	33	22	11	2				1	1	1		125
	SE	5			5	2	7	38	29	29	6	2	3						126
	SSE	1			4	7	6	20	43	48	14	13	3						159
	S							15	25	72	50	17	3			1			183
	SSW			1	1	2	2	3	11	77	117	86	19	5	1	1			326
	SW			1		2		2	1	41	122	117	58	10	2	3			359
	WSW	1	1	1	2	2	3	1		14	34	75	67	35	8	2	2	1	249
	W	2	1		6	2		5	1	7	10	21	54	79	44	14	3	4	253
	WNW			3	7	5			1			2	4	10	44	28	7	1	112
	NW		2	2	3	5						1		5	29	66	14	6	133
	NNW	1	6	4	3	2	1			2			1	9	17	53	44	12	155
N	2	38	20	3	11	2	1		1	2		1	6	7	34	63	59	253	
VARIABLE			3	4	10	2	1		3	2	3	4	4	5	1	4		46	
MISSING	4		6							4	3	2		2	2			23	
TOTAL	38	219	303	225	227	92	193	155	363	386	360	228	189	174	255	159	154	3720	

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TABLE 337

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
SEPTEMBER 1949 - 1953	CALM	3		3	5	7	6	9	10	23	14	14	7	7	8	11		5	134
	NNE		91	65	16	4	2	1	1	1	1			1	1	3	6	24	217
	NE	1	40	51	23	13	1	1					1			2	2	5	140
	ENE	1	5	24	36	23	8	3	2						1			2	105
	E			6	27	38	17	28	4	3		1							124
	ESE			2	2	3	7	34	30	2	3				1			1	85
	SE				2	2	3	31	40	25	1	1	1			1		1	108
	SSE					2	2	10	51	67	17	4		1					154
	S			1			1	3	43	174	62	8							292
	SSW	1						3	11	127	190	78	9		1				420
	SW					1	1		3	46	111	121	29	4	2	1			319
	WSW				1					11	43	73	79	20	5	3	1	1	237
	W				1	2			1	3	6	35	93	107	52	15		1	316
	WNW		1			1	1				2	2	8	54	103	68	10	1	251
	NW				1	1							1	17	58	98	22	5	203
	NNW		7	1	3	2	1	1		2	1		1	6	11	74	58	23	191
	N	1	28	20	3	3	2	2		1	1	1			7	29	45	48	190
	VARIABLE		2		7	2	1		3	1	3	4	5	4	6	7	2	2	49
	MISSING									1	7	7	9	6	11	12	5	7	65
	TOTAL	7	176	173	127	104	53	126	199	486	462	349	243	227	267	324	151	126	3600
OCTOBER 1949 - 1953	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	5			1	7	5	13	9	19	16	7	5	4	7	7	2	4	111
	NNE	1	72	67	17	6	4	1							4	12	37		221
	NE		29	62	36	12	1		1		1		1		1	3	1	7	155
	ENE	2	8	17	35	32	11	5		1	1				1	4	1	2	120
	E			1	13	24	34	32	9	1							2	1	117
	ESE				2	5	13	34	17	4									75
	SE	1			2	7	12	39	55	16	2	1							135
	SSE				1	2	3	7	84	53	17	2							169
	S					1	1	3	59	190	51	8							313
	SSW				1	1		2	20	136	245	85	18	2		1	2		513
	SW							5	3	51	131	141	49	11	2		1		394
	WSW				1			1	1	14	29	58	78	41	9	3		1	236
	W			1	1	3	1		1	5	8	18	51	90	54	13	1		247
	WNW				2	1				1			6	25	87	51	5		180
	NW				1	1		1				1		7	33	89	19	2	154
	NNW		2	1	1					1				3	16	94	97	25	240
	N		35	25	7	4		1				1		1	6	27	83	96	286
	VARIABLE		1		1	1	2		1			3	2	1		2	1	1	16
	MISSING		11	6	1		3	1	2	3	1	2	1	2	2		2	1	38
TOTAL	9	158	180	123	107	90	145	262	495	502	329	211	187	218	298	229	177	3720	

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TABLE 338

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
NOVEMBER 1949 - 1953	CALM	3	2		2	6	1	3	1	8	3	9	5	8	7	6		1	65
	NNE		16		1											6	5	7	42
	NE		7	11	10	5	3	1							1	4	4	2	48
	ENE			1	15	10	3	1		1		1							33
	E				6	16	15	16	1	1									55
	ESE					6	5	19	3				1						34
	SE					1		21	27	12		1	1						64
	SSE	1					1	9	59	58		1							135
	S							2	35	208	94	9	2						350
	SSW							1	7	81	196	71	10	1		1		1	369
	SW						1	1	17	124	153	59	8		1				365
	WSW				1	1			1	10	33	57	141	54	9	1			307
	W		1							3	2	17	109	248	77	22		1	481
	WNW									1		3	5	41	145	105	13	2	315
	NW				1						1			9	61	147	28	1	248
	NNW		3	1	2									5	14	102	159	19	305
	N		22	14	3				1		1				7	31	122	103	304
	VARIABLE			1		1			2	1					1	1		1	8
	MISSING		5	2						6	13	6	6	6	3	11	7	7	72
	TOTAL	4	57	38	40	46	29	74	138	407	472	330	339	380	326	437	338	145	3600
DECEMBER 1949 - 1953	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	5	1	1			1	7	8	4	11	5	3	13	7	8	1	2	77
	NNE		22	16	7	6			1						3	4	6	5	70
	NE	2	5	16	10	7	1	1	1					2	3	2	1		51
	ENE									1								2	77
	E		1	12	21	26	8	4	1							1			168
	ESE			3	14	47	46	42	9	2	2	1					1		133
	SE																		
	SSE				1		7	40	72	14	2								136
	S					1		3	75	43	10	3				1	1		137
	SSW								32	188	100	7		1					328
	SW			1					4	65	194	82	13						359
	WSW						1		4	14	75	164	95	7	2				362
	W					1				3	20	62	192	94	16	5	1		394
	WNW			1				1			7	7	82	260	133	37	4		532
	NW									2	1	1	3	14	52	129	50	3	273
	NNW		3	2	2	1			1					4	23	73	87	12	208
	N	2	13	7	8	8			1		1			2	8	15	43	42	150
	VARIABLE							1	3					1	3	2	1		11
	MISSING																		
	TOTAL	9	46	59	65	98	95	175	228	342	422	334	393	439	377	367	205	66	3720

