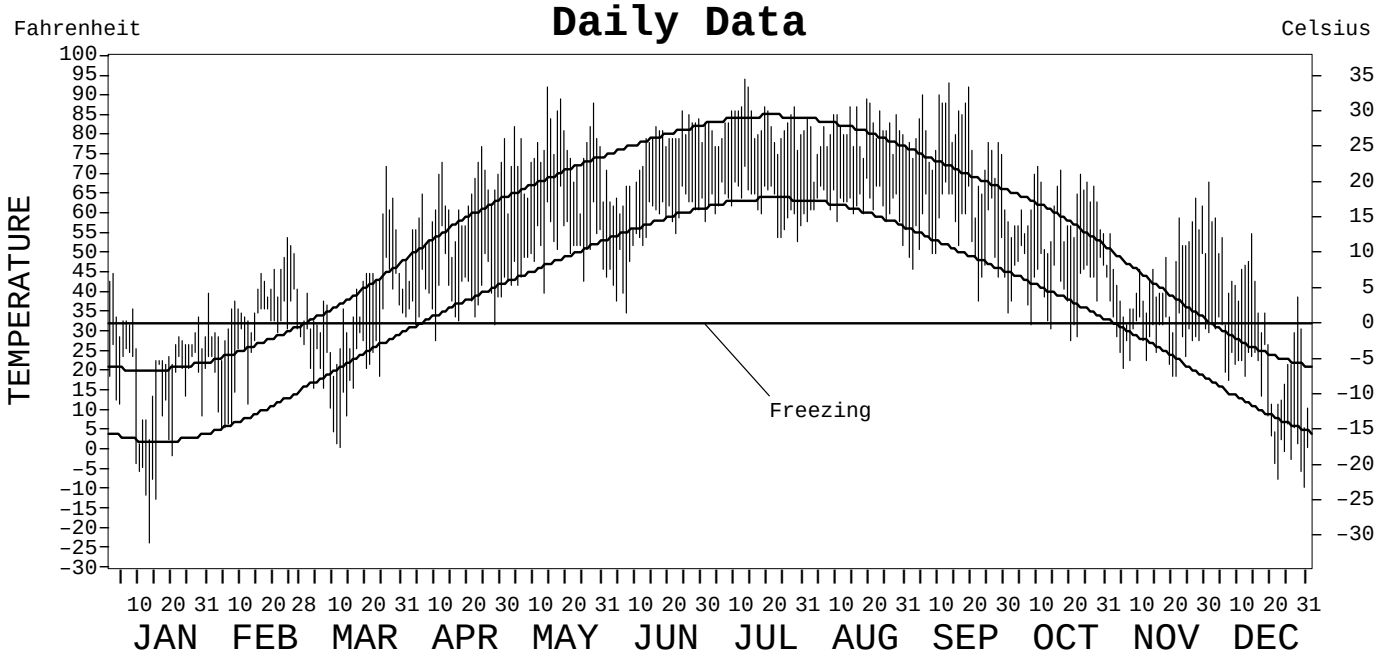
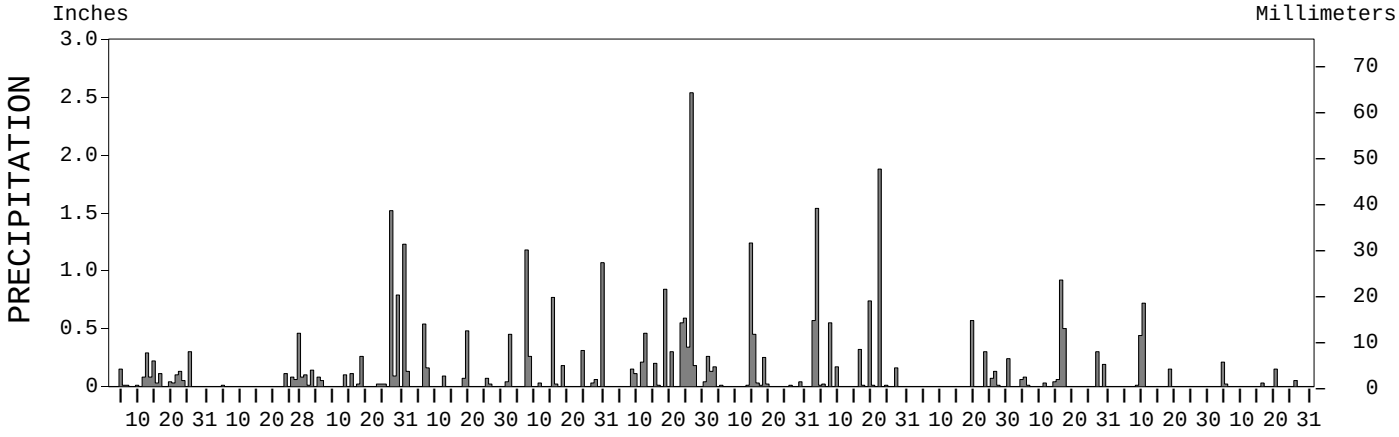
1998 LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

