QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA

Effective January, 2005, flags will be available for most data elements:
If data are suspect:
s will appended to the value on the web form
s will be placed in a column following the suspect value in the ASCII form
If data are flagged as erroneous, it will not be printed.

**NOTICE OF CHANGE:
Effective July 28, 2000, observations contained in the Quality Controlled Local Climatological Data Hourly Observations table are reported in whole degrees Fahrenheit. The dry bulb, dew point and wet bulb temperatures were originally reported to the nearest tenth of a degree Fahrenheit. The Automated Surface Observing System (ASOS) records temperatures and dew points in whole degrees Fahrenheit and converts these values to the nearest tenth of a degree Celsius for observation transmission. Until this date, these values online have incorrectly been converted back to the nearest tenth of a degree Fahrenheit, implying a level of precision that is not present at the instrument level. We apologize for any inconvenience this may cause.

The Automated Weather Observing System (AWOS) generally records temperatures and dew points in whole degrees Fahrenheit and converts these values to the nearest whole degree Celsius for observation transmission. Also, AWOS stations will often have less data (i.e., fewer weather elements) than ASOS stations.

NCDC forms contain:
whole degree Celsius temperature values for AWOS stations
tenths degrees Celsius temperature values for ASOS stations

FORMAT FOR DAILY TABLE

COLUMN	TERMINOLOGY
1	DATE
Temp	Degrees Fahrenheit
2	MAXIMUM
3	MINIMUM
4	AVERAGE
5	DEPARTURE FROM NORMAL
6	AVERAGE DEW POINT
7	AVERAGE WET BULB
Degree Days: Base 65 F	
8	HEATING (SEASON BEGINS WITH JULY)
9	COOLING (SEASON BEGINS WITH JANUARY)
10	SUNRISE (Calculated, not observed)
11	SUNSET (Calculated, not observed)
Significant Weather Types	Weather Phenomena
12	+FC TORNADO/WATERSPOUT FC FUNNEL CLOUD TS THUNDERSTORM GR HAIL RA RAIN

	DZ DRIZZLE SN SNOW SG SNOW GRAINS GS SMALL HAIL &/OR SNOW PELLETS PL ICE PELLETS IC ICE CRYSTALS FG+ HEAVY FOG (FG & LE.25 MILES VISIBILITY) FG FOG BR MIST UP UNKNOWN PRECIPITATION HZ HAZE FU SMOKE VA VOLCANIC ASH DU WIDESPREAD DUST DS DUSTSTORM PO SAND/DUST WHIRLS SA SAND SS SANDSTORM PY SPRAY SQ SQUALL DR LOW DRIFTING SH SHOWER FZ FREEZING MI SHALLOW PR PARTIAL BC PATCHES BL BLOWING VC VICINITY - LIGHT + HEAVY "NO SIGN" MODERATE
Snow/Ice	INCHES
13	SNOW/ICE (ON GROUND)(1200 UTC) T = TRACE M = MISSING DATA
14	WATER EQUIVALENT (1800 UTC) M = MISSING DATA
Precipitation:	INCHES (24-HR PERIOD ENDING AT INDICATED LOCAL STANDARD TIME)
15	SNOWFALL (INCHES AND TENTHS)(2400 LST)* T = TRACE M = MISSING DATA
16	WATER EQUIVALENT(INCHES & HUNDREDTHS(2400 LST) RAINFALL & MELTED SNOW M = MISSING DATA T = TRACE
Pressure	INCHES OF HG
17	AVERAGE STATION PRESSURE
18	AVERAGE SEA LEVEL PRESSURE
Wind	SPEED IN MILES PER HOUR DIRECTION TO TENS OF DEGREES
19	RESULTANT WIND SPEED
20	RESULTANT DIRECTION - (WHOLE DEGREES)
21	AVERAGE SPEED
22	MAXIMUM 5 SECOND SPEED
23	MAXIMUM 5 SECOND DIRECTION
24	MAXIMUM 2 MINUTE SPEED
25	MAXIMUM 2 MINUTE DIRECTION

