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U. S. DEPARTMENT OF COMMERCE
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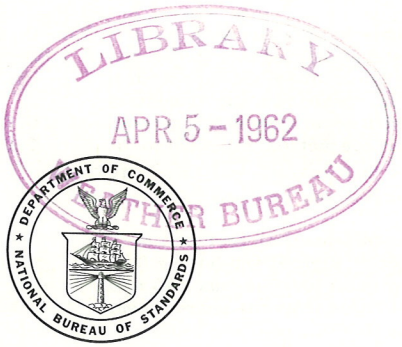
CLIMATOGRAPHY OF THE UNITED STATES NO. 81-16

DECENNIAL CENSUS OF UNITED STATES CLIMATE—

MONTHLY NORMALS OF TEMPERATURE, PRECIPITATION, AND HEATING DEGREE DAYS

MICHIGAN



WASHINGTON, D. C.:1962

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PREFACE

The climatological standard normals presented in this publication are based on records for the 30-year period 1931-1960 inclusive. For the first time, normals have been computed for substations and divisions using a base period identical to that used for first-order stations.

Previous normals were published in Weather Bureau Technical Paper No. 31, "Monthly Normal Temperatures, Precipitation, and Degree Days," and were based on records for the period 1921-1950. Earlier sets of normals are described in [1].

This is the first series of publications resulting from the project "The Decennial Census of United States Climate, 1960." The project is a continuation of earlier censuses of the climate of the United States that date back to the early 19th Century and are described in [2]. Future publications of this project will be listings of daily normals of temperature, and degree days; summaries of hourly observations; and listings of monthly divisional averages of temperature and precipitation.

Units used in this publication are degrees F. for temperatures, and inches for precipitation. The heating degree day normals are derived from the monthly normal temperatures, and are computed on the standard base of 65°F. Monthly normals of less than 5 degree days are shown as zero.

Standard Normals for Weather Bureau First Order Stations

A normal of a climatological element is an arithmetic mean for a specific period of record which estimates the true mean of the element at the current exposure of the meteorological instrument measuring the element. The true mean is the mean of all possible observations (population) at the current exposure. It is from this population that future observations will come, not from values in the past record. This is what makes it important to obtain an estimate of this mean. The true mean can never be known exactly but must be estimated from a sample of the past record ([3] p. 53 section 4. 3). The normals presented here are estimates of the true mean obtained from the 30-year sample record 1931-1960. They are called standard normals because they conform to the World Meteorological Organization standard for climatological normals.

If no exposure changes have occurred at a station the normal is estimated by simply averaging the 30 values from the 1931-1960 record. Since it is next to impossible to maintain a multiple purpose network of meteorological stations without having exposure changes, it is first necessary to find and evaluate these changes and then make adjustments for them if necessary.

Heterogeneities in record due to exposure changes are found in two ways: by determining them from the station histories and by use of statistical tests. The statistical test when standardized for the purpose is easy to apply and will often find heterogeneities which are not defined by the station histories as well as those which have been so determined. Two statistical tests were employed: one for temperature and the other for precipitation. These are described in [4].

After the periods of heterogeneity have been determined, adjustments are applied to remove the heterogeneities introduced into the mean. This is done by comparing the record at the base station, for which the normal is desired, to the record at a supplementary station with a homogeneous period which covers the heterogeneous period at the base station. The difference method is applied to the monthly average maximum and minimum temperatures and the ratio method to the monthly total precipitation. A weighted average of the various partial means of the adjusted and unadjusted record is then prepared to give the normal. Brief discussions of the methods of adjustment are found in [3] (p. 49, section 4. 24).

Normal heating degree days are derived by the method described in [5].

Normals for Substations and Divisions

Normals for substations were computed somewhat differently than those for first-order stations. Monthly substation normals are the simple arithmetic averages of the monthly values of temperature and precipitation for the period 1931-1960. These were computed for only those substations that were active during the entire period and no attempt was made to adjust for minor changes in location of the observing site, or for changes in the time of observation. Normals were not computed for substations that were moved a significant distance during the 1931-1960 period. Missing values in the data series were estimated by methods described in [6]. Substations whose locations were essentially unchanged during the 1931-1960 period are identified in the tables.

Monthly divisional normals are the means of the monthly divisional averages of temperature and precipitation for the period 1931-1960. In calculating the monthly divisional averages, all of the stations in the division that furnished both temperature and precipitation data during the particular month were used. The averages therefore were obtained from a variable station sample. As a result, the divisional normals often differ from the averages of the normals for stations in the division.

Annual substation and divisional normals are the averages of the 12 monthly temperature normals and the sums of the 12 monthly precipitation normals.

References

1. U. S. Weather Bureau, "History of Climatological Publications," Key to Meteorological Records Documentation No. 4. 1, Washington, D. C., 1958.
2. H. E. Landsberg, "The Decennial United States Census of Climate 1960 and Its Antecedents," Key to Meteorological Records Documentation No. 6. 2, U. S. Weather Bureau, Washington, D. C., 1960.
3. U. S. Weather Bureau, Climatology at Work, Gerald L. Barger, ed., Washington, D. C., 1960.
4. H. C. S. Thom, "Tests of Significance for Temperature and Precipitation Normals," U. S. Weather Bureau Manuscript, 1961.
5. H. C. S. Thom, "The Rational Relationship Between Heating Degree Days and Temperature," Monthly Weather Review, Vol. 82, No. 1, January 1954.
6. U. S. Weather Bureau, Administrative Manual, Vol. III, Chap. C-05, paras. C-0509 and C-0510.

NOTES

1. Station Names

   In Table I, "AP" after the city name indicates "airport station " "CO" indicates "city office station." Figures and letters following the station name indicate a rural location, and refer to the distance and direction of the station from the nearest post office.

   # indicates a station whose location has been essentially unchanged during the period 1931-1960.

   H indicates the ground elevation of the station in feet above sea level, as of December 31, 1960.

   G indicates the elevation at hygrothermometer site (where different from "H").

   T indicates the height of the thermometer in feet above the ground as of December 31, 1960.