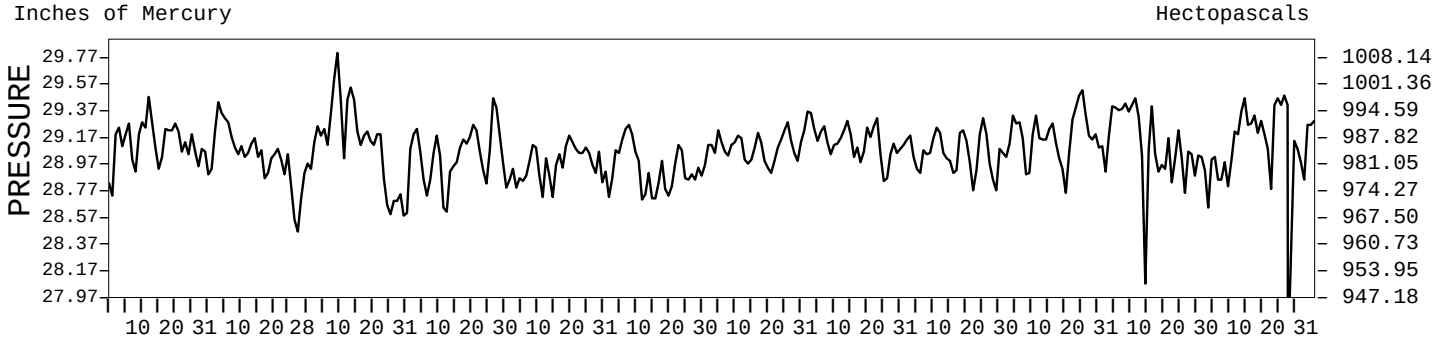
ISSN 0198-2745

MINNEAPOLIS – ST. PAUL, MINNESOTA (MSP)

Daily Data







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NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER ASHEVILLE, NORTH CAROLINA
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METEOROLOGICAL DATA FOR 1998

MINNEAPOLIS–ST.PAUL, MN (MSP)

LATITUDE: 44° 52′ 59″ N | LONGITUDE: 93° 13′ 44″ W | ELEVATION (FT): GRND: 834 BARO: 860 | TIME ZONE: CENTRAL (UTC+ 6) | WBAN: 14922

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	MEAN DAILY MAXIMUM	26.0	38.0	39.7	61.6	75.6	74.5	82.7	80.9	78.3	60.2	45.1	34.5	58.1
	HIGHEST DAILY MAXIMUM	45	54	72	77	92	86	94	89	93	72	64	68	94
	DATE OF OCCURRENCE	02	24	26	24	14	24	13	19	13	10	27	01	JUL 13
	MEAN DAILY MINIMUM	12.1	25.8	24.1	39.7	51.2	55.2	62.4	62.2	54.9	42.1	29.2	14.6	39.5
	LOWEST DAILY MINIMUM	−23	6	1	28	40	35	53	52	38	28	19	−9	−23
	DATE OF OCCURRENCE	13	05+	12	10	13	07	29	30	22	20	21+	30	JAN 13
	AVERAGE DRY BULB	19.1	31.9	31.9	50.7	63.4	64.9	72.6	71.6	66.6	51.2	37.2	24.6	48.8
	MEAN WET BULB	18.8	30.0	29.4	43.5	56.2	59.9	65.8	65.9	59.4	47.3	34.6		
	MEAN DEW POINT	15.2	26.4	23.5	34.0	49.2	55.3	61.1	62.2	53.7	42.4	29.6		
	NUMBER OF DAYS WITH:													
	MAXIMUM ≥ 90°	0	0	0	0	1	0	2	0	4	0	0	0	7
	MAXIMUM ≤ 32°	23	8	9	0	0	0	0	0	0	0	2	14	56
	MINIMUM ≤ 32°	31	18	24	3	0	0	0	0	0	5	23	30	134
	MINIMUM ≤ 0°	8	0	0	0	0	0	0	0	0	0	0	6	14
H/C	HEATING DEGREE DAYS	1414	917	1019	423	104	107	0	0	74	422	829	1249	6558
	COOLING DEGREE DAYS	0	0	0	0	62	111	243	212	130	0	0	0	758
RH	MEAN (PERCENT)	81	81	72	56	60	71	68	74	65	72	73	73	70
	HOUR 06 LST	86	86	83	72	76	83	85	88	85	83	81	82	82
	HOUR 12 LST	79	78	64	45	50	61	54	65	52	62	65	65	62
	HOUR 18 LST	78	76	65	45	49	60	54	63	52	66	70	70	62
	HOUR 24 LST	84	85	78	63	67	82	80	81	74	78	78	76	77
S	PERCENT POSSIBLE SUNSHINE													
W/O	NUMBER OF DAYS WITH:													
	HEAVY FOG(VISBY ≤ 1/4 MI)	0	4	1	0	2	1	0	0	0	0	0	1	9
	THUNDERSTORMS	0	0	2	4	6	11	5	8	3	4	0	0	43
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.)	29.11	29.03	29.11	29.03	28.96	28.93	29.10	29.13	29.04	29.17	29.07		
	MEAN SEA-LEVEL PRESS. (IN.)	30.06	29.95	30.04	29.93	29.84	29.81	29.98	30.02	29.93		29.99		
WINDS	RESULTANT SPEED (MPH)	0.4	1.5	3.8	2.6	1.4	1.6	2.0	1.4	1.8	2.4	1.0		
	RES. DIR. (TENS OF DEGS.)	04	13	02	06	17	16	27	14	23	17	25		
	MEAN SPEED (MPH)	8.1	7.7	10.5	9.9	9.4	8.5	7.3	7.6	7.9	9.6	9.4	8.6	8.7
	PREVAIL.DIR.(TENS OF DEGS.)	07	14	36	02	18	12	22	15	21	11	15	23	15
	MAXIMUM 2-MINUTE WIND:													
	SPEED (MPH)	28	31	31	45	49	48	34	29	26	31	32	33	49
	DIR. (TENS OF DEGS.)	27	12	31	18	22	33	34	25	33	11	30	21	22
	DATE OF OCCURRENCE	10	25	13	12	15	26	14	22	30+	05	11+	01	MAY 15
	MAXIMUM 5-SECOND WIND:													
	SPEED (MPH)	34	37	40	55	64	56	44	39	32	39	47	40	64
	DIR. (TENS OF DEGS.)	28	11	32	18	26	24	35	28	33	11	29	21	26
	DATE OF OCCURRENCE	10	25	13	12	30	25	14	19	30+	05	10	01	MAY 30
PRECIPITATION	WATER EQUIVALENT:													
	TOTAL (IN.)	1.64	0.80	4.56	1.56	4.40	6.52	2.63	5.99	1.32	2.19	1.32	0.46	33.39
	GREATEST 24-HOUR (IN.)	0.30	0.52	1.57	0.70	1.32	2.60	1.69	2.11	0.57	0.92	1.12	0.21	2.60
	DATE OF OCCURRENCE	25	26-27	27-28	06-07	07-08	26-27	14-15	02-03	19	16	09-10	04-05	JUN 26-27
	NUMBER OF DAYS WITH:													
	PRECIPITATION ≥ 0.01	16	6	16	8	12	14	13	13	6	10	4	5	123
	PRECIPITATION ≥ 0.10	7	2	8	4	7	12	6	8	4	4	3	2	67
	PRECIPITATION ≥ 1.00	0	0	2	0	2	1	1	2	0	0	0	0	8
SNOWFALL	SNOW,ICE PELLETS,HAIL:													
	TOTAL (IN.)	20.4	1.1	11.6	T	T	T	0.0	0.0	T	0.0	0.1	3.1	36.3
	GREATEST 24-HOUR (IN.)	4.0	1.0	3.4	T	T	T	0.0	0.0	T	0.0	0.1	2.0	4.0
	DATE OF OCCURRENCE	25	28	18	01	15	12			25		08	20	JAN 25
	MAXIMUM SNOW DEPTH (IN.)	10	7	2	T	0	0	0	0	0	0	T	2	10
	DATE OF OCCURRENCE	28+	08+	16	01							19+	20	JAN 28+
	NUMBER OF DAYS WITH:													
	SNOWFALL ≥ 1.0	8	1	6	0	0	0	0	0	0	0	0	1	16