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TABLE 339

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
JANUARY 1950 - 1954	CALM	1			2	7	2	9	4	13	5	13	1	3	5	4	3	2	74
	NNE		41	38	18	7								2	2	4	10	12	134
	NE		6	32	21	7	1	1	1						3	4	1	1	78
	ENE	2	1	15	43	47	4	8	1	1			1	1		3		1	128
	E			2	13	30	53	32	3	2	1	1				1			138
	ESE	1	1		1	6	32	59	16	2									118
	SE			1		2	9	34	65	10	2	1	1				1	1	127
	SSE	1					2	15	88	61	9	1							177
	S							1	21	192	104	7	1						326
	SSW								1	64	192	61	13	1					332
	SW								1	7	74	104	60	4		1			251
	WSW								1	2	15	29	78	50	2	2			179
	W										1	10	94	254	90	29			478
	WNW	1			1	1		2			1		2	31	100	79	10	1	229
	NW		1	2	1									2	39	145	49	2	241
	NNW		1	2				1						6	15	146	149	24	344
	N		41	12	10	3		1						2	5	31	100	86	291
	VARIABLE				2						1		1	3	2	3	1	3	16
	MISSING		3	4	1	2		2	7	3	9	1	2		3	9	7	6	59
	TOTAL	6	95	108	113	112	103	163	211	357	414	228	254	359	266	461	331	139	3720
FEBRUARY 1950 - 1954	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	2		3	1	1	2		5	6	1	2	2	8	3	6			42
	NNE		70	35	14	6													167
	NE		15	39	22	6	2							1	2	4	7	32	91
	ENE		1	22	105	47	6		1						1	1			184
	E		1	4	43	79	43	21	4						1	1			197
	ESE				6	12	28	62	16	4	1								129
	SE				1	4	4	38	48	7	1								103
	SSE			1	1	2	2	13	55	40	6	3					1	1	123
	S				1			2	15	139	75	6				1	1		240
	SSW	1				1	1	2	1	18	115	77	10						226
	SW							1		5	51	86	52	9	3		1		208
	WSW	1				1				1	14	27	86	73	18	3		2	226
	W									1	1	13	58	208	117	24	3		425
	WNW												2	43	111	91	9	2	258
	NW		1			3	1		1				1	3	37	83	25	4	159
	NNW	1	3	2	1	1	1			1		1		5	12	69	102	26	225
	N	1	53	12	9	1								2	7	33	72	130	320
	VARIABLE	2		1	2	1				1	1		2	2		7			19
	MISSING			8	9								9	10		1	1	4	42
TOTAL	8	144	127	215	165	90	139	146	223	266	215	222	364	312	327	221	200	3384	

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TABLE 340

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
MARCH 1950 - 1954	CALM		1	1	3	5	12	4	3	5	4	3		4	6	3	5		59
	NNE		83	63	12	3	1			1	1				3	1	4	24	196
	NE	3	16	63	54	13	1	2							1	1	1	3	158
	ENE	2	4	42	95	78	18	4	2	1			1		2			1	250
	E			2	34	118	91	14	1	1	1			1				1	264
	ESE			1	3	21	49	78	18	6	2							1	179
	SE	1			3	1	10	48	56	14	1	1						1	136
	SSE				2	3	3	14	49	56	18	2						1	148
	S							4	28	153	62	9	2						258
	SSW					2	1		2	37	74	37	5	3	1	1	1		164
	SW								1	2	25	66	26	2	1		1		124
	WSW	1				1	1	1		2	13	53	93	69	9	3	1		247
	W		1				2	1		1	3	12	84	231	109	18	3	3	468
	WNW												4	27	105	97	23	3	247
	NW		3	1	2	1								3	43	134	46	6	239
	NNW			2	2		2				1			5	6	75	121	33	255
	N		43	10	6	2				1			1	2	4	39	64	117	289
	VARIABLE		1		6	4	2	4			2	1			1	1		1	23
	MISSING											3	1						4
	TOTAL	7	160	185	222	252	193	174	160	280	207	187	217	347	291	373	270	195	3720
APRIL 1950 - 1954	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	1		2	4	2	4	1	6	5	5	3		3	3	5	1	1	46
	NNE		81	56	16	7	4	2							4	4	4	37	215
	NE	1	23	62	42	20	5			1				2		2		2	160
	ENE	2	8	43	100	78	18	6	1		2					1	1	1	261
	E		2	4	46	105	77	47	6	2	1							1	291
	ESE			5	6	14	35	65	15	5		1				1			147
	SE			1	3	8	7	25	46	17	3	1							111
	SSE				3	1	2	12	77	41	3	5				1			145
	S				1	1	1		16	87	32	2	2						142
	SSW			1			1	3	1	24	92	74	5	3	1		1		206
	SW				2	1	1			5	46	88	43	6	1		1		195
	WSW				2	2			1	2	9	34	96	45	6	2			199
	W		1	2	3	2	1	3	1	1	4	16	43	210	83	33	1	1	405
	WNW		2	2		2	1	1				4	5	73	153	94	14	3	354
	NW		1		3	5						1	2	9	43	71	35	7	177
	NNW			6	5	6						2	1	1	6	55	67	33	196
	N		32	18	5	6	2	1				1	1	1	5	17	49	82	220
	VARIABLE			3	14	10	3	1	2			1	2	2	2	4	2	1	47
	MISSING						5	9	8	10	5	3	10	9	2	16	6		83
	TOTAL	4	156	213	255	270	167	177	180	200	202	236	210	364	309	306	182	169	3600