   /NO TEST/ indicates that significant difference tests were not made.

2. Table Content

   * indicates that the departure of the 1951-60 record from the 1921-50 normal is statistically significant, but through the adjustments for changes in location and exposure the absolute difference between old and new normals may even in these cases be very small.

   T in the data tables indicates a monthly precipitation amount of only a trace.

February monthly normals are for a 28-day month.

TABLE I - NORMALS FOR FIRST ORDER STATIONS

STATION		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL
ALPENA AP	H 689 T 5	/NO TEST/												
MAX TEMP		28.9	29.8	37.1	51.9	65.5	75.6	80.4	78.5	69.4	58.9	43.5	31.9	54.3
MIN TEMP		12.4	10.3	17.3	29.3	38.7	48.6	53.4	52.5	45.6	36.6	27.7	17.3	32.5
AVG TEMP		20.7	20.1	27.2	40.6	52.1	62.1	66.9	65.5	57.5	47.8	35.6	24.6	43.4
DEG DAYS		1373	1272	1172	732	400	126	53	90	234	533	882	1252	8104
PRECIP		1.95	1.61	2.02	2.63	2.91	2.67	2.86	3.03	3.61	2.42	2.37	1.84	29.92
DETROIT AP CITY	H 619 T 5													
MAX TEMP		33.0	33.9	42.3	56.4*	68.6	79.1	83.9	81.9	74.2	62.8	47.1	35.7	58.2
MIN TEMP		20.7	20.4*	27.3	37.8*	48.4	59.3	63.8*	62.6*	55.0	44.7	33.7	24.1*	41.5
AVG TEMP		26.9	27.2*	34.8	47.1*	58.6	69.2	73.9*	72.3*	64.6	53.8	40.4	29.9*	49.9
DEG DAYS		1181	1058*	936	537*	236	48	0	0	93	360	738	1088*	6275
PRECIP		2.05	2.08	2.42	3.00	3.53*	2.83	2.82	2.86	2.44	2.63*	2.21	2.08	30.95
DETROIT AP WAYNE	H 630 T 6	/NO TEST/												
MAX TEMP		32.9	34.0	42.6	56.7	68.7	78.9	83.7	81.8	74.1	62.8	46.9	35.5	58.2
MIN TEMP		19.1	19.2	26.1	36.6	47.1	57.8	62.1	61.0	53.5	43.1	31.8	22.2	40.0
AVG TEMP		26.0	26.6	34.4	46.7	57.9	68.4	72.9	71.4	63.8	53.0	39.4	28.9	49.1
DEG DAYS		1209	1075	949	549	248	57	0	9	108	378	768	1119	6469
PRECIP		1.93	1.95	2.41	3.05	3.54	3.31	2.69	2.84	2.32	2.57	2.27	1.92	30.80
DETROIT AP WILLOW RUN	H 722 T 62													
MAX TEMP		33.4	34.7	43.6	57.8*	70.0	80.1	85.0	83.0*	74.9	63.6*	47.3	35.9*	59.1
MIN TEMP		19.8	20.0	27.0	37.5*	48.3	59.1	63.4	62.1	54.6*	44.1	32.7*	22.9	41.0
AVG TEMP		26.6	27.4	35.3	47.7*	59.2	69.6	74.2	72.6*	64.8*	53.9*	40.0*	29.4*	50.1
DEG DAYS		1190	1053	921	519*	217	45	0	0	90*	357*	750*	1104*	6246
PRECIP		1.94	1.95	2.40	3.05	3.48*	3.28	2.68	2.84	2.29*	2.53*	2.25	1.98	30.67
#ESCANABA CO	H 594 T 52													
MAX TEMP		25.5	26.9	34.0	46.6*	58.4	69.3	75.7	73.8	65.2	54.8	40.3	29.6	50.0
MIN TEMP		11.2	10.4*	18.4	31.5*	42.1	52.8	58.7	57.4	49.5	40.4	28.1	16.9	34.8
AVG TEMP		18.4	18.7*	26.2	39.1*	50.3	61.1	67.2	65.6	57.4	47.6	34.2	23.3	42.4
DEG DAYS		1445	1296*	1203	777*	456	159	59	87	243	539	924	1293	8481