26	DATE
	NOTE: RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS
ELEMENTS:	
27	AVERAGE MONTHLY MAXIMUM TEMPERATURE (DEGREES F)
28	MONTHLY MAXIMUM TEMPERATURE DEPARTURE FROM NORMAL (DEGREES F)
29	AVERAGE MONTHLY MINIMUM TEMPERATURE (DEGREES F)
30	MONTHLY MINIMUM TEMPERATURE DEPARTURE FROM NORMAL (DEGREES F)
31	MONTHLY AVERAGE TEMPERATURE (DEGREES F)
32	MONTHLY AVERAGE TEMPERATURE DEPARTURE FROM NORMAL (DEGREES F)
33	MONTHLY AVERAGE DEW POINT (DEGREES F)
34	MONTHLY AVERAGE WET BULB (DEGREES F)
35	MONTHLY AVERAGE HDD
36	MONTHLY AVERAGE CDD
37	MONTHLY TOTAL HDD
38	MONTHLY HDD DEPARTURE FROM NORMAL
39	SEASON TO DATE TOTAL HDD
40	SEASON TO DATE DEPARTURE FROM NORMAL HDD
41	MONTHLY TOTAL CDD
42	MONTHLY CDD DEPARTURE FROM NORMAL
43	SEASON TO DATE TOTAL CDD
44	SEASON TO DATE DEPARTURE FROM NORMAL CDD
45	TOTAL MONTHLY SNOW/ICE WATER EQUIVALENT (INCHES)
46	TOTAL MONTHLY SNOWFALL (INCHES)*
47	GREATEST MONTHLY 24HR SNOWFALL (INCHES)
48	DATE OF GREATEST MONTHLY 24HR SNOWFALL
49	GREATEST MONTHLY 24HR SNOW DEPTH (INCHES)
50	DATE OF GREATEST MONTHLY 24HR SNOW DEPTH
51	TOTAL MONTHLY PRECIPITATION (INCHES)
52	MONTHLY PRECIPITATION DEPARTURE FROM NORMAL (INCHES)
53	GREATEST 24HR PRECIPITATION (INCHES)
54	DATE OF GREATEST 24HR PRECIPITATION
55	MONTHLY AVERAGE STATION PRESSURE (INCHES HG)
56	MONTHLY AVERAGE SEA LEVEL PRESSURE (INCHES HG)
57	MONTHLY RESULTANT WIND SPEED (MPH)
58	MONTHLY RESULTANT WIND DIRECTION (TENS OF DEGREES)
59	MONTHLY AVERAGE WIND SPEED (MPH)
60	MONTHLY MAXIMUM SEA LEVEL PRESSURE (INCHES OF HG)
61	DATE OF MONTHLY MAXIMUM SEA LEVEL PRESSURE
62	TIME OF MONTHLY MAXIMUM SEA LEVEL PRESSURE
63	MONTHLY MINIMUM SEA LEVEL PRESSURE (INCHES OF HG)
64	DATE OF MONTHLY MINIMUM SEA LEVEL PRESSURE
65	TIME OF MONTHLY MINIMUM SEA LEVEL PRESSURE
66	NUMBER OF DAYS WITH MAXIMUM TEMPERATURE >= 90 F
67	NUMBER OF DAYS WITH MAXIMUM TEMPERATURE <= 32 F
68	NUMBER OF DAYS WITH THUNDERSTORMS
69	NUMBER OF DAYS WITH MINIMUM TEMPERATURE <= 32 F
70	NUMBER OF DAYS WITH MINIMUM TEMPERATURE <= 0 F
71	NUMBER OF DAYS WITH HEAVY FOG
72	NUMBER OF DAYS WITH PRECIPITATION >= .01 INCH
73	NUMBER OF DAYS WITH PRECIPITATION >= .10 INCH
74	NUMBER OF DAYS WITH SNOWFALL >= 1.0 INCH

* Not all stations report snow totals

M = Missing Data, or data that are not normally reported for the station.

- = values not available for sunrise/sunset.

