

1999

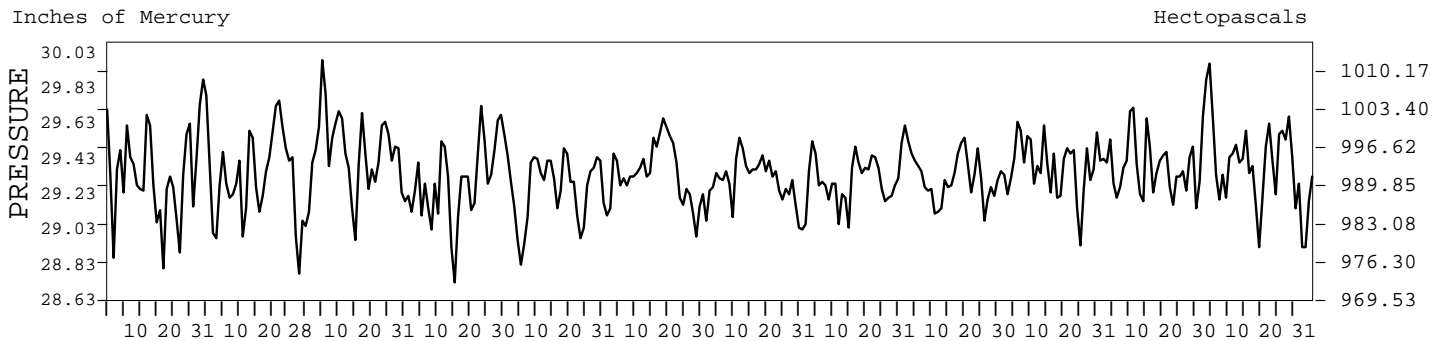
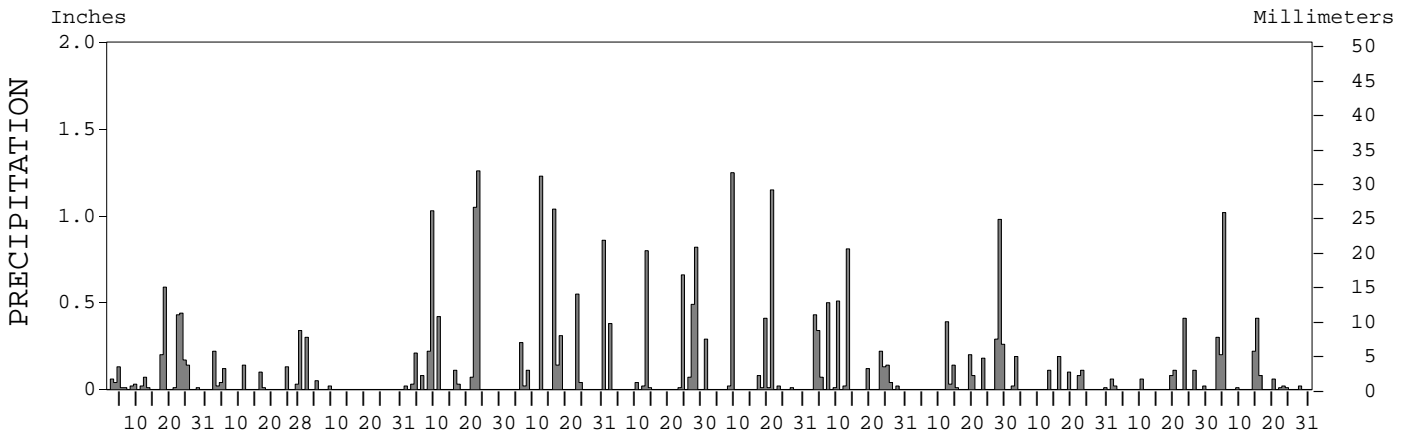
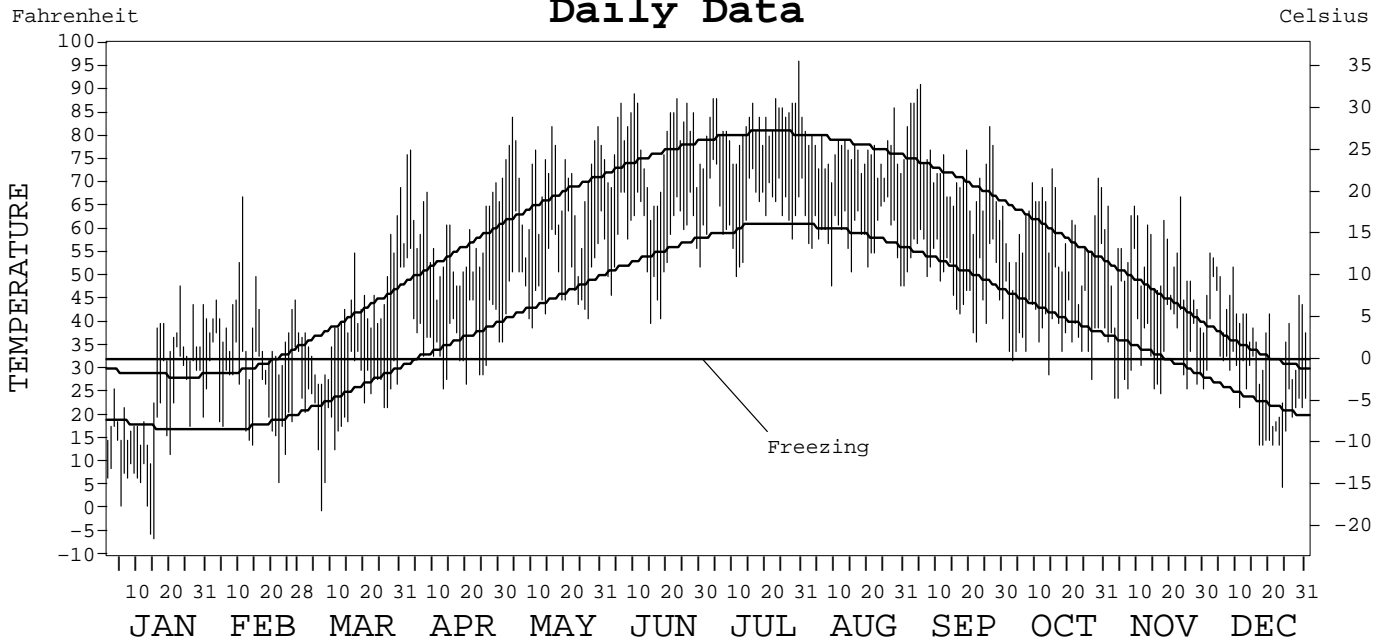
LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA



ISSN 0198-2656

MUSKEGON,
MICHIGAN (MKG)

Daily Data



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Thomas R. Karl

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	NATIONAL ENVIRONMENTAL AND INFORMATION SERVICE	NATIONAL SATELLITE, DATA, AND INFORMATION SERVICE	NATIONAL CLIMATIC DATA CENTER ASHEVILLE, NORTH CAROLINA	DIRECTOR NATIONAL CLIMATIC DATA CENTER
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METEOROLOGICAL DATA FOR 1999

MUSKEGON, MI (MKG)

LATITUDE: 43° 10' 16" N LONGITUDE: 86° 14' 12" W ELEVATION (FT): GRND: 627 BARO: 627 TIME ZONE: EASTERN (UTC + 5) WBAN: 14840

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	
TEMPERATURE °F	MEAN DAILY MAXIMUM	28.1	39.3	41.7	58.6	70.3	77.8	82.7	76.2	73.0	59.4	52.2	38.5	58.2	
	HIGHEST DAILY MAXIMUM	48	67	69	77	84	89	96	86	91	73	67	55	96	
	DATE OF OCCURRENCE	23	11	31	03	04	10	30	28	05	15	23	02	JUL 30	
	MEAN DAILY MINIMUM	16.3	24.8	23.9	38.0	49.5	57.5	64.3	58.6	49.9	39.2	34.3	25.5	40.1	
	LOWEST DAILY MINIMUM	-6	6	0	26	36	40	50	48	36	28	24	5	-6	
	DATE OF OCCURRENCE	15	22	07	13	01	15	11	31+	22	27	04+	24	JAN 15	
	AVERAGE DRY BULB	22.2	32.1	32.8	48.3	59.9	67.7	73.5	67.4	61.5	49.3	43.3	32.0	49.2	
	MEAN WET BULB	21.3	29.6	29.4	43.0	53.7	62.6	69.1	63.1	56.5	46.1	40.8	30.0	45.4	
	MEAN DEW POINT	17.6	24.4	22.2	36.5	48.0	58.9	66.2	59.7	51.9	41.7	35.9	26.0	40.8	
	NUMBER OF DAYS WITH:														
	MAXIMUM ≥ 90°	0	0	0	0	0	0	1	0	2	0	0	0	0	3
	MAXIMUM ≤ 32°	17	5	5	0	0	0	0	0	0	0	0	8	35	
	MINIMUM ≤ 32°	29	20	28	8	0	0	0	0	0	3	14	24	126	
MINIMUM ≤ 0°	2	0	1	0	0	0	0	0	0	0	0	0	3		
H/C	HEATING DEGREE DAYS	1320	915	990	496	187	64	3	17	141	479	644	1019	6275	
	COOLING DEGREE DAYS	0	0	0	2	36	152	274	101	45	0	0	0	610	
RH	MEAN (PERCENT)	81	74	65	69	68	74	77	77	72	75	74	78	74	
	HOUR 01 LST	83	77	75	76	76	87	86	88	84	80	76	81	81	
	HOUR 07 LST	82	83	77	84	77	85	90	91	89	84	81	82	84	
	HOUR 13 LST	78	67	53	57	59	62	66	64	54	64	65	74	64	
	HOUR 19 LST	80	73	62	59	61	63	67	69	65	73	71	77	68	
S	PERCENT POSSIBLE SUNSHINE														
W/O	NUMBER OF DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	10	3	1	2	2	2	2	4	1	4	5	4	40	
	THUNDERSTORMS	1	1	0	2	5	8	6	4	4	4	2	0	37	
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
	MIDNIGHT-MIDNIGHT: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
NUMBER OF DAYS WITH:															
CLEAR															
PARTLY CLOUDY															
CLOUDY															
PR	MEAN STATION PRESS. (IN.)	29.36	29.33	29.45	29.29	29.28	29.34	29.30	29.33	29.31	29.40	29.42	29.36	29.35	
	MEAN SEA-LEVEL PRESS. (IN.)	30.07	30.03	30.15	29.98	29.95	30.01	29.96	30.01	29.99	30.09	30.10	30.05	30.03	
WINDS	RESULTANT SPEED (MPH)	0.7	2.5	1.9	3.6	2.0	2.3	3.2	1.2	2.5	2.9	3.6	3.0	1.6	
	RES. DIR. (TENS OF DEGS.)	21	22	31	08	19	22	23	33	26	24	24	25	24	
	MEAN SPEED (MPH)	11.3	10.8	11.1	10.2	9.8	7.5	8.7	7.2	7.9	9.9	10.3	10.3	9.6	
	PREVAIL. DIR. (TENS OF DEGS.)	08	19	20	08	11	20	21	01	01	19	20	29	19	
	MAXIMUM 2-MINUTE WIND:														
	SPEED (MPH)	38	38	29	38	34	31	26	25	29	30	33	34	38	
	DIR. (TENS OF DEGS.)	08	20	20	21	18	30	20	17	23	34	20	22	21	
	DATE OF OCCURRENCE	02	11	31+	06	06	28+	29	16	19	23	23	25	APR 06	
	MAXIMUM 5-SECOND WIND:														
	SPEED (MPH)	48	53	37	45	43	39	33	31	38	38	40	43	53	
DIR. (TENS OF DEGS.)	08	18	21	21	18	18	18	16	23	19	20	31	18		
DATE OF OCCURRENCE	02	03	31+	06	17+	11	29	16	19	25	23	26	FEB 03		
PRECIPITATION	WATER EQUIVALENT:														
	TOTAL (IN.)	2.39	1.15	0.37	4.53	4.57	3.30	3.25	3.36	2.56	0.81	0.87	2.36	29.52	
	GREATEST 24-HOUR (IN.)	0.75	0.34	0.30	1.87	1.23	0.82	1.25	0.83	0.98	0.19	0.41	1.22	1.87	
	DATE OF OCCURRENCE	17-18	28	02	22-23	12	28+	09	12-13	28	16	23	04-05	APR 22-23	
	NUMBER OF DAYS WITH:														
	PRECIPITATION ≥ 0.01	18	10	3	12	10	10	10	14	10	8	8	12	125	
PRECIPITATION ≥ 0.10	7	6	1	7	8	5	4	9	7	5	3	5	67		
PRECIPITATION ≥ 1.00	0	0	0	3	2	0	2	0	0	0	0	1	8		
SNOWFALL	SNOW, ICE PELLETS, HAIL:														
	TOTAL (IN.)	52.4	2.3												
	GREATEST 24-HOUR (IN.)	9.4	2.3												
	DATE OF OCCURRENCE	06	24												
	MAXIMUM SNOW DEPTH (IN.)	30	2												
	DATE OF OCCURRENCE	07	25+												
NUMBER OF DAYS WITH:															
SNOWFALL ≥ 1.0	11	1													

