



# MAY 2003

## LOCAL CLIMATOLOGICAL DATA

NOAA, National Climatic Data Center

# DULUTH, MN

INTERNATIONAL AIRPORT (DLH)  
 Lat: 46°50' N Long: 92°11' W Elev (Ground): 1426 Feet  
 Time Zone: CENTRAL WBAN: 14913 ISSN #:0198-2702

DATE	TEMPERATURE °F						DEG DAYS BASE 65°		WEATHER	SNOW/ICE ON GND(IN)		PRECIPITATION (INCHES)		PRESSURE (INCHES OF HG)		WIND SPEED = MPH DIR = TENS OF DEGREES						DATE	
	MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW PT	AVERAGE WET BULB	HEATING	COOLING		0600 LST	1200 LST	2400 LST	2400 LST	AVERAGE STATION	AVERAGE SEA LEVEL	RESULTANT SPEED	RES DIR	AVERAGE SPEED	MAXIMUM				
																			5-SEC		2-MIN		
1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
01	59	32	46	0	25	37	19	0			0.0	0.00	28.47	30.00	5.3	07	8.4	23	13	20	13	01	
02	54	28*	41*	-6	14	31	24	0			0.0	0.00	28.64	30.20	7.0	11	7.3	18	12	13	10	02	
03	61	29	45	-2	19	35	20	0			0.0	0.00	28.59	30.13	9.4	11	10.4	23	09	18	08	03	
04	58	36	47	-1	27	39	18	0	RA BR		0.0	0.07	28.37	29.90	14.1	09	14.5	43	12	35	11	04	
05	49	39	44	-4	34	40	21	0	RA BR		0.0	0.11	28.17	29.69	18.3	08	18.5	41	08	31	10	05	
06	54	41	48	0	36	42	17	0			0.0	0.00	28.36	29.89	10.5	09	10.7	26	09	21	09	06	
07	60	42	51	2	32	42	14	0			0.0	0.00	28.47	30.00	6.9	10	7.4	17	09	16	11	07	
08	62	36	49	0	28	40	16	0			0.0	0.00	28.50	30.02	14.3	08	14.6	37	07	30	07	08	
09	46	37	42	-8	37	39	23	0	TSRA RA FG+ BR		0.0	0.93	28.14	29.67	16.7	08	17.2	44	08	35	08	09	
10	51	37	44	-6	42	43	21	0	FG+ BR		0.0	0.00	28.13	29.66	0.8	32	6.1	16	34	12	34	10	
11	53	44	49	-1	38	44	16	0	RA		0.0	0.05	28.04	29.55	16.4	35	17.0	46*	33	36*	34	11	
12	66	39	53	2	29	43	12	0			0.0	0.00	28.43	29.96	10.4	32	10.7	28	33	22	32	12	
13	69	45	57	6	29	45	8	0			0.0	0.00	28.48	29.99	2.7	07	7.5	18	13	15	13	13	
14	66	43	55	4	33	45	10	0			0.0	0.00	28.41	29.92	5.4	11	7.1	17	20	15	07	14	
15	67	39	53	1	35	45	12	0			0.0	0.00	28.53	30.06	10.9	07	12.0	28	08	23	08	15	
16	69	45	57	5	40	48	8	0			0.0	0.00	28.58	30.11	11.5	09	11.9	25	10	21	08	16	
17	66	39	53	1	45	49	12	0	FG+ BCFG BR		0.0	0.00	28.61	30.14	7.9	11	8.3	22	09	18	09	17	
18	65	42	54	1	45	48	11	0	FG+ BR		0.0	0.00	28.54	30.06	9.4	11	9.6	20	10	17	10	18	
19	60	40	50	-3	48	50	15	0	RA FG+ BR HZ		0.0	1.85	28.48	30.00	3.5	34	9.5	32	34	26	34	19	
20	57	38	48	-5	33	41	17	0	RA		0.0	T	28.78	30.33	9.6	31	10.4	35	31	23	31	20	
21	62	36	49	-5	31	42	16	0			0.0	0.00	28.78	30.32	7.3	19	8.3	28	21	21	17	21	
22	48	42	45	-9	41	43	20	0	RA BR		0.0	0.20	28.73	30.28	5.3	12	5.9	14	19	12	19	22	
23	60	36	48	-6	31	41	17	0	BR		0.0	0.00	28.72	30.26	7.8	08	8.3	23	09	17	09	23	
24	68	35	52	-2	27	42	13	0			0.0	0.00	28.60	30.13	6.5	08	7.0	18	07	16	11	24	
25	68	34	51	-4	32	44	14	0			0.0	0.00	28.63	30.16	5.2	07	7.2	25	12	22	10	25	
26	72	38	55	0	36	47	10	0			0.0	0.00	28.68	30.21	4.4	09	5.8	18	07	16	07	26	
27	79*	40	60	4	41	52	5	0	RA BR		0.0	0.02	28.56	30.07	5.0	24	7.1	24	21	20	27	27	
28	72	56	64	8	46	54	1	0	RA BR		0.0	0.17	28.42	29.92	12.3	34	13.1	35	35	25	36	28	
29	78	50	64*	8	43	54	1	0	RA		0.0	T	28.31	29.81	7.3	24	10.2	24	24	20	24	29	
30	64	45	55	-1	49	52	10	0	TSRA RA BR		0.0	0.14	28.12	29.61	8.9	06	14.0	35	01	28	06	30	
31	57	38	48	-9	32	41	17	0			0.0	0.00	28.57	30.10	3.2	10	7.4	21	10	16	10	31	

61.9	39.4	50.7	■ ■	34.8	43.8	14.1	0.0	< MONTHLY AVERAGES	TOTALS->	0.0	3.54	28.48	30.00	5.0	08	10.1	<- MONTHLY AVERAGES				
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-1.5	- .8	-1.1	■ ■	->-----DEPARTURE FROM NORMAL-----<						0.59	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3										
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<b>DEGREE DAYS</b>				GREATEST 24-HR PRECIPITATION: 1.85 DATE: 19				SEA LEVEL PRESSURE				DATE		TIME			
MONTHLY TOTAL DEPARTURE				SEASON TO DATE TOTAL DEPARTURE				GREATEST 24-HR SNOWFALL: 0.0 DATE:				MAXIMUM		: 30.41		21 0655	
HEATING: 438				9616				GREATEST SNOW DEPTH: 0 DATE:				MINIMUM		: 29.38		30 0855	
COOLING: 0				-7				NUMBER OF DAYS WITH		MAXIMUM TEMP ≥ 90: 0		MINIMUM TEMP ≤ 32: 3		PRECIPITATION ≥ 0.01 INCH: 9		PRECIPITATION ≥ 0.10 INCH: 6	
								THUNDERSTORMS: 2		MINIMUM TEMP ≤ 0: 0		HEAVY FOG: 5		SNOWFALL ≥ 1.0 INCH: 0			

MAY 2003  
DULUTH, MN

# HOURLY PRECIPITATION

(WATER EQUIVALENT IN INCHES)

## DULUTH, MN

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DLH

WBAN # 14913

DATE	FOR HOUR (LST) ENDING AT												DATE	FOR HOUR (LST) ENDING AT												DATE	Sum if Different (See Note)	2400 LST	
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24			Water	Equiv.
01													01												01		0.00		
02													02												02		0.00		
03													03												03		0.00		
04													04											0.02	0.05	04		0.07	
05	T	0.01	0.01	0.01	T		T	T	0.03	0.02	0.02	0.01	05	T	T	T	T	T	T							05		0.11	
06													06													06		0.00	
07													07													07		0.00	
08													08													08		0.00	
09			T	0.05	0.30	0.10	0.06	0.05	0.08	0.16	0.04	0.02	09	0.03	T	T	0.01	0.01		0.01			0.01		09		0.93		
10													10													10		0.00	
11	T	0.01	T	T	0.01	0.01	T	0.01	T	0.01	T		11			T	T									11		0.05	
12													12													12		0.00	
13													13													13		0.00	
14													14													14		0.00	
15													15													15		0.00	
16													16													16		0.00	
17													17													17		0.00	
18													18													18		0.00	
19	T	T		T	0.02		T	T	0.22	0.27	0.35	0.11	19	0.03	0.48	0.26	0.05	0.01		T	0.05		T		19		1.85		
20					T	T							20													20		T	
21													21													21		0.00	
22					T	0.01	0.04	0.03	0.02	0.01	0.01	0.01	22	T	0.02	0.02	0.02	T	0.01						22		0.20		
23													23													23		0.00	
24													24													24		0.00	
25													25													25		0.00	
26													26													26		0.00	
27													27												T	27		0.02	
28	0.17	T											28												T	28		0.17	
29													29												T	29		T	
30	T	0.02	0.10										30												T	30		0.14	
31													31		T	T	T	0.02								31		0.00	

### MAXIMUM SHORT DURATION PRECIPITATION (See Note)

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)												
Ending Date												
Ending Time (Hour/Min)												

Date and time are not entered for TRACE amounts.

Note : The sum of the hourly totals is given when it differs from the daily total. NWS does not edit ASOS hourly values but may edit daily and monthly totals. Hourly, daily, and monthly totals are printed as reported by the ASOS site.

## REFERENCE NOTES & SUPPLEMENTAL SUMMARIES

\* = Extreme for the month (last occurrence if more than one)

T = Trace precipitation amount

+ = also occurs on earlier date

FG+ = Heavy fog, visibility .25 miles or less

BLANK entries denote missing or unreported data

Resultant wind is the vector sum of the wind speeds and directions divided by the number of observations.

Wind direction is recorded in tens of degrees (2 digits) clockwise from true north. '00' = calm, 'VR' = variable.

Precipitation is for the 24-hour period ending at the time indicated in the column heading.

Water Equivalent of snow on the ground is reported only when the depth is 2 or more inches.

NORMALS ARE FOR THE YEARS 1971–2000

### WEATHER NOTATIONS

QUALIFIER	WEATHER PHENOMENA		
	PRECIPITATION	OBSCURATION	OTHER
BC Patches	DZ Drizzle	BR Mist	DS Duststorm
BL Blowing	GR Hail	DU Widespread Dust	FC Funnel Cloud
DR Low Drifting	GS Small Hail and/or Snow Pellets	FG Fog	+FC Tornado Waterspout
FZ Freezing	IC Ice Crystals	FU Smoke	PO Well-Developed Dust/Sand Whirls
MI Shallow	PL Ice Pellets	HZ Haze	SQ Squalls
PR Partial	RA Rain	PY Spray	SS Sandstorm
SH Shower(s)	SG Snow Grains	SA Sand	GL Glaze
TS Thunderstorm	SN Snow	VA Volcanic Ash	
VC In the Vicinity	UP Unknown Precipitation		

Intensity (as indicated on pages 4 to 6):  
'+' = Heavy    ' ' = Moderate    '-' = Light

## DULUTH, MN MAY 2003

Ceilorometer (30-second) data are used to derive cloudiness at or below 12,000 feet. This cloudiness is the mean cloud cover detected during sunrise to sunset (SR–SS), or midnight to midnight (MN–MN).

Satellite data are used to derive cloudiness above 12,000 feet. Effective Cloud Amount is based on the cloud cover and the transparency of the clouds within the satellite field of view (approx. 31x31 miles).

Sky Condition is based on the sum (not to exceed 8) of the sunrise to sunset cloud cover below and above 12,000 feet. Both ceilometer and satellite data must be present to compute Sky Condition. Clear = 0–2 oktas, Partly Cloudy = 3–6 oktas, Cloudy = 7–8 oktas.

A Heating (Cooling) Degree Day is the difference between the average daily temperature and 65 degrees F. The HDD season begins July 1, the CDD season begins January 1.

Dew Point is the temperature to which the air must be cooled to achieve 100% relative humidity. Wet Bulb is the temperature the air would have if cooled to saturation at constant pressure by evaporation of water into it.

Snow Depth, Snowfall, and Sunshine data may come from nearby sites that the National Weather Service deems Climatologically representative of this site.

### ADDITIONAL NOTES:

DATE	SUNSHINE		CLOUDINESS (OKTAS)				VISIBILITY (MILES)		RESERVED
	TOTAL MINUTES	PERCENT POSSIBLE	SR–SS		MN–MN		MINIMUM	MAXIMUM	
			CEILOMETER	SATELLITE	CEILOMETER	SATELLITE			
01							10.00	10.00	
02							10.00	10.00	
03							10.00	10.00	
04							3.00	10.00	
05							5.00	10.00	
06							10.00	10.00	
07							10.00	10.00	
08							10.00	10.00	
09							<.25	10.00	
10							.25	10.00	
11							10.00	10.00	
12							10.00	10.00	
13							10.00	10.00	
14							10.00	10.00	
15							10.00	10.00	
16							10.00	10.00	
17							.25	10.00	
18							.25	10.00	
19							.25	10.00	
20							10.00	10.00	
21							10.00	10.00	
22							3.00	10.00	
23							6.00	10.00	
24							10.00	10.00	
25							10.00	10.00	
26							10.00	10.00	
27							6.00	10.00	
28							2.50	10.00	
29							10.00	10.00	
30							2.50	10.00	
31							10.00	10.00	
<b>MONTHLY AVGS</b>							7.27	10.00	
<b>SUNSHINE (MINUTES)</b>									
Total:                      Possible: Percent Possible:									
<b>NUMBER OF DAYS WITH:</b>									
<b>SKY CONDITION</b>									
CLR   PTLY CLDY   CLOUDY   MISSING 31									
<b>MINIMUM VISIBILITY (MILES)</b>									
<=0.25      <=3.0      >=7.0 4                      6                      19									





# OBSERVATIONS AT 3-HOURLY INTERVALS

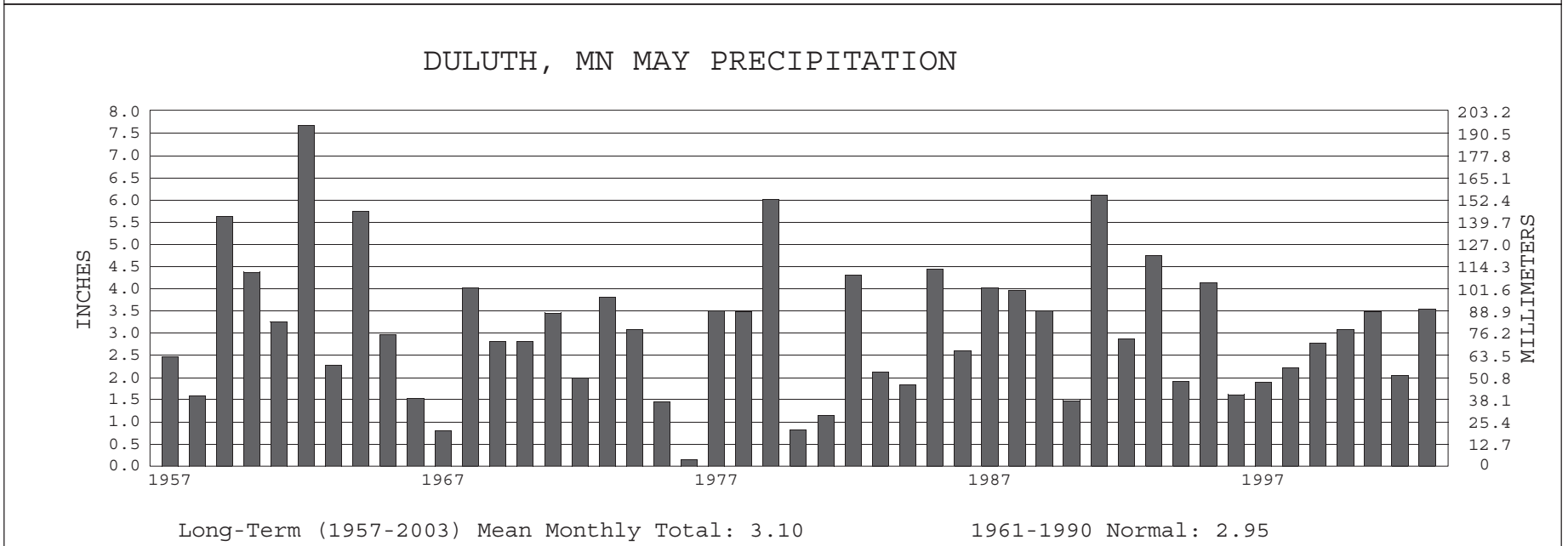
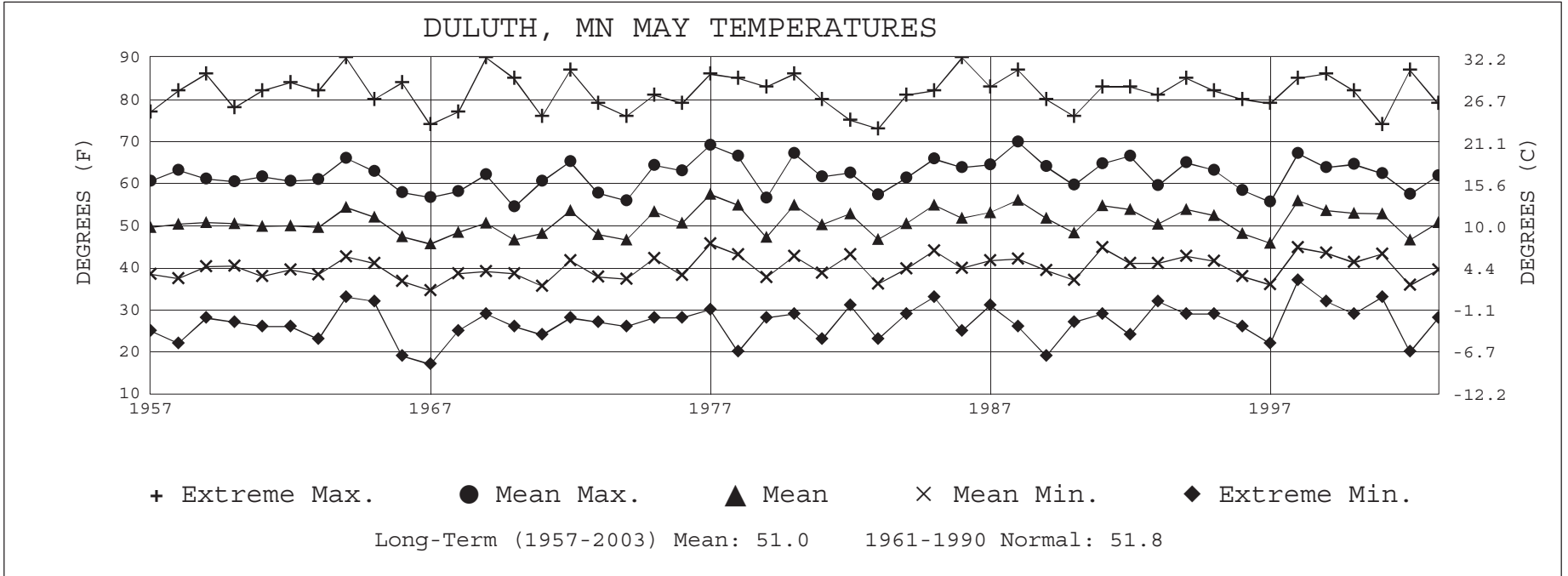
# DULUTH, MN

MAY 2003

DLH

WBAN # 14913

HOUR (LST)	SKY COVER		CEILING 100'S OF FT	SATELLITE		VISIBILITY (MILES)	WEATHER	TEMPERATURE °F				WIND		PRESSURE (INCHES, HG)		HOUR (LST)	SKY COVER		CEILING 100'S OF FT	SATELLITE		VISIBILITY (MILES)	WEATHER	TEMPERATURE °F				WIND		PRESSURE (INCHES, HG)	
	DRY BULB	DEW POINT		WET BULB	RELATIVE HUMIDITY (PCT)			SPEED (MPH)	DIRECTION TENS OF DEG	STATION	SEA LEVEL	DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY (PCT)		SPEED (MPH)	DIRECTION TENS OF DEG		STATION	SEA LEVEL										
SUNRISE: 0424								MAY 25								SUNSET: 1947															
03	CLR	NC				10.00		42	34	39	73	5	34	28.58	30.11	03	FEW	NC				10.00		40	36	38	86	7	02	28.53	30.07
06	SCT	NC				10.00		45	36	41	71	5	36	28.62	30.14	06	CLR	NC				10.00		40	34	37	79	7	02	28.58	30.13
09	FEW	NC				10.00		66	34	50	31	3	VR	28.63	30.15	09	CLR	NC				10.00		47	32	40	56	13	10	28.62	30.15
12	FEW	NC				10.00		67	32	50	27	13	10	28.64	30.17	12	CLR	NC				10.00		51	29	41	43	9	12	28.61	30.15
15	FEW	NC				10.00		66	29	49	25	14	09	28.63	30.16	15	CLR	NC				10.00		54	28	43	37	8	15	28.58	30.12
18	FEW	NC				10.00		64	25	47	23	8	09	28.63	30.16	18	CLR	NC				10.00		56	32	45	40	7	19	28.53	30.07
21	CLR	NC				10.00		55	29	43	37	5	03	28.65	30.17	21	CLR	NC				10.00		49	34	42	57	3	21	28.54	30.08
24	FEW	NC				10.00		44	38	41	79	3	36	28.65	30.18	24	CLR	NC				10.00		45	32	39	61	7	25	28.55	30.09
SUNRISE: 0423								MAY 26								SUNSET: 1948															
03	CLR	NC				10.00		41	36	39	82	3	01	28.66	30.19	3-HOURLY OBSERVATION NOTES															
06	FEW	NC				10.00		49	37	43	64	7	36	28.71	30.24	Sky Cover is the amount of the sky obscured. CLR or SKC = 0, FEW = 1/8-2/8,															
09	CLR	NC				10.00		68	36	52	31	5	02	28.73	30.24	SCT = 3/8-4/8, BKN = 5/8-7/8, OVC = 8/8, VV = Vertical Visibility = 8/8.															
12	CLR	NC				10.00		70	34	52	27	14	12	28.71	30.23	Ceiling is reported in hundreds of feet above ground level for clouds at or below 12,000 feet.															
15	CLR	NC				10.00		71	33	52	25	10	10	28.68	30.21	NC= No ceiling detected.															
18	CLR	NC				10.00		68	34	51	28	9	10	28.65	30.18	& = Original observation contained additional weather elements.															
21	FEW	NC				10.00		57	38	48	49	0	00	28.67	30.19	See page 3 for additional notes.															
24	CLR	NC				10.00		50	36	44	59	0	00	28.67	30.19																
SUNRISE: 0422								MAY 27								SUNSET: 1949															
03	CLR	NC				10.00		42	36	39	79	0	00	28.66	30.19																
06	CLR	NC				10.00		49	43	46	80	0	00	28.69	30.21																
09	CLR	NC				10.00		71	37	54	29	5	VR	28.66	30.17																
12	CLR	NC				10.00		76	38	56	25	16	20	28.59	30.10																
15	CLR	NC				10.00		79	37	57	22	12	22	28.51	30.03																
18	CLR	NC				10.00		74	40	56	29	10	25	28.48	29.98																
21	BKN	090				10.00		68	46	56	45	13	29	28.43	29.92																
24	OVC	070				6.00	-RA BR	60	59	59	96	9	30	28.40	29.89																
SUNRISE: 0421								MAY 28								SUNSET: 1950															
03	CLR	NC				10.00		56	54	55	93	6	30	28.37	29.86																
06	BKN	018				10.00		56	53	54	90	16	32	28.38	29.88																
09	CLR	NC				10.00		61	49	54	65	15	33	28.41	29.91																
12	FEW	NC				10.00		68	44	55	42	18	35	28.44	29.94																
15	SCT	NC				10.00		69	41	54	36	17	01	28.45	29.95																
18	FEW	NC				10.00		69	39	53	33	17	35	28.44	29.94																
21	CLR	NC				10.00		59	42	50	54	6	31	28.46	29.97																
24	CLR	NC				10.00		56	41	48	57	7	31	28.45	29.95																
SUNRISE: 0421								MAY 29								SUNSET: 1951															
03	CLR	NC				10.00		51	41	46	69	6	34	28.43	29.93																
06	CLR	NC				10.00		54	43	48	67	5	32	28.42	29.92																
09	SCT	NC				10.00		67	41	53	39	12	28	28.41	29.91																
12	FEW	NC				10.00		75	41	57	30	14	22	28.35	29.84																
15	FEW	NC				10.00		77	41	57	28	16	23	28.26	29.75																
18	FEW	NC				10.00		73	44	57	36	12	23	28.22	29.71																
21	BKN	100				10.00		69	44	56	41	12	21	28.18	29.67																
24	OVC	090				10.00	-RA	63	48	55	58	8	15	28.11	29.59																
SUNRISE: 0420								MAY 30								SUNSET: 1952															
03	OVC	070				10.00		57	51	54	81	9	14	28.03	29.51																
06	SCT	NC				10.00		56	49	52	77	9	16	27.95	29.42																
09	CLR	NC				10.00		61	51	55	70	8	13	27.91	29.38																
12	BKN	065				10.00		58	51	54	78	24	07	27.97	29.45																
15	OVC	012				7.00		53	50	51	89	21	05	28.10	29.60																
18	OVC	019				10.00		52	48	50	86	17	02	28.26	29.77																
21	OVC	036				10.00		50	44	47	80	10	01	28.39	29.91																
24	OVC	095				10.00		45	41	43	86	6	04	28.47	29.99																





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NOAA, National Climatic Data Center

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DIRECTOR

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