NATIONAL WEATHER SERVICE INSTRUCTION 10-1004
May 27, 2013

Operations and Services
Climate Services, NWSPD 10-10

CLIMATE RECORDS

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/

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SUMMARY OF REVISIONS: This instruction supersedes National Weather Service Instruction 10-1004, dated February 17, 2011 and contains these changes:

1. Update all references of 1971-2000 normals to 1981-2010 normals.
2. Complete update of section 3.4 for new method of normal creation by NCDC.
3. Updated Section 7 graphics and base mean period for 1981-2010 normal.
4. Updated station list in Appendic C.

(signed) 5/13/2013

Christopher Strager Date
Acting Director, Office of Climate,
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1. Introduction. This instruction describes surface station climatological data from observing stations and the principles to promote the integrity of the climatological data record. The instruction also discusses station long term normals, means, and extremes; national and state extremes; and station climatological reports.

The National Climatic Data Center (NCDC) http://www.ncdc.noaa.gov determines station long term normals, means, and extremes from observing station sites. The Climate Prediction Center (CPC) http://www.cpc.ncep.noaa.gov provides forecast means and outlook classes as referenced in their climate outlooks.

Preliminary Data are data that have not been subject to all levels of NCDC quality control (QC). ***Final Data*** are data that have been through all applicable NCDC QC procedures and have been added to the NCDC archive.

2. Surface Station Observation Data. Observational climate data may include the values, totals, or averages of the following (Table 1) for seconds, minute(s), hour, day, month, season, year, and/or other time period, as appropriate.

High temperature (°F)	Low temperature (°F)	Average temperature (°F)
Heating Degree days (°F)	Cooling Degree Days (°F)	Precipitation (0.01 inches or T)
Snowfall (0.1 inches or T)	Snow depth (inches or T)	Relative Humidity (%)
Average 2-min wind speed (mph)	High 2-min wind speed (mph)	Mean wind direction (degrees)
Highest 3-sec wind gust (mph)	Direction of highest gust (degrees)	Average detected cloud cover (oktas or tenths)
Visibility (statute miles)	Sunshine (minutes)	Sunshine (% of possible)

Table 1. Surface Station Observations. (T=trace, mph=miles per hour)

The National Weather Service (NWS) manages its weather/climate monitoring systems through compliance with the "Ten Principles of Climate Monitoring" (see Appendix A). To protect and enhance the integrity of climate records, Weather Forecast Offices (WFO) and Weather Service Offices (WSO) should apply these principles within their capability for surface observing stations in their area of responsibility. Further reference to WFO will mean WFO and WSO. NWS Instruction 10-1305 (Observational Quality Control – General) (http://www.weather.gov/directives/sym/pd01013005curr.pdf) provides additional information and procedures for WFOs to protect and enhance the integrity of climate records.

3. Surface Station Long Term Normals, Means, and Extremes. NCDC provides these statistics for temperature, precipitation, snowfall, and heating and cooling degree days for use with NWS Automated Surface Observing System (ASOS) data sites and published NWS Cooperative Observing Program (COOP) stations.

3.1 Definitions. The definitions used for these statistics are consistent with World Meteorological Organization (WMO) http://www.wmo.int terminology.

Period of Record (or Record Period): The full length of a station's records from beginning of observations to the most recent observation (the present if the station is active).

Record Mean: The mean for the station's period of record, without regard to changes in a station's location.

Adjusted Record Mean: The mean for the station's period of record, after adjusting the data for inhomogeneity introduced by changes in station location.

Period Mean: A period mean is a mean computed for any period of at least 10 years starting on January 1 of a year ending with the digit 1. One such period is 01/01/1991 through 12/31/2000.

Normal: A normal is a period mean computed by NCDC for an NWS observing station from a period comprising three consecutive 10-year decadal periods (for example, 1981-2010). For cases of sensor instrumentation change and/or relocation, NCDC will make appropriate adjustments to the observational record for the observing station. See Section 3.4.3 for details.

Extreme: An extreme is the maximum, minimum or longevity value of an element for a specific calendar day or month, all time, or other specific reference time frame for a station's period of record.

Local Climatological Data (LCD) site. An LCD site is a location for which NCDC publishes a summary of final data that includes a daily account of temperature extremes, degree days, precipitation and winds (as available). LCDs also include the hourly precipitation and abbreviated 3-hourly weather observations. Almost all LCD sites are located at major airports.

Climatological Data (CD) site. A CD site is a location for which NCDC publishes a summary of final data that includes a daily account of all observed parameters at that location which may include, but are not limited to, temperature extremes and precipitation. CD sites may be located at airports, both small and large but also include other locations within the Cooperative Observing Program. All LCD sites are also considered CD sites by default.

3.2 Final Source of Normals. NCDC no longer issues standard publications for normal. All normal can be retrieved via internet at http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html and http://gis.ncdc.noaa.gov/map/viewer/#cfg=cdo&theme=normals&layers=01&node=gis

3.3 Effective Date of Normals. Normals become effective as soon as NCDC provides public access to the normal from the NCDC web page. Every attempt will be made to upload the new normal dataset to the individual field office AWIPS on or about the same date..

3.4 Calculation of Normals.

The underlying values used to compute the 1981–2010 normals come from the Global Historical Climatology Network–Daily (GHCN-Daily) dataset (Menne
et al. 2012). As its name suggests, this dataset contains daily observations for many atmospheric variables worldwide and is the most comprehensive set of daily climate data for the United States.

The data values have undergone extensive quality assurance (QA) as described by Durre et al. (2010). A majority of the stations included in the 1981–2010 climate normals record their daily observations at or near 7 a.m. local time, with smaller percentages of stations observing in the late afternoon or around midnight. Each station is assigned the same identifier used in the GHCN-Daily dataset; corresponding metadata, such as latitude, longitude, station name, and so on, are taken directly from the GHCN-Daily station inventory. Note that the GHCN-Daily station IDs (e.g., USW00023174 for Los Angeles International Airport) are based on the National Weather Service's (NWS's) Cooperative Observer Program (COOP) and/or Weather Bureau–Army–Navy (WBAN) identifiers, not the airport codes (e.g., LAX) that are commonly used for airports. The QA checks applied to GHCN-Daily flag a portion of the daily observations as erroneous. These erroneous data values are treated as "missing values" in the computation of climate normals. Durre et al. (2010) estimate that the false positive rate is on the order of 1%–2%. However, this effect is unlikely to have any appreciable impact on the climate normals due to the nature of long-term averaging. All 1981–2010 climate normal values are accompanied by a completeness flag, which is an indication of how many nonmissing and unflagged values (i.e., "good" values) are used in the calculation. In general, a station needs at least 10 "sufficiently complete" months for each month of the year for normals to be computed (although estimated normals are computed for some shorter records as described below). The completeness criteria are loosely based on the guidelines provided by the World Meteorological Organization (WMO 1989, 2007). All reported climate normals are representative of the local observation time (of day) for the station and are rounded to a fixed precision (e.g., HDD/CDD normals are rounded to whole degrees Fahrenheit).

The 1971–2000 temperature normals were computed from monthly temperatures that were adjusted for inhomogeneities using the methods described by Peterson and Easterling (1994) and Easterling and Peterson (1995). Building on this previous work, the monthly temperature data (Tmax and Tmin) used to compute the 1981–2010 normals are first calculated from GHCN-Daily and subsequently undergo robust QA (Menne et al. 2009) and homogenization using the pairwise comparison technique described by Menne and Williams (2009). Further, by statistical design, all temperature-related normals across all time scales (including the daily time scale) reflect the QA and homogenization applied to the monthly Tmax and Tmin data. For example, our statistical procedures ensure that the mean of the 31 daily Tmin normals in January average to the relevant monthly January Tmin normal, which in effect passes through monthly QA and adjustments down to the daily time scale. For precipitation, snowfall, and snow depth, we rely fully on the comprehensive set of QA procedures that are part of GHCN-Daily (Durre et al. 2010), since QA at the monthly time scale tends to be less effective for these variables. In addition, no effort was made either to identify or to remove inhomogeneities in the precipitation-related variables since no technique had been developed that was suitable for a station network as large and diverse as that used here.