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TABLE 341

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory

MONTH	ARGONNE WIND DIRECTION (16 POINTS)	CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
MAY 1950 - 1954	CALM	2	3	4	1	5	2	4	6	14	5	5	1	6	7	7	1		73
	NNE	2	191	139	35	11	4	1			1				1	4	10	63	462
	NE	2	41	109	80	29	3	2		1					1	1	1	7	277
	ENE		9	40	99	77	19	3	4			2					1	3	257
	E	5		10	40	91	72	35	6	3	1								263
	ESE	2	1		8	20	23	43	19	7	2								125
	SE				4	6	5	25	55	13	2	1		2					113
	SSE				2	6	1	13	34	30	7	2	1			1			97
	S				4	3	2	4	20	67	81	13	2	2	1				199
	SSW				2		2	1	1	35	76	53	21	4	3				198
	SW		1		3	1	1		3	11	55	81	47	15	1	1			220
	WSW		2		3	2	1	2	2	6	22	41	96	59	6	6			248
	W	1	2	1	1	3	1	1		2	9	13	63	190	106	24	3		420
	WNW		3	1	2	4	1		1	1	1		8	45	53	55	11		186
	NW		2	5	3	6	4	1	2	1				5	26	49	19	3	126
	NNW		3	9	6	5		1	1					2	15	43	46	15	146
	N	2	63	26	6	2						1		1	5	14	37	71	228
	VARIABLE		3	2	4	8	8	12	4	3	2	4	3	6	1	4	3	1	68
	MISSING			2						1	6		1	2	2				14
	TOTAL	16	324	348	303	279	149	148	154	199	270	214	245	339	228	209	132	163	3720
JUNE 1950 - 1954	ARGONNE WIND DIR.	CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	TOTAL
	CALM	2		2	6	9	4	6	10	10	6	4	1	4	9	17	3	2	95
	NNE		74	71	17	9	2	2						1	2	6	2	29	215
	NE	2	14	39	36	21	3	4		1	1	1		1		2		8	133
	ENE		6	39	46	66	17	4	2			1		1				5	187
	E		6	19	44	70	48	41	11	3				1	1			2	246
	ESE			2	9	18	16	44	24	5	3							1	122
	SE	1		4	4	7	6	31	43	20	5	4							125
	SSE	1		1	2	8	6	19	38	66	20	5	1	1	1	1			170
	S				1	2	1	5	11	105	72	19	3	2	1		1		223
	SSW					5	1	1	6	65	126	126	26	1	1	1		1	360
	SW	1		1	3	1			4	16	47	111	62	12	2	4	1		265
	WSW	1				2	2		1	8	11	45	65	46	7	3	2	1	194
	W	3	2	2	2	1	1		1	2	6	8	34	85	43	16	6	1	213
	WNW		1	1	2					1	1		3	30	53	44	5	5	146
	NW	1	1	2	1		1			2				6	22	50	9	5	100
	NNW	1	3	6	5	1	5	2			1		2	6	9	42	35	15	133
	N		20	11	9	5	2	1						2	1	12	22	47	132
	VARIABLE		4	6	6	11	6	1	4	1		3	3	5	4	4	1	1	60
	MISSING	2	21	29	22	40	30	24	27	55	65	55	30	19	17	19	17	9	481
TOTAL	15	152	235	215	276	151	185	182	360	364	382	230	223	173	221	104	132	3600	

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TABLE 342

Joint Frequency Distribution of Hourly Wind Direction at Chicago Midway Airport
and Argonne Meteorology Laboratory
July 1949 - June 1954