NORMALS, MEANS, AND EXTREMES

MUSKEGON, MI (MKG)

LATITUDE: 43° 10' 16" N LONGITUDE: 86° 14' 12" W ELEVATION (FT): GRND: 627 BARO: 627 TIME ZONE: EASTERN (UTC + 5) WBAN: 14840

ELEMENT		POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	28.8	30.8	41.2	54.5	66.6	75.6	80.3	78.1	70.8	59.0	46.0	33.7	55.5
	MEAN DAILY MAXIMUM	52	29.7	31.7	41.1	54.7	66.7	76.0	80.4	78.6	70.9	59.4	45.6	34.4	55.8
	HIGHEST DAILY MAXIMUM	60	63	67	80	86	93	98	96	99	95	83	76	64	99
	YEAR OF OCCURRENCE		1950	1999	1981	1970	1962	1995	1999	1964	1954	1971	1961	1982	AUG 1964
	MEAN OF EXTREME MAXS.	52	45.7	47.4	64.8	75.2	82.7	88.6	89.8	88.4	84.9	75.2	63.5	51.5	71.5
	NORMAL DAILY MINIMUM	30	17.7	18.0	25.4	35.4	45.1	54.4	60.2	58.8	51.5	41.5	32.7	23.3	38.7
	MEAN DAILY MINIMUM	52	17.6	18.3	25.2	35.5	45.4	54.9	60.3	59.1	51.5	41.8	32.5	23.1	38.8
	LOWEST DAILY MINIMUM	60	-13	-19	-10	1	22	31	40	36	27	21	-14	-15	-19
	YEAR OF OCCURRENCE		1948	1996	1943	1982	1947	1972	1945	1979	1991	1980	1950	1976	FEB 1996
	MEAN OF EXTREME MINS.	52	-1.4	-1.0	6.2	20.2	31.3	40.6	47.4	46.1	34.8	26.8	17.5	4.9	22.8
	NORMAL DRY BULB	30	23.3	24.4	33.3	45.0	55.9	65.0	70.3	68.5	61.2	50.3	39.4	28.5	47.1
	MEAN DRY BULB	52	23.6	25.0	33.1	45.2	56.2	65.5	70.4	68.8	61.2	50.6	39.0	28.9	47.3
	MEAN WET BULB	16	23.3	24.9	30.7	40.6	50.5	59.7	60.8	64.0	56.7	46.2	36.1	26.2	43.3
	MEAN DEW POINT	16	19.3	20.0	24.5	33.7	43.9	54.7	57.0	60.6	52.9	41.9	31.6	22.4	38.5
	NORMAL NO. DAYS WITH:														
MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	*	0.7	1.0	0.7	0.0	0.0	0.0	0.0	2.4	
MAXIMUM ≤ 32°	30	18.6	15.5	6.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	2.0	13.7	56.2	
MINIMUM ≤ 32°	30	29.2	26.2	23.8	11.1	1.8	*	0.0	0.0	0.3	5.3	15.2	26.7	139.6	
MINIMUM ≤ 0°	30	1.9	1.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	4.7	
H/C	NORMAL HEATING DEG. DAYS	30	1293	1137	983	600	309	78	10	25	133	456	768	1132	6924
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	27	78	174	133	19	0	0	0	431
RH	NORMAL (PERCENT)	30	78	75	71	65	64	68	71	74	76	74	75	79	72
	HOUR 01 LST	30	80	78	75	72	73	78	81	85	84	79	78	80	79
	HOUR 07 LST	30	80	80	79	77	75	80	84	88	88	83	80	81	81
	HOUR 13 LST	30	75	70	64	56	54	57	58	61	63	64	70	76	64
	HOUR 19 LST	30	77	73	67	58	55	58	60	65	72	72	74	78	67
S	PERCENT POSSIBLE SUNSHINE														
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	56	1.8	1.7	2.3	2.0	2.4	2.1	1.5	2.0	1.6	2.1	1.9	1.6	23.0
	THUNDERSTORMS	59	0.2	0.4	1.6	3.4	4.4	6.2	6.2	5.9	4.8	2.2	1.1	0.4	36.8
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	54	7.0	6.5	5.8	5.4	4.9	4.6	4.0	4.2	4.6	5.1	6.6	6.9	5.5
	MIDNIGHT-MIDNIGHT (OKTAS)	26	6.8	6.1	5.5	4.8	4.5	4.2	3.8	3.8	4.4	5.1	6.4	6.8	5.2