NORMALS, MEANS, AND EXTREMES

MINNEAPOLIS–ST.PAUL, MN (MSP)

LATITUDE: 44° 52′ 59″ N LONGITUDE: 93° 13′ 44″ W ELEVATION (FT): GRND: 834 BARO: 860 TIME ZONE: CENTRAL (UTC+ 6) WBAN: 14922

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	20.7	26.6	39.2	56.5	69.4	78.8	84.0	80.7	70.7	58.8	41.0	25.5	54.3
	MEAN DAILY MAXIMUM	54	21.4	27.0	38.8	56.1	69.0	78.5	83.2	80.8	70.9	59.4	40.2	26.5	54.3
	HIGHEST DAILY MAXIMUM	60	58	60	83	95	96	102	105	102	98	90	75	68	105
	YEAR OF OCCURRENCE		1944	1981	1986	1980	1978	1985	1988	1947	1976	1997	1944	1998	JUL 1988
	MEAN OF EXTREME MAXS.	54	40.7	45.2	61.6	78.6	87.5	93.2	94.7	93.5	88.7	79.9	60.6	45.8	72.5
	NORMAL DAILY MINIMUM	30	2.8	9.2	22.7	36.2	47.6	57.6	63.1	60.3	50.3	38.8	25.2	10.2	35.3
	MEAN DAILY MINIMUM	54	3.8	9.5	21.9	35.8	47.7	57.7	62.7	60.7	50.5	39.5	24.7	11.2	35.5
	LOWEST DAILY MINIMUM	60	-34	-32	-32	2	18	34	43	39	26	13	-17	-29	-34
	YEAR OF OCCURRENCE		1970	1996	1962	1962	1967	1945	1972	1967	1974	1997	1964	1983	JAN 1970
	MEAN OF EXTREME MINS.	54	-19.8	-13.9	-.6	20.2	32.3	43.5	51.5	48.5	34.9	24.4	4.5	-11.9	17.8
	NORMAL DRY BULB	30	11.8	17.9	31.0	46.4	58.5	68.2	73.6	70.5	60.5	48.8	33.2	17.9	44.9
	MEAN DRY BULB	54	12.6	18.3	30.4	45.9	58.3	68.0	73.0	70.8	60.7	49.5	32.4	18.9	44.9
	MEAN WET BULB	15	14.2	18.8	28.7	40.2	51.8	61.4	65.1	63.8	55.5	43.5	28.4	17.6	40.8
	MEAN DEW POINT	15	8.9	13.1	21.9	30.8	44.0	55.5	60.3	59.6	50.8	37.4	23.1	12.9	34.9
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.1	0.9	2.9	6.6	3.8	0.8	0.0	0.0	0.0	15.1
	MAXIMUM ≤ 32°	30	23.6	17.8	8.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	6.7	21.6	78.7
	MINIMUM ≤ 32°	30	30.9	27.0	25.1	11.1	1.1	0.0	0.0	0.0	0.5	7.4	23.4	30.1	156.6
	MINIMUM ≤ 0°	30	14.1	8.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	8.1	33.1
H/C	NORMAL HEATING DEG. DAYS	30	1649	1319	1054	558	244	41	11	22	167	502	954	1460	7981
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	43	137	278	192	32	0	0	0	682
RH	NORMAL (PERCENT)	30	70	70	67	60	60	64	65	68	71	68	73	74	68
	HOUR 06 LST	30	72	73	72	66	67	72	74	77	79	74	76	76	73
	HOUR 12 LST	30	74	75	76	74	76	78	80	83	85	81	80	78	78
	HOUR 18 LST	30	66	65	61	52	51	54	53	56	59	58	66	70	59
	HOUR 24 LST	30	68	65	61	50	49	52	52	56	61	60	69	72	60
S	PERCENT POSSIBLE SUNSHINE	58	53	59	57	58	61	66	72	69	62	55	39	42	58
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	60	1.1	1.3	1.3	0.4	0.5	0.5	0.3	0.6	0.8	0.9	1.1	1.3	10.1
	THUNDERSTORMS	60	0.0	0.2	1.0	2.6	5.1	7.7	7.7	6.5	4.2	1.8	0.6	0.1	37.5
CLOUDINESS	MEAN:														
	SUNRISE–SUNSET (OKTAS)	58	5.1	5.0	5.4	5.3	5.1	4.9	4.2	4.2	4.4	4.6	5.7	5.5	5.0
	MIDNIGHT–MIDNIGHT (OKTAS)	32	4.9	4.8	5.1	5.0	4.8	4.5	4.0	4.0	4.2	4.6	5.3	5.2	4.7