ARGONNE WIND DIRECTION (16 POINTS)		CHICAGO MIDWAY AIRPORT WIND DIRECTION (16 POINTS)																	TOTAL
		CALM	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
CALM	CALM	39	12	25	32	72	55	100	80	186	109	96	35	93	85	117	27	26	1189
	NNE	4	913	709	213	95	24	13	3	2	3	1	6	19	59	90	358	2512	
	NE	15	296	612	419	197	31	17	4	4	4	4	3	8	14	29	18	51	1726
ENE	ENE	22	59	339	682	590	138	56	13	13	5	2	5	3	5	15	4	23	1974
	E	18	20	96	360	770	580	384	71	30	8	6	1	5	2	3	3	5	2362
	ESE	6	3	17	52	147	272	580	208	64	17	3	1		2	4	2	3	1381
SE	SE	9		6	32	53	83	392	578	202	31	16	6	3		1	1	3	1416
	SSE	5		4	16	38	34	150	687	617	154	48	8	5	3	6	1	1	1777
	S			1	7	7	6	48	327	1706	858	121	16	8	2	2	2	1	3112
SSW	SSW	4		3	5	12	8	19	79	824	1795	920	171	24	8	5	6	2	3885
	SW	2	2	2	9	11	6	15	27	249	975	1377	637	103	18	11	7	1	3452
	WSW	4	4	1	13	16	11	10	6	84	267	616	1137	631	101	36	7	7	2951
W	W	8	10	9	14	15	6	14	7	28	67	199	814	2042	953	262	25	12	4485
	WNW	1	8	9	14	15	5	3	5	6	9	19	53	443	1132	847	120	21	2710
	NW	1	12	15	17	24	6	2	3	5		5	12	85	463	1124	330	48	2152
NNW	NNW	3	51	48	38	24	12	6	2	8	3	3	7	58	157	863	998	255	2536
	N	9	401	185	86	61	11	12	2	2	3	6	4	24	70	307	722	932	2837
	VARIABLE	2	13	27	60	57	29	23	22	15	13	25	24	29	27	37	17	13	433
MISSING	MISSING	6	40	61	38	52	40	38	55	82	111	83	72	58	45	73	46	34	934
TOTAL		158	1844	2169	2107	2256	1357	1882	2179	4127	4432	3550	3006	3628	3106	3801	2426	1796	43824

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TABLE 343

**Monthly Frequency Distributions of Difference in Daily Peak Gust Speeds
at Chicago Midway Airport and Argonne Meteorology Laboratory
July 1953 - June 1954**

PEAK GUST SPEED DIFF. (MPH) CHICAGO MINUS ARGONNE	MONTH												TOTAL
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
≥ 10	1	1	2	1		2	2			1		3	13
9						1	2			1	2	1	7
8	1		2		1	1	1		1	1	1	2	11
7	1	2		1	3	2	2	1		1			13
6	3	4		2	4	1	3	2		2	3	2	26
5		4	5	2	4	2	4		4	4		4	33
4	4	6	2	1	1	7	3	5	4	3	3	2	41
3	4	4	4	3	3	3	6	6	3		5	1	42
2	6	5	6	9	6	6	3	3	3	8	2	5	62
1	7	2	1	8	2	1	2	4	4	4	5	3	43
0	2	1	2	1	3	2		3	3	1	4	2	24
-1	2	2	3	1		2	1		2	1	3	1	18
-2			1	1	1		2	1	3	3	1	1	14
-3			1	1				1			2	1	6
-4					1				1				2
-5			1		1	1		1	2			2	8
-6								1					1
≤ -10									1				1
TOTAL	31	31	30	31	30	31	31	28	31	30	31	30	365

TABLE 344

**Monthly Average of Daily Peak Gusts (mph) at Chicago Midway Airport
and Argonne Meteorology Laboratory**

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	18	18	21	22	DATA NOT TABULATED				27	29	24	23
JULY 1950 - JUNE 1951	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	17	17	18	20	27	20	23	23	28	24	22	19
JULY 1951 - JUNE 1952	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	18	17	22	22	25	26	24	24	26	26	21	22
JULY 1952 - JUNE 1953	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	20	18	19	23	23	19	23	32 27 5	30 26 4	31 28 3	27 25 2	26 24 2
JULY 1953 - JUNE 1954	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	21 19 2	21 17 4	26 23 3	22 19 3	25 22 3	29 26 3	28 23 5	27 25 2	27 26 1	29 26 3	27 25 2	27 24 3

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TABLE 345

Monthly Average Wind Speeds (mph) at Chicago Midway Airport
and Argonne Meteorology Laboratory
Chicago Anemometer Height 37.75-Feet and Argonne Anemometer Height 19-Feet

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO WIND SPEED	7	7	9	9	12	11	12	11	12	12	10	10
	ARGONNE WIND SPEED	5	5	6	7	9	9	10	9	11	11	8	8
	DIFFERENCE	2	2	3	2	3	2	2	2	1	1	2	2
JULY 1950 - JUNE 1951	CHICAGO WIND SPEED	7	8	8	9	13	10	11	11	13	10	9	7
	ARGONNE WIND SPEED	5	5	5	6	10	8	9	9	11	9	8	6
	DIFFERENCE	2	3	3	3	3	2	2	2	2	1	1	1
JULY 1951 - JUNE 1952	CHICAGO WIND SPEED	6	6	9	9	10	10	10	9	10	11	9	9
	ARGONNE WIND SPEED	5	5	7	7	10	10	10	9	10	10	7	7
	DIFFERENCE	1	1	2	2	0	0	0	0	0	1	2	2
JULY 1952 - JUNE 1953	CHICAGO WIND SPEED	9	7	8	1	12	10	11	13	12	13	11	9
	ARGONNE WIND SPEED	6	5	5	7	8	8	8	10	9	10	9	7
	DIFFERENCE	3	2	3	4	4	2	3	3	3	3	2	2
JULY 1953 - JUNE 1954	CHICAGO WIND SPEED	8	7	9	9	12	14	12	13	12	11	11	9
	ARGONNE WIND SPEED	5	4	6	6	8	10	9	10	10	9	8	7
	DIFFERENCE	3	3	3	3	4	4	3	3	2	2	3	2