	MEAN NO. DAYS WITH:														
CLEAR	54	1.6	2.9	5.2	6.5	8.4	8.7	10.9	10.6	8.9	7.4	2.5	1.6	75.2	
PARTLY CLOUDY	54	3.4	4.7	7.3	7.3	8.9	9.8	10.8	10.7	9.1	8.2	4.4	3.8	88.4	
CLOUDY	54	25.9	20.6	18.5	16.1	13.8	11.5	9.3	9.7	12.1	15.4	23.1	25.6	201.6	
PR	MEAN STATION PRESSURE (IN)	26	29.34	29.38	29.32	29.29	29.29	29.28	29.31	29.35	29.37	29.36	29.33	29.36	29.33
	MEAN SEA-LEVEL PRES. (IN)	16	30.05	30.07	30.06	29.96	29.99	29.95	29.98	30.03	30.03	30.05	30.04	30.07	30.02
WINDS	MEAN SPEED (MPH)	33	12.0	11.2	11.7	11.5	9.7	9.1	8.9	8.5	9.3	10.3	11.9	11.6	10.5
	PREVAIL. DIR (TENS OF DEGS)	24	29	30	09	30	22	20	22	20	12	13	14	29	30
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	3	38	38	34	48	44	31	39	26	31	32	52	34	52
	DIR. (TENS OF DEGS)		08	20	33	22	27	22	34	21	29	19	23	22	23
	YEAR OF OCCURRENCE		1999	1999	1998	1997	1998	1998	1998	1997	1997	1997	1998	1999	NOV 1998
	MAXIMUM 5-SECOND:														
SPEED (MPH)	3	48	53	48	61	52	41	51	34	40	43	67	43	67	
DIR. (TENS OF DEGS)		08	18	33	22	24	21	34	22	30	19	23	31	23	
YEAR OF OCCURRENCE		1999	1999	1998	1997	1998	1998	1998	1997	1997	1997	1998	1999	NOV 1998	
PRECIPITATION	NORMAL (IN)	30	2.34	1.49	2.51	2.90	2.60	2.35	2.10	3.41	3.88	2.80	3.15	3.03	32.56
	MAXIMUM MONTHLY (IN)	60	4.55	3.30	6.59	7.12	6.48	5.46	6.63	9.88	13.55	7.33	6.61	5.42	13.55
	YEAR OF OCCURRENCE		1982	1997	1976	1947	1990	1967	1952	1975	1986	1991	1985	1949	SEP 1986
	MINIMUM MONTHLY (IN)	60	0.45	0.36	0.37	0.72	0.33	0.19	0.47	0.11	0.17	0.33	0.62	0.91	0.11
	YEAR OF OCCURRENCE		1956	1982	1999	1989	1992	1959	1951	1969	1979	1944	1986	1960	AUG 1969
	MAXIMUM IN 24 HOURS (IN)	60	1.69	1.84	2.36	2.31	2.59	4.03	2.54	3.72	6.00	3.21	2.31	3.04	6.00
	YEAR OF OCCURRENCE		1974	1997	1976	1963	1989	1994	1959	1975	1986	1954	1990	1982	SEP 1986
	NORMAL NO. DAYS WITH:														
PRECIPITATION ≥ 0.01	30	18.2	13.7	13.2	12.2	10.0	9.6	8.4	9.0	10.5	11.5	13.9	17.3	147.5	
PRECIPITATION ≥ 1.00	30	0.1	*	0.2	0.4	0.4	0.4	0.4	0.7	0.9	0.2	0.5	0.3	4.4	
SNOWFALL	NORMAL (IN)	30	38.3	19.2	12.3	3.7	T	0.0	0.0	0.0	0.0	0.7	8.7	30.6	113.5
	MAXIMUM MONTHLY (IN)	58	102.4	45.8	35.7	20.4	0.4	0.0	T	0.0	T	4.9	25.7	82.6	102.4
	YEAR OF OCCURRENCE		1982	1981	1965	1982	1954		1990		1994	1967	1995	1963	JAN 1982
	MAXIMUM IN 24 HOURS (IN)	58	22.0	17.5	9.9	12.2	0.4	0.0	T	0.0	T	4.7	9.1	20.1	22.0
	YEAR OF OCCURRENCE		1982	1965	1961	1982	1954		1990		1994	1967	1964	1963	JAN 1982
	MAXIMUM SNOW DEPTH (IN)	50	33	32	22	13	0	0	0	0	0	3	11	34	34
	YEAR OF OCCURRENCE		1979	1958	1963	1982						1967	1955	1963	DEC 1963
NORMAL NO. DAYS WITH:															
SNOWFALL ≥ 1.0	30	11.0	6.5	4.1	1.0	0.0	0.0	0.0	0.0	0.0	0.2	2.7	9.3	34.8	