Table of Remarks and Supplemental Coded Data

The following groups are reported in the **Remarks** section of the SWO reports. Remarks include clarifying or augmenting data concerning elements in the body of the SWO reports, additive coded data, and maintenance data. If an element or phenomena does not occur, is missing, or cannot be observed, the corresponding group and space are omitted (body and/or remarks) from that particular report, except for Sea-level Pressure (SLPppp). SLPNO shall be reported in a METAR when the SLP is not available. The left most column are examples.		
TORNADO, FUNNEL CLOUD or WATERSPOUT	TORNADIC ACTIVITY	Augmented; report should include TORNADO, FUNNEL CLOUD or WATERSPOUT, time (after the hour) of beginning/end, location, movement; e.g.,TORNADO B25 N MOVE E
AO2	TYPE OF AUTOMATED STATION	AO1; automated station without a precipitation descriminator. AO2; automated station with precipitation descriminator.
PK WND 20032/25	PEAK WIND	PK WND dddff(F)/(hh)mm; direction in tens of degrees, speed in whole knots, time (reported in UTC) in minutes after the hour. Only minutes after the hour is included if the hour can be inferred from the report.
WSHFT 1715	WIND SHIFT,/FONT>	WSHFT followed by hours and minutes of occurrence. The term FROPA may be entered after the time if it is reasonably certain that the wind shift was a result of a frontal passage.
TWR VIS 2	TOWER OR SURFACE VISIBILITY	TWR VIS vvvvv: visibility reported by tower personnel,e.g., TWR VIS 2; SFC VIS vvvvv: visibility reported by ASOS or observer.
VIS 3/4V1 1/2	VARIABLE PREVAILING VISIBILITY	VIS $v_nv_nv_nv_nv_n$**V**$v_xv_xv_x$ v_xv_x; reported if prevailing visibility is <3 statute miles and variable.
VIS 3/4 RWY11	VISIBILITY AT SECOND LOCATION	VIS vvvvv(LOC); reported if different than the reported prevailing visibility in the body of the report.
FRQ LTG NE	LIGHTNING	(FREQUENCY) LTG (LOCATION); when detected the frequency and location is reported, e.g., FRQ LTG NE, meaning frequent lightning to northeast of station. (See code details in table below)
RAB07	BEGINNING AND ENDING TIME OF PRECIPITATION AND THUNDERSTORMS	w'w'B(hh)mmE(hh)mm; TSB(hh)mmE(hh)mm, where w'w' is the present weather precipitation contraction, B indicates began, E indicates ended; (hh)indicates the hour (reported in UTC) the phenomena began or ended and can be omitted if the hour can be inferred from the report, mm indicates the minutes after the hour the phenomenon began or ended.
	VIRGA	Augmented to report by human observer; indicates precipitation not reaching the ground is observed.
CIG 013V017	VARIABLE CEILING	CIG $h_nh_nh_nVh_xh_xh_x$; reported if the ceiling in the body of the report is <3000 feet and variable.
CIG 017	CEILING HEIGHT	CIG hhh[LOC]; Ceiling height reported if secondary