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TABLE 346

Comparison of Monthly Peak Gusts (mph) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	31	45	31	43	DATA NOT TABULATED				43	53	55	36
JULY 1950 - JUNE 1951	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	26	27	42	35	44	39	41	43	45	39	37	36
JULY 1951 - JUNE 1952	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	45	32	40	33	43	62	41	43	44	41	39	37
JULY 1952 - JUNE 1953	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	49	DATA NOT TABULATED				30	44	58 47 11	50 47 3	49 44 5	46 45 1	49 48 1
JULY 1953 - JUNE 1954	CHICAGO PEAK GUST ARGONNE PEAK GUST DIFFERENCE	46 38 8	35 28 7	42 35 7	47 31 16	33 37 - 4	51 43 8	39 33 6	37 43 - 6	52 57 - 5	47 43 4	44 47 - 3	44 47 - 3

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5. Joint Frequency Distributions of Argonne Wind Speed and
Difference in Temperatures at Chicago Midway Airport
and Argonne Meteorology Laboratory for Indicated
Argonne Wind Directions

Table 347: This table is based on three variables: wind direction, wind speed, and the difference in temperature between the Argonne Meteorology Laboratory and the Chicago Airport Station. A clear cut relationship among these variables is not readily apparent. It does appear, however, that when the wind was from the northeast and east, there was a greater probability for the temperature at Argonne to exceed the temperature at the Airport. For example, during the five-year period under study, when the wind was from the northeast and east, the temperatures were warmer at Argonne 8.2% and 6.7% of the observation times, respectively; when the winds were from any of the other directions, the temperature was higher at Argonne at only from 2.2% to 4.6% of the observation times. This effect was probably due to the lake breeze. At those times the temperature at the Airport was lowered by the cooled air from Lake Michigan which had not yet reached the Argonne site.

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TABLE 347

Joint Frequency Distributions of Argonne Wind Speed and Difference in Temperatures
at Chicago Midway Airport and Argonne Meteorology Laboratory for Indicated
Argonne Wind Directions
July 1949 - June 1954

WIND DIR. (8 PTS.)	WIND SPEED (MPH)	CHICAGO MINUS ARGONNE TEMPERATURE °F																		MISS- ING	TOTAL	
		≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			≥9
CALM	0 - 4 MISSING				1		5	3	10	15	37	60	172 1	217	229	193	126	60	27	19	14	1188 1
	TOTAL				1		5	3	10	15	37	60	173	217	229	193	126	60	27	19	14	1189
NORTHEAST	0 - 4				1	1	5	11	23	41	98	162	257	248	154	90	44	19	12	21	1187	
	5 - 9	1	1	1	4	8	18	51	77	174	266	364	322	202	106	42	26	20	7	5	1696	
	10 - 14			1	6	3	18	18	57	110	194	236	150	61	15	6					875	
	15 - 19				1	1	3	1	10	31	51	48	19	2							167	
	20 - 24									5	14	16	2	1							38	
	25 - 29									1	1	1									2	
	MISSING									4	6	5	6	5	3	1					30	
TOTAL	1	1	2	1	12	13	44	81	171	367	629	833	755	517	276	138	70	39	19	26	3995	
EAST	0 - 4				2	1	7	17	30	69	118	257	315	351	219	110	72	36	15	2	15	1375
	5 - 9		1	2	1	7	17	30	69	118	257	315	351	219	110	72	36	15	2	15	1613	
	10 - 14	1		1	1	1	10	11	43	63	153	171	135	52	16	3					661	
	15 - 19						1	6	8	22	42	64	35	5	1						184	
	20 - 24										4	14	9	2							29	
	25 - 29										2	3	1								3	
	MISSING						1			1	1	2	1	1	1	1	1	1			11	
TOTAL	1	1	3	4	9	33	54	153	267	580	806	843	547	299	163	64	21	8	20	3876		
SOUTHEAST	0 - 4				1	1	3	4	15	29	47	112	208	302	255	175	100	46	22	16	14	1350
	5 - 9	2	1	2	1	1	6	3	8	19	66	124	210	263	215	136	85	42	18	6	17	1225
	10 - 14	1			1	1			1	9	28	62	141	129	82	55	22	6	2	1	2	541
	15 - 19										2	6	23	25	15	5	2					78
	20 - 24												7	2	1							10
	25 - 29										1	1										2
	MISSING								1	1	1	4	1	1	1	1	1					10
TOTAL	3	1	2	2	2	9	7	24	58	145	309	590	722	568	372	210	94	42	23	33	3216	
SOUTH	0 - 4		1	1	2	1	1	7	21	40	65	152	180	200	172	103	63	29	12	6	20	1076
	5 - 9			1	1	1	4	10	34	75	167	337	405	378	256	172	112	66	15	8	98	2139
	10 - 14		1		1		1	5	19	49	122	252	395	244	199	120	73	32	12	6	43	1574
	15 - 19				1			1	7	12	37	94	119	84	55	31	11	4	1		12	469
	20 - 24										1	14	37	18	12	4	1	1			5	93
	25 - 29										2	1	5	2	2	1	2				3	18
	30 - 34											1	1	3	1	1						6
	MISSING										1	6	4	1	1	1						13
TOTAL		2	2	4	2	6	23	81	176	395	856	1146	930	697	433	262	132	40	20	181	5388	

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TABLE 347 (Cont'd.)