PRECIPITATION (inches) 1999 MUSKEGON, MI (MKG)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	2.51	1.03	2.94	3.35	2.06	2.42	1.90	1.85	7.15	2.50	3.01	2.49	33.21
1971	1.87	2.19	1.99	1.67	1.67	0.98	1.74	1.33	1.77	0.71	1.86	5.34	23.12
1972	2.21	1.01	2.30	2.09	1.18	3.29	3.51	6.67	3.28	3.45	1.32	4.08	34.39
1973	1.35	1.64	2.57	3.65	3.77	2.10	3.08	3.01	1.67	3.31	2.30	2.91	31.36
1974	4.30	2.24	4.29	3.56	4.13	2.65	1.48	2.78	0.76	2.06	2.67	1.58	32.50
1975	3.57	1.98	2.54	3.06	2.63	4.97	2.07	9.88	1.32	1.15	4.23	2.79	40.19
1976	1.72	2.81	6.59	3.21	5.11	1.41	1.18	0.95	1.08	1.29	1.51	1.75	28.61
1977	2.91	1.16	3.48	1.71	1.51	2.52	2.41	2.48	4.40	2.46	3.11	3.97	32.12
1978	3.24	0.81	1.69	3.41	2.99	3.19	1.54	4.25	4.53	3.07	2.37	2.81	33.90
1979	2.76	0.90	4.04	2.91	1.96	2.07	1.71	4.15	0.17	4.66	3.26	2.49	31.08
1980	2.35	0.69	1.02	4.41	1.77	4.36	3.62	5.52	4.31	2.17	1.88	3.27	35.37
1981	0.77	2.85	0.95	3.54	2.82	3.93	1.86	3.15	5.41	3.16	2.50	2.17	33.11
1982	4.55	0.36	2.40	2.32	3.40	2.79	2.43	4.67	1.80	1.63	5.34	5.27	36.96
1983	1.20	1.22	2.60	3.26	3.30	1.72	1.61	1.46	7.47	2.53	4.47	4.07	34.91
1984	1.32	1.18	2.06	1.90	5.62	1.90	2.49	2.02	1.97	2.23	3.19	4.82	30.70
1985	2.45	2.83	4.02	2.13	1.55	0.98	3.27	7.08	3.35	5.01	6.61	2.99	42.27
1986	1.03	2.68	1.73	1.77	2.21	1.76	3.15	2.98	13.55	2.21	0.62	1.36	35.05
1987	1.52	0.68	1.48	2.82	2.51	1.15	2.13	8.12	4.56	3.31	3.18	4.21	35.67
1988	2.89	1.66	1.95	3.83	0.43	0.47	1.65	3.11	5.92	4.79	6.58	2.82	36.10
1989	1.61	1.04	1.92	0.72	4.64	0.89	1.36	4.86	2.41	1.58	2.92	1.90	25.85
1990	2.34	1.74	2.42	2.00	6.48	3.63	1.26	1.22	3.79	4.36	5.31	2.60	37.15
1991	1.36	0.75	4.40	3.56	3.52	3.84	3.31	3.88	3.32	7.33	4.25	1.82	41.34
1992	1.36	1.33	2.30	3.30	0.33	1.50	2.68	1.97	3.54	2.46	6.26	2.69	29.72
1993	2.61	0.83	1.66	4.83	2.26	4.40	3.87	6.40	4.59	1.66	2.00	1.10	36.21
1994	2.66	2.65	1.34	2.38	1.28	4.99	2.46	5.22	2.98	2.19	3.71	1.01	32.87
1995	2.82	1.30	1.79	3.47	1.83	0.71	2.67	3.54	0.99	3.68	4.82	1.88	29.50
1996	1.47	1.58	1.22	2.47	3.37	4.46	1.87	1.10	2.62	3.64	1.33	1.87	27.00
1997	2.03	3.30	0.95	1.80	2.25	3.00	2.15	2.88	3.10	1.28	2.43	1.22	26.39
1998	2.61	1.75	3.65	1.84	1.89	1.33	1.03	2.92	3.27	4.09	2.30	1.32	28.00
1999	2.39	1.15	0.37	4.53	4.57	3.30	3.25	3.36	2.56	0.81	0.87	2.36	29.52
POR= 59 YRS	2.26	1.68	2.40	3.00	2.75	2.61	2.38	3.16	3.37	2.68	3.11	2.55	31.95