RWY11	AT SECOND LOCATION	ceilometer site ceiling value is different than the ceiling height in the body of the report.
PRESFR	PRESSURE RISING OR FALLING RAPIDLY	PRESRR or PRESFR; pressure rising or falling rapidly at time of observation.
SLP125	SEA LEVEL PRESSURE	SLPppp; sea level pressure reported for ppp in tens, units, and tenths of hPa.
P0003	HOURLY PRECIPITATION AMOUNT	Prrrr; in tens, units, tenths and hundredths of an inch since last regular hourly METAR. A trace is reported as P0000.
60009	3- AND 6-HOUR PRECIPITATION AMOUNT	6RRRR; precipitation amount, including water equivalent, to nearest 0.01 inches for past 6 hours reported in 00, 06, 12, and 18 UTC observations and for past 3 hours in 03, 09, 15, and 21 UTC observations. A trace is 60000.
70015	24-HOUR PRECIPITATION AMOUNT	$7R_{24}R_{24}R_{24}R_{24}$; precipitation amount to nearest 0.01 inches for past 24 hours reported in 12 UTC observation; e.g., 70015 indicates 0.15 inches of precipitation for past 24 hours.
T00640036	HOURLY TEMPERATURE AND DEW POINT	$Ts_nT_aT_aT_as_nT'_aT'_aT'_a$; reported to nearest tenth of ^oC; s_n: 1 if temperature or dew point below 0^oC and 0 if temperature/dew point 0^oC or higher.
10066	6-HOUR MAXIMUM TEMPERATURE	$1s_nT_xT_xT_x$; maximum temperature for past 6 hours reported to nearest tenth of degree Celsius; reported on 00, 06, 12, 18 UTC reports; s_n = 1 if temperature below 0^oC and 0 if temperature 0^oC or higher.
21012	6-HOUR MINIMUM TEMPERATURE	$2s_nT_nT_nT_n$; minimum temperature for past 6 hours reported to nearest tenth of degree Celsius; reported on 00, 06, 12, 18 UTC reports; s_n = 1 if temperature below 0^oC and 0 if temperature 0^oC or higher.
400461006	24-HOUR MAXIMUM AND MINIMUM TEMPERATURE	$4s_nT_xT_xT_xs_nT_nT_nT_n$; maximum temperature for past 6 hours reported to nearest tenth of degree Celsius; reported on midnight local standard time reports; s_n = 1 if temperature below 0^oC and 0 if temperature 0^oC or higher; e.g., 400461006 indicates a 24-hour maximum temperature of 4.6^oC and a 24-hour minimum temperature of -0.6^oC.
58033	PRESSURE TENDENCY	5appp; the character (a) and amount of change in pressure (ppp) in tenths of hPa for the past 3 hours. (See code details in table below)
TSNO	SENSOR STATUS INDICATORS	RVRNO: RVR missing; PWINO: precipitation identifier information not available; PNO: precipitation amount not available; FZRANO: freezing rain information not available; TSNO: thunderstorm information not available (may indicate augmenting weather observer not logged on); VISNO [LOC} visibility at second location not available, e.g. VISNO RWY06; CHINO [LOC}: (cloud-height- indicator) sky condition at secondary location not available, e.g., CHINO RWY06.
$	MAINTENANCE	Maintenance is needed on the system.

	CHECK INDICATOR	

Table of Remarks Referring to Type and Frequency of Lightning

Type of Lightning		
Type	**Contraction**	**Definition**
Cloud-ground	CG	Lightning occurring between cloud and ground.
In-cloud	IC	Lightning which takes place within the cloud.
Cloud-cloud	CC	Streaks of lightning reaching from one cloud to another.
Cloud-air	CA	Streaks of lightning which pass from a cloud to the air, but do not strike the ground.
Frequency of Lightning		
Frequency	**Contraction**	**Definition**
Occasional	OCNL	Less than 1 flash per minute.
Frequent	FRQ	About 1 to 6 flashes per minute.
Continuous	CONS	More than 6 flashes per minute.