PRECIP		1.45*	1.21*	1.66	2.23*	2.97	3.16*	3.53*	3.11	3.14	2.11	2.35	1.40	28.32
FLINT AP BISHOP	H 766 T 5													
MAX TEMP		31.0	31.8	40.6	55.8*	68.3	78.6	83.8	81.4	73.2	61.6	45.7	34.0	57.2
MIN TEMP		16.2	15.6	23.5	34.5*	45.2	55.8	59.3	57.9	50.2*	40.3	30.1	19.8	37.4
AVG TEMP		23.6	23.7	32.1	45.2*	56.8	67.2	71.6	69.7	61.7*	51.0	37.9	26.9	47.3
DEG DAYS		1283	1156	1020	594*	276	72	6	25	141*	440	813	1181	7007
PRECIP		1.70	1.76	2.14	2.66	3.39	3.12	2.91	3.15	2.94*	2.30	2.18	1.80	30.05
GRAND RAPIDS AP	H 681 T 6													
MAX TEMP		31.5	32.4*	40.9	56.2	68.3	78.6	83.6	82.1	73.4	61.9	45.8	34.5	57.4
MIN TEMP		17.3	16.6*	23.9	35.2*	45.7	56.2	60.1*	58.9*	50.9	40.4	30.5	21.4*	38.1
AVG TEMP		24.4	24.5*	32.4	45.7*	57.0	67.4	71.9*	70.5*	62.2	51.2	38.2	28.0*	47.8
DEG DAYS		1259	1134*	1011	579*	279	75	9*	28*	135	434	804	1147*	6894
PRECIP		1.91	1.75	2.28	2.94	3.46	3.31	2.73	2.70	2.98*	2.61	2.49	2.03	31.19
LANSING AP CAPITAL	H 852 T 5													
MAX TEMP		31.1	31.9	40.7	55.9*	68.1*	78.4*	83.4	81.6*	73.0	61.4*	45.3	34.0*	57.1
MIN TEMP		17.4	16.5	24.1	35.5*	46.0	56.3	59.9	58.8*	51.0	41.1	30.5	21.0*	38.2
AVG TEMP		24.3	24.2	32.4	45.7*	57.1*	67.4	71.7	70.2*	62.0	51.3*	37.9	27.5*	47.6
DEG DAYS		1262	1142	1011	579*	273*	69*	6	22*	138	431*	813	1163*	6909
PRECIP		1.96	1.95	2.40*	2.87	3.73	3.34*	2.58*	3.05	2.60*	2.50	2.21	1.99*	31.18
MARQUETTE CO	H 677 T 46													
MAX TEMP		25.7	26.6	33.4	46.6	58.8	69.6	75.7	74.0	65.7	55.4	39.3	29.3	50.0
MIN TEMP		13.2	12.8*	20.0	31.9*	40.9	50.6	57.6	57.5	49.7	40.6	28.2	18.9	35.2
AVG TEMP		19.5	19.7*	26.7	39.3*	49.9	60.1	66.7	65.8	57.7	48.0	33.8	24.1	42.6
DEG DAYS		1411	1268*	1187	771*	468	177	59	81	240	527	936	1268	8393
PRECIP		1.89*	1.65	1.91	2.70	2.96*	3.46	3.20	3.03	3.28	2.33	3.28	1.92	31.61
MUSKEGON AP	H 628 T 4													
MAX TEMP		31.3	31.6	39.5	53.8*	65.3	75.7*	80.9	79.7	71.5	60.4	45.3	35.0	55.8
MIN TEMP		18.7	17.7*	24.2	34.6*	44.3	54.7	59.6	58.8	51.4	41.6	31.9	22.8	38.4
AVG TEMP		25.0	24.7*	31.9	44.2*	54.8	65.2*	70.3	69.3	61.5	51.0	38.6	28.9	47.1
DEG DAYS		1240	1128*	1026	624*	335	102*	22	40	150	440	792	1119	7018
PRECIP		2.10	1.80*	2.05	2.58*	2.97	2.70	2.41*	2.91	3.06*	2.55	2.94	2.00	30.07
SAULT STE MARIE AP	H 721 T 8													
MAX TEMP		23.1	24.0*	31.7	46.4*	59.9	69.9	75.6	74.0	64.4	53.5*	38.6	27.3	49.0
MIN TEMP		7.4	6.4*	14.8	28.6*	38.3	47.0	52.5	53.0	46.1	37.1	25.9	13.4	30.9
AVG TEMP		15.3	15.2*	23.3	37.5*	49.1	58.5	64.1	63.5	55.3	45.3*	32.3	20.4	40.0
DEG DAYS		1541	1394*	1293	825*	493	213	109	118	294	611*	981	1383	9255
PRECIP		2.07*	1.50	1.81	2.16*	2.77	3.30	2.48*	2.89	3.81	2.82	3.33	2.28	31.22