In the 1971–2000 climate normals, all daily normals were calculated using a cubic spline fit through the monthly normals. In other words, no daily data were explicitly utilized to refine the shape of the annual cycle. In contrast, the 1981–2010 Climate Normals make extensive use of daily observations from GHCN-Daily. This allows for a more precise representation of intraseasonal temperature signals using harmonic analysis and facilitates the inclusion of additional precipitation-related parameters such as daily percentiles, month-to-date and year-to-date normals, and daily probabilities.

Previous installments of NOAA's climate normals have computed HDD/CDD normals using a parametric method described by Thom (1954, 1966). In the 1971–2000 Climate Normals, monthly degree-day normals were calculated directly from daily data for a small fraction of the stations (first-order stations), and the daily degree-day normals for these stations were calculated as the cubic spline fit through the monthly normals. A modification of the "Thom method" was used for all other stations. The 1981–2010 HDD/CDD normals were computed more directly using a 15-day windowing approach that exploits both the improved daily temperature normals and the distribution of daily observations in the window about these normals. Further, all monthly degree-day normals are calculated as the sums of the corresponding daily degree-day normals.

For active short-record stations that fail the 10-yr completeness criterion described above but do have at least two years of sufficiently complete months for each month of the year, so-called "quasi normals," or estimated normals, are provided. Included in the active short-record stations are not only NWS sites but also stations in the U.S. Climate Reference Network, a national network operational since 2001 that was designed explicitly to measure long-term (e.g., 50–100 years or longer) climate variability and change. Average monthly temperature and precipitation normals are estimated using linear combinations of the normals from neighboring longer-record stations closely following the "pseudonormals" methodology outlined by Sun and Peterson (2005, 2006). Other statistics that are in some way dependent on these average monthly values are also available for the short-record stations. Quasi normals are computed for all temperature-related variables except standard deviations as well as for month-to-date, year-to-date, monthly, seasonal, and annual precipitation averages. Quasi normals are not provided for snowfall or snow depth parameters.

3.4.1 Daily Normals. NCDC derives daily temperature normals using a technique called constrained harmonic analysis. For example, a daily precipitation normal of 0.12 inches on May 1 does not imply that the most likely precipitation amount on May 1 is 0.12 inches. WFOs use these daily normals for the calculation of daily, weekly, monthly, seasonal, yearly, month-to-date, season-to-date, and year-to-date departures from normal.

3.4.2 Effect on Normals from Changes in Observing Conditions. If temperature sensors or precipitation gauges are relocated and/or replaced by new equipment, the NWS will collect comparative data to be used as the basis for revising the normals. For details, see NWS Instructions 10-2101 (General Instructions for Terrestrial-Based In-Situ Instrument and Algorithm Intercomparisons for the Purpose of Climate Data Continuity) http://www.weather.gov/directives/sym/pd01021001curr.pdf and 10-1302 (Instrument Requirements and Standards for the NWS Surface Observing Program [Land]) http://www.weather.gov/directives/sym/pd01013002curr.pdf. Revised normals for a site become final as soon as they are distributed to the WFO.

3.4.3 Normals and Observations for February 29. WFOs will handle normals and observations related to February 29 in leap years in the following manner:

- February 29 (Daily) Normals: For February 29, WFOs will use the February 28 values for temperature, precipitation, snowfall, and heating/ cooling degree days.

- February Monthly Normals: No change will be made in leap years for normal temperatures, precipitation or snowfall. However, for heating and cooling degree days, WFOs will increase the February normals by the February 29 values.

- Seasonal Normals: After February 29, WFOs will not increase normal seasonal heating and cooling degree day totals, precipitation, or snowfall by the February 29 values.

- Annual Normals: There will be no change in annual temperature, precipitation, or snowfall values by the February 29 values.

- Seasonal and Annual Observed Totals: WFOs will increase the seasonal and annual precipitation and snowfall totals by the February 29 observed values. WFOs will increase seasonal heating and cooling degree days totals by the February 29 values.

Example for heating degree days (cooling degree days would be treated similarly):

For February Computations:

	NORMAL	OBSERVED	DEPARTURE FROM NORMAL
Season through January	2850	2850	0
February 1-28	+800	+700	
February 29	+ 30	+ 20	
Season through February	3680	3570	-110

For March Computations:

Remove Feb 29 Normal	- 30		
Updated through February	3650	3570	- 80
March 1-31	+600	+530	
Season through March	4250	4100	-150

Consider the following example for precipitation (snowfall would be treated similarly):

For February Computations:

	NORMAL	OBSERVED	DEPARTURE FROM NORMAL
January	3.00	3.00	0
February 1-28	2.80	2.75	-0.05
February 29	0.10	0.06	-0.04
February 1-29	2.80 (still)	2.81	+0.01
Year through February	5.80	5.81	+0.01

3.5 Extremes. NCDC provides station extremes for each calendar day, month, and the period of record (i.e. "all time"). To address the challenge of having consistent climate extremes for ASOS LCD stations with numerous relocations during the period of record (especially in large metropolitan areas), NCDC developed a methodology to establish multi-location combined (or threaded) station data sets under the "ThreadEx" project (as described in detail in Appendix B).

4. Climatological Data Reports. WFOs will issue the following products for all ASOS LCD sites (see Appendix C) in their area of responsibility. These reports contain information in accordance with Sections 2 and 3.

- Climatological Report - Daily (CLI)
- Climatological Report - Monthly (CLM)
- Preliminary Local Climatological Data Report (CF6)
- Record Event Report (RER)

WFOs may optionally issue climate reports for the week, season, year, or other period of time under the AWIPS product category of MIS (Miscellaneous Local Product), PNS (Public Information Statement), OPU (Other Public Products), or another specified PIL (e.g. CLA [annual], CLS [seasonal], and CLQ [quarterly]) on a case-by-case basis (by a request through the WFO's regional office).

The data in these products are preliminary since the products are issued before all levels of NCDC QC makes data final. See climate data disclaimer in NWS Instruction 10-1003 (Climate Data Services) http://www.weather.gov/directives/sym/pd01010003curr.pdf. Sunrise, sunset and sunshine in these reports are not official since the U.S. Naval Observatory is the source for official astronomical records. See astronomical disclaimer in NWS Instruction 10-1003 (Climate Data Services).

To add or remove LCD designation from ASOS sites in its area of responsibility, a WFO will coordinate with its region and NCDC and reach a consensus, considering such factors as data quality, frequency, reliability, length of record; and historical, cultural, business, public interest, and any other factor(s) of significance. To add or remove CD designation from ASOS sites, only data quality and reliability need be taken into account. With both LCD and CD designation changes, the proper documentation (forms B-43 and B-44) will need to be filed within CSSA. (All active LCD and CD ASOS sites are REQUIRED to have accurate B-44 forms on file within CSSA.)

WFOs may also optionally issue any or all these products for other sites (i.e. NCDC archived non-LCD sites), whether published or not, of major interest in their area, in concurrence with their regional climate services program manager. WFOs should consider user interest; length of climate record; and quality, frequency, and reliability of current observations when considering optional non-LCD site products. It is preferred, however, that WFO climate products are produced primarily for published sites (either LCD or CD).

WFOs should compose these products with the Advanced Weather Interactive Processing System (AWIPS) CLIMAT program or a text editor if the program is not available. For service backup procedures, see NWS Instruction 10-2201 (Backup Operations) http://www.weather.gov/directives/sym/pd01022001curr.pdf. WFOs will first report operational problems with the AWIPS CLIMAT program to the AWIPS Network Control Facility (NCF) (anytime – "24/7"). NCF will open a trouble ticket and attempt to solve the problem directly. If NCF can not solve the problem, WFOs should report the problem to their regional climate services program manager for referral to the NWS Climate Services Division. This reporting process doesn't include requests to change output, format, or calculation methods, which are handled through the established policy coordination process for the directive system.

WFOs will only use backup observation sites when valid ASOS data at the primary site are not available and when all the following four conditions for backup sources are met:

- Sited near the ASOS location in an area of similar exposure (as determined by the WFO).
- The data from the backup site are received, accepted, and archived by NCDC.
.
- Sensors and methods meet NWS instrument standards (NWS Instruction 10-1302 – Instrument Requirements and Standards for the NWS Surface Observing Programs (Land), Appendix D) (http://www.weather.gov/directives/sym/pd01013002curr.pdf).

- Completed WS Form B-44 that includes backup site/sensor metadata coordinated with NCDC's Data Operations Division (E/CC1) (in accordance with NWS Manual 10-1313 - Cooperative Station Service Accountability) (http://www.weather.gov/directives/sym/pd01013013curr.pdf).

WFOs will **not** estimate values for missing elements.

WFOs will indicate data as missing (as described in Sections 4.1.3, 4.2.3, and 4.3.3) when the following circumstances apply:

- When there are no data or inaccurate data due to a power outage, sensor malfunction, or other deficiency due to inadequate sensor performance (in the judgment of the WFO).

- There are no established backup sources available nearby.

WFOs will document the use of backup sources in the remarks Section of the Preliminary Local Climatological Data Report (CF6), as described in Section 4.3.3. Due to current limitations in the AWIPS CLIMAT program, it is recommended that the WFO maintain a list of remarks and enter these in the remarks section of the CF6 prior to sending the final version for the month.

4.1 Climatological Report – Daily (CLI).

4.1.1 Mission Connection. The CLI provides climatological data for each day.

4.1.2 Issuance Guidelines.

a. Issuance Criteria. CLIs will be issued with a separate product for each ASOS LCD site (i.e., unique AWIPS ID for each ASOS LCD site [CLIxxx, xxx for the site] under the WFO's WMO heading [CDaa4i CCCC] for the CLI product category). CLIs for non-LCD sites may be sent as separate products (using the xxx for non-LCD site) or grouped together within an LCD product separated by "&&".

b. Issuance Time. The CLI will be issued at least twice daily. The first mandatory issuance will be between 12:30 a.m. and 5:00 a.m. local time to capture the previous calendar day's (midnight-to-midnight Local Standard Time [LST]) data. The second mandatory issuance will be in the late afternoon/early evening (typically between 3:00 p.m. and 5:30 p.m. local time), before local newscast times, to capture data for the current day. Other optional issuances may be made to meet local user requirements (e.g., a late morning report to capture the current day morning low temperature, an early evening report to capture the final high daily temperature, etc.)

c. Valid Time. The CLI is valid from the time of release until the next issuance.

d. Product Expiration Time. The CLI does not have a product expiration time.

4.1.3 Technical Description.

a. MND Product Type Line. The CLI MND is "CLIMATE REPORT."

b. Content. The CLI contains the standardized data shown in Section "c." All data shown in Section "c" are required for both mandatory daily issuances, except as identified in Note 3 at the end of Section "4.1.3.c," for all CLIs year-round. Data to be included in the optional CLIs may be adapted to meet local needs. "MM" should be used to indicate missing data, as appropriate (as explained in Section 4). To ensure consistency with NCDC routines, one or more missing daily values will result in a "MM" for the preliminary monthly value. WFOs may append specialized data to the end of the standard fixed-fields to meet the needs of local users.

c. Format. The CLI is a tabular product. However, supplemental narrative information may be included to meet local user needs. When specialized or additional information is appended to the standard format, it will be separated from the standard fixed-fields by double ampersands (&&). Double dollar signs ($$) will be used to signify the end of the product.

```
Product Format                                                  Description of Entry
CDaa4i cccc ddhhmm                                              (WMO Heading)
CLIxxx                                                          (AWIPS ID)

CLIMATE REPORT
NATIONAL WEATHER SERVICE <WFO> <STATE>
<HHMM> AM <LT> <DAY MMM DD YYYY>
.....................................

...THE <CITY1 NAME> CLIMATE SUMMARY FOR <MONTH DD YEAR>...

CLIMATE NORMAL PERIOD YYYY TO YYYY
CLIMATE RECORD PERIOD YYYY TO YYYY

WEATHER ITEM   OBSERVED  TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE    (LST)  VALUE       VALUE  FROM      YEAR
                                                   NORMAL
.................................................................

TEMPERATURE (F)
 YESTERDAY
  MAXIMUM        000    0000 PM 000    YYYY 000    000       000
  MINIMUM        000    0000 AM 000    YYYY 000    000       000
  AVERAGE        000                       000    000       000

PRECIPITATION (IN)
 YESTERDAY        00.00          00.00 YYYY  00.00  00.00     00.00
 MONTH TO DATE    00.00                      00.00  00.00     00.00
 SINCE <SEASON>   00.00                      00.00  00.00     00.00
 SINCE JAN  1    000.00                      00.00  00.00     00.00

SNOWFALL (IN)
 YESTERDAY        00.0           00.0  YYYY  00.0   00.0      00.0
 MONTH TO DATE   000.0                      00.0  000.0     000.0
 SINCE <SEASON>  000.0                     000.0 0000.0    0000.0
 SINCE JUL  1   0000.0                     000.0 0000.0    0000.0
```

```
 SNOW DEPTH      000

DEGREE DAYS
 HEATING
  YESTERDAY      000                          00    000       000
  MONTH TO DATE 0000                        0000   0000      0000
  SINCE <SEASON>0000                        0000  00000      0000
  SINCE JUL  1 00000                       00000  00000     00000

 COOLING
  YESTERDAY       00                          00    000        00
  MONTH TO DATE 0000                         000   0000      0000
  SINCE <SEASON>0000                        0000   0000      0000
  SINCE JAN  1  0000                        0000   0000      0000

.................................................................
WIND (MPH)
 HIGHEST WIND SPEED    000    HIGHEST WIND DIRECTION <DIR> (000)
 HIGHEST GUST SPEED    000    HIGHEST GUST DIRECTION <DIR> (000)
 AVERAGE WIND SPEED     00.0

SKY COVER
 POSSIBLE SUNSHINE 000 PERCENT
 AVERAGE SKY COVER 0.0

WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
 <W1>
 <W2>
 <W3>
 <ETC.>

RELATIVE HUMIDITY (PERCENT)
 HIGHEST 000   0000 PM
 LOWEST  000   0000 AM
 AVERAGE 000
.................................................................

THE <CITY1 NAME> CLIMATE NORMALS FOR TODAY
                         NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)  000       000      YYYY
 MINIMUM TEMPERATURE (F)  000       000      YYYY
SUNRISE AND SUNSET
<MONTH DD YEAR>........SUNRISE  0000 AM <LT>  SUNSET  0000 PM <LT>(today)
<MONTH DD YEAR>........SUNRISE  0000 AM <LT>  SUNSET  0000 PM <LT>(tomorrow)

-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.

&&    (Standard Format end indicator entered locally)
-----------------------------------------------------------------
(<any additional local specialized climate data>

$$
```

Note 1: Note: The “xxx” in this product is the three-letter data site identifier, or WFO site identifier for reports with multiple non-LCD data sites.

Note 2: <Season-to-date> may be locally set to alternate season/year-to-date.

Default <seasons> in northern Hemisphere are defined as:
Winter - December, January, February
Spring - March, April, May
Summer - June, July, August
Fall - September, October, November

For American Samoa (in the Southern Hemisphere), the default seasons are reversed.

Note 3: WFOs may report only observed values for snowfall. However, if a WFO elects to report any other snowfall field (i.e., record value, year, normal value, departure from normal, or last year), then all snowfall fields will be reported.

4.1.4 Updates, Amendments, and Corrections. These will be done as needed.

4.1.5 Supporting Software. The AWIPS CLIMAT program uses the ASOS Daily Summary Message (DSM) to produce the CLI. The DSM is an automated coded message primarily for use by the NWS National Centers for Environmental Prediction (NCEP), NCDC, and WFOs. The DSM is not subject to WFO quality control. If some data entries are not available from the DSM, other sources, such as the METARs (Transmitted Aviation Weather Reports) or Supplemental Climatic Data (SCD) reports may be used to fill in data resulting from gaps in the DSM. WFOs should correct erroneous data in the CLI. The "PRIMARY DSM XMIT TIME" will be set to 00:15 a.m. LST for each ASOS site. Intermediate DSMs may be generated and transmitted at any time to meet local needs. The ASOS Users Guide provides detailed guidance regarding the DSM.

4.2. Climatological Report - Monthly (CLM).

4.2.1 Mission Connection . The CLM provides climatological data for a monthly basis.

4.2.2 Issuance Guidelines.

a. Issuance Criteria. CLMs will be issued with a separate product for each ASOS LCD site (i.e., unique AWIPS ID for each ASOS LCD site [CLMxxx; xxx for the site] under the WFO's WMO heading [CXaa5i CCCC] for the CLM product category). CLMs for non-LCD sites may be sent as separate products (using the xxx for non-LCD site) or grouped together within an LCD product separated by "&&."

b. Issuance Time. The CLM will be issued at least monthly, no later than the 5th day of the following month. A monthly product can be generated using the AWIPS CLIMAT program anytime after the last mandatory CLI issuance between 12:30 a.m. and 5:00 a.m. local time for the last day of the past month.

c. Valid Time. CLMs are valid from the time of release until the next issuance.

d. Product Expiration Time. The CLM does not have a product expiration time.

4.2.3 Technical Description.

a. MND Product Type Line. The CLM MND is "CLIMATE REPORT."

b. Content. The CLM contains the standardized data shown that follows. These data are required for all CLMs year-round except as noted by "*" in the generic format in Section "4.2.3.c" MM will be used to indicate missing data, as appropriate (i.e. one or more missing daily values result in "MM" for the preliminary monthly value). WFOs may append specialized data to the end of the standard fixed-fields to meet the needs of local users.

c. Format. The CLM is a tabular product. However, supplemental narrative information may be included to meet local user needs. When specialized or additional information is appended to the standard format, it will be separated from the standard fixed-fields by double ampersands (&&). Double dollar signs ($$) will be used to signify the end of the product.

Product Format — Description of Entry

```
CXaa5i cccc ddhhmm                                              (WMO Heading)
CLMxxx                                                          (AWIPS ID)

CLIMATE REPORT
NATIONAL WEATHER SERVICE <WFO> <ST>
<HMM> AM <LT> <DAY MMM DD YYYY>

.................................

...THE <CITY_NAME> CLIMATE SUMMARY FOR THE MONTH OF <MONTH> <YEAR>...

CLIMATE NORMAL PERIOD YYYY TO YYYY
CLIMATE RECORD PERIOD YYYY TO YYYY

WEATHER     OBSERVED                NORMAL      DEPART      LAST YEAR'S
            VALUE       DATE(S)     VALUE       FROM        VALUE DATE(S)
                                                NORMAL
.....................................................................
TEMPERATURE (F)
RECORD
 HIGH             00    MO/DD/YYYY
 LOW              00    MO/DD/YYYY
HIGHEST           00    MO/DD       00*         00*         00    00
LOWEST            00    MO/DD       00*         00*         00    00
AVG. MAXIMUM      00.0                00.0        0.0         00
AVG. MINIMUM      00.0                00.0        0.0         00
MEAN              00.0                00.0        0.0         00
DAYS MAX >= 90    00                  0.0         0.0         00
DAYS MAX <= 32    00                  0.0         0.0         00
DAYS MIN <= 32    00                  0.0         0.0         00
DAYS MIN <= 0     00                  0.0         0.0         00

PRECIPITATION (INCHES)
RECORD
 MAXIMUM          0.00  YYYY
```

```
 MINIMUM          0.00  YYYY
TOTALS            0.00              0.00        0.00        00
DAILY AVG.        0.00              0.00        0.00        00
DAYS >= .01       00                0.0         0.0         00
DAYS >= .10       00                0.0         0.0         00
DAYS >= .50       00                0.0         0.0         00
DAYS >= 1.00      00                0.0         0.0         00
GREATEST
 24 HR. TOTAL     0.00  MO/DD TO MO/DD                      00

SNOWFALL (INCHES)
RECORDS
 TOTAL            0.0   YYYY
TOTALS            0.0               0.0         0.0         00
SINCE 7/1         0.0               0.0         0.0         00
SNOWDEPTH AVG.    0                 0           0           00
DAYS >= 1.0       0                 0.0         0.0         00
GREATEST
 SNOW DEPTH       0     MM                                  00    00
 24 HR TOTAL      0.0   MM/DD TO MM/DD                      00

DEGREE_DAYS
HEATING TOTAL     000               00          00          00
 SINCE 7/1        0000              00          00          00
COOLING TOTAL     00                00          00          00
 SINCE 1/1        00                00          00          00

WIND (MPH)
AVERAGE WIND SPEED                  0.0
HIGHEST WIND SPEED/DIRECTION        00/000      DATE  MO/DD
HIGHEST GUST SPEED/DIRECTION        00/000      DATE  MO/DD

SKY COVER
POSSIBLE SUNSHINE (PERCENT)   00
AVERAGE SKY COVER             0.00
NUMBER OF DAYS FAIR           00
NUMBER OF DAYS PC             00
NUMBER OF DAYS CLOUDY         00

AVERAGE RH (PERCENT)          00

WEATHER CONDITIONS. NUMBER OF DAYS WITH
THUNDERSTORM            00    MIXED PRECIP            00
HEAVY RAIN              00    RAIN                    00
LIGHT RAIN              00    FREEZING RAIN           00
LT FREEZING RAIN        00    HAIL                    00
HEAVY SNOW              00    SNOW                    00
LIGHT SNOW              00    SLEET                   00
FOG                     00    FOG W/VIS <= 1/4 MILE   00
HAZE                    00

-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.

&&    (Standard Format end indicator entered locally)
-------------------------------------------------------------------
(<any additional local specialized climate data>
$$
```

* optional – actually these are means and departure from means for the period of record.

4.2.4 Updates, Amendments, and Corrections . These are issued as needed, based upon user needs

4.2.5 Supporting Software. The AWIPS CLIMAT program usually uses the WFO's own database of monthly values (which were mainly derived from the ASOS DSMs) to produce the CLM. The WFOs, however, may optionally use ASOS Monthly Summary Message (MSM) to produce the CLM. The MSM is an automated coded message primarily for use by NCEP, NCDC, and WFOs. The MSM is not subject to WFO quality control. WFOs should correct erroneous or missing data in the CLM. The "MSM XMIT TIME" will be set to a time between 12:30 a.m. and 05:00 a.m. LST for each ASOS site. The ASOS Users Guide provides detailed guidance regarding the MSM.

4.3 Preliminary Local Climatological Data Report (CF6).

4.3.1 Mission Connection. NCDC uses the CF6 (also called the F-6) as a data source to resolve discrepancies with ASOS LCD data reports when preparing the final climate record for each ASOS LCD site. CF6s are also used by the public. WFOs will provide NCDC the name, e-mail address, and telephone number of a point of contact for questions relating to the CF6 data. The WFO CF6 web page will include the disclaimer stating that the data is "preliminary." See NWS Instruction 10-1003 for the disclaimer.

4.3.2 Issuance Guidelines. WFOs will, at a minimum, post on the World Wide Web the CF6 data and any remarks for the entire preceding calendar month no later than the 5th day of the following month. CF6s should be posted to the standardized WFO climate web pages by sending (through AWIPS) a separate product for each ASOS site (i.e., unique CF6 AWIPS ID for each ASOS site [CF6xxx] under the WFO's WMO heading [CXaa5i CCCC] for the CF6 product category).

WFOs should post the CF6 data and any remarks more frequently (i.e. daily data postings for month to date along with the needed remarks, such as backup sensor information.)

WFO's should indicate the "final posting" with a note in the CF6 remarks section (i.e. "FINAL MM-YY for month [MM] and year [YY]). This does ***not*** mean the data are "final," as defined in section 1.

Other remarks (Section 4.3.3) will be posted in the "remarks" section of the CF6.

If the WFO makes corrections to any value(s) in a previously reported "final posting" of an CF6, NCDC will be immediately notified of the change and the updated "final posting" will be sent to NCDC's Global Climate Applications Division for updating of all relevant NCDC data sets and products. Notification and transmittal of the updated CF6 (as attachment) may take place by the submission of a Datzilla report (http://datzilla.srcc.lsu.datzilla).

4.3.3 Technical Description.

a. Content. The CF6 will contain a row of data for each day and summary information of average and cumulative data. Missing data will be indicated with an "M," as appropriate (Section 4). To ensure consistency with NCDC routines, one or more missing daily values will result in an “M” for the corresponding preliminary monthly average or cumulative data value.

WFOs will document the following in the REMARKS section of the CF6.

- Data from backup sensor site and dates.
- Location of the backup site in reference to the ASOS site using eight point compass direction and distance in Statue miles (in tenths of a mile).

b. Format. WFOs posting CF6s will use the standard format following the key below. All data are for midnight to midnight LST.

KEY to CF6:

Column 1 - Day of month.
Column 2 - Maximum temperature for the day (nearest whole degree Fahrenheit).
Column 3 - Minimum temperature for the day (nearest whole degree Fahrenheit).
Column 4 - Average daily temperature (nearest whole degree Fahrenheit using columns 2 and 3).
Column 5 - Departure of the average temperature from normal (whole degrees Fahrenheit).
Column 6A - Heating Degree Days (HDD) using 65°F base, in whole degrees Fahrenheit.
Column 6B - Cooling Degree Days (CDD) using 65°F base, in whole degrees Fahrenheit.
Column 7 - Precipitation amount for the day (liquid equivalent, in hundredths of inches or trace).
Column 8 - Snowfall amount (including ice pellets) for the day, in tenths of inches or trace.
Column 9 - Snow depth (including ice pellets, glaze, and hail) to nearest whole inch (or trace) (taken at 1200 Universal Coordinated Time). Hail is noted in remarks section.
Column 10 - Average daily wind speed in miles per hour.
Column 11 - Fastest two-minute sustained (or average) wind speed in miles per hour.
Column 12 - Direction of fastest wind speed; degrees clockwise from true north.
Column 13 - Minutes of sunshine
Column 14 - Percent of possible sunshine.
Column 15 - Cloud cover from sunrise to sunset in tenths.
Column 16 - Weather codes (from weather key on CF6 form).
Column 17 - Peak wind gust in miles per hour.
Column 18 - Direction of peak wind gust in degrees clockwise from true north.

STANDARD FORMAT to CF6:

```
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:
                                        MONTH:
                                        YEAR:
                                        LATITUDE:
                                        LONGITUDE:

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                        AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S  WX   SPD DR
================================================================================
...for each day of month...  ...see column key on preceding page...
================================================================================
SM ...summations for columns 2, 3, 6A, 6B, 7, 8, 10, 13 and 15...
================================================================================
AV (for columns 2, 3)                        FASTST  PSBL  %        MAX(MPH)
                                 MISC ----->  #                  (and direction)
================================================================================

NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2
                                        STATION:
                                        MONTH:
                                        YEAR:
                                        LATITUDE:
                                        LONGITUDE:

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY:        TOTAL FOR MONTH:           1 = FOG OR MIST
DPTR FM NORMAL:         DPTR FM NORMAL:            2 = FOG REDUCING VISIBILITY
HIGHEST:       ON       GRTST 24HR       ON           TO 1/4 MILE OR LESS
LOWEST:        ON                                  3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:               5 = HAIL
                        GRTST 24HR       ON        6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:     ON        7 = BLOWING DUST OR SAND:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:        0.01 INCH OR MORE:
MAX 90 OR ABOVE:        0.10 INCH OR MORE:
MIN 32 OR BELOW:        0.50 INCH OR MORE:
MIN  0 OR BELOW:        1.00 INCH OR MORE:

[HDD (BASE 65) ]
TOTAL THIS MO.          CLEAR  (SCALE 0-3)
DPTR FM NORMAL          PTCLDY (SCALE 4-7)
TOTAL FM JUL 1          CLOUDY (SCALE 8-10)
DPTR FM NORMAL

[CDD (BASE 65) ]
TOTAL THIS MO.
DPTR FM NORMAL          [PRESSURE DATA]
TOTAL FM JAN 1          HIGHEST SLP   ON
DPTR FM NORMAL          LOWEST  SLP   ON

[REMARKS]
```

4.3.4. Updates, Amendments, and Corrections. WFOs will perform a quality control check of the CF6 data before final posting for the month.

4.3.5 Supporting Software. At AWIPS sites, the AWIPS CLIMAT program produces the CF6.

4.4 Record Event Report (RER).

4.4.1 Mission Connection. The RER contains meteorological and hydrological events that equal or exceed existing extreme records. The RER will be used to report occurrences relating to both maximum and minimum extreme records.

4.4.2 Issuance Guidelines.

a. Issuance Criteria. The RER is an event driven product.

b. Issuance Time. The RER will be issued on an as needed basis whenever an existing record value is met or exceeded.

c. Valid Time. The RER does not have a valid time.

d. Product Expiration Time. The RER does not have a product expiration time.

4.4.3 Technical Description.

a. MND Product Type Line. The RER MND is "RECORD EVENT REPORT."

b. Content. The RER should be used to report record occurrences of the following meteorological or hydrological events (Table 2, next page), as data availability allows. At AWIPS sites, events identified with an "*" should be automatically identified by the AWIPS CLIMAT program. "All time" in Table 2 means for the station's' period of record.

WFOs producing RERs may optionally add the following statement to RERs for non ASOS LCD sites without the latest 30-year decadal records.

"Record reports for this station may not be as meaningful as those for stations with 30-year decadal normals (1981-2010) as the period of record here is only XX years."

Record Variable	Extreme For:
Temperature	
maximum	day*, month, season, all time
minimum	day*, month, season, all time
highest so early	spring
highest so late	fall
lowest so late	spring
lowest so early	fall
lowest maximum	day, month, season, all time
highest minimum	day, month, season, all time
Sea level pressure	
highest	all time
lowest	all time
Wind	
highest speed	all time
highest gust	all time
Largest hail size	all time
Most/least precipitation or snowfall/ snow depth	
within calendar day	day*, month, season, all time
within 24-hour period	month, season, all time
"storm" total	month, season, all time
Greatest snow depth	month, season, all time

Table 2. Station Extremes.

c. Format. The RER is a text product.

Product Format	Description of Entry
SXaa7i cccc ddhhmm	(WMO Heading)
RERxxx	(AWIPS ID)
RECORD EVENT REPORT	(MND)
NATIONAL WEATHER SERVICE city st	(Issuing Office)
time am/pm time_zone day mon dd yyyy	(Issuing time and date)
[TEXT]	
$$	

4.4.4 Updates, Amendments, and Corrections . As needed, based upon user needs.

4.4.5 Supporting Software. The RER is automatically composed whenever the AWIPS CLIMAT program is run and an existing record value (which AWIPS CLIMAT monitors) is met or exceeded. Alternatively, the RER may be composed using the AWIPS text editor or any other text editor.

5. Surface National Climate Extremes. There is a National Climate Extremes Committee (NCEC) to assess the scientific merit of potentially new national extreme climate record events reported from the field. See Appendix D for details on the NCEC. The following list (Table 3) contains parameters that are monitored under the scope of NCEC for the final national climate extremes.

Temperature (°F) Maximum Minimum Maximum 24 hour change	**Snow (inches)** Maximum 24 hour Maximum seasonal (July-June) Maximum Depth	**Rain (inches)** Maximum 24 hour Minimum annual Maximum annual **Longest Dry Period (days)**
Hail Size (inches & lbs/oz) Largest diameter Largest circumference Heaviest	**Pressure (millibars/inches Hg)** Lowest Highest	**Wind (miles per hour)** Maximum gust

Table 3. National Extremes

6. Surface State Climate Extremes. State Climate Extremes Committees (SCEC) may be formed to assess the scientific merit of potentially new state extreme climate record events reported from the field. See Appendix E for detailed guidance on SCECs. Should an SCEC be formed for a state, the guidance in Appendix E will be a requirement for a WFO to participate.

7. Base Period Means and Outlook Class Limits for Climate Outlooks. CPC provides this information for surface air temperature, precipitation, sea surface temperature, and 500 millibar heights as reference in their climate outlooks. The information applies to the valid times of the various outlooks. CPC and the Climate Services Division will announce the effective date of the new base period means and class limits at least 30 days in advance. These graphics are available on the CPC web page at http://www.cpc.ncep.noaa.gov/products/predictions/90day under the "NORM" column.

7.1 Definitions.

Base Period Mean. CPC computes base period means for each of the 102 climate outlook divisional areas in the conterminous U.S. and selected observing stations from a period comprising of three consecutive 10-year periods ending in a decadal year (e.g. 1981-2010).

Outlook Class Limits. CPC provides three climatologically equally likely classes: above, near, and below normal (for temperature) or median (for precipitation). The upper and lower limits of the middle class are defined, thereby defining the lower limits of the above class and upper limits of the below class, respectively.

7.2 Temperature and Precipitation Base Period Means and Outlook Classes. CPC calculates this information for each of 102 areal climate outlook divisions and/or selected cities. CSPM's may request additions or deletions of selected cities to CPC's Operations Branch.

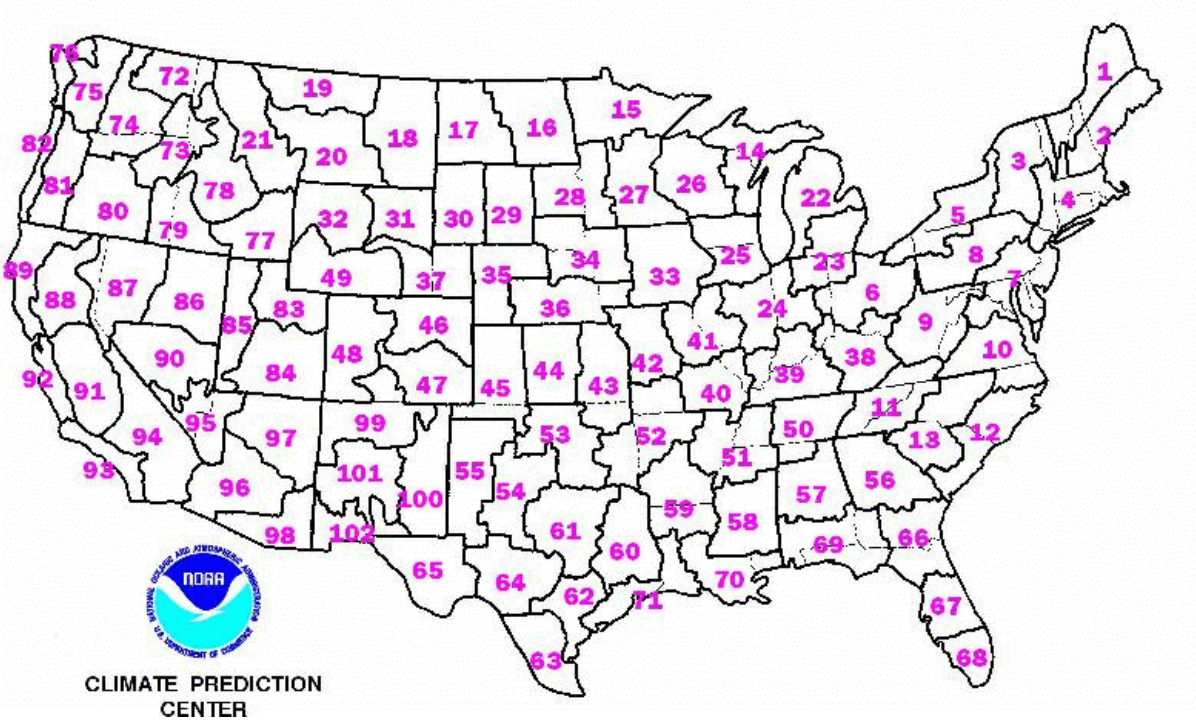

Figure 1. CPC Climate Outlook Divisions for contiguous U.S. (Note: Long Island NY is in division 4).

Base Period Means and Class Limits are calculated for the following valid times (Table 4). This information is available in both graphic and text formats on CPC's web site. CPC may post just a subset of the valid time calculations for the 6- to 10-day and 8- to 14-day Outlooks (one or two valid times per month).

For Three-Month Outlooks:	**For One-Month Outlooks:**
January through March	January
February through April	February
March through May	March
April through June	April
May through July	May
June through August	June
July through September	July
August through October	August
September through November	September
October through December	October
November through January	November
December through February	December

For 8- to 14-day Outlooks:	**For 6- to 10-Day Outlooks:**
January 1 through January 7	January 1 though January 5
January 2 through January 8	January 2 through January 6
etc.	etc.
December 31 through January 6	December 31 through January 4

Table 4. Valid Times for Climate Outlooks.

The following are some examples of CPC base period mean maps available on their web site.

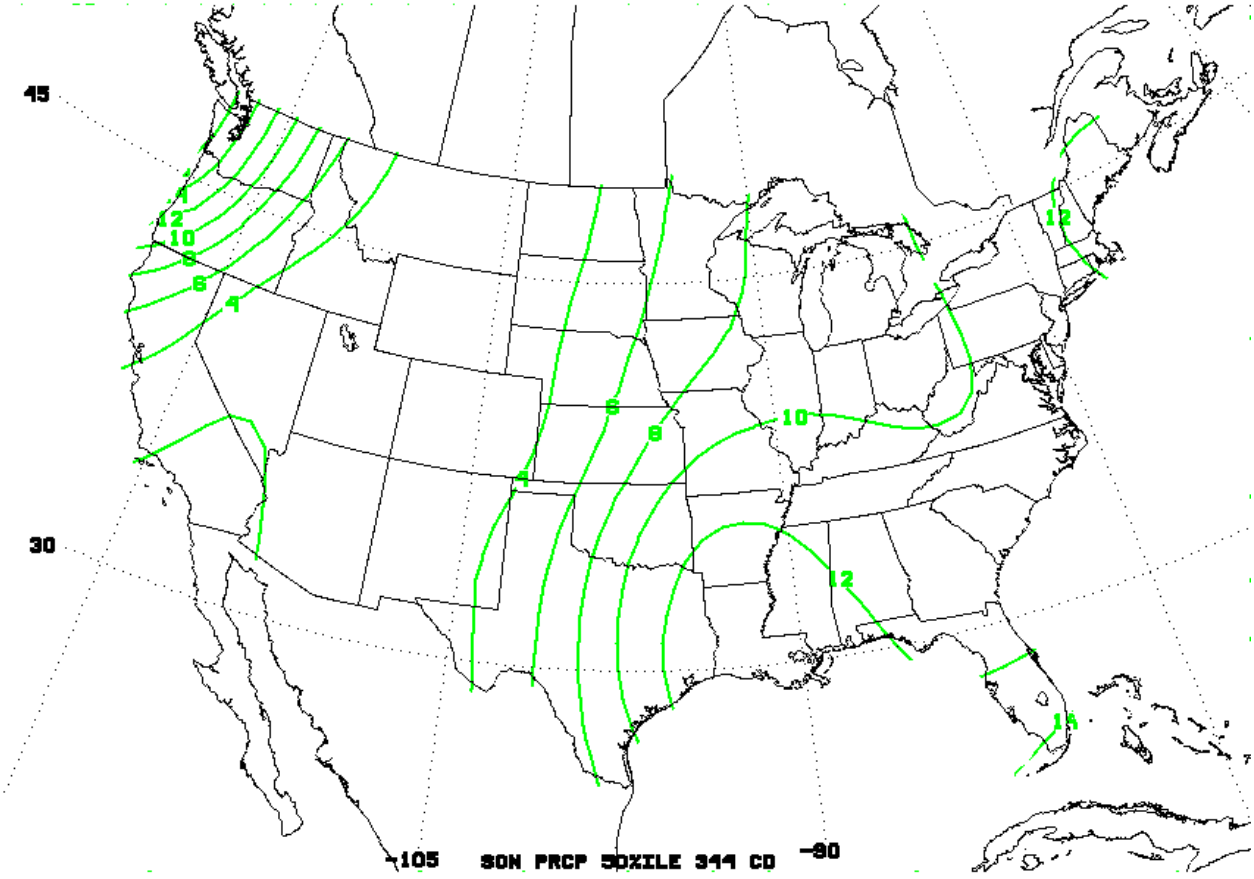

Figure 2. Map of CPC 1981-2010 base period mean total precipitation (inches) for September through November.

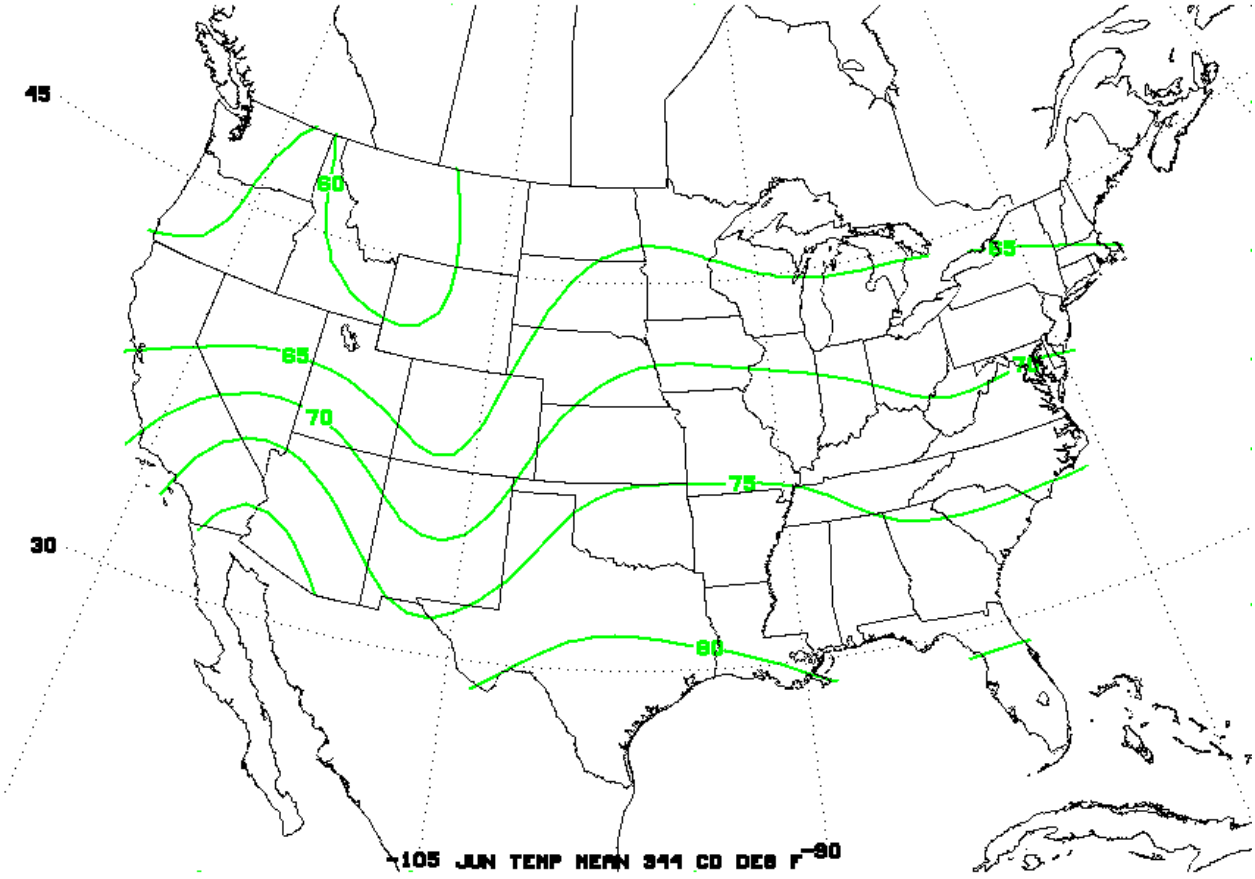

Figure 3. Map of CPC 1981-2010 base period mean temperature for June.

7.3 Base Period Means for Mean 500 millibar heights. CPC has calculated mean Northern Hemisphere 500 millibar heights for the 6-to 10-day and 8- to 14-day valid times listed in Table 4 in Section 7.2. This information is available in graphic format on CPC's web site. The following is an example of base period mean 500 millibar chart.

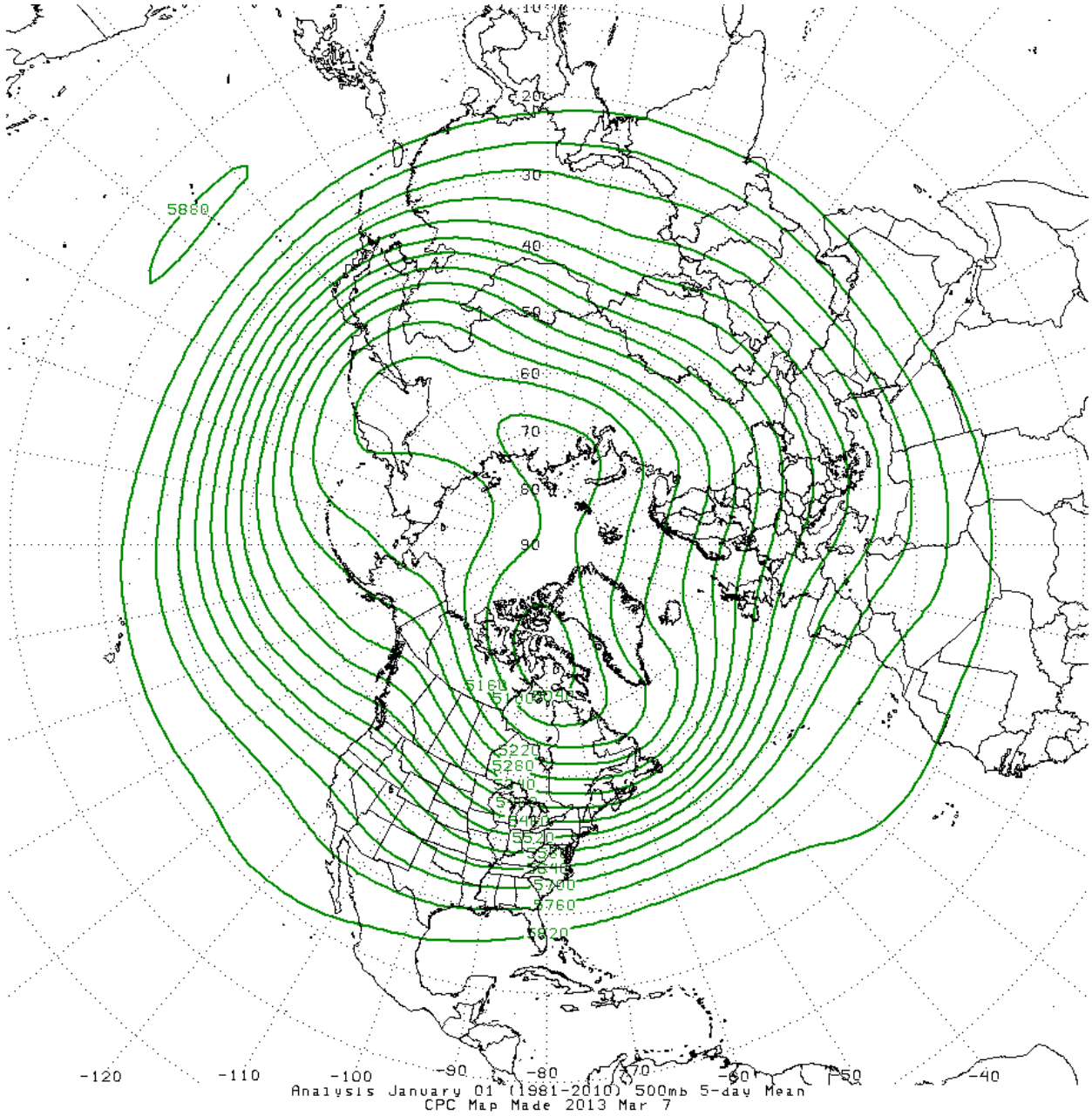

Figure 4. CPC 1981-2010 base period mean Northern Hemisphere 500 millibar height chart (in decameters) for January 1 through 5 (to be used to determine height anomalies in the 6- to 10-day 500 mb height outlook issued December 26).

7.4 Sea Surface Temperature (SST) Base Period Means. CPC has calculated SST means for each month as reference to the official Tropical Pacific SST Outlook (for the Pacific Niño 3.4 area [5°N to 5°S and 120°W to 170°W]). The CPC web site provides global maps of the base period SST means and charts for critical "Niño" subsections of the Tropical Pacific Ocean. Since the SST outlooks are valid for three-month periods, CPC averages the base period SST means of the three months as a reference to calculate the predicted three-month anomaly.

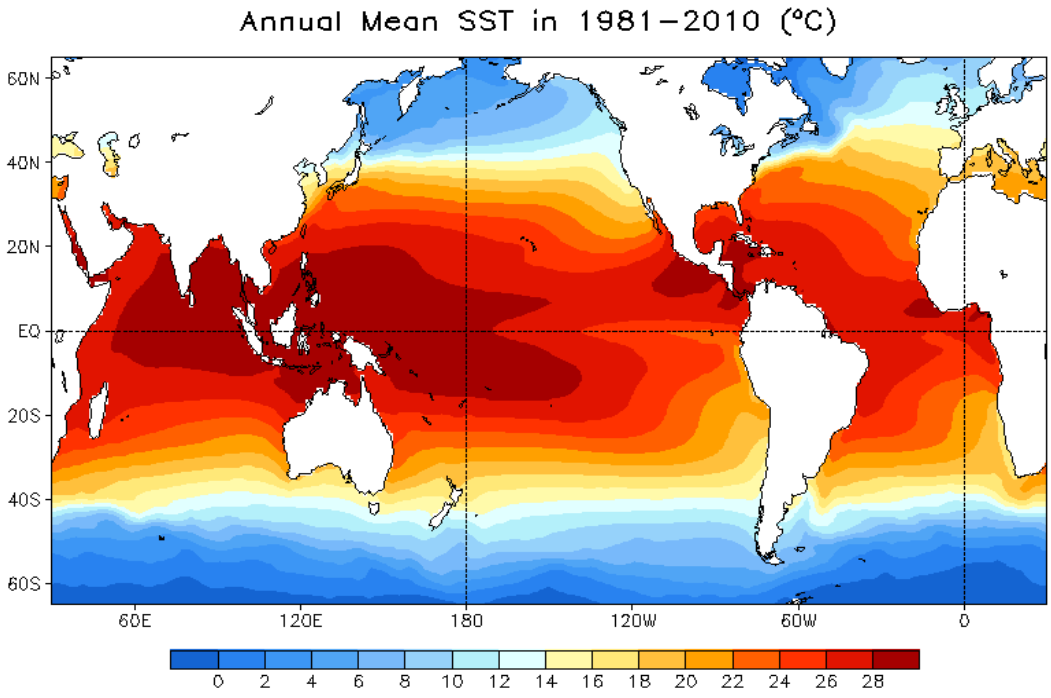

Figure 5. April 1981-2010 base period mean sea surface temperature chart. Temperatures are in Celsius.

Appendix A – Ten Principles of Climate Monitoring

The National Research Council (NRC 1999) recommended that the following ten climate monitoring principles, proposed by Karl *et al.* (1995), should be applied to climate monitoring systems:

1. **Management of Network Change:** Assess how and the extent to which a proposed change could influence the existing and future climatology obtainable from the system, particularly with respect to climate variability and change. Changes in observing times will adversely affect time series. Without adequate transfer functions, spatial changes and spatially dependent changes will adversely affect the mapping of climatic elements.

2. **Parallel Testing:** Operate the old system simultaneously with the replacement system over a sufficiently long time period to observe the behavior of the two systems over the full range of variation of the climate variable observed. This testing should allow the derivation of a transfer function to convert between climatic data taken before and after the change. When the observing system is of sufficient scope and importance, the results of parallel testing should be documented in peer-reviewed literature.

3. **Metadata:** Fully document each observing system and its operating procedures. This is particularly important immediately prior to and following any contemplated change. Relevant information includes: instruments, instrument sampling time, calibration, validation, station location, exposure, local environmental conditions, and other platform specifics that could influence the data history. The recording should be a mandatory part of the observing routine and should be archived with the original data. Algorithms used to process observations need proper documentation. Documentation of changes and improvements in the algorithms should be carried along with the data throughout the data archiving process.

4. **Data Quality and Continuity:** Assess data quality and homogeneity as a part of routine operating procedures. This assessment should focus on the requirements for measuring climate variability and change, including routine evaluation of the long-term, high-resolution data capable of revealing and documenting important extreme weather events.

5. **Integrated Environmental Assessment:** Anticipate the use of data in the development of environmental assessments, particularly those pertaining to climate variability and change, as a part of a climate observing system's strategic plan. National climate assessments and international assessments (e.g., international ozone or IPCC) are critical to evaluating and maintaining overall consistency of climate data sets. A system's participation in an integrated environmental monitoring program can also be quite beneficial for maintaining climate relevancy. Time series of data achieve value only with regular scientific analysis.

6. **Historical Significance:** Maintain operation of observing systems that have provided homogeneous data sets over a period of many decades to a century or more. A list of

protected sites within each major observing system should be developed, based on their prioritized contribution to documenting the long-term climate record.

7. **Complementary Data:** Give the highest priority in the design and implementation of new sites or instrumentation within an observing system to data-poor regions, poorly observed variables, regions sensitive to change, and key measurements with inadequate temporal resolution. Data sets archived in non-electronic format should be converted for efficient electronic access.

8. **Climate Requirements:** Give network designers, operators, and instrument engineers climate monitoring requirements at the outset of network design. Ensure instruments have adequate accuracy with biases sufficiently small to resolve climate variations and changes of primary interest. Ensure modeling and theoretical studies identify spatial and temporal resolution requirements.

9. **Continuity of Purpose:** Maintain a stable, long-term commitment to these observations, and develop a clear transition plan from serving research needs to serving operational purposes.

10. **Data and Metadata Access:** Develop data management systems that facilitate access, use, and interpretation of data and data products by users. Freedom of access, low cost mechanisms that facilitate use (directories, catalogs, browse capabilities, availability of meta data on station histories, algorithm accessibility and documentation, etc.), and quality control should be an integral part of data management. International cooperation is critical for successful data management.

References:

Karl, T.R., V.E. Derr, D.R. Easterling, C.K. Folland, D.J. Hoffman, S. Levitus, N.Nicholls, D.E. Parker, and G.W. Withee, 1995: Critical issues for long-term climate monitoring. ***Climatic Change***, **31**, 185-221.

National Research Council (NRC), 1999: **Adequacy of Climate Observing Systems**, National Academy Press, Washington, D.C.

Appendix B - Accessing NOAA Daily Temperature and Precipitation Extremes Based on Combined/Threaded Station Records

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ABSTRACT

Daily records of both temperature and precipitation are of great interest to the public and many data users and are beneficial in climate perspectives. However, numerous station relocations over the years has resulted in inconsistent approaches to combining multi-location data sets, resulting in disparate reporting of record and extreme values at many prominent large metropolitan observing sites. To address this challenge, the methodology for establishing multi-location combined (or threaded) station data sets under the so-called "***ThreadEx***" project is presented.

1. INTRODUCTION

In the interest of ensuring consistent reporting of climatological data, NOAA's National Climatic Data Center (NCDC), in partnership with the Northeast Regional Climate Center (NRCC), NOAA's National Weather Service/Climate Services Division (NWS/CSD), and numerous data users, has established a data set of combined (or threaded) period of record daily temperature and precipitation values at 255 NOAA published *Local Climatological Data (LCD)* locations that generally correspond to most medium- and large-sized cities in the United States. This new ThreadEx data set provides a consistent basis for the reporting of daily extremes for the longest period of time meaningful. The development of this data set is especially timely given the increasing availability of historic daily values in digital form for the first half of the 20th century (and earlier in some cases) (Kunkel *et al*., 1998; Guttman, 2002).

Many research applications rely on using a variety of homogenization techniques to account for non-climatic shifts resulting from station relocations, changes in instrument type, and variations in the time of observations (DeGaetano *et al.*, 2002). The ThreadEx project aims to report the *actual* values for a given region