HOURLY OBSERVATIONS DOCUMENTATION

WATER EQUIVALENT IN INCHES
T = TRACE PRECIPITATION AMOUNT
M = MISSING DATA

** 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.

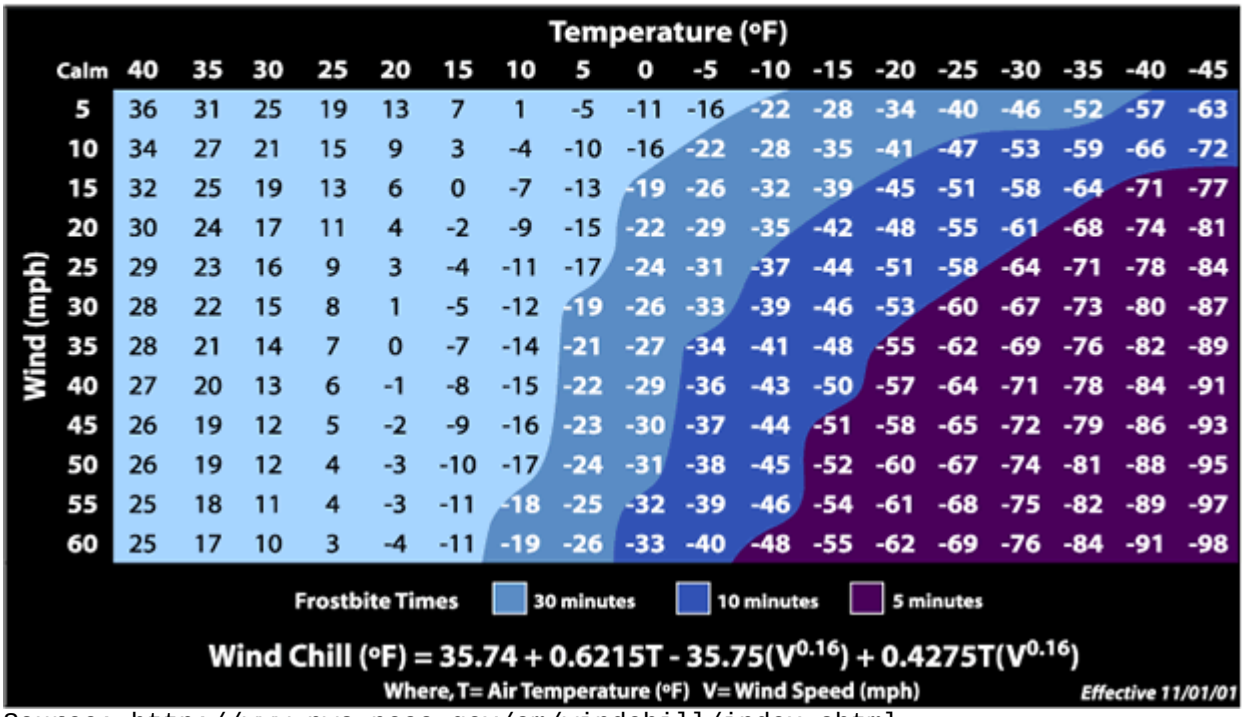
HOURLY PRECIPITATION DATA ARE NOT NORMALLY AVAILABLE FOR AWOS SITES.

** NCDC DERIVES THE MONTHLY SHORT DURATION PRECIPITATION FROM 1 MINUTE ASOS DATA. THE MONTHLY SHORT DURATION PRECIPITATION DATA ARE NOT PRINTED WHEN INCONSISTENT WITH ASOS HOURLY TOTALS.

NUMERICAL CODES LISTING FOR HOURLY OBSERVATIONS

COLUMN	TERMINOLOGY
1	DATE
2	TIME: TIME IN LST (LOCAL STANDARD TIME)
3	STATION TYPE 0 AMOS now AWOS, also USAF stations 4 MAPSO 5 Navy METAR 6 Navy Airways(obsolete) 8 SOD- Keyed from 10C 9 SOD/HPD- Keyed B16, F-6, Navy Forms 11 ASOS (NWS) 12 ASOS (FAA) 15 Climate Reference Network (CRN)
4	Sky Conditions SKY CONDITIONS BELOW 12,000 FEET AGL (ABOVE GROUND LEVEL) SKY CONDITIONS CONTRACTIONS ARE FOR EACH LAYER IN ASCENDING ORDER. NUMBERS FOLLOWING CONTRACTIONS ARE BASE HEIGHT IN HUNDREDS OF FEET ABOVE GROUND LEVEL (AGL). CLR: CLEAR BELOW 12,000 FT FEW: > 0/8 - 2/8 SKY COVER SCT SCATTERED: 3/8 - 4/8 SKY COVER BKN BROKEN: 5/8 - 7/8 SKY COVER OVC OVERCAST: 8/8 SKY COVER VVXXX INDICATES INDEFINITE CEILING WITH THE VERTICAL VISIBILITY (XXX) LISTED IN HUNDREDS OF FEET. WHEN CLOUDS ARE COMPOSED OF TOWERING CUMULUS OR CUMULONIMBUS, TCU OR CB (RESPECTIVELY) FOLLOW CLOUD HEIGHT.