TABLE II - NORMALS BY CLIMATOLOGICAL DIVISIONS

STATIONS (By Divisions)	TEMPERATURE (°F) JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	PRECIPITATION (In.) JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
WEST UPPER DIVISION																										
IRON MOUNTAIN WATERWKS	15.7	17.0	25.7	40.8	53.4	63.1	67.7	65.4	56.9	46.9	31.9	20.0	42.0	1.33	1.19	1.67	2.51	3.06	3.77	3.50	3.99	3.13	2.11	2.33	1.37	29.96
IRONWOOD	14.1	15.6	24.8	40.6	53.5	62.9	68.2	66.2	57.5	46.9	30.1	18.3	41.6	1.88	1.78	1.99	2.59	3.62	4.89	4.05	4.21	3.42	2.48	3.14	2.01	36.06
#ISHPEMING	15.5	16.3	24.0	38.3	51.0	61.4	66.1	64.5	56.3	45.9	30.6	19.6	40.8	1.47	1.28	1.72	2.49	3.11	3.79	4.04	3.59	3.45	2.63	2.74	1.41	31.72
MARQUETTE CO	19.5	19.7	26.7	39.3	49.9	60.1	66.7	65.8	57.7	48.0	33.8	24.1	42.6	1.89	1.65	1.91	2.70	2.96	3.46	3.20	3.03	3.28	2.33	3.28	1.92	31.61
STAMBAUGH	14.6	16.0	24.7	39.7	52.4	61.8	66.5	64.4	55.7	45.8	29.8	18.5	40.8	1.24	1.21	1.53	2.27	3.23	4.18	3.58	3.65	3.30	2.12	2.21	1.23	29.75
DIVISION	15.2	16.7	24.6	39.7	51.4	61.0	66.0	64.5	56.2	46.5	31.1	19.8	41.1	1.66	1.41	1.86	2.45	3.29	4.23	3.56	3.70	3.32	2.29	2.64	1.64	32.05
EAST UPPER DIVISION																										
#CHATHAM EXPERIMENT FARM	17.6	18.0	24.6	38.3	50.1	60.2	65.7	64.4	56.4	46.5	32.6	21.9	41.4	2.08	1.62	1.74	2.30	3.12	3.54	3.43	3.21	4.23	2.89	3.30	2.01	33.47
#ESCANABA CO	18.4	18.7	26.2	39.1	50.3	61.1	67.2	65.6	57.4	47.6	34.2	23.3	42.4	1.45	1.21	1.66	2.23	2.97	3.16	3.53	3.11	3.14	2.11	2.35	1.40	28.32
GRAND MARAIS	19.5	18.7	24.2	36.9	47.8	57.2	62.7	63.1	55.9	46.6	33.8	24.0	40.9	2.19	1.74	1.73	1.97	2.68	3.29	2.67	2.58	3.33	2.34	3.02	2.20	29.74
#MUNISING	19.1	18.9	25.2	38.3	49.1	59.2	65.0	64.5	56.9	46.9	33.5	23.1	41.6	2.51	1.94	1.95	2.25	2.94	3.45	3.19	3.18	3.64	2.91	3.52	2.60	34.08
#NEWBERRY STATE HOSPITAL	17.7	17.7	24.9	38.7	50.4	60.2	65.7	64.5	56.0	45.9	32.7	22.2	41.4	•	•	•	•	•	•	•	•	•	•	•	•	•
SAULT STE MARIE AP	15.3	15.2	23.3	37.5	49.1	58.5	64.1	63.5	55.3	45.3	32.3	20.4	40.0	2.07	1.50	1.81	2.16	2.77	3.30	2.48	2.89	3.81	2.82	3.33	2.28	31.22
DIVISION	18.4	18.6	25.2	38.3	49.3	59.1	64.8	64.5	56.6	46.9	33.9	23.1	41.6	2.10	1.66	1.89	2.29	2.96	3.42	3.00	3.03	3.57	2.62	3.01	2.12	31.67
NORTHWEST LOWER DIV																										
CADILLAC 3 WSW	19.4	18.6	26.1	40.7	52.7	63.1	67.4	65.8	57.5	46.9	33.9	23.1	42.9	1.83	1.59	2.01	2.68	2.97	3.15	2.78	3.01	3.53	2.88	2.89	1.85	31.17
EAST JORDAN	22.1	20.9	28.2	42.5	54.0	64.2	69.0	67.5	59.6	49.6	36.9	26.3	45.1	•	•	•	•	•	•	•	•	•	•	•	•	•
#FIFE LAKE 2 S	20.2	19.4	26.8	41.5	53.3	63.5	67.6	66.0	58.2	47.9	34.9	24.0	43.6	1.90	1.52	1.71	2.41	2.90	3.23	3.18	3.08	3.19	3.02	2.86	1.93	30.93
LAKE CITY EXP FARM	19.7	19.2	26.6	41.7	53.5	63.5	67.8	66.2	58.0	47.6	34.4	23.3	43.5	1.34	1.21	1.48	2.39	2.97	3.19	3.16	2.85	3.20	2.74	2.44	1.36	28.33
MANISTEE	24.9	24.7	31.5	43.8	54.3	64.4	69.7	69.0	61.6	51.2	38.8	28.7	46.9	•	•	•	•	•	•	•	•	•	•	•	•	•
TRAVERSE CITY FAA AP	23.0	22.2	29.0	42.1	53.0	64.2	69.9	68.7	60.5	50.0	37.1	26.9	45.6	1.82	1.40	1.61	2.26	2.89	2.82	2.79	2.88	3.48	2.80	2.86	1.75	29.36
#WELLSTON TIPPEY DAM	•	•	•	•	•	•	•	•	•	•	•	•	•	2.06	1.55	1.83	2.63	3.08	3.18	2.69	3.31	3.70	3.01	3.01	1.92	31.97
DIVISION	21.4	20.7	27.8	41.7	53.0	63.4	68.3	67.1	59.1	48.8	36.1	25.4	44.4	1.87	1.46	1.70	2.43	2.94	3.09	2.78	3.04	3.57	2.86	2.90	1.90	30.54