WBAN : 14840

AVERAGE TEMPERATURE (°F) 1999 MUSKEGON, MI (MKG)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	19.2	22.9	28.6	46.5	58.4	67.0	71.5	69.4	61.8	53.2	39.4	27.4	47.1
1971	20.0	24.8	29.3	42.9	53.6	68.6	67.9	66.7	64.5	57.8	38.1	31.6	47.2
1972	21.8	22.4	30.3	42.6	58.7	61.7	68.0	68.2	62.3	47.7	38.2	27.5	45.8
1973	27.9	24.1	41.4	44.9	51.9	66.5	71.0	71.6	62.0	54.5	40.0	26.9	48.6
1974	25.1	20.3	32.9	45.2	52.1	62.2	70.1	68.7	58.5	47.9	39.7	31.0	46.1
1975	28.1	26.0	31.0	41.0	59.5	67.4	71.1	70.2	56.8	53.3	46.0	30.4	48.4
1976	23.6	32.3	37.6	46.5	52.0	67.7	70.0	67.1	58.3	46.0	33.1	20.6	46.2
1977	14.3	22.0	38.8	50.3	63.1	62.3	72.2	66.6	62.3	47.8	39.5	26.2	47.1
1978	19.5	15.7	29.2	44.7	58.0	63.2	67.3	68.5	63.2	48.1	37.6	26.4	45.1
1979	17.0	14.5	33.6	41.2	54.7	64.2	68.6	66.4	60.7	49.4	39.2	31.3	45.1
1980	23.7	22.0	30.6	44.8	56.4	61.5	70.9	70.7	60.9	45.7	37.8	25.2	45.9
1981	20.6	28.1	34.9	47.1	53.8	65.9	69.7	69.6	58.9	47.2	38.7	29.7	47.0
1982	16.1	21.6	30.5	40.1	62.0	59.7	71.6	67.1	60.4	52.4	40.3	35.7	46.5
1983	26.9	30.2	36.4	41.9	50.5	66.2	74.4	72.2	62.6	50.0	40.7	20.8	47.7
1984	19.3	31.9	27.5	46.3	51.4	66.9	68.3	71.7	59.7	52.7	39.4	32.0	47.3
1985	20.4	21.6	35.1	50.3	58.7	62.3	69.3	67.1	63.3	50.8	38.0	24.6	46.8
1986	24.6	24.0	36.5	49.4	58.1	64.5	72.9	65.6	61.9	49.7	36.4	31.1	47.9
1987	26.5	30.7	37.0	48.6	60.6	68.9	73.4	68.7	62.0	46.0	41.8	33.3	49.8
1988	22.9	22.5	34.2	45.6	59.8	67.6	72.7	73.5	61.2	45.2	41.2	28.8	47.9
1989	31.0	21.8	31.5	43.9	54.7	65.0	71.8	67.9	58.7	49.8	36.6	20.5	46.1
1990	32.1	28.7	36.9	46.3	53.7	64.7	69.9	68.2	62.3	49.3	43.0	31.0	48.8
1991	24.5	29.5	37.7	49.1	63.0	69.5	71.1	70.6	60.5	52.1	36.3	30.5	49.5
1992	28.8	29.9	33.6	43.1	55.4	61.7	66.2	64.5	59.9	49.0	38.3	31.0	46.8
1993	26.1	23.6	33.3	43.3	56.9	64.7	72.2	71.8	57.1	47.8	38.2	29.3	47.0
1994	16.0	20.4	32.9	45.5	53.3	66.3	69.7	65.5	63.6	52.3	42.0	33.8	46.8
1995	27.1	23.9	36.2	42.8	55.2	69.8	71.8	74.1	57.7	50.5	32.1	24.5	47.1
1996	21.6	24.2	29.0	41.7	53.8	64.5	65.2	70.0	61.3	49.2	34.1	29.1	45.3
1997	23.6	27.1	33.4	42.3	48.9	66.5	68.9	64.8	60.3	49.8	36.1	31.5	46.1
1998	29.7	35.0	36.3	47.6	61.9	65.0	71.1	71.0	63.8	52.5	42.3	34.2	50.9
1999	22.2	32.1	32.8	48.3	59.9	67.7	73.5	67.4	61.5	49.3	43.3	32.0	49.2
POR= 59 YRS	23.7	24.9	32.9	45.3	55.9	65.3	70.2	68.8	61.2	50.7	39.1	28.8	47.2

HEATING DEGREE DAYS (base 65°F) 1999 MUSKEGON, MI (MKG)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1970-71	9	20	146	367	763	1161	1387	1119	1098	657	352	39	7118
1971-72	31	22	120	246	801	1031	1333	1231	1068	665	233	133	6914
1972-73	41	44	118	529	797	1152	1147	1137	726	602	401	15	6709
1973-74	3	8	155	328	743	1171	1229	1246	989	587	398	116	6973
1974-75	7	13	215	525	750	1046	1137	1085	1050	714	202	62	6806
1975-76	16	5	249	364	565	1066	1275	942	841	561	400	24	6308
1976-77	5	43	219	581	948	1371	1564	1200	807	436	145	117	7436
1977-78	7	54	101	526	758	1196	1402	1374	1105	599	239	100	7461
1978-79	29	15	125	519	815	1190	1481	1408	969	708	340	84	7683
1979-80	19	49	160	482	766	1039	1277	1239	1060	601	277	152	7121
1980-81	0	8	152	592	806	1228	1368	1028	923	529	345	34	7013
1981-82	17	9	196	545	782	1089	1509	1209	1064	738	147	165	7470
1982-83	9	52	172	390	734	899	1173	969	877	685	449	77	6486
1983-84	20	1	137	457	723	1365	1411	954	1156	559	415	19	7217
1984-85	23	11	193	374	761	1016	1376	1206	920	465	214	123	6682
1985-86	13	15	153	431	802	1244	1244	1144	878	481	219	75	6699
1986-87	7	60	129	466	855	1042	1184	954	863	487	204	32	6283
1987-88	17	35	112	582	690	976	1299	1227	948	573	189	55	6703
1988-89	11	19	130	606	708	1115	1044	1203	1032	626	323	72	6889
1989-90	0	27	215	468	843	1371	1012	1008	863	580	341	79	6807
1990-91	6	24	149	484	655	1046	1249	990	840	469	157	12	6081
1991-92	9	2	199	397	855	1061	1116	1013	965	653	304	134	6708
1992-93	24	70	185	493	796	1047	1200	1152	977	643	277	79	6943
1993-94	0	11	244	530	796	1101	1513	1244	989	582	365	64	7439
1994-95	5	57	94	385	683	957	1166	1144	887	661	298	34	6371
1995-96	21	1	243	449	981	1247	1340	1180	1110	692	357	64	7685
1996-97	42	2	167	483	919	1106	1277	1053	970	674	492	32	7217
1997-98	25	53	148	475	859	1028	1089	833	884	514	124	118	6150
1998-99	1	0	92	382	674	949	1320	915	990	496	187	64	6070
1999-	3	17	141	479	644	1019							

