



# AUGUST 2002

## 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					
																			SPEED	DIR	SPEED	DIR		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
01	71	56	64	-2	56	60	1	0	TS TSRA RA BR	0		0.0	0.55	28.36	29.86	9.5	32	10.9	39	01	29	36	01	
02	71	53	62	-4	51	56	3	0		0		0.0	0.00	28.61	30.13	9.6	29	10.3	24	28	18	29	02	
03	65	54	60	-6	58	59	5	0	RA BR	0		0.0	0.04	28.58	30.10	4.1	15	5.3	17	15	16	15	03	
04	78	55	67	1	57	61	0	2	BR	0		0.0	0.00	28.63	30.14	5.9	01	6.3	16	02	13	04	04	
05	70	54	62	-4	50	56	3	0		0		0.0	0.00	28.78	30.30	8.9	10	10.1	20	11	16	11	05	
06	66	51	59	-7	51	55	6	0		0		0.0	0.00	28.83	30.36	11.9	11	12.6	24	09	20	10	06	
07	69	56	63	-3	56	58	2	0	RA	0		0.0	0.07	28.77	30.29	8.1	13	9.2	20	12	16	12	07	
08	80	56	68	2	60	63	0	3		0		0.0	0.00	28.70	30.21	8.2	18	9.4	21	21	17	21	08	
09	82	63	73*	8	63	66	0	8		0		0.0	0.00	28.55	30.05	11.1	24	11.5	26	24	20	24	09	
10	77	58	68	3	60	63	0	3	RA BR	0		0.0	0.06	28.35	29.84	10.2	25	11.7	31	26	26	25	10	
11	83*	56	70	5	60	64	0	5		0		0.0	0.00	28.36	29.85	6.1	27	8.1	24	31	17	32	11	
12	74	57	66	1	60	62	0	1	TS TSRA RA FG BR	0		0.0	1.33	28.31	29.80	5.5	27	9.6	33	27	25	27	12	
13	74	54	64	-1	51	56	1	0		0		0.0	0.00	28.35	29.84	7.4	29	8.1	18	31	15	27	13	
14	77	53	65	1	55	59	0	0	RA	0		0.0	0.03	28.16	29.65	13.1	22	13.5	33	22	28	23	14	
15	71	55	63	-1	58	60	2	0	TSRA RA BR	0		0.0	0.55	28.18	29.67	10.1	26	12.1	31	27	25	28	15	
16	75	51	63	-1	55	59	2	0	TSRA RA	0		0.0	0.13	28.37	29.88	6.1	25	10.0	23	27	20	27	16	
17	64	52	58	-6	51	55	7	0	TSRA RA DZ FG BR	0		0.0	1.19	28.18	29.67	14.8	28	19.6	51*	29	41*	29	17	
18	68	49	59	-5	47	52	6	0		0		0.0	0.00	28.41	29.92	9.3	31	9.8	22	32	17	30	18	
19	70	45*	58	-5	48	53	7	0		0		0.0	0.00	28.51	30.03	4.9	27	6.5	16	28	13	27	19	
20	74	52	63	0	52	57	2	0		0		0.0	0.00	28.54	30.05	8.0	20	9.2	21	23	18	21	20	
21	64	58	61	-2	59	60	4	0	RA FG+ BCFG BR	0		0.0	0.25	28.45	29.96	6.3	11	6.8	15	12	14	12	21	
22	61	56	59	-4	57	58	6	0	DZ FG+ BR	0		0.0	0.02	28.61	30.13	7.4	10	7.5	20	10	15	11	22	
23	71	54	63	1	58	60	2	0	RA FG+ BR	0		0.0	T	28.52	30.03	1.5	31	4.8	13	31	10	28	23	
24	79	58	69	7	57	62	0	4		0		0.0	0.00	28.48	29.98	6.7	33	7.5	21	01	16	02	24	
25	80	52	66	5	56	61	0	1		0		0.0	0.00	28.53	30.03	4.1	32	5.3	17	34	13	30	25	
26	73	59	66	5	55	59	0	1		0		0.0	0.00	28.61	30.12	9.5	08	12.0	29	09	24	09	26	
27	65	51	58*	-3	53	55	7	0	RA	0		0.0	T	28.75	30.27	13.0	11	13.2	28	10	23	10	27	
28	74	51	63	2	58	59	2	0	TS RA DZ FG+ BCFG BR HZ	0		0.0	T	28.71	30.23	6.8	15	7.6	17	20	14	20	28	
29	75	59	67	7	61	62	0	2	RA FG+ BCFG BR	0		0.0	T	28.66	30.17	2.9	20	5.8	16	27	14	27	29	
30	75	57	66	6	60	61	0	1	FG+ BCFG BR	0		0.0	0.00	28.72	30.24	7.3	13	7.8	14	12	13	13	30	
31	77	56	67	7	61	64	0	2	FG+ BCFG BR HZ	0		0.0	0.00	28.64	30.15	10.7	19	11.2	24	20	18	19	31	
72.7 54.5 63.6 ■■ 55.9 59.2 2.2 1.1 < MONTHLY AVERAGES TOTALS->												0.0	4.22	28.52	30.03	2.0	21	9.5	<- MONTHLY AVERAGES					
-1.2 1.0 -.1 ■■ <-----DEPARTURE FROM NORMAL----->												0.00	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3											
DEGREE DAYS									GREATEST 24-HR PRECIPITATION: 1.33 DATE: 12					SEA LEVEL PRESSURE DATE TIME										
MONTHLY TOTAL DEPARTURE									GREATEST 24-HR SNOWFALL: 0.0 DATE:					MAXIMUM : 30.43 06 0755										
SEASON TO DATE TOTAL DEPARTURE									GREATEST SNOW DEPTH: 0 DATE:					MINIMUM : 29.48 17 0555										
HEATING: 68 -38 95 -80									NUMBER OF DAYS WITH → MAXIMUM TEMP ≥ 90: 0					MINIMUM TEMP ≤ 32: 0					PRECIPITATION ≥ 0.01 INCH : 11					
COOLING: 33 -27 272 95									MAXIMUM TEMP ≤ 32 : 0					MINIMUM TEMP ≤ 0 : 0					PRECIPITATION ≥ 0.10 INCH : 6					
									THUNDERSTORMS : 6					HEAVY FOG : 7					SNOWFALL ≥ 1.0 INCH : 0					