TABLE II - NORMALS BY CLIMATOLOGICAL DIVISIONS

MICHIGAN

STATIONS (By Divisions)	TEMPERATURE (°F) JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	PRECIPITATION (In.) JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
NORTHEAST LOWER DIV																										
ALPENA AP	20.7	20.1	27.2	40.6	52.1	62.1	66.9	65.5	57.5	47.8	35.6	24.6	43.4	1.95	1.61	2.02	2.63	2.91	2.67	2.86	3.03	3.61	2.42	2.37	1.84	29.92
ALPENA SEWAGE PLANT	21.0	20.0	27.6	39.8	50.9	61.4	67.1	65.9	58.3	47.9	36.3	25.6	43.5	1.56	1.40	1.88	2.23	2.61	2.59	2.52	2.54	3.15	2.03	2.15	1.70	26.36
ATLANTA 3 ENE	19.7	19.2	26.9	41.2	53.0	63.1	67.5	65.6	57.7	47.8	35.0	23.7	43.4	*	*	*	*	*	*	*	*	*	*	*	*	*
CHEBOYGAN RR LIGHT STA	20.7	20.1	27.4	40.8	52.1	62.4	68.5	67.1	59.2	49.0	36.3	25.4	44.1	*	*	*	*	*	*	*	*	*	*	*	*	*
GRAYLING MILITARY RES	19.2	19.1	26.4	41.3	53.8	63.8	68.0	66.3	58.2	48.1	34.4	23.1	43.5	1.42	1.21	1.50	2.57	3.51	3.69	3.82	3.37	3.83	3.00	2.87	1.96	32.35
HALE LOUD DAM	20.0	19.4	27.0	41.0	52.3	62.7	67.3	65.9	57.5	48.7	35.4	24.4	43.5	1.67	1.41	1.99	2.57	2.87	2.68	2.67	3.12	3.03	2.46	2.32	1.64	28.43
HARRISVILLE	22.6	22.4	28.8	41.1	51.1	61.7	67.3	66.7	59.6	49.5	37.0	26.4	44.5	*	*	*	*	*	*	*	*	*	*	*	*	*
HIGGINS LAKE	19.5	19.1	26.6	40.7	52.8	63.3	67.9	66.3	58.1	47.7	34.3	23.3	43.3	2.03	1.61	2.00	2.58	2.92	3.42	3.35	3.06	3.51	2.96	3.08	1.99	32.51
HOUGHTON LAKE 3 NW	20.7	20.4	28.1	42.6	54.8	64.3	68.1	66.5	58.6	48.6	35.3	24.5	44.4	1.49	1.29	1.69	2.31	2.93	3.12	2.88	2.67	2.94	2.99	2.36	1.67	28.34
MACKINAW CITY NO 2	21.0	19.3	25.8	38.5	49.5	59.7	66.9	66.4	58.7	49.0	36.6	26.2	43.1	1.59	1.38	1.49	2.12	2.85	2.85	2.37	2.77	3.80	2.58	2.51	1.57	27.88
MIO HYDRO PLANT	19.0	18.3	26.5	40.6	52.4	62.8	66.9	65.2	56.9	46.9	34.6	23.1	42.8	1.30	1.24	1.51	2.15	2.59	2.75	2.90	2.97	3.01	2.11	1.97	1.29	25.79
ONAWAY BLACK L FOREST	20.0	20.0	27.5	41.2	53.3	63.2	68.3	66.8	58.4	48.4	35.4	24.4	43.9	*	*	*	*	*	*	*	*	*	*	*	*	*
VANDERBILT TROUT STA	18.7	17.9	25.4	40.2	52.3	60.5	66.4	64.8	57.0	46.9	34.1	22.9	42.3	1.75	1.34	1.67	2.29	2.70	2.78	2.59	2.89	3.94	2.67	2.67	1.82	29.11
WEST BRANCH 2 N	19.2	19.5	27.0	41.2	53.4	63.2	67.2	65.5	57.0	47.0	33.8	22.9	43.1	1.46	1.40	1.82	2.35	3.16	3.09	2.95	3.05	3.01	2.80	2.60	1.71	29.40
DIVISION	20.2	19.9	27.1	41.0	52.5	62.6	67.6	66.1	58.2	48.1	35.4	24.4	43.6	1.69	1.42	1.74	2.39	2.93	2.97	2.83	2.89	3.43	2.57	2.51	1.71	29.08
WEST CENTRAL LOWER DIV																										
#MART	24.4	24.2	31.5	44.6	55.3	65.9	70.5	69.1	61.1	51.0	38.3	28.1	47.0	2.49	1.95	1.82	2.60	3.03	3.19	2.77	3.02	3.16	2.62	3.10	2.05	31.80
LUDINGTON 4 SE	24.9	24.6	31.6	43.6	53.6	63.7	69.1	68.4	61.1	51.0	38.4	28.4	46.5	2.30	1.87	1.81	2.46	2.69	3.04	2.23	2.76	3.04	2.61	2.85	2.09	29.75
MUSKEGON AP	25.0	24.7	31.9	44.2	54.8	65.2	70.3	69.3	61.5	51.0	38.6	28.9	47.1	2.10	1.80	2.05	2.58	2.97	2.70	2.41	2.91	3.06	2.55	2.94	2.00	30.07
NEWAYGO HARDY DAM	22.5	22.2	30.1	43.7	55.6	65.9	70.1	68.6	60.4	49.5	36.7	26.2	46.0	2.14	1.90	2.19	2.77	3.27	3.12	2.76	3.20	3.08	2.68	2.84	2.06	32.01
SCOTTVILLE 1 NE	*	*	*	*	*	*	*	*	*	*	*	*	*	2.29	1.77	1.88	2.44	2.86	3.03	2.19	2.87	2.88	2.69	2.76	1.96	29.62
DIVISION	23.4	23.5	30.9	44.0	54.9	65.3	69.8	68.6	60.7	50.4	37.4	27.2	46.3	2.31	1.90	1.97	2.64	3.02	3.15	2.65	2.90	3.07	2.65	2.92	2.07	31.25
CENTRAL LOWER DIV																										
ALMA	23.9	24.0	32.4	46.0	57.4	67.9	72.3	70.4	62.5	51.7	38.4	27.4	47.9	1.45	1.37	1.80	2.40	3.04	3.08	2.51	3.34	3.15	2.42	2.21	1.59	28.36