	MEAN NO. DAYS WITH:														
	CLEAR	58	8.3	7.7	7.1	6.9	7.0	7.2	9.8	10.0	9.8	9.8	5.5	6.4	95.5
	PARTLY CLOUDY	58	7.3	6.9	7.4	7.7	9.1	10.4	11.8	11.2	8.5	7.5	6.4	6.4	100.6
	CLOUDY	58	15.4	13.7	16.5	15.3	14.8	12.4	9.5	9.8	11.8	13.7	18.1	18.2	169.2
PR	MEAN STATION PRESSURE(IN)	26	29.17	29.18	29.10	29.06	29.05	29.03	29.08	29.11	29.12	29.12	29.11	29.17	29.11
	MEAN SEA-LEVEL PRES. (IN)	15	30.11	30.12	30.06	29.96	29.95	29.92	29.96	30.00	30.01	30.02	30.05	30.12	30.02
WINDS	MEAN SPEED (MPH)	49	10.5	10.3	11.3	12.3	11.3	10.5	9.5	9.3	10.0	10.6	11.0	10.3	10.6
	PREVAIL.DIR(TENS OF DEGS)	30	31	31	31	12	12	12	18	18	18	31	31	31	31
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	2	31	31	32	45	49	48	34	33	31	34	32	33	49
	DIR. (TENS OF DEGS)		33	12	18	18	22	33	21	33	30	20	30	21	22
	YEAR OF OCCURRENCE		1997	1998	1997	1998	1998	1998	1997	1997	1997	1997	1998	1998	MAY 1998
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	2	38	37	40	55	64	56	48	41	44	44	47	40	64
	DIR. (TENS OF DEGS)		32	11	32	18	26	24	22	33	30	19	29	21	26
	YEAR OF OCCURRENCE		1997	1998	1998	1998	1998	1998	1997	1997	1997	1997	1998	1998	MAY 1998
PRECIPITATION	NORMAL (IN)	30	0.95	0.88	1.94	2.42	3.39	4.05	3.53	3.62	2.72	2.19	1.55	1.08	28.32
	MAXIMUM MONTHLY (IN)	60	3.63	2.14	4.75	5.88	8.03	9.82	17.90	9.31	7.53	5.68	5.29	4.27	17.90
	YEAR OF OCCURRENCE		1967	1981	1965	1986	1962	1990	1987	1977	1942	1971	1991	1982	JUL 1987
	MINIMUM MONTHLY (IN)	60	0.10	0.06	0.32	0.16	0.61	0.22	0.58	0.43	0.41	0.01	0.02	T	T
	YEAR OF OCCURRENCE		1990	1964	1994	1987	1967	1988	1975	1946	1940	1952	1939	1943	DEC 1943
	MAXIMUM IN 24 HOURS (IN)	60	1.21	1.10	1.66	2.23	3.03	3.00	10.00	7.36	3.55	2.95	2.91	2.47	10.00
	YEAR OF OCCURRENCE		1967	1966	1965	1975	1965	1986	1987	1977	1942	1966	1940	1982	JUL 1987
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	9.2	7.4	9.9	11.2	11.4	11.1	9.2	9.6	10.0	8.2	8.4	9.8	115.4
	PRECIPITATION ≥ 1.00	30	0.1	0.1	0.2	0.3	0.7	1.0	0.9	1.0	0.4	0.5	0.2	0.1	5.5
SNOWFALL	NORMAL (IN)	30	12.5	9.2	11.6	3.6	0.1	0.0	0.0	0.0	0.*	0.4	7.3	11.3	56.0
	MAXIMUM MONTHLY (IN)	59	46.4	26.5	40.0	21.8	3.0	T	T	T	1.7	8.2	46.9	33.2	46.9
	YEAR OF OCCURRENCE		1982	1962	1951	1983	1946	1995	1994	1992	1942	1991	1991	1969	NOV 1991
	MAXIMUM IN 24 HOURS (IN)	59	18.5	9.3	14.7	13.6	3.0	T	T	T	1.7	8.2	21.0	16.5	21.0
	YEAR OF OCCURRENCE		1982	1939	1985	1983	1946	1995	1994	1992	1942	1991	1991	1982	NOV 1991
	MAXIMUM SNOW DEPTH (IN)	52	38	30	27	10	2	0	0	0	0	1	23	21	38
	YEAR OF OCCURRENCE		1982	1967	1965	1985	1984					1969	1991	1991	JAN 1982
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	3.9	3.1	3.2	0.9	0.*	0.0	0.0	0.0	0.0	0.1	2.2	3.7	17.1