AUGUST 2002  
DULUTH, MN

# HOURLY PRECIPITATION

(WATER EQUIVALENT IN INCHES)

DULUTH, MN

AUGUST 2002

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		0.43	0.08							T	0.02		01												01	0.53		0.55	
02												0.03	02												02			0.00	
03										T	T		03		T	0.01		T	T						03			0.04	
04													04												04			0.00	
05													05												05			0.00	
06													06												06			0.00	
07			T				0.01	T	0.06	T	T		07												07			0.07	
08													08												08			0.00	
09													09												09			0.00	
10		T		T			0.06	T		T			10												10			0.06	
11													11												11			0.00	
12	0.12	T	0.31	0.32	0.27	0.01	0.21	0.07					12		T	0.02	T								12			1.33	
13													13												13			0.00	
14			T	T	T	0.02	0.15	0.24	0.04	0.06	T	0.01	14										T	0.01	0.02		14		0.03
15													15	T					0.03						15			0.55	
16	0.01												16												16	1.12		0.13	
17	0.02	0.41	0.06	0.11	0.45	0.06	0.01				T	T	17										0.01	0.01	0.10		17		1.19
18													18												18			0.00	
19													19												19			0.00	
20													20												20			0.00	
21	T		0.01	0.13	0.07	0.01	0.01				0.01	T	21	0.01											21	0.01		0.25	
22													22												22			0.02	
23	T		T										23									T		0.01	T			T	
24													24												24			0.00	
25													25												25			0.00	
26													26												26			0.00	
27													27												27			T	
28					T								28												28			T	
29						T							29				T	T							29			T	
30													30												30			0.00	
31													31												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)	.15	.23	.29	.37	.48	.51	.52	.58	.78	.87	.90	.91
Ending Date	17	01	01	01	01	01	12	12	12	12	12	12
Ending Time (Hour/Min)	0438	0144	0150	0156	0159	0209	0430	0359	0409	0425	0440	0513

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.

\* = 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

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

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

## WEATHER NOTATIONS

**DULUTH, MN  
AUGUST 2002**

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).

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.

DATE	SUNSHINE		CLOUDINESS (OKTAS)				VISIBILITY (MILES)		RESERVED
	TOTAL MINUTES	PERCENT POSSIBLE	SR-SS		MN-MN		MINIMUM	MAXIMUM	
			CEILOMETER	SATELLITE	CEILOMETER	SATELLITE			
01							1.00	10.00	
02							10.00	10.00	
03							3.00	10.00	
04							.75	10.00	
05							10.00	10.00	
06							10.00	10.00	
07							10.00	10.00	
08							10.00	10.00	
09							10.00	10.00	
10							2.00	10.00	
11							10.00	10.00	
12							.50	10.00	
13							10.00	10.00	
14							10.00	10.00	
15							1.25	10.00	
16							7.00	10.00	
17							.50	10.00	
18							10.00	10.00	
19							10.00	10.00	
20							10.00	10.00	
21							<.25	10.00	
22							.25	10.00	
23							.25	10.00	
24							7.00	10.00	
25							10.00	10.00	
26							10.00	10.00	
27							10.00	10.00	
28							.25	10.00	
29							.25	10.00	
30							<.25	10.00	
31							.25	10.00	
MONTHLY AVGS							5.78	10.00	

SUNSHINE (MINUTES)

Total:

Possible:

Percent Possible:

NUMBER OF DAYS WITH:

SKY CONDITION

CLR PTLY CLDY CLOUDY MISSING

31

MINIMUM VISIBILITY (MILES)