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COOLING DEGREE DAYS (base 65°F) 1999 MUSKEGON, MI (MKG)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	0	0	0	13	49	121	220	162	54	7	0	0	626
1971	0	0	0	0	5	151	125	82	114	28	0	0	505
1972	0	0	0	0	43	41	144	149	41	1	0	0	419
1973	0	0	0	4	0	67	194	220	75	13	0	0	573
1974	0	0	0	0	3	38	173	137	27	1	0	0	379
1975	0	0	0	0	38	141	213	174	6	11	0	0	583
1976	0	0	0	15	2	113	166	118	21	1	0	0	436
1977	0	0	0	4	95	42	237	114	28	0	0	0	520
1978	0	0	0	0	29	57	109	131	79	0	0	0	405
1979	0	0	0	0	29	67	137	103	36	7	0	0	379
1980	0	0	0	1	20	54	191	190	36	0	0	0	492
1981	0	0	0	0	6	67	172	160	20	0	0	0	425
1982	0	0	0	0	61	12	220	126	41	9	0	0	469
1983	0	0	0	0	4	122	319	230	72	2	0	0	749
1984	0	0	0	2	0	81	134	227	40	0	0	0	484
1985	0	0	0	30	24	47	153	88	108	0	0	0	450
1986	0	0	0	18	11	67	258	82	42	0	0	0	478
1987	0	0	0	1	75	155	282	157	32	0	0	0	702
1988	0	0	0	0	36	140	258	288	23	0	0	0	745
1989	0	0	0	0	12	81	217	122	32	0	0	0	464
1990	0	0	0	25	0	74	166	131	73	4	0	0	473
1991	0	0	0	2	103	154	206	184	70	6	0	0	725
1992	0	0	0	2	13	39	69	62	37	1	0	0	223
1993	0	0	0	0	29	76	229	225	15	2	0	0	576
1994	0	0	0	4	10	110	156	80	59	0	0	0	419
1995	0	0	0	0	0	185	238	290	30	4	0	0	747
1996	0	0	0	0	17	57	52	165	62	0	0	0	353
1997	0	0	0	0	0	86	151	58	13	10	0	0	318
1998	0	0	0	0	37	121	201	193	63	2	0	0	617
1999	0	0	0	2	36	152	274	101	45	0	0	0	610

SNOWFALL (inches) 1999 MUSKEGON, MI (MKG)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1970-71	0.0	0.0	0.0	0.0	10.5	27.9	45.2	10.5	29.0	3.2	0.0	0.0	126.3
1971-72	0.0	0.0	0.0	0.0	20.2	8.4	39.0	19.4	22.5	2.5	0.0	0.0	112.0
1972-73	0.0	0.0	0.0	4.6	7.8	24.7	7.9	19.5	4.0	8.3	T	0.0	76.8
1973-74	0.0	0.0	0.0	0.0	8.1	25.3	33.5	25.0	18.2	T	0.0	0.0	110.1
1974-75	0.0	0.0	0.0	4.0	8.3	16.3	18.8	21.6	14.1	9.1	0.0	0.0	92.2
1975-76	0.0	0.0	0.0	0.0	6.2	30.1	32.0	11.0	6.8	0.8	T	0.0	86.9
1976-77	0.0	0.0	0.0	T	19.7	36.9	60.5	11.3	9.3	6.2	0.0	0.0	143.9
1977-78	0.0	0.0	0.0	T	14.3	55.3	61.1	24.2	9.9	T	0.0	0.0	164.8
1978-79	0.0	0.0	0.0	0.1	7.8	24.6	65.7	11.8	10.5	2.3	0.0	0.0	122.8
1979-80	0.0	0.0	0.0	T	13.1	4.3	29.6	14.5	8.1	5.8	0.0	0.0	75.4
1980-81	0.0	0.0	0.0	0.2	6.9	28.8	23.7	45.8	2.2	T	0.0	0.0	107.6
1981-82	0.0	0.0	0.0	0.2	6.8	22.8	102.4	8.1	13.2	20.4	0.0	0.0	173.9
1982-83	0.0	0.0	0.0	T	3.4	5.5	7.9	6.0	12.7	T	0.0	0.0	35.5
1983-84	0.0	0.0	T	0.0	2.6	50.9	28.8	2.7	8.7	0.5	0.0	0.0	94.2
1984-85	0.0	0.0	0.0	0.0	T	23.0	46.7	33.7	10.1	2.2	0.0	0.0	115.7
1985-86	0.0	0.0	0.0	0.0	4.3	57.0	23.8	17.7	7.0	T	0.0	0.0	109.8
1986-87	0.0	0.0	0.0	0.0	5.3	16.3	24.6	1.5	6.4	8.3	0.0	0.0	62.4
1987-88	0.0	0.0	0.0	T	3.9	20.4	33.2	26.7	7.2	T	0.0	0.0	91.4
1988-89	0.0	0.0	0.0	0.6	2.3	32.5	10.2	34.7	10.2	0.6	T	0.0	91.1
1989-90	0.0	0.0	0.0	4.1	17.9	77.0	6.5	23.9	5.4	2.0	T	0.0	136.8
1990-91	T	0.0	0.0	0.0	5.1	17.4	25.6	16.1	4.0	0.4	0.0	0.0	68.6
1991-92	0.0	0.0	T	T	14.5	29.5	21.4	8.1	10.7	1.3	0.0	0.0	85.5
1992-93	0.0	0.0	0.0	0.5	9.6	21.4	22.5	24.8	9.7	3.6	0.0	0.0	92.1
1993-94	0.0	0.0	0.0	0.1	0.9	37.6	59.8	33.0	1.1	T	T	0.0	132.5
1994-95	0.0	0.0	T	T	0.4	12.2	27.9	34.5	14.3	2.2	0.0	0.0	91.5
1995-96	0.0	0.0	0.0	T	25.7	29.6	22.8	18.4	18.4	1.3			
1996-97													
1997-98													
1998-99							52.4	2.3					
1999-													
POR= 55 YRS	T	0.0	T	0.5	9.0	25.0	31.3	17.4	11.1	2.7	0.0	0.0	97.0