PRECIPITATION (inches) 1998 MINNEAPOLIS – ST. PAUL, MN (MSP)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	2.05	0.31	0.90	1.55	1.98	2.93	2.95	0.99	0.49	2.53	0.65	2.06	19.39
1970	0.47	0.16	2.05	3.55	4.77	1.27	3.66	2.19	3.19	4.97	3.82	0.43	30.53
1971	1.22	1.74	1.21	1.11	3.14	3.52	3.94	1.78	2.73	5.68	2.67	0.70	29.44
1972	0.84	0.49	1.25	1.69	2.18	3.31	5.12	2.48	1.96	1.77	1.11	1.57	23.77
1973	0.92	0.84	1.12	2.32	2.48	1.06	2.90	3.05	2.08	1.29	1.97	1.10	21.13
1974	0.17	1.06	1.00	2.42	2.08	5.21	1.14	2.75	0.58	1.69	0.66	0.35	19.11
1975	2.82	0.79	1.67	5.40	3.81	7.99	0.58	4.92	1.31	0.27	4.80	0.79	35.15
1976	0.87	0.59	2.83	0.80	1.13	3.86	2.45	1.39	1.42	0.49	0.16	0.51	16.50
1977	0.65	0.93	2.66	1.84	2.86	3.57	3.72	9.31	4.43	2.34	1.42	1.15	34.88
1978	0.38	0.24	0.79	3.63	3.79	7.09	3.19	5.77	2.47	0.19	1.84	0.88	30.26
1979	1.09	1.39	2.55	0.66	4.55	4.78	2.34	7.04	2.20	3.16	0.98	0.33	31.07
1980	0.94	0.67	1.12	0.83	2.29	5.52	2.30	3.26	3.68	0.66	0.26	0.24	21.77
1981	0.30	2.14	0.71	2.17	2.18	4.42	4.09	4.73	1.46	2.69	2.16	0.92	27.97
1982	2.45	0.43	2.09	1.62	4.99	1.44	0.92	3.80	1.50	3.45	3.27	4.27	30.23
1983	0.67	1.19	3.22	3.97	6.20	5.22	3.07	3.12	3.34	2.61	4.93	1.53	39.07
1984	0.88	1.64	1.47	3.86	2.29	7.95	3.03	5.15	2.65	5.48	0.31	2.24	36.95
1985	0.87	0.50	4.48	1.81	3.65	2.18	2.20	5.02	4.37	3.66	1.72	1.20	31.66
1986	0.90	0.84	2.03	5.88	3.48	5.34	4.11	4.44	6.90	1.77	0.62	0.31	36.62
1987	0.63	0.13	0.64	0.16	1.88	1.95	17.90	3.67	1.28	0.60	2.07	1.25	32.16
1988	1.37	0.30	1.33	1.58	1.70	0.22	1.17	4.29	2.79	0.80	2.86	0.67	19.08
1989	0.52	1.04	2.19	2.66	3.38	3.50	3.50	2.92	1.28	0.53	1.38	0.42	23.32
1990	0.10	0.77	3.66	3.80	3.36	9.82	5.06	1.71	1.88	1.23	0.65	1.01	33.05
1991	0.49	1.03	2.29	3.58	6.35	2.57	2.95	3.14	5.43	2.52	5.29	1.05	36.69
1992	0.66	0.57	1.56	1.99	1.15	3.68	5.21	4.54	5.20	2.11	1.95	1.05	29.67
1993	1.25	0.39	1.25	1.99	4.02	6.28	5.58	6.50	2.04	0.79	1.57	0.55	32.21
1994	1.17	0.78	0.32	3.77	2.21	3.09	4.12	2.90	4.74	4.65	1.39	0.53	29.67
1995	0.36	0.25	2.11	1.90	2.43	3.38	2.72	4.59	2.21	3.68	0.88	1.15	25.66
1996	1.87	0.24	1.39	0.76	2.37	4.76	2.09	1.43	1.30	3.01	5.08	1.75	26.05
1997	1.71	0.30	1.18	1.01	1.70	3.70	12.60	6.01	3.19	2.03	0.69	0.31	34.43
1998	1.64	0.80	4.56	1.56	4.40	6.52	2.63	5.99	1.32	2.19	1.32	0.46	33.39
POR= 108 YRS	0.86	0.83	1.62	2.15	3.34	4.17	3.57	3.42	2.87	2.01	1.42	0.90	27.16

WBAN : 14922

AVERAGE TEMPERATURE (°F) 1998 MINNEAPOLIS – ST. PAUL, MN (MSP)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	9.4	19.3	24.1	49.3	60.6	61.8	73.6	74.4	63.0	46.5	33.6	20.3	44.7
1970	5.6	15.4	26.0	46.1	58.5	71.2	75.2	71.9	61.2	49.6	32.7	18.2	44.3
1971	6.5	17.0	28.0	47.0	55.4	71.5	68.8	69.6	62.8	51.4	32.7	18.4	44.1
1972	5.5	10.5	26.5	41.9	61.3	66.0	68.5	69.8	57.9	43.7	32.2	11.3	41.3
1973	17.4	21.6	40.2	44.4	55.2	69.5	73.8	73.4	60.1	53.8	34.3	16.7	46.7
1974	11.9	16.9	29.5	47.1	54.4	65.5	76.6	67.3	55.3	49.8	33.7	24.4	44.4
1975	14.5	15.5	22.1	38.9	60.9	68.8	76.3	71.7	57.7	52.8	37.5	21.3	44.8
1976	11.6	27.8	31.4	51.8	58.9	71.7	76.1	73.3	61.8	44.6	28.3	13.6	45.9
1977	0.3	22.7	37.5	53.0	66.9	68.4	74.8	66.1	60.5	47.1	30.8	14.4	45.2
1978	5.5	11.6	30.0	45.2	61.8	67.8	71.1	72.2	67.3	49.8	32.5	15.2	44.2
1979	3.2	10.0	28.9	44.0	55.5	67.3	73.6	69.9	63.4	46.6	31.7	26.0	43.3
1980	15.3	15.3	27.3	49.2	61.5	67.6	75.2	70.7	59.5	45.1	36.6	19.8	45.3
1981	18.0	23.4	37.7	49.1	57.1	67.0	70.9	69.3	60.0	46.7	38.0	17.5	46.2
1982	2.3	15.8	29.0	43.8	62.5	63.7	75.6	71.8	60.9	50.3	31.5	25.7	44.4
1983	19.6	26.9	34.2	42.3	54.6	68.0	77.2	76.8	62.6	48.4	34.0	3.7	45.7
1984	12.0	27.5	24.8	47.1	56.0	69.7	72.2	73.5	57.2	50.7	33.3	17.9	45.2
1985	10.1	16.5	35.6	52.1	62.2	63.9	73.9	67.6	59.9	47.5	24.8	7.7	43.5
1986	17.5	15.7	33.9	49.6	59.4	68.6	73.9	67.1	59.8	49.2	28.2	24.7	45.6
1987	21.2	31.6	38.7	53.5	63.5	72.8	76.0	69.0	62.5	44.6	37.9	25.0	49.7
1988	10.4	13.9	33.8	47.4	65.4	74.4	78.1	73.9	62.4	44.0	32.7	20.5	46.4
1989	21.2	8.6	26.6	45.3	57.5	68.4	76.4	70.8	60.9	49.9	28.0	10.6	43.7
1990	26.3	23.7	35.7	46.8	56.3	69.5	71.3	70.6	64.4	48.1	37.4	16.9	47.3
1991	12.5	24.4	34.3	49.1	61.9	72.9	72.3	71.1	59.0	47.2	24.5	21.2	45.9
1992	21.9	28.0	33.1	43.6	60.5	65.6	65.8	65.9	59.6	47.4	31.4	21.2	45.3
1993	14.6	17.2	29.5	44.2	57.2	64.5	70.3	70.4	55.0	46.5	30.6	22.2	43.5
1994	4.4	13.2	34.7	45.9	60.7	69.9	70.1	67.4	64.3	52.2	38.0	24.5	45.4
1995	18.5	19.3	35.0	42.2	56.9	71.2	73.1	74.7	60.2	48.6	27.4	19.1	45.5
1996	10.2	18.0	25.3	41.4	55.6	67.4	70.0	70.5	62.2	48.8	25.4	13.7	42.4
1997	10.3	19.9	29.3	43.0	53.4	70.0	71.0	68.8	62.4	50.2	28.1	26.9	44.4
1998	19.1	31.9	31.9	50.7	63.4	64.9	72.6	71.6	66.6	51.2	37.2	24.6	48.8
POR= 108 YRS	13.2	17.3	30.1	46.0	58.3	67.9	73.1	70.6	61.5	49.6	32.7	19.3	45.0

HEATING DEGREE DAYS (base 65°F) 1998 MINNEAPOLIS – ST. PAUL, MN (MSP)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969–70	5	0	131	580	933	1379	1842	1382	1204	577	249	20	8302
1970–71	3	5	190	476	959	1443	1811	1341	1139	537	297	18	8219
1971–72	16	22	164	413	962	1438	1844	1576	1188	687	204	73	8587
1972–73	34	52	218	651	974	1664	1474	1208	761	611	299	13	7959
1973–74	1	3	185	350	915	1493	1642	1344	1092	535	338	72	7970
1974–75	0	48	289	467	933	1252	1561	1379	1324	775	188	39	8255
1975–76	15	7	231	387	818	1346	1650	1074	1031	405	195	11	7170
1976–77	0	4	162	632	1092	1590	2005	1180	844	365	75	17	7966
1977–78	0	35	145	548	1016	1565	1842	1488	1080	584	162	46	8511
1978–79	5	7	89	464	968	1538	1914	1537	1112	623	307	38	8602
1979–80	0	24	105	566	992	1203	1536	1436	1165	484	184	34	7729
1980–81	0	12	194	611	845	1396	1453	1160	838	472	249	28	7258
1981–82	11	11	172	564	803	1466	1945	1374	1111	629	117	71	8274
1982–83	0	14	168	448	997	1212	1400	1061	947	673	313	49	7282
1983–84	2	0	161	514	923	1901	1641	1082	1240	531	284	7	8286
1984–85	5	12	251	435	943	1453	1694	1355	904	403	123	104	7682
1985–86	0	28	240	537	1201	1774	1466	1377	957	454	212	30	8276
1986–87	0	43	177	480	1096	1243	1352	929	809	347	134	13	6623
1987–88	2	29	106	623	804	1236	1688	1479	962	523	76	4	7532
1988–89	1	16	116	646	963	1373	1353	1576	1184	583	251	44	8106
1989–90	0	6	159	470	1105	1683	1194	1151	899	569	274	37	7547
1990–91	2	5	136	516	820	1484	1624	1130	945	481	197	3	7343
1991–92	7	8	228	548	1206	1354	1333	1067	981	636	190	72	7630
1992–93	32	52	182	542	1003	1351	1557	1335	1096	617	243	70	8080
1993–94	3	18	302	566	1025	1322	1879	1445	932	569	180	27	8268
1994–95	2	45	99	390	802	1250	1434	1274	924	678	247	47	7192
1995–96	6	0	201	511	1123	1416	1697	1360	1222	699	304	62	8601
1996–97	3	2	167	500	1182	1583	1688	1255	1100	653	351	6	8490
1997–98	27	26	113	483	1101	1173	1414	917	1019	423	104	107	6907
1998–	0	0	74	422	829	1249							

WBAN : 14922

COOLING DEGREE DAYS (base 65°F) 1998 MINNEAPOLIS – ST. PAUL, MN (MSP)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	0	0	0	0	76	49	276	298	77	12	0	0	788
1970	0	0	0	17	54	213	323	225	83	5	0	0	920
1971	0	0	0	2	5	218	141	168	106	3	0	0	643
1972	0	0	0	0	94	109	148	208	13	0	0	0	572
1973	0	0	0	1	4	158	280	271	47	8	0	0	769
1974	0	0	0	5	18	93	369	127	6	1	0	0	619
1975	0	0	0	0	66	159	371	220	18	16	0	0	850
1976	0	0	0	14	14	223	351	269	72	7	0	0	950
1977	0	0	0	12	145	129	310	76	19	0	0	0	691
1978	0	0	0	0	72	138	201	236	164	0	0	0	811
1979	0	0	0	0	17	113	275	181	65	0	0	0	651
1980	0	0	0	16	82	121	322	194	38	1	0	0	774
1981	0	0	0	0	10	96	200	151	28	0	0	0	485
1982	0	0	0	0	46	40	338	232	53	0	0	0	709
1983	0	0	0	0	0	145	389	368	98	8	0	0	1008
1984	0	0	0	0	13	155	237	280	24	0	0	0	709
1985	0	0	0	22	43	77	284	118	93	0	0	0	637
1986	0	0	0	1	45	148	286	115	32	0	0	0	627
1987	0	0	0	11	95	253	348	159	37	0	0	0	903
1988	0	0	0	1	96	296	412	302	45	0	0	0	1152
1989	0	0	0	0	26	153	359	192	41	8	0	0	779
1990	0	0	0	28	11	178	206	191	125	1	0	0	740
1991	0	0	0	8	109	246	238	205	51	0	0	0	857
1992	0	0	0	3	56	96	64	88	28	2	0	0	337
1993	0	0	0	0	12	60	176	195	8	0	0	0	451
1994	0	0	0	3	52	183	167	126	86	0	0	0	617
1995	0	0	0	0	3	240	264	308	63	9	0	0	887
1996	0	0	0	0	20	142	168	181	87	4	0	0	602
1997	0	0	0	0	1	163	222	150	41	33	0	0	610
1998	0	0	0	0	62	111	243	212	130	0	0	0	758

SNOWFALL (inches) 1998 MINNEAPOLIS – ST. PAUL, MN (MSP)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969–70	0.0	0.0	0.0	2.4	3.8	33.2	9.8	4.3	8.6	1.3	T	0.0	63.4
1970–71	0.0	0.0	0.0	T	6.3	5.5	19.9	13.9	7.0	1.9	0.2	0.0	54.7
1971–72	0.0	0.0	0.0	0.0	13.2	12.8	12.2	7.6	10.4	8.0	0.0	0.0	64.2
1972–73	0.0	0.0	T	T	1.1	15.3	11.6	11.3	0.4	2.0	0.0	0.0	41.7
1973–74	0.0	0.0	0.0	0.0	0.1	17.9	2.5	15.7	7.7	7.3	0.0	0.0	51.2
1974–75	0.0	0.0	0.0	0.0	1.2	6.1	27.4	9.0	18.3	2.2	0.0	0.0	64.2
1975–76	0.0	0.0	0.0	0.0	16.2	5.6	12.8	5.1	13.6	0.0	1.2	0.0	54.5
1976–77	0.0	0.0	0.0	2.3	1.4	8.3	13.4	1.8	14.6	1.8	0.0	0.0	43.6
1977–78	0.0	0.0	0.0	3.0	11.7	14.2	6.8	4.6	8.5	1.9	0.0	0.0	50.7
1978–79	0.0	0.0	0.0	0.0	16.5	15.1	14.2	13.5	8.4	0.7	0.0	0.0	68.4
1979–80	0.0	0.0	0.0	T	7.7	1.7	12.9	8.8	13.7	8.5	0.0	0.0	53.3
1980–81	0.0	0.0	0.0	T	0.9	2.8	4.6	11.0	0.1	1.7	0.0	0.0	21.1
1981–82	0.0	0.0	0.0	0.9	14.0	10.6	46.4	7.4	10.9	4.8	0.0	0.0	95.0
1982–83	0.0	0.0	0.0	1.4	3.6	19.3	3.2	10.8	14.3	21.8	0.0	0.0	74.4
1983–84	0.0	0.0	0.0	T	30.4	21.0	10.6	9.3	17.3	9.8	0.0	0.0	98.4
1984–85	0.0	0.0	0.0	0.3	2.0	16.3	13.1	4.2	36.8	T	0.0	0.0	72.7
1985–86	0.0	0.0	0.4	T	23.9	13.5	10.3	12.3	8.7	0.4	0.0	0.0	69.5
1986–87	0.0	0.0	0.0	T	4.4	4.2	5.5	1.2	2.1	T	0.0	0.0	17.4
1987–88	0.0	0.0	0.0	0.3	4.5	7.5	19.5	4.5	3.7	2.4	0.0	0.0	42.4
1988–89	0.0	0.0	0.0	0.2	15.8	7.2	6.0	17.3	22.7	0.8	0.1	T	70.1
1989–90	0.0	0.0	0.0	0.0	11.3	7.0	1.1	10.7	3.2	2.2	0.0	0.0	35.5
1990–91	0.0	0.0	0.0	T	5.0	11.7	6.5	14.2	4.4	1.5	0.3	0.0	43.6
1991–92	0.0	T	0.0	8.2	46.9	6.7	5.0	5.9	10.8	0.6	0.0	0.0	84.1
1992–93	0.0	T	T	1.3	12.2	9.2	12.0	5.3	6.9	0.5	0.0	0.0	47.4
1993–94	T	0.0	0.0	T	7.7	4.5	24.3	12.0	1.7	5.5	0.0	T	55.7
1994–95	T	0.0	0.0	T	6.2	6.5	4.2	2.1	10.4	0.2	0.0	T	29.6
1995–96	0.0	0.0	T	0.7	6.6	16.1	14.5	1.2	14.1	2.3	T	0.0	55.5
1996–97	0.0	0.0	0.0	T	15.3	23.5					T	T	
1997–98	T	0.0	0.0	T	8.6	3.3	20.4	1.1	11.6	T	T	T	45.0
1998–	0.0	0.0	T	0.0	0.1	3.1							
POR= 58 YRS	T	T	0.0	0.5	7.8	9.2	10.0	8.1	10.4	2.8	0.4	T	49.2

WBAN : 14922

REFERENCE NOTES:

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).

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).

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.

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.

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 EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

1998
MINNEAPOLIS – ST. PAUL, MINNESOTA (MSP)

The Twin Cities of Minneapolis and St. Paul are located at the confluence of the Mississippi and Minnesota Rivers over the heart of an artesian water basin. Its flat or gently rolling terrain varies little in elevation from that of the official observation station at International Airport. Numerous lakes dot the surrounding area. Minneapolis alone boasts of 22 lakes within the city park system. The largest body of water, nearly 15,000 acres, is Lake Minnetonka, located about 15 miles west of the airport. Most bodies of water are relatively small and shallow and are ice covered during winter.

The climate of the Minneapolis–St. Paul area is predominantly continental. Seasonal temperature variations are quite large. Temperatures range from less than –30 degrees to over 100 degrees. The growing season is 166 days. Because of this favorable growing season, all crops generally mature before the autumn freeze occurs.

The Twin Cities lie near the northern edge of the influx of moisture from the Gulf of Mexico. Severe storms such as blizzards, freezing rain (glaze), tornadoes, wind and hail storms do occur. The total annual precipitation is important. Even more significant is its proper distribution during the growing season. During the five month growing season, May through September, the major crops produced are corn, soybeans, small grains, and hay. During this period, the normal rainfall is over 16 inches, approximately 65 percent of the annual precipitation. Winter snowfall is nearly 48 inches. Winter recreational weather is excellent because of the dry snow. These conditions exist from about Christmas into early March. Snow depths average 6 to 8 inches in the city and 8 to 10 inches in the suburbs during this period.

Floods occur along the Mississippi River due to spring snow melt, excessive rainfall, or both. Occasionally an ice jam forms and creates a local flood condition. The flood problem at St. Paul is complicated because the Minnesota River empties into the Mississippi River between the two cities. Consequently, high water or flooding on the Minnesota River creates a greater flood potential at St. Paul. Flood stage at St. Paul can be expected on the average once in every eight years.

STATION LOCATION

MINNEAPOLIS-ST. PAUL, MINNESOTA

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE SEA LEVEL GROUND TEMPERATURE SITE	ELEVATION ABOVE GROUND WIND INSTRUMENTS	ELEVATION ABOVE GROUND EXTREME THERMOMETERS	ELEVATION ABOVE GROUND PSYCHROMETER	ELEVATION ABOVE GROUND SUNSHINE SWITCH	ELEVATION ABOVE GROUND TIPPING BUCKET RAIN GAGE	ELEVATION ABOVE GROUND WEIGHING RAIN GAGE	ELEVATION ABOVE GROUND 8 INCH RAIN GAGE	ELEVATION ABOVE GROUND HYGROTHERMOMETER	AUTOMATIC OBSERVING EQUIPMENT *	REMARKS
COOPERATIVE																
Dr. C.L. Anderson Corner Helen & 2nd St.	1/01/56	12/31/59		44°59'	93°18'	839										Surgeon General & Smithsonian Institute to 1870.
Mr. Wm. Cheney, Corner Douglas & Freemonet St.	11/01/64	6/30/01		44°58'	93°20'	850										
Mr. J.H. Aschenbeck 721 6th Avenue North	11/25/87	10/?/95		45°00'	93°19'	850		18					3			
Mr. J.H. Aschenbeck 731 6th Avenue North	10/?/95	9/?/23	2 blocks	45°00'	93°19'	825		4					3			Thermometers 99', RG 95' to 11/1/04; anemometer 192' to 4/96.
Mr. J.H. Aschenbeck 1730 Penn. Avenue N.	9/?/23	10/?/36	1.5 mi. NW	45°01'	93°21'	888		4					3			Precipitation only after 2/23/29. Temperature obs. 7A, 2P and 9P.
CITY																
U.S. Court House, cor. Marquette Ave. & 3rd St	11/06/90	4/10/38		44°59'	93°18'	839	105	105	104		97		96			
AIRPORT																
Administration Bldg. Wold-Chamberlain AP	1/27/34	10/16/37		44°53'	93°13'	832	61	32								
Administration Bldg. Minneapolis-St. Paul International Airport Wold-Chamberlain Field	10/16/37	Present	NA	44°53'	93°13'	a834	b21 h33	f43	f42	%50 i42	e41	c4 g41	e41	d5 j5	NA	Several minor moves of instruments but no significant changes in elevations other than given below. St. Paul WBAS was integrated with Minneapolis WBAS 6/1/53. a - Ground elevation 830' to 1/1/60 & 822' to 5/24/63. b - 75' to 9/18/58. c - Installed 11/20/53. Elevation 41' to 10/24/62. d - Commissioned on field site 1/1/60; moved 800' WNW 5/31/63. e - Standby after 10/24/62. f - Standby after 1/1/60. g - Effective 11/15/72. % - Commissioned 9/18/58. h - Raised 10/17/81. i - Effective 11/5/84. j - Type change 12/11/85.
															S	ASOS Commissioned 06/01/96

* Type
M = AMOS
T = AUTOB
S = ASOS
W = AWOS

SUBSCRIPTION:
Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.

INQUIRIES/COMMENTS CALL: (828) 271-4800

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