	SOME STATIONS REPORT CLOUDS ABOVE 12,000 FEET.
5	VISIBILITY IN STATUTE MILES (SM)
6	(SEE DAILY TABLE #12 FOR EXPLANATION OF WEATHER TYPES)
7	DRY BULB TEMPERATURE (DEGREES F) WHOLE DEGREES
8	DRY BULB TEMPERATURE (DEGREES C) ASOS IN TENTHS; AWOS IN WHOLE DEGREES
9	WET BULB TEMPERATURE (DEGREES F) WHOLE DEGREES
10	WET BULB TEMPERATURE (DEGREES C) ASOS IN TENTHS; AWOS IN WHOLE DEGREES
11	DEW POINT TEMPERATURE (DEGREES F) WHOLE DEGREES
12	WET BULB TEMPERATURE (DEGREES C) ASOS IN TENTHS; AWOS IN WHOLE DEGREES
13	RELATIVE HUMIDITY (PERCENT)
14	WIND SPEED (MPH)
15	WIND DIRECTION (TENS OF DEGREES FROM TRUE NORTH) VRB = VARIABLE WITH SPEED EQUAL TO OR LESS THAN 6 KNOTS
16	WIND CHARACTERISTIC GUSTS (MPH)
17	STATION PRESSURE (INCHES IN HUNDREDTHS)
18	PRESSURE TENDENCY
19	NET 3 HOUR CHANGE (MILLIBARS)
20	SEA LEVEL PRESSURE (INCHES IN HUNDREDTHS)
21	REPORT TYPE: AA - METAR (AVIATION ROUTINE WEATHER REPORT) – HOURLY SP - METAR SPECIAL REPORT
22	PRECIPITATION TOTALS (INCHES AND HUNDREDTHS) HOURLY TOTALS IF COLUMN 20 IS "AA" (HOURLY METAR REPORT).
23	ALTIMETER (INCHES IN HUNDREDTHS)



Source: http://www.nws.noaa.gov/om/windchill/index.shtml

Surface Weather Observations - METAR always have wind speeds originally reported in knots. The conversion table below will provide a quick conversion for winds from calm to 99 knots. The converted values are all rounded to the nearest integer. For a more accurate conversion use the following formula:
KNOT = 1.15155 MILES PER HOUR

Knots to Miles Per Hour Conversion Chart									
K	0	1	2	3	4	5	6	7	8	9
T	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH
S										
0	0	1	2	3	5	6	7	8	9	10
10	12	13	14	15	16	17	18	20	21	22
20	23	24	25	26	28	29	30	31	32	33
30	35	36	37	38	39	40	41	43	44	45
40	46	47	48	49	51	52	53	54	55	56
50	58	59	60	61	62	63	64	66	67	68
60	69	70	71	72	74	75	76	77	78	79
70	81	82	83	84	85	86	87	89	90	91
80	92	93	94	96	97	98	99	100	101	102
90	104	105	106	107	108	109	110	112	113	114

TEMPERATURE - HUMIDITY INDEX (STEADMAN, 1979)											
	RELATIVE HUMIDITY (PERCENT)										
	0	10	20	30	40	50	60	70	80	90	100
T > 120	107	116	130	148							
E > 115	103	111	120	135	151						
M > 110	99	105	112	123	137	150					
P > 105	95	100	105	113	123	135	149				
E > 100	91	95	99	104	110	120	132	144			
R > 95	87	90	93	96	101	107	114	124	136		
A > 90	83	85	87	90	93	96	100	106	113	122	
T > 85	78	80	82	84	86	88	90	93	97	102	108
U > 80	73	75	77	78	79	81	82	85	86	88	91
R > 75	69	70	72	73	74	75	76	77	78	79	80
E > 70	64	65	66	67	68	69	70	70	71	71	72

Pressure Tendency description:

0: Increasing, then decreasing; atmospheric pressure the same or higher than 3 hours ago
1: Increasing then steady; or increasing, then increasing more slowly; atmospheric pressure now higher than 3 hours ago
2: Increasing (steadily or unsteadily); atmospheric pressure now higher than 3 hours ago
3: Decreasing or steady, then increasing; or increasing, then increasing more rapidly; atmospheric pressure now higher than 3 hours ago
4: Steady; atmospheric pressure the same as 3 hours ago
5: Decreasing, then increasing; atmospheric pressure the same or lower than 3 hours ago
6: Decreasing, then steady; or decreasing, then decreasing more slowly; atmospheric pressure

now lower than 3 hours ago
7: Decreasing (steadily or unsteadily); atmospheric pressure now lower than 3 hours ago
8: Steady or increasing, then decreasing; or decreasing, then decreasing more rapidly; atmospheric pressure now lower than 3 hours ago
9: Missing