#BIG RAPIDS WATERWORKS	22.9	23.0	30.7	44.2	55.7	65.6	69.8	68.2	60.0	49.7	37.0	26.5	46.1	2.00	1.78	2.11	2.71	3.02	3.56	2.67	2.78	3.34	2.74	2.84	1.93	31.48
GLADWIN	21.1	21.1	29.3	43.3	54.7	64.8	69.1	67.5	59.2	48.8	35.9	25.1	45.0	1.73	1.48	1.89	2.60	3.08	3.36	2.82	3.10	3.23	2.82	2.49	1.92	30.52
GREENVILLE	24.3	24.6	32.8	46.2	57.7	67.9	72.3	70.5	62.2	51.6	38.2	27.6	48.0	*	*	*	*	*	*	*	*	*	*	*	*	*
MIDLAND DOW CHEMICAL	24.8	24.8	32.8	46.2	57.9	68.1	72.4	70.7	62.9	52.4	39.3	28.3	48.4	1.74	1.75	2.03	2.50	3.01	3.09	2.36	2.86	3.13	2.69	2.39	1.94	29.49
MOUNT PLEASANT COLLEGE	23.0	23.3	31.4	45.3	57.0	67.1	71.6	69.9	62.0	51.1	37.5	26.6	47.2	1.65	1.47	1.81	2.41	2.98	3.08	2.66	2.97	3.24	2.65	2.33	1.70	28.95
DIVISION	23.1	23.4	31.4	45.1	56.6	66.8	71.0	69.4	61.2	50.6	37.5	26.8	46.9	1.72	1.59	1.93	2.56	3.09	3.27	2.60	3.11	3.20	2.64	2.50	1.80	30.01
EAST CENTRAL LOWER DIV																										
BAD AXE RADIO STATION	23.1	22.8	30.6	43.6	54.9	65.2	70.2	69.1	61.3	50.8	37.9	27.0	46.4	*	*	*	*	*	*	*	*	*	*	*	*	*
BAY CITY SEWAGE PLANT	25.0	25.1	32.9	46.3	58.1	68.6	73.1	71.3	63.2	52.6	39.2	28.3	48.6	1.44	1.44	1.75	2.22	2.93	3.23	2.19	2.68	2.84	2.39	2.12	1.50	26.73
CARO STATE HOSPITAL	23.9	23.8	32.4	45.5	56.7	67.1	71.4	69.6	62.0	51.6	38.5	27.6	47.5	1.50	1.37	1.79	2.21	2.87	3.11	2.91	2.93	2.90	2.58	2.25	1.67	28.09
SAGINAW FAA AIRPORT	23.4	23.3	31.8	44.9	56.3	66.9	71.6	69.7	61.5	50.7	37.8	26.9	47.1	1.63	1.74	1.87	2.38	2.89	2.94	2.47	2.88	3.01	2.52	2.29	1.78	28.40
DIVISION	23.6	23.7	31.6	44.9	55.8	66.4	71.0	69.6	61.7	51.2	38.3	27.3	47.1	1.67	1.62	1.84	2.39	3.01	3.11	2.78	2.74	2.85	2.52	2.25	1.81	28.59
SOUTHWEST LOWER DIV																										
ALLEGAN SEWAGE PLANT	26.5	26.7	34.5	47.4	58.5	68.5	72.6	71.2	63.6	52.9	39.8	29.7	49.3	2.32	1.93	2.38	3.20	3.57	3.53	2.52	3.45	3.06	2.73	2.66	2.20	33.55
BLOOMINGDALE	26.5	27.1	34.9	47.6	58.5	68.2	72.5	71.0	63.5	52.9	39.7	29.5	49.3	2.57	2.22	2.65	3.27	3.79	3.86	2.65	3.27	3.21	2.98	2.98	2.56	36.01
#EAU CLAIRE 4 NE	26.4	27.3	35.5	48.2	59.1	69.5	74.2	72.8	65.2	54.3	39.9	29.3	50.1	2.13	1.77	2.32	3.31	4.07	4.18	3.08	3.20	3.14	3.29	2.75	2.25	35.49
GRAND HAVEN FIRE DEPT	26.6	26.5	33.5	45.2	55.7	65.9	71.0	69.9	62.9	52.5	40.0	30.0	48.3	2.22	1.84	2.12	2.68	3.34	3.24	2.67	2.92	3.07	2.58	2.89	2.18	31.75
GRAND RAPIDS AP	24.4	24.5	32.4	45.7	57.0	67.4	71.9	70.5	62.2	51.2	38.2	28.0	47.8	1.91	1.75	2.28	2.94	3.46	3.31	2.73	2.70	2.98	2.61	2.49	2.03	31.19
GULL LAKE EXP FARM	24.9	25.6	33.8	46.7	58.0	68.3	72.6	71.2	63.3	52.3	38.6	27.9	48.6	2.03	1.78	2.30	3.16	3.73	4.23	2.87	3.66	3.09	3.11	2.56	1.80	34.32
HOLLAND	27.2	27.2	34.8	47.0	58.0	67.9	72.6	71.3	64.0	53.6	40.6	30.3	49.5	2.16	1.90	2.37	2.93	3.42	3.12	2.95	3.01	3.35	2.97	2.96	2.34	33.48
#KALAMAZOO STATE HOSP	*	*	*	*	*	*	*	*	*	*	*	*	*	2.26	2.01	2.53	3.08	3.76	3.73	3.31	3.08	3.02	3.01	2.60	2.09	34.48
KENT CITY 2 SW	*	*	*	*	*	*	*	*	*	*	*	*	*	1.93	1.90	2.08	2.80	3.42	3.28	2.61	3.24	3.15	2.66	2.91	2.03	32.01
PAW PAW 2 E	25.9	26.7	34.7	47.5	58.5	68.6	72.9	71.4	63.9	52.9	39.5	28.9	49.3	2.31	1.99	2.79	3.39	4.17	4.15	3.31	3.03	3.18	3.22	2.72	2.24	36.50
SOUTH HAVEN EXP FARM	27.7	28.1	35.0	46.3	56.2	66.7	71.4	70.5	64.3	54.2	41.5	31.0	49.4	1.98	1.76	2.12	2.98	3.52	3.43	2.60	3.00	3.04	3.11	2.65	2.06	32.25
DIVISION	26.4	27.0	34.7	47.2	57.9	67.9	72.5	71.2	63.9	53.2	39.9	29.5	49.3	2.22	1.92	2.41	3.14	3.76	3.73	2.93	3.16	3.10	3.01	2.74	2.29	34.41