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REFERENCE NOTES:

<p>PAGE 1: THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).</p> <p>PAGE 2 AND 3: H/C INDICATES HEATING AND COOLING DEGREE DAYS. RH INDICATES RELATIVE HUMIDITY W/O INDICATES WEATHER AND OBSTRUCTIONS S INDICATES SUNSHINE. PR INDICATES PRESSURE. CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).</p> <p>GENERAL: T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE. + INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES. BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA. NORMALS ARE 30-YEAR AVERAGES (1961 - 1990). ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM. PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH. POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING. WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED. 0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05. CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET. THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.</p>	<p>GENERAL CONTINUED: CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED. WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH. RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION. AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2. SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL. A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F. DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR. DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY. WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.</p> <p>ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTHS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.</p>
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1999 MUSKEGON, MICHIGAN (MKG)

Muskegon is located on the eastern shore of Lake Michigan approximately 100 miles north of the southern tip of the lake. The terrain is generally level with several sand dunes along the shoreline. Much of the soil is sandy and vegetation grows well, as evidenced by the trees and grass which grow on the dunes. Many crops grow in the area. Asparagus and celery are the principal truck-garden vegetables. A variety of fruits is raised and blueberries lead as a principal product. The main industry in this area is manufacturing with emphasis on foundry and machined products. The area is also a resort center due to features such as extensive sandy beaches, both on Lake Michigan and inland lakes.

Lake Michigan has a very decided effect upon the weather and climate of this area. The prevailing westerly winds tend to moderate the temperatures, resulting in warmer winters than further inland. In the summer the effect is just the opposite. The air temperature usually remains below the uncomfortable readings of the high 90s. Spring arrives about three to four weeks later than normal for this latitude. Autumn is also delayed, as is the cold of early winter.

Precipitation is fairly moderate, but snowfall is moderate to heavy. The heaviest snows occur during late December, January, and February. Precipitation is also influenced by the lake, especially during the winter. Instability in snow showers along the lakeshore vary enormously in intensity, resulting in traces of snow to more than a foot in 24 hours. The heavier snow squalls tend to concentrate over small sections of the shoreline, depending on their intensity and the direction of the wind. With strong winds most snowshowers will fall further inland, sometimes as much as 30 to 40 miles. Snowfall is likely to occur every day for weeks at a time. The daily accumulation of lake effect snow varies greatly. However, due to low water content of most of the storms, the snow settles rapidly.

Summertime thunderstorms have a tendency, as they move inland, to follow the Muskegon and Grand River Valleys. Thus, these areas are more often frequented by severe electrical storms which will pass without a drop of rain 2 to 3 miles from the immediate river valleys. Thunderstorms near the shoreline are most frequent at night. The afternoon convection-type storms seldom occur within 5 miles of the lake. Lake Michigan-spawned thunderstorms give shoreline areas a surprising number of occurrences compared with surrounding areas of the same latitude during late summer and autumn.

Many crops are planted before the frost danger is over. The young plants are protected by farmers, thus extending the length of the growing season.

Based on the 1951-1980 period, the average first occurrence of 32 degrees Fahrenheit in the fall is October 11 and the average last occurrence in the spring is May 8.

STATION LOCATION

MUSKEGON, MICHIGAN

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE											REMARKS	
						SEA LEVEL	GROUND											AUTOMATED
							G	W	E	P	S	T	R	8	H	A		
<u>COOPERATIVE</u>																		
West Muskegon	1896	1914		43°14'	86°17'													
1180 Lake Street	1914 1924 1929	1921 1925 1930	3 mi. W	43°13'	86°20'													
509 Southern Avenue	1921	1931	2.5 mi. E	43°13'	86°17'													
Beach Street	1932	1938	3 mi. W	43°14'	86°20'													
<u>AIRPORT</u>																		
Muskegon County Airport	2/13/38	10/15/75	7 mi. SE	43°10'	86°14'	f625	d20	b4	a4			c5	b5	e5 h6		Weather Bureau Operation. a - Installed 8/29/38. b - Installed 7/1/40. c - Installed 1/1/41. d - 36 feet to 7/30/53 and 45 feet to 7/25/61. e - Commissioned 2600 feet at 259 degrees from office 12/1/60. Moved 1200 feet SE 9/12/68. f - 627 feet to 9/12/68.		
Administration and NWS Building Muskegon County Airport	10/15/75	05/01/96	0.9 mi. SSW	43°10'	86°15'	625	g20	5	5	NA	i3	5	3	g6	NA	g - Same site as prior to 10/15/75. h - Moved 1200 feet SE 9/12/68. i - Effective 8/20/87.		
Muskegon County Airport	05/01/96	Present	NA	43°10'	86°14'	627								S		ASOS Commissioned 05/01/96		

SUBSCRIPTION: Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.
INQUIRIES/COMMENTS CALL: (828) 271-4800

National Climatic Data Center
151 Patton Avenue, Rm 120
Asheville NC 28801-5001

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