Joint Frequency Distributions of Argonne Wind Speed and Difference in Temperatures
at Chicago Midway Airport and Argonne Meteorology Laboratory for Indicated
Argonne Wind Directions
July 1949 - June 1954

WIND DIR. (8 PTS.)	WIND SPEED (MPH)	CHICAGO MINUS ARGONNE TEMPERATURE °F																			MISS- ING	TOTAL
		≤-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	≥9		
SOUTHWEST	0 - 4	1	2	1	1	1	3	2	17	42	86	183	306	309	287	212	107	56	21	11	17	1665
	5 - 9	2			3	1	7	16	39	108	244	376	622	570	410	308	195	70	32	12	44	3059
	10 - 14	1			1	2	1	6	11	45	117	223	401	552	356	184	76	19	4	2	32	2033
	15 - 19						1		2	10	32	79	166	161	90	33	15	5	5		5	604
	20 - 24										2	16	39	39	12	3	1					112
	25 - 29												7	14	4							25
	30 - 34												1	2		1						4
	MISSING											3	3	2	1							9
TOTAL	4	2	1	5	4	12	24	69	205	481	880	1545	1649	1160	741	394	150	62	25	98	7511	
WEST	0 - 4				1	2	2	5	15	24	42	78	151	236	251	184	128	56	35	20	20	1250
	5 - 9	1			2	2		4	6	32	92	206	457	576	483	299	195	103	50	30	46	2587
	10 - 14			1			1	2	2	21	77	195	378	589	270	106	31	9	5	3	24	1714
	15 - 19	1	1						2	8	32	116	218	202	80	15	6	1		2	10	694
	20 - 24						1	1		2	16	42	121	93	33	6	2				6	323
	25 - 29				1				2		5	8	19	13	5	2	1				8	64
	30 - 34									2	2	2	2	3						1	10	
	MISSING								3	1	1	4				1						10
TOTAL	2	1	2	4	4	4	12	27	92	267	646	1350	1712	1122	612	364	169	90	55	115	6652	
NORTHWEST	0 - 4						6	2	5	15	35	77	159	186	169	133	71	40	20	6	18	942
	5 - 9	2	2	1	3	3	4	5	13	52	137	291	459	537	352	232	112	26	6	6	29	2272
	10 - 14	1	1	1	1	4	1	5	16	25	101	231	472	476	188	49	18	3		2	5	1600
	15 - 19								2	3	42	118	161	95	48	7					16	492
	20 - 24	1							3	1	7	25	48	40	7	2					4	138
	25 - 29											1	5	4								10
	30 - 34											1									1	4
	MISSING								2	2	4	6	6	3	1	1						4
TOTAL	4	3	2	4	7	11	12	39	96	322	746	1304	1339	765	423	201	69	26	14	72	5459	
NORTH	0 - 4			1	2		2	1	7	22	40	116	170	227	208	166	94	61	19	22	42	1200
	5 - 9	2	2			2	5	9	24	53	118	212	359	467	369	253	133	70	35	27	39	2179
	10 - 14		1		2	2	2	7	18	32	87	167	294	336	200	68	31	10	2	1	17	1277
	15 - 19	1		1			5	7	5	7	29	63	111	95	25	9	3	3	1		7	372
	20 - 24	1					1		2	1	5	11	33	27	6	7	2	1				97
	25 - 29									2	1	6	9	2	1							21
	30 - 34									2	4	6	6	3	1	1						25
	MISSING								2	2	4	6	6	3	1	1						25
TOTAL	4	3	2	4	4	15	24	58	119	284	581	982	1157	810	504	263	145	57	50	105	5171	
VARIABLE	0 - 4	1			1	1	1	5	10	11	19	40	34	58	66	46	25	10	3		15	346
	5 - 9				1	1	1	2	2	7	4	9	21	11	7	7	2	1		1	3	80
	10 - 14			1							1		1	2								4
	MISSING									1	1					1						3
	TOTAL	1		1	2	2	1	7	12	19	25	49	56	71	73	54	27	11	3	1	18	433
MISSING	0 - 4							2	3	11	24	42	26	18	19	8	1	2				156
	5 - 9						1	1	9	23	35	57	53	42	21	12	6	4	3			267
	10 - 14	1			1	2				5	18	20	33	23	24	11	2	1			1	142
	15 - 19	1									1	4	6	6	7	1					1	27
	20 - 24										1		1				1				1	4
	25 - 29																				1	1
	MISSING							2	5	35	58	80	78	39	23	9	3	1	1	3	337	
	TOTAL	2			1	2	1	3	14	44	114	181	199	167	110	55	19	10	4	1	7	934

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(V) Monthly Precipitation Totals

Table 348: In this table the monthly totals of precipitation for the Chicago Midway Airport and Argonne Meteorology Laboratory are presented. As is evident, there was considerable variation in the precipitation from month to month at both locations. The precipitation ratio for each month, i.e., Chicago Midway Airport precipitation amounts divided by Argonne amounts, are also presented. During most of the months, each station received approximately within 50% of the amount received at the other; however, there were exceptions. The exceptions occurred during months with sub-normal precipitation amounts in both locations.

TABLE 348

Monthly Precipitation Totals (Inches) at Chicago Midway Airport
and Argonne Meteorology Laboratory

PERIOD		MONTH											
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JULY 1949 - JUNE 1950	CHICAGO PRECIPITATION	3.59	1.31	1.24	2.73	.89	6.67	3.77	3.35	2.01	4.67	.78	8.89
	ARGONNE PRECIPITATION	5.04	2.34	1.23	3.00	.71	2.75	3.52	1.43	.60	4.82	.13	5.86
	PRECIPITATION RATIO	.71	.56	1.01	.91	1.25	2.43	1.07	2.34	3.35	.97	6.00	1.52
JULY 1950 - JUNE 1951	CHICAGO PRECIPITATION	6.78	1.78	2.00	1.29	1.63	2.70	1.81	2.62	2.81	4.62	4.90	2.05
	ARGONNE PRECIPITATION	5.72	1.91	1.89	1.20	1.53	1.20	1.46	2.08	2.39	3.66	5.23	2.66
	PRECIPITATION RATIO	1.19	.93	1.06	1.08	1.07	2.25	1.24	1.26	1.18	1.26	.94	.77
JULY 1951 - JUNE 1952	CHICAGO PRECIPITATION	4.96	4.86	5.29	2.73	3.74	2.76	2.18	.44	3.64	2.54	3.18	3.63
	ARGONNE PRECIPITATION	5.30	4.22	5.19	2.89	3.53	1.40	1.47	.10	3.45	2.53	2.74	4.98
	PRECIPITATION RATIO	.94	1.15	1.02	.94	1.06	1.97	1.48	4.40	1.06	1.00	1.16	.73
JULY 1952 - JUNE 1953	CHICAGO PRECIPITATION	2.27	3.69	1.61	.90	2.25	1.96	1.47	1.58	3.92	2.82	2.43	4.63
	ARGONNE PRECIPITATION	3.47	5.18	1.76	.62	2.62	2.03	1.36	1.23	3.47	2.98	2.97	7.39
	PRECIPITATION RATIO	.65	.71	.91	1.45	.86	.97	1.08	1.28	1.13	.95	.82	.63
JULY 1953 - JUNE 1954	CHICAGO PRECIPITATION	4.16	1.00	2.02	1.25	1.77	3.10	1.10	2.40	5.00	4.43	1.75	4.27
	ARGONNE PRECIPITATION	5.91	2.95	2.23	.94	1.03	2.51	.98	2.38	4.02	4.10	2.48	2.44
	PRECIPITATION RATIO	.70	.34	.91	1.33	1.72	1.24	1.12	1.01	1.24	1.08	.71	1.75

APPENDIX
AND
ACKNOWLEDGEMENTS

APPENDIX

(A) Location of the Meteorology Site

The Du Page County Site of the Argonne National Laboratory is located 25 miles southwest of the Loop in Chicago and 25 miles due west of Lake Michigan (see Figure 20). The Site itself consists of 3700 acres of partly forested, slightly rolling meadow land, approximately 2.5 miles square. The largest topographical feature is the Des Plaines River channel, about one mile wide, through which run the Des Plaines River and the Chicago Sanitary Canal. This channel borders the Site on the south side and is oriented ENE - WSW. The elevation of the lowest part of the channel is 600 feet above sea level. The bluffs, which comprise the south border of the Site, rise sharply at the varying slope angles of from 15° to 60° , reaching the average elevation of 650 feet at the top. The land then slopes gradually upward for the next 3000 feet at an average angle of 3° , reaching the average site elevation of 725 feet above sea level 3000 feet from the bluffs. Several large ravines run northward into the southern quarter of the Site. The bluff and ravines are generally forested with deciduous trees of an average height of 50-60 feet. With the exception of a large forested area in the center of the Site, the remaining portion is gently rolling abandoned farm land, with no more rapid change in elevation than 25 feet in a distance of 500 horizontal feet.

The meteorology laboratory site is located 746 feet above sea level in an open treeless meadow, where the exposure for meteorological measurements is excellent. The meteorology tower, on which are mounted wind and temperature instruments, is a standard forest fire-lookout tower. The base of the tower cabin is 120 feet high, and a steel mast extends upward through its roof to 150 feet. A number of 8-foot booms extending from the tower at various levels are used to support temperature and wind equipment. The nearest obstruction, the Meteorology Building, is 300 feet west of the tower. It is 65 feet long by 20 feet wide and 13 feet high. The terrain is clear 1400 feet to the north, 1500 feet to the east, and 1600 feet to the south; 3500 feet to the south is the Sag Channel.

All of the meteorological instruments used to furnish data for this report are located on the Meteorology Laboratory site. Their relative location is shown in Figure 21.

FIGURE 20. MAP OF THE AREA SURROUNDING THE ARGONNE NATIONAL LABORATORY.

FIGURE 21. ARRANGEMENT OF INSTRUMENTS AT METEOROLOGY SITE

(B) Instruments

All of the meteorological measurements presented in this report, with the exception of measurements of temperature difference and the last three years of temperature, were obtained through the use of standard, commercially available instruments. The equipment for measuring wind, relative humidity, precipitation, and pressure was obtained from the Friez Instrument Division of the Bendix Aviation Corporation, Towson, Md.; the pyrliometer, used for measuring sunshine intensity, was procured from The Eppley Laboratory, Inc., Newport, R. I.; the thermohms, used for measuring soil temperature, were purchased from Leeds and Northrup. Esterline-Angus recorders were used for recording wind, and Leeds and Northrup Micromax recorders were used for recording sunshine intensity and soil temperatures.

The temperature data for the first two years were obtained by means of a hygrothermograph manufactured by the Friez Instrument Division of the Bendix Aviation Corporation. Thermopiles mounted in aspirated radiation shields were used to measure temperature during the remaining three of the five years. Similar thermopiles were used to measure temperature difference. All of the thermopiles were designed and built at Argonne. Brown Elektronik Potentiometers were used to record these measurements.

1. Temperature

The hygrothermograph, Model 594, used to measure temperature during the first two years, was housed about 5 feet above ground in a cotton-region type weather shelter. A Bourdon tube is the sensitive thermal element used in this instrument. Small displacements resulting from changes in curvature due to changes in temperature are amplified by a system of levers. To this lever system is attached a pen which makes an ink trace on a paper chart attached to a drum 11.5 inches in circumference. The drum rotates once in approximately seven days. Servicing took place once a week, at which time the instrument calibration was checked with a psychrometer.

The thermopile, used to measure temperature during the last three years, consisted of five copper-constantan welded thermocouples made of #36 wire. The thermopile was mounted in an aspirated radiation shield which consisted of two polished concentric cylinders with their axis oriented vertically. A combination of cold-junction spools was used as reference junctions. The voltage output from the thermopile and cold-junction spools was recorded continuously on a Brown Elektronik Potentiometer strip chart recorder. This recorder has a double range. In one range temperatures from 0 - 40°C are measured; in the other, temperatures from -20° to 20°C.

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The Brown recorder was checked daily for timing errors. A chart speed of 3 inches per hour was used.

2. Temperature Difference

Two thermopiles of the type used in measuring the ambient air temperature were placed in a series circuit for measuring temperature differences between two levels above the ground. The voltage output due to any temperature differences between these two thermopiles was fed into a Brown Electronik Potentiometer and recorded continuously on a strip chart. This instrument was calibrated for various ambient air temperatures and a range of vertical temperature differences.

The temperature difference recorder was checked daily for timing errors. The chart speed was 3 inches per hour.

3. Relative Humidity

A hygrothermograph Model No. 594 was used to measure relative humidity. This instrument, housed in a cotton-region type weather shelter, was located about five feet above ground. The humidity element is a bundle of human hair. A system of levers amplifies the small displacements resulting from the changes in hair length. To this lever system is attached a pen which makes an ink trace on a paper chart attached to a drum 11.5 inches in circumference. The drum rotates once in approximately seven days. Servicing took place once a week, at which time the instrument calibration was checked with a psychrometer.

4. Pressure

Atmospheric pressure was measured by a Friez microbarograph Model 740-1 which is located indoors in the Meteorology Laboratory. The sensing element of this instrument consists of two partly evacuated bellows arranged in tandem. The relatively small displacements of the bellows are amplified by a linkage system to which is attached an ink-writing pen. Pressure is recorded on a chart attached to a clock-driven drum, 11.3 inches in circumference, which rotates once in about seven days. The microbarograph was serviced once a week, at which time its calibration was checked against a mercurial barometer.

5. Precipitation

Precipitation was measured by a dual-traverse weighing type Friez precipitation gauge Model 775-B. The intake opening was increased from 8 inches to 12.65 inches diameter resulting in an intake area increase of 2.5 times. The instrument operates as follows:

Precipitation accumulates in a bucket which rests on a coil spring. When rain, snow, hail, etc., fall into the bucket, a small displacement occurs owing to the contraction of the spring. A linkage system amplifies this displacement and moves a pen which makes an ink trace on a paper chart wrapped around a drum 11.5 inches in circumference. The drum rotates once in approximately seven days. Servicings took place once each week.

6. Wind Instruments

At each level of the meteorology tower an Aerovane system was used to measure and record both wind speed and wind direction. The wind-speed portion of the equipment operates as follows:

A three-bladed propeller mounted on the wind vane is turned by the wind at a rate directly proportional to the wind speed. In turn, the propeller drives a small DC generator producing a proportional voltage which is registered on an Esterline-Angus recorder. The scale of the chart paper is graduated in miles per hour.

The wind-direction portion of the equipment utilizes an AC selsyn system. The wind vane drives the transmitter; in turn the receiver located in a second Esterline-Angus recorder reproduces the rotary motion of the vane. The selsyn receiver is coupled to the pen of the recorder by means of a heart-shaped cam. As a result, the possible 360° rotation of the wind vane is represented by clockwise and counterclockwise pen sweeps across the chart. Since each position of the recorder pen, except for the end points of the traverse, corresponds to two positions of the wind vane, a chronograph side-marking pen is used to eliminate the ambiguity which results. The chart speeds were set at 3 inches per hour.

7. Sunshine

Sunshine data were obtained by means of an Eppley 50-junction pyrliometer and a Leeds-Northrup Micromax Strip-Chart recorder. This recorder is located indoors in the Meteorology Laboratory, and the pyrliometer is mounted on a 5-foot pole located about 100 feet to the south of this building.

The pyrliometer consists of a thermopile of which the alternate junctions are in good thermal contact with two concentric silver rings but electrically insulated from them. Lampblack is used to coat the inner ring black, and magnesium oxide is smoked on the outer ring to give it a white covering. These rings are hermetically sealed in a soda-lime glass bulb which contains dry air. Incident solar radiation produces a temperature difference between the two rings. The resultant voltage is measured and recorded on the Micromax. It has been found that the voltage

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output is very nearly directly proportional to the intensity of solar radiation received.

Since the Micromax recorder is located at the Meteorology Laboratory, it has been checked daily. Time errors were infrequent since the chart paper is fed by a synchronous motor chart drive; the paper speed was 3 inches per hour.

8. Soil Temperature

Soil temperature data were obtained at seven levels beneath the ground surface by means of Leeds and Northrup 100-ohm copper thermohms. The lead-in wires from these elements were brought into the Meteorology Laboratory through underground conduit. A Clare stepping switch, Model 26, was used to program the data, which were recorded on a Leeds and Northrup Micromax recorder. Soil temperature data were obtained for the following levels below ground surface: 1 cm, 10 cm, 20 cm, 50 cm, 100 cm, 10 feet, and 29 feet.

The Micromax recorder for this installation was also checked daily. The paper speed was 3 inches per hour.

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