SOUTH CENTRAL LOWER DIV																										
ALBION	*	*	*	*	*	*	*	*	*	*	*	*	*	2.18	1.93	2.59	3.39	4.16	4.21	2.97	3.16	3.17	2.93	2.48	1.96	35.13
BATTLE CREEK	25.0	25.7	33.8	46.9	58.4	68.6	72.8	71.4	63.5	52.3	38.5	28.1	48.8	2.04	1.78	2.37	3.00	3.80	4.03	2.87	3.10	2.84	2.96	2.40	1.90	33.09
CHARLOTTE	24.9	25.3	33.6	46.6	57.9	67.9	72.2	70.5	62.8	51.9	38.3	27.4	48.3	1.81	1.66	2.09	2.95	3.93	4.09	2.56	3.15	3.03	2.83	2.33	1.81	32.24
COLDWATER STATE SCHOOL	26.0	26.7	34.9	47.6	58.5	68.7	72.7	71.1	63.9	53.0	39.3	28.9	49.3	1.94	1.84	2.48	3.37	3.68	4.22	3.43	3.04	3.25	2.57	2.48	1.82	34.12
HASTINGS FISHERIES	25.5	26.1	34.2	47.4	58.9	68.8	72.9	71.3	63.8	52.8	39.2	28.5	49.1	1.68	1.66	2.10	2.87	3.76	3.97	2.84	3.47	3.21	2.88	2.25	1.72	32.41
HILLSDALE	25.3	26.2	34.3	47.3	58.4	68.1	72.1	70.4	63.0	52.3	38.6	28.1	48.7	2.33	2.16	2.84	3.57	3.76	4.16	3.18	2.95	3.00	2.89	2.82	2.14	35.80
JACKSON FAA AIRPORT	25.2	26.0	34.0	47.7	58.2	68.2	72.4	70.9	63.2	52.3	38.6	28.2	48.7	1.79	1.75	2.20	3.11	3.63	4.05	2.74	2.69	2.62	2.54	2.26	1.77	31.15
LANSING AP CAPITAL	24.3	24.2	32.4	45.7	57.1	67.4	71.7	70.2	62.0	51.3	37.9	27.5	47.6	1.96	1.95	2.40	2.87	3.73	3.34	2.58	3.05	2.60	2.50	2.21	1.99	31.18
OWOSSO SEWAGE PLANT	25.0	25.3	33.4	46.4	57.6	67.7	72.0	70.4	63.1	52.4	39.1	28.2	48.4	1.68	1.66	2.00	2.70	3.46	3.44	2.56	2.88	2.77	2.44	2.08	1.70	29.37
THREE RIVERS	26.4	27.4	35.5	48.2	59.2	69.3	73.3	71.6	64.4	53.2	39.7	29.1	49.8	1.96	1.79	2.52	3.33	4.04	4.41	3.30	3.32	3.37	2.85	2.57	2.11	35.57
DIVISION	25.1	25.8	34.0	47.2	58.2	68.3	72.4	70.8	63.3	52.6	38.8	28.2	48.7	1.89	1.76	2.32	3.13	3.78	3.97	2.97	3.17	2.95	2.76	2.36	1.86	32.92
SOUTHEAST LOWER DIV																										
#ADRIAN	26.3	27.3	35.3	47.7	59.4	69.9	74.0	72.3	64.2	52.9	39.2	29.0	49.8	1.99	1.82	2.46	3.25	3.59	3.51	3.09	2.64	2.77	2.68	2.24	1.89	31.93
DETROIT AP CITY	26.9	27.2	34.8	47.1	58.5	69.2	73.9	72.3	64.6	53.8	40.4	29.9	49.9	2.05	2.08	2.42	3.00	3.53	3.89	2.82	2.86	2.44	2.63	2.21	2.08	30.95
DETROIT AP WAYNE	26.0	26.6	34.4	46.7	57.9	68.4	72.9	71.4	63.8	53.0	39.4	28.9	49.1	1.93	1.95	2.41	3.05	3.54	3.31	2.69	2.84	2.32	2.57	2.27	1.92	30.80
DETROIT AP WILLOW RUN	26.6	27.4	35.3	47.7	59.2	69.6	74.2	72.6	64.8	53.9	40.0	29.4	50.1	1.94	1.95	2.40	3.05	3.48	3.28	2.68	2.84	2.29	2.53	2.25	1.98	30.67
FLINT AP BISHOP	23.6	23.7	32.1	45.2	56.8	67.2	71.6	69.7	61.7	51.0	37.9	26.9	47.3	1.70	1.76	2.14	2.66	3.39	3.12	2.91	3.15	2.94	2.30	2.18	1.80	30.05
MILFORD GM PROVING GRND	23.7	23.9	32.2	45.0	56.5	66.7	71.3	69.9	62.0	51.3	37.4	26.7	47.2	1.98	2.09	2.53	3.31	3.80	3.33	2.69	3.16	2.90	2.74	2.44	2.11	33.08
MONROE SEWAGE PLANT	27.2	27.9	35.5	47.6	59.1	69.6	73.9	72.3	65.2	54.0	40.4	29.9	50.2	2.01	1.87	2.32	3.00	3.37	3.52	2.93	2.97	2.68	2.44	1.91	1.80	30.82
MOUNT CLEMENS AF BASE	25.7	25.8	33.5	45.8	57.1	67.6	72.8	71.2	63.4	52.6	39.5	28.8	48.7	1.73	1.96	2.16	2.62	3.09	2.74	2.22	2.56	2.25	2.16	1.95	1.95	27.39
PONTIAC STATE HOSPITAL	24.7	25.2	33.3	46.3	57.8	67.9	72.4	71.0	63.5	52.6	38.8	27.8	48.4	1.83	2.01	2.19	2.88	3.51	3.37	2.82	2.83	2.65	2.71	2.23	1.96	30.99
#WILLIS 5 SSW	25.5	26.3	34.4	46.6	57.9	67.8	72.0	70.4	63.0	52.1	39.0	28.2	48.6	1.93	1.77	2.31	3.11	3.39	3.36	2.63	3.06	2.58	2.50	2.18	1.88	30.70
DIVISION	25.6	26.1	34.0	46.5	57.7	68.2	72.6	71.0	63.6	52.7	39.2	28.6	48.8	1.89	1.90	2.29	2.94	3.38	3.29	2.75	2.91	2.58	2.61	2.21	1.93	30.68

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1963 REVISIONS AND ADDITIONS TO CLIMATOGRAPHY OF THE UNITED STATES NO. 81-16 MICHIGAN

TABLE I — NORMALS FOR FIRST ORDER STATIONS

STATION	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
ALPENA AP													
H 689 T 5													
MAX TEMP	28.9	28.8	36.1	50.9	64.5	74.6	80.4	78.5	69.4	58.9	43.5	31.9	53.9
MIN TEMP	10.4	8.3	15.3	27.3	36.7	46.6	51.4	50.5	42.6	33.6	25.7	16.3	30.4
AVG TEMP	19.7	18.6	25.7	39.1	50.6	60.6	65.9	64.5	56.0	46.3	34.6	24.1	42.1
DEG DAYS	1404	1299	1218	777	446	156	68	105	273	580	912	1268	8506
DETROIT AP-CITY													
G 619 T 5													
MAX TEMP	33.0	33.9	42.3	56.4	68.6	79.1	83.9	81.9	74.2	62.8	47.1	35.7	58.2
MIN TEMP	20.7	20.4	27.3	38.8	49.4	60.3	64.8	63.6	56.0	44.7	33.7	24.1	42.0
AVG TEMP	26.9	27.2	34.8	47.6	59.0	69.7	74.4	72.8	65.1	53.8	40.4	29.9	50.1
DEG DAYS	1181	1058	936	522	220	42	0	0	87	360	738	1088	6232
DETROIT AP-WAYNE													
G 633 T 6													
MAX TEMP	33.9	35.0	43.6	57.7	69.7	79.9	84.7	83.8	76.1	64.8	48.9	36.5	59.6
MIN TEMP	19.1	19.2	26.1	36.6	47.1	56.8	61.1	60.0	52.5	43.1	31.8	23.2	39.7
AVG TEMP	26.5	27.1	34.9	47.2	58.4	68.4	72.9	71.9	64.3	54.0	40.4	29.9	49.7
DEG DAYS	1194	1061	933	534	239	57	0	0	96	353	738	1088	6293
DETROIT AP-WILLOW RUN													
G 711 T 5													
MAX TEMP	33.4	34.7	43.6	57.8	70.0	81.1	86.0	84.0	75.9	64.6	48.3	35.9	59.6
MIN TEMP	19.8	20.0	27.0	37.5	47.3	58.1	62.4	61.1	53.6	43.1	31.7	22.9	40.4
AVG TEMP	26.6	27.4	35.3	47.7	58.7	69.6	74.2	72.6	64.8	53.9	40.0	29.4	50.0
DEG DAYS	1190	1053	921	519	229	45	0	0	90	357	750	1104	6258
FLINT AP-BISHOP													
H 766 T 5													
MAX TEMP	30.0	30.8	39.6	54.8	67.3	77.6	82.8	80.4	72.2	60.6	44.7	33.0	56.2
MIN TEMP	14.2	13.6	21.5	32.5	43.2	53.8	57.3	55.9	49.2	39.3	29.1	18.8	35.7
AVG TEMP	22.1	22.2	30.6	43.7	55.3	65.7	70.1	68.2	60.7	50.0	36.9	25.9	46.0
DEG DAYS	1330	1198	1066	639	319	90	16	40	159	465	843	1212	7377
PRECIP	1.70	1.76	2.14	2.66	3.39	3.12	2.91	3.17	2.94	2.37	2.18	1.80	30.14
MUSKEGON AP													
G 627 T 5													
MAX TEMP	32.3	32.6	40.5	54.8	66.3	77.7	81.9	80.7	72.5	61.4	46.3	36.0	56.9
MIN TEMP	19.7	18.7	25.2	35.6	45.3	55.7	60.6	59.8	53.4	43.6	32.9	23.8	39.5
AVG TEMP	26.0	25.7	32.9	45.2	55.8	66.7	71.3	70.3	63.0	52.5	39.6	29.9	48.2
DEG DAYS	1209	1100	995	594	310	78	12	28	120	400	762	1088	6696
SAULT STE MARIE AP													
H 721 T 8													
MAX TEMP	23.1	24.0	31.7	46.4	59.9	69.9	75.6	74.0	64.4	54.5	39.6	27.3	49.2
MIN TEMP	8.4	7.4	15.8	29.6	39.3	48.0	53.5	54.0	47.1	38.1	26.9	14.4	31.9
AVG TEMP	15.8	15.7	23.8	38.0	49.6	59.0	64.6	64.0	55.8	46.3	33.3	20.9	40.6
DEG DAYS	1525	1380	1277	810	477	201	96	105	279	580	951	1367	9048

Continued

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TABLE II — NORMALS BY CLIMATOLOGICAL DIVISIONS

MICHIGAN

DIVISION	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
TEMPERATURE (°F.)													
WEST UPPER DIVISION	15.4	16.2	24.4	39.0	51.2	60.7	66.1	64.6	56.3	46.2	31.0		40.9
EAST UPPER DIVISION	18.3	18.1	24.9	38.1		59.2	65.0	64.4	56.5	46.7	33.7	22.9	41.4
NORTHWEST LOWER DIVISION	21.7	20.9	28.0		52.8	63.2	68.2	67.0	59.2	48.9	36.3	25.8	44.5
NORTHEAST LOWER DIVISION		19.7	27.0	40.9			67.4	66.0	58.0	48.0	35.3	24.3	43.5
WEST CENTRAL LOWER DIV	23.6	23.3		43.9	55.0	65.2	69.9			50.3	37.6	27.3	46.4
CENTRAL LOWER DIVISION	23.2	23.3	31.3	45.0		66.7	71.1			50.7		26.7	
EAST CENTRAL LOWER DIV	23.7	23.5		44.7			71.1		61.8		38.4		
SOUTHWEST LOWER DIVISION	26.5			47.1		68.1	72.7	71.3	64.0	53.3	40.0	29.6	49.4
SOUTH CENTRAL LOWER DIV	25.2	25.7	33.8	46.9	58.0	68.2		70.7	63.2	52.3			48.6
SOUTHEAST LOWER DIVISION			34.1	46.6	57.9		72.7	71.1	63.7		39.3		48.9
PRECIPITATION (In.)													
WEST UPPER DIVISION	1.88	1.54	1.75	2.34	3.17	4.00	3.43		3.43	2.41	2.75	1.79	32.19
EAST UPPER DIVISION	2.13	1.70	1.87	2.24	2.94	3.36	2.99	3.01	3.68	2.67	3.10	2.18	31.87
NORTHWEST LOWER DIVISION		1.48	1.68	2.40	2.92	3.06	2.73	3.01		2.87	2.91	1.89	30.39
NORTHEAST LOWER DIVISION	1.65	1.39	1.72	2.37	2.91	2.95	2.82	2.93	3.46	2.58	2.48	1.67	28.93
WEST CENTRAL LOWER DIV	2.23	1.87		2.60		3.06		2.96	3.20	2.75	3.00	2.06	31.37
CENTRAL LOWER DIVISION	1.73	1.57	1.92		3.07	3.24	2.61	3.08	3.21	2.63	2.51	1.81	29.94
EAST CENTRAL LOWER DIV		1.63	1.81		2.98	3.07	2.67	2.69	2.86	2.51	2.26	1.79	28.33
SOUTHWEST LOWER DIVISION	2.21	1.91	2.40	3.12		3.74	2.89	3.18	3.14	3.02	2.72	2.21	34.30
SOUTH CENTRAL LOWER DIV	1.84	1.75	2.24	3.01	3.72	3.89	2.88	3.15	2.96	2.67		1.84	32.31
SOUTHEAST LOWER DIVISION	1.87	1.87	2.26	2.96	3.45	3.26	2.77	2.92	2.66	2.59	2.19	1.92	30.72

REVISIONS TO FIRST ORDER STATIONS IN TABLE I AFFECT THE SAME STATIONS IN TABLE II.

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