<=0.25 <=3.0 >=7.0

6 14 17

## OBSERVATIONS AT 3-HOURLY INTERVALS

DULUTH, MN

AUGUST 2002

DLH

WBAN # 14913

HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F			RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES, HG)		HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F			RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES, HG)			
	SKY COVER	CEILING 100'S OF FT	OBSERVATION TIME (LST)	EFF CLD AMT <i>Okta</i>		VISIBILITY (MILES)	DRY BULB	DEW POINT		WET BULB	SPEED (MPH)	DIRECTION TENS OF DEG	STATION		SEA LEVEL	SKY COVER	CEILING 100'S OF FT	OBSERVATION TIME (LST)		EFF CLD AMT <i>Okta</i>	VISIBILITY (MILES)	DRY BULB		DEW POINT	WET BULB	SPEED (MPH)	DIRECTION TENS OF DEG	STATION	SEA LEVEL
SUNRISE: 0449					AUG 01	SUNSET: 1942					SUNRISE: 0456					AUG 07	SUNSET: 1933												
03	CLR	NC			10.00	63	62	62	97	0	00	28.21	29.69	03	SCT	NC			10.00	57	55	56	93	7	12	28.78	30.31		
06	CLR	NC			10.00	64	62	63	93	3	36	28.21	29.69	06	BKN	060			10.00	58	56	57	93	7	16	28.81	30.34		
09	BKN	090			10.00	69	63	65	81	5	VR	28.29	29.78	09	OVC	095			10.00	57	54	55	90	9	17	28.79	30.33		
12	BKN	020			10.00	67	57	61	71	20	33	28.33	29.82	12	SCT	NC			10.00	63	56	59	78	9	21	28.75	30.28		
15	FEW	NC			10.00	71	48	58	44	23	32	28.41	29.90	15	CLR	NC			10.00	68	57	61	68	13	13	28.74	30.27		
18	FEW	NC			10.00	68	49	57	51	16	32	28.47	29.96	18	CLR	NC			10.00	65	57	60	76	12	11	28.73	30.24		
21	CLR	NC			10.00	58	50	54	75	8	30	28.52	30.03	21	FEW	NC			10.00	60	57	58	90	8	12	28.73	30.26		
24	CLR	NC			10.00	56	51	53	84	8	31	28.55	30.07	24	CLR	NC			10.00	58	57	57	97	7	13	28.73	30.24		
SUNRISE: 0450					AUG 02	SUNSET: 1941					SUNRISE: 0457					AUG 08	SUNSET: 1932												
03	CLR	NC			10.00	54	51	52	90	10	32	28.57	30.08	03	CLR	NC			10.00	57	57	57	100	7	13	28.74	30.26		
06	CLR	NC			10.00	54	50	52	87	8	33	28.61	30.13	06	SCT	NC			10.00	58	57	57	97	9	13	28.75	30.28		
09	FEW	NC			10.00	63	49	55	60	15	29	28.64	30.16	09	FEW	NC			10.00	68	61	64	78	9	22	28.74	30.26		
12	SCT	NC			10.00	67	51	58	57	14	26	28.64	30.16	12	FEW	NC			10.00	76	63	68	64	10	17	28.71	30.22		
15	SCT	NC			10.00	71	52	60	51	15	31	28.62	30.14	15	FEW	NC			10.00	79	57	65	47	16	22	28.68	30.19		
18	CLR	NC			10.00	69	52	59	55	13	29	28.60	30.11	18	SCT	NC			10.00	73	61	65	66	9	17	28.64	30.14		
21	CLR	NC			10.00	58	52	55	81	7	30	28.62	30.14	21	BKN	120			10.00	70	61	64	73	8	18	28.65	30.15		
24	CLR	NC			10.00	56	52	54	87	3	27	28.63	30.15	24	SCT	NC			10.00	66	61	63	84	6	18	28.64	30.14		
SUNRISE: 0451					AUG 03	SUNSET: 1939					SUNRISE: 0459					AUG 09	SUNSET: 1930												
03	CLR	NC			10.00	56	53	54	90	0	00	28.64	30.16	03	FEW	NC			10.00	65	61	63	87	12	23	28.62	30.12		
06	CLR	NC			10.00	55	52	53	90	6	15	28.61	30.12	06	SCT	NC			10.00	65	59	61	81	17	23	28.57	30.08		
09	OVC	110			10.00	63	55	58	76	3	24	28.65	30.17	09	SCT	NC			10.00	70	62	65	76	15	24	28.56	30.06		
12	OVC	100			10.00	61	60	60	97	12	15	28.56	30.08	12	SCT	NC			10.00	77	65	69	66	15	24	28.56	30.06		
15	FEW	NC			10.00	64	61	62	90	7	15	28.55	30.07	15	FEW	NC			10.00	79	65	70	62	13	24	28.53	30.03		
18	OVC	011			10.00	61	60	60	97	8	14	28.52	30.04	18	SCT	NC			10.00	76	66	69	72	13	23	28.51	30.01		
21	OVC	005			10.00	61	59	60	93	6	13	28.55	30.06	21	BKN	120			10.00	71	63	66	76	9	24	28.50	29.99		
24	OVC	001			3.00 BR	61	60	60	97	3	35	28.54	30.06	24	SCT	NC			10.00	69	63	65	81	9	24	28.48	29.97		
SUNRISE: 0452					AUG 04	SUNSET: 1938					SUNRISE: 0460					AUG 10	SUNSET: 1929												
03	OVC	005			7.00	63	62	62	97	5	34	28.55	30.06	03	OVC	090			7.00	67	65	66	93	7	25	28.46	29.95		
06	OVC	016			10.00	64	62	63	93	6	35	28.60	30.11	06	BKN	110			6.00 BR	65	63	64	93	8	19	28.38	29.87		
09	OVC	055			10.00	68	62	64	81	10	02	28.63	30.14	09	OVC	009			6.00 BR	67	64	65	91	9	24	28.36	29.85		
12	SCT	NC			10.00	74	60	65	62	7	05	28.64	30.14	12	FEW	NC			10.00	74	54	62	50	18	27	28.32	29.80		
15	CLR	NC			10.00	77	51	62	40	10	04	28.65	30.15	15	BKN	085			10.00	75	56	63	52	20	24	28.29	29.77		
18	CLR	NC			10.00	75	52	61	45	7	01	28.66	30.16	18	BKN	045			10.00	71	57	63	61	18	27	28.30	29.79		
21	CLR	NC			10.00	60	53	56	78	0	00	28.70	30.22	21	CLR	NC			10.00	64	57	60	78	9	26	28.33	29.83		
24	CLR	NC			10.00	59	51	55	75	6	36	28.70	30.21	24	CLR	NC			10.00	58	56	57	93	7	27	28.34	29.84		
SUNRISE: 0454					AUG 05	SUNSET: 1936					SUNRISE: 0501					AUG 11	SUNSET: 1927												
03	CLR	NC			10.00	59	50	54	72	7	03	28.70	30.21	03	CLR	NC			10.00	58	56	57	93	7	28	28.33	29.83		
06	FEW	NC			10.00	56	50	53	81	5	05	28.74	30.26	06	CLR	NC			10.00	60	58	59	93	10	26	28.35	29.85		
09	CLR	NC			10.00	67	49	57	53	15	10	28.78	30.31	09	CLR	NC			10.00	71	60	64	68	12	29	28.38	29.88		
12	CLR	NC			10.00	68	49	57	51	13	11	28.78	30.30	12	CLR	NC			10.00	79	58	66	49	14	27	28.40	29.89		
15	CLR	NC			10.00	69	50	58	51	10	12	28.78	30.30	15	CLR	NC			10.00	81	57	66	44	7	23	28.38	29.87		
18	CLR	NC			10.00	67	49	57	53	14	10	28.79	30.31	18	CLR	NC			10.00	78	62	68	58	7	19	28.33	29.82		
21	CLR	NC			10.00	58	52	55	81	12	11	28.83	30.36	21	SCT	NC			10.00	69	65	66	87	5	19	28.36	29.84		
24	CLR	NC			10.00	56	53	54	90	9	10	28.86	30.39	24	OVC	090			10.00	69	61	64	76	8	31	28.36	29.84		
SUNRISE: 0455					AUG 06	SUNSET: 1935					SUNRISE: 0502					AUG 12	SUNSET: 1926												
03	CLR	NC			10.00	55	52	53	90	9	13	28.86	30.38	03	OVC	019			3.00 +TSRA BR	63	60	61	90	10	08	28.29	29.78		
06	CLR	NC			10.00	54	50	52	87	10	13	28.88	30.41	06	BKN	100			10.00	62	61	61	96	10	15	28.27	29.76		
09	CLR	NC			10.00	61	46	53	58	14	14	28.90	30.43	09	OVC	004			10.00	65	63	64	93	0	00	28.26	29.75		
12	FEW	NC			10.00	63	48	55	58	15	11	28.84	30.37	12	BKN	033			10.00	72	64	67	76	13	26	28.28	29.76		
15	FEW	NC			10.00	65	50	57	59	17	10	28.80	30.33	15	BKN	055			8.00 -RA	71	66	68	84	13	26	28.29	29.78		
18	FEW	NC			10.00	62	52	56	70	15	09	28.78	30.32	18	FEW	NC			10.00	68	57	61	68	14	27	28.31	29.80		
21	CLR	NC			10.00	57	54	55	90	13	10	28.79	30.32	21	BKN	120			10.00	60	55	57	84	7	29	28.36	29.86		
24	FEW	NC			10.00	56	54	55	93	9	12	28.79	30.32	24	SCT	NC			10.00	57	54	55	90	8	27	28.38	29.87		

## OBSERVATIONS AT 3-HOURLY INTERVALS

DULUTH, MN

AUGUST 2002

DLH

WBAN # 14913

HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F				RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES, HG)		HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F				RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES, HG)	
	SKY COVER	CEILING 100'S OF FT	OBSERVATION TIME (LST)	EFF CLD AMT Oktas		VISIBILITY (MILES)	DRY BULB	DEW POINT	WET BULB		SPEED (MPH)	DIRECTION TENS OF DEG	STATION	SEA LEVEL		SKY COVER	CEILING 100'S OF FT	OBSERVATION TIME (LST)	EFF CLD AMT Oktas		VISIBILITY (MILES)	DRY BULB	DEW POINT	WET BULB		SPEED (MPH)	DIRECTION TENS OF DEG	STATION	SEA LEVEL
			SUNRISE: 0504		AUG 13	SUNSET: 1924											SUNRISE: 0511		AUG 19	SUNSET: 1914									
03	CLR	NC			10.00	57	54	55	90	9	31	28.36	29.85	03	CLR	NC				48	46	47	93	0	00	28.47	29.98		
06	SCT	NC			10.00	54	51	52	90	7	32	28.38	29.88	06	CLR	NC				47	46	46	97	6	33	28.49	30.01		
09	FEW	NC			10.00	65	51	57	61	10	31	28.38	29.88	09	CLR	NC				59	47	53	64	5	VR	28.52	30.05		
12	BKN	045			10.00	68	50	58	53	9	29	28.38	29.88	12	FEW	NC				65	46	55	51	9	29	28.53	30.05		
15	SCT	NC			10.00	72	50	59	46	9	25	28.33	29.82	15	CLR	NC				69	48	57	47	7	25	28.51	30.03		
18	SCT	NC			10.00	71	49	58	46	8	26	28.31	29.82	18	CLR	NC				68	48	57	49	9	24	28.50	30.01		
21	CLR	NC			10.00	61	54	57	78	3	28	28.31	29.81	21	CLR	NC				57	50	53	78	5	26	28.52	30.05		
24	CLR	NC			10.00	55	49	52	80	7	26	28.28	29.78	24	CLR	NC				58	49	53	72	9	25	28.54	30.06		
			SUNRISE: 0505		AUG 14	SUNSET: 1922											SUNRISE: 0513		AUG 20	SUNSET: 1912									
03	CLR	NC			10.00	55	51	53	87	8	23	28.23	29.72	03	CLR	NC				54	50	52	87	8	23	28.55	30.06		
06	FEW	NC			10.00	56	51	53	84	9	23	28.22	29.71	06	CLR	NC				55	51	53	87	6	23	28.56	30.08		
09	BKN	110			10.00	62	53	57	73	14	23	28.18	29.67	09	CLR	NC				65	53	58	66	17	22	28.58	30.10		
12	SCT	NC			10.00	73	54	62	51	24	20	28.10	29.59	12	CLR	NC				72	52	60	50	17	20	28.58	30.09		
15	SCT	NC			10.00	76	55	63	48	21	23	28.11	29.59	15	CLR	NC				72	50	59	46	9	19	28.53	30.05		
18	BKN	120			10.00	71	59	64	66	10	21	28.12	29.61	18	CLR	NC				66	52	58	61	7	11	28.50	30.01		
21	SCT	NC			10.00	69	60	64	73	14	21	28.13	29.61	21	BKN	050				65	52	58	63	8	16	28.50	30.01		
24	SCT	NC			10.00	66	63	64	90	18	21	28.13	29.60	24	BKN	017				61	55	58	81	8	17	28.49	29.98		
			SUNRISE: 0506		AUG 15	SUNSET: 1921											SUNRISE: 0514		AUG 21	SUNSET: 1910									
03	OVC	080			10.00	65	61	63	87	9	21	28.10	29.58	03	OVC	110			10.00	60	58	59	93	7	13	28.46	29.96		
06	OVC	031			10.00	64	61	62	90	9	22	28.11	29.59	06	OVC	001			1.50	60	59	59	96	9	13	28.44	29.94		
09	OVC	095			6.00	62	60	61	93	8	27	28.14	29.62	09	VV	001			0.25	61	60	60	97	8	12	28.43	29.94		
12	BKN	021			10.00	65	59	61	81	16	27	28.15	29.63	12	VV	001			0.25	60	60	60	100	7	12	28.45	29.96		
15	BKN	044			10.00	70	58	63	66	22	27	28.18	29.66	15	OVC	005			10.00	64	62	63	93	8	09	28.42	29.92		
18	BKN	045			10.00	63	55	58	76	9	36	28.25	29.74	18	OVC	003			2.50	60	59	59	96	6	13	28.44	29.94		
21	CLR	NC			10.00	56	54	55	93	9	27	28.29	29.80	21	OVC	003			3.00	59	58	58	96	6	09	28.48	29.99		
24	CLR	NC			10.00	55	53	54	93	9	28	28.33	29.84	24	VV	001			0.75	58	58	58	100	0	00	28.50	30.01		
			SUNRISE: 0508		AUG 16	SUNSET: 1919											SUNRISE: 0515		AUG 22	SUNSET: 1909									
03	CLR	NC			10.00	52	51	51	97	7	28	28.36	29.86	03	VV	001			0.25	58	58	58	100	3	10	28.53	30.05		
06	CLR	NC			10.00	53	52	52	96	7	28	28.41	29.92	06	VV	001			0.25	58	57	57	97	6	12	28.57	30.09		
09	FEW	NC			10.00	66	55	60	68	9	30	28.43	29.94	09	OVC	003			7.00	59	59	59	100	12	10	28.64	30.16		
12	BKN	250			10.00	71	53	61	53	10	27	28.42	29.93	12	OVC	003			8.00	60	58	59	93	12	10	28.66	30.18		
15	BKN	200			10.00	73	53	61	50	12	27	28.39	29.89	15	OVC	005			10.00	60	57	58	90	10	11	28.66	30.18		
18	BKN	110			10.00	69	58	62	68	8	21	28.39	29.89	18	OVC	007			10.00	59	56	57	90	8	09	28.64	30.16		
21	OVC	110			10.00	63	58	60	84	6	13	28.32	29.82	21	VV	001			0.50	56	56	56	100	6	10	28.62	30.15		
24	OVC	034			7.00	62	60	61	93	9	15	28.21	29.69	24	VV	001			0.25	56	56	56	100	8	11	28.60	30.12		
			SUNRISE: 0509		AUG 17	SUNSET: 1917											SUNRISE: 0517		AUG 23	SUNSET: 1907									
03	OVC	002			5.00	60	59	59	96	20	13	28.05	29.53	03	OVC	003			0.50	56	55	55	97	6	09	28.57	30.10		
06	OVC	025			5.00	60	59	59	96	6	21	28.01	29.48	06	OVC	007			7.00	54	52	53	93	6	11	28.56	30.08		
09	OVC	018			10.00	60	54	57	80	28	30	28.06	29.55	09	OVC	005			10.00	58	55	56	90	0	00	28.55	30.08		
12	BKN	045			10.00	61	47	53	60	32	29	28.16	29.65	12	OVC	009			10.00	65	60	62	84	0	00	28.53	30.05		
15	BKN	043			10.00	61	45	53	56	31	29	28.23	29.72	15	SCT	NC			10.00	69	62	65	78	8	27	28.49	30.00		
18	SCT	NC			10.00	61	45	53	56	24	29	28.27	29.77	18	CLR	NC			10.00	69	62	65	78	8	29	28.45	29.95		
21	FEW	NC			10.00	56	45	50	67	17	29	28.32	29.83	21	CLR	NC			10.00	62	60	61	93	7	28	28.47	29.98		
24	CLR	NC			10.00	52	46	49	80	14	29	28.33	29.84	24	FEW	NC			10.00	61	60	60	97	7	29	28.46	29.96		
			SUNRISE: 0510		AUG 18	SUNSET: 1916											SUNRISE: 0518		AUG 24	SUNSET: 1905									
03	FEW	NC			10.00	50	46	48	86	13	30	28.36	29.87	03	CLR	NC			10.00	64	61	62	90	9	31	28.44	29.94		
06	OVC	014			10.00	50	47	48	89	13	32	28.38	29.90	06	FEW	NC			7.00	61	59	60	93	6	33	28.46	29.96		
09	BKN	011			10.00	56	49	52	77	14	31	28.42	29.94	09	CLR	NC			10.00	71	61	65	71	7	36	28.47	29.97		
12	SCT	NC			10.00	65	47	55	52	15	28	28.42	29.93	12	SCT	NC			10.00	76	55	63	48	10	35	28.50	29.99		
15	SCT	NC			10.00	67	46	56	47	13	30	28.42	29.93	15	SCT	NC			10.00	79	53	63	41	9	33	28.50	29.98		
18	BKN	060			10.00	63	48	55	58	8	32	28.42	29.93	18	FEW	NC			10.00	75	53	62	46	5	01	28.50	29.99		
21	OVC	100			10.00	57	49	53	75	5	35	28.44	29.95	21	CLR	NC			10.00	62	56	59	81	3	30	28.52	30.02		
24	FEW	NC			10.00	53	48	50	83	6	33	28.46	29.97	24	CLR	NC			10.00	58	54								

## OBSERVATIONS AT 3-HOURLY INTERVALS

DULUTH, MN

AUGUST 2002

DLH

WBAN # 14913

HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F			RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES,HG)		
			OBSERVATION TIME (LST)	EFF CLD AMT Okta		DRY BULB	DEW POINT	WET BULB		SPEED (MPH)	DIRECTION TENS OF DEG			
	SKY COVER	CEILING 100'S OFF		VISIBILITY (MILES)										
SUNRISE: 0519 AUG 25 SUNSET: 1903														
03	CLR	NC			10.00	56	54	55	93	6	34	28.53	30.04	
06	CLR	NC			10.00	57	55	56	93	7	34	28.55	30.06	
09	CLR	NC			10.00	72	55	62	55	7	35	28.56	30.06	
12	CLR	NC			10.00	77	56	64	48	5	VR	28.54	30.04	
15	CLR	NC			10.00	79	56	65	45	7	31	28.51	30.01	
18	CLR	NC			10.00	76	58	65	54	7	29	28.50	30.00	
21	CLR	NC			10.00	66	59	62	78	5	29	28.52	30.02	
24	CLR	NC			10.00	62	57	59	84	3	33	28.53	30.03	
SUNRISE: 0520 AUG 26 SUNSET: 1901														
03	CLR	NC			10.00	61	57	59	87	6	33	28.54	30.04	
06	CLR	NC			10.00	61	57	59	87	7	35	28.57	30.07	
09	CLR	NC			10.00	73	61	65	66	12	09	28.58	30.08	
12	CLR	NC			10.00	68	56	61	66	12	09	28.61	30.12	
15	CLR	NC			10.00	71	56	62	59	20	10	28.62	30.13	
18	CLR	NC			10.00	64	54	58	70	15	09	28.63	30.14	
21	CLR	NC			10.00	59	51	55	75	13	09	28.67	30.18	
24	CLR	NC			10.00	60	51	55	72	20	10	28.70	30.22	
SUNRISE: 0522 AUG 27 SUNSET: 1860														
03	CLR	NC			10.00	55	51	53	87	14	10	28.71	30.22	
06	BKN	005			10.00	54	52	53	93	13	10	28.73	30.26	
09	OVC	005			10.00	59	54	56	83	14	09	28.76	30.29	
12	BKN	065			10.00	62	54	57	75	15	09	28.76	30.29	
15	CLR	NC			10.00	63	56	59	78	14	11	28.76	30.29	
18	FEW	NC			10.00	57	53	55	87	13	11	28.75	30.29	
21	FEW	NC			10.00	53	51	52	93	8	10	28.75	30.29	
24	OVC	004			10.00	51	50	51	96	8	11	28.74	30.28	
SUNRISE: 0523 AUG 28 SUNSET: 1858														
03	OVC	002		1.50	BR	52	51	52	97	8	14	28.76	30.29	
06	VV	001		0.25	FG	52	52	52	100	5	12	28.75	30.29	
09	VV	001		0.25	FG	57	57	57	100	3	15	28.74	30.28	
12	OVC	011		5.00	BR	67	63	64	87	7	20	28.72	30.24	
15	CLR	NC		8.00		73	64	67	74	8	18	28.69	30.21	
18	FEW	NC		9.00		67	62	64	84	6	14	28.65	30.16	
21	SCT	NC		5.00	BR	61	59	60	93	3	07	28.67	30.19	
24	OVC	001		0.25	FG	59	59	59	100	7	13	28.63	30.14	
SUNRISE: 0524 AUG 29 SUNSET: 1856														
03	VV	001		0.50	FG	61	61	61	100	6	20	28.64	30.14	
06	OVC	001		0.50	FG	60	60	60	100	3	12	28.65	30.16	
09	SCT	NC		10.00		66	62	64	87	5	27	28.67	30.18	
12	BKN	085		10.00		72	62	66	71	9	23	28.66	30.17	
15	BKN	065		10.00		70	62	65	76	10	25	28.65	30.16	
18	FEW	NC		10.00		70	63	66	79	5	17	28.64	30.15	
21	SCT	NC		10.00		62	59	60	90	3	13	28.67	30.18	
24	VV	001		0.25	FG	60	60	60	100	7	13	28.69	30.20	
SUNRISE: 0526 AUG 30 SUNSET: 1854														
03	VV	001		0.25	FG	59	59	59	100	5	13	28.71	30.22	
06	VV	001		<.25	FG	59	59	59	100	6	13	28.73	30.25	
09	OVC	001		0.50	FG	61	61	61	100	7	14	28.73	30.25	
12	FEW	NC		10.00		73	62	66	69	10	19	28.73	30.24	
15	CLR	NC		10.00		71	63	66	76	8	14	28.73	30.24	
18	CLR	NC		6.00	BR	64	61	62	90	10	13	28.72	30.24	
21	VV	001		0.25	FG	59	58	58	96	9	13	28.73	30.25	
24	VV	001		0.25	FG	57	57	57	100	6	12	28.73	30.24	

HOUR (LST)			SATELLITE		WEATHER	TEMPERATURE °F			RELATIVE HUMIDITY (PCT)	WIND		PRESSURE (INCHES,HG)		
			OBSERVATION TIME (LST)	EFF CLD AMT Okta		DRY BULB	DEW POINT	WET BULB		SPEED (MPH)	DIRECTION TENS OF DEG			
	SKY COVER	CEILING 100'S OFF		VISIBILITY (MILES)										
SUNRISE: 0527 AUG 31 SUNSET: 1852														
03	CLR	NC			6.00	BR	60	58	59	93	10	17	28.70	30.21
06	SCT	NC			0.75	BCFG	56	56	56	100	6	13	28.71	30.23
09	CLR	NC			5.00	HZ	67	62	64	84	10	18	28.69	30.21
12	CLR	NC			10.00		75	63	67	66	15	20	28.66	30.17
15	CLR	NC			9.00		77	63	68	62	13	18	28.61	30.11
18	CLR	NC			8.00		73	63	67	71	10	19	28.59	30.10
21	CLR	NC			9.00		70	63	66	79	13	19	28.58	30.08
24	CLR	NC			10.00		68	61	64	78	15	21	28.55	30.04

**3-HOURLY OBSERVATION NOTES**

Sky Cover is the amount of the sky obscured. CLR or SKC = 0, FEW = 1/8-2/8, SCT = 3/8-4/8, BKN = 5/8-7/8, OVC = 8/8, VV = Vertical Visibilty = 8/8.

Ceiling is reported in hundreds of feet above ground level for clouds at or below 12,000 feet.

NC= No ceiling detected.

& = Original observation contained additional weather elements.

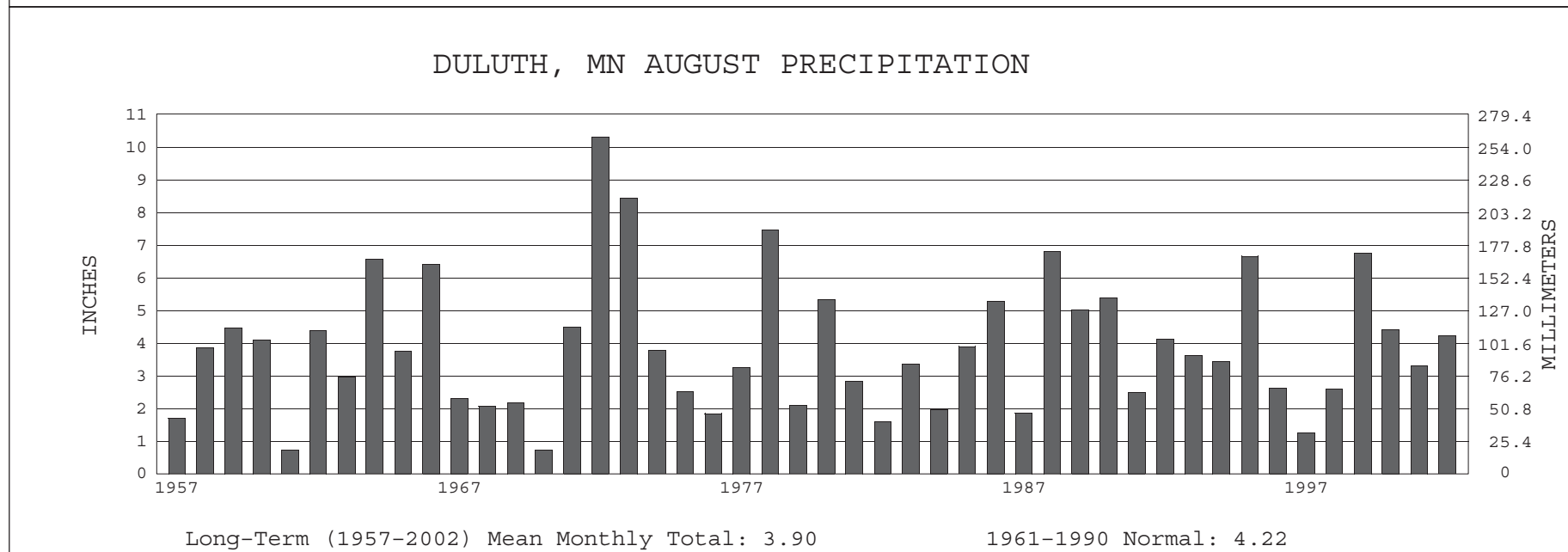
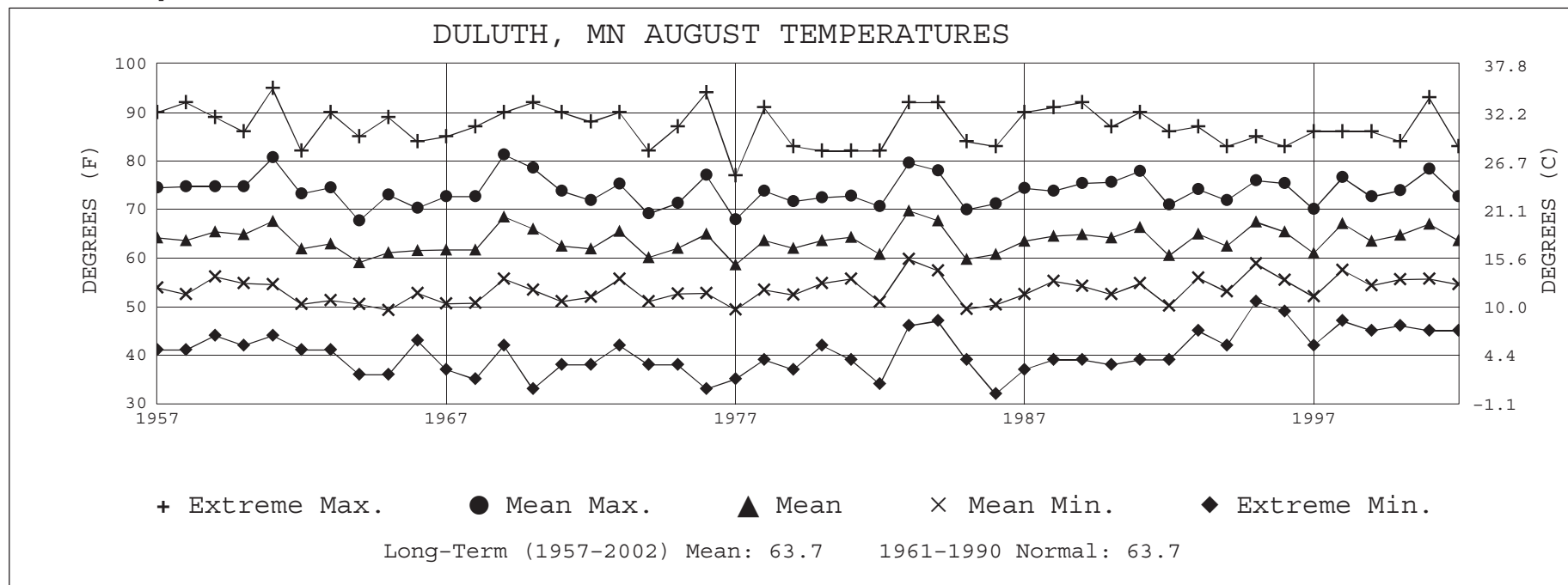
See page 3 for additional notes.

SUMMARY BY HOUR												
HOUR (LST)	AVERAGES								RESULTANT WIND (MPH)			
	CEILOMETER	EFF CLD AMT	DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY	PRESSURE (INCHES,HG)				WIND SPEED (MPH)	
							STATION	SEA LEVEL	VISIBILITY (MILES)			
01			58	55	57	90	28.52	30.02	8.19	7	0	0
02			58	56	57	91	28.52	30.02	7.80	8	1	22
03			58	56	57	92	28.51	30.02	7.77	8	1	18
04			58	56	56	93	28.51	30.02	7.36	8	1	20
05			57	55	56	93	28.51	30.02	7.62	7	1	16
06			58	55	56	92	28.52	30.03	7.69	8	1	19
07			60	56	58	89	28.53	30.04	7.69	9	1	24
08			62	57	59	83	28.53	30.04	7.65	9	2	24
09			64	57	60	78	28.53	30.04	8.55	10	2	25
10			66	57	61	75	28.54	30.05	8.95	11	3	24
11			67	56	61	69	28.53	30.04	9.17	11	5	24
12			69	56	61	66	28.53	30.03	9.46	13	5	24
13			70	56	62	62	28.53	30.03	9.53	13	4	25
14			71	56	62	60	28.52	30.03	9.66	13	4	23
15			71	56	62	60	28.52	30.02	9.84	13	4	24
16			71	56	62	61	28.51	30.02	9.63	12	3	23
17			69	56	61	63	28.51	30.02	9.60	11	3	23
18			68	56	61	68	28.51	30.02	9.53	10	2	22
19			65	56	60	74	28.51	30.02	9.19	8	2	18
20			63	56	59	80	28.52	30.03	9.06	8	2	17
21			61	56	58	83	28.53	30.04	8.96	8	2	19
22			60	56	58	85	28.53	30.04	8.73	8	2	20
23			60	56	58	86	28.53	30.04	8.59	9	2	21
24			59	55	57	88	28.53	30.04	8.12	8	2	21

## SUMMARY BY HOUR

HOUR (LST)	AVERAGES									RESULTANT WIND (MPH)		
	CEILOMETER	EFF CLD AMT	DRY BULB	DEW POINT	WET BULB	RELATIVE HUMIDITY	PRESSURE (INCHES, HG)		VISIBILITY (MILES)	WIND SPEED (MPH)	SPEED	DIRECTION
							STATION	SEA LEVEL				
01			58	55	57	90	28.52	30.02	8.19	7	0	0
02			58	56	57	91	28.52	30.02	7.80	8	1	22
03			58	56	57	92	28.51	30.02	7.77	8	1	18
04			58	56	56	93	28.51	30.02	7.36	8	1	20
05			57	55	56	93	28.51	30.02	7.62	7	1	16
06			58	55	56	92	28.52	30.03	7.69	8	1	19
07			60	56	58	89	28.53	30.04	7.69	9	1	24
08			62	57	59	83	28.53	30.04	7.65	9	2	24
09			64	57	60	78	28.53	30.04	8.55	10	2	25
10			66	57	61	75	28.54	30.05	8.95	11	3	24
11			67	56	61	69	28.53	30.04	9.17	11	5	24
12			69	56	61	66	28.53	30.03	9.46	13	5	24
13			70	56	62	62	28.53	30.03	9.53	13	4	25
14			71	56	62	60	28.52	30.03	9.66	13	4	23
15			71	56	62	60	28.52	30.02	9.84	13	4	24
16			71	56	62	61	28.51	30.02	9.63	12	3	23
17			69	56	61	63	28.51	30.02	9.60	11	3	23
18			68	56	61	68	28.51	30.02	9.53	10	2	22
19			65	56	60	74	28.51	30.02	9.19	8	2	18
20			63	56	59	80	28.52	30.03	9.06	8	2	17
21			61	56	58	83	28.53	30.04	8.96	8	2	19
22			60	56	58	85	28.53	30.04	8.73	8	2	20
23			60	56	58	86	28.53	30.04	8.59	9	2	21
24			59	55	57	88	28.53	30.04	8.12	8	2	21







AUGUST 2002

DULUTH, MN

# LOCAL CLIMATOLOGICAL DATA

NOAA, National Climatic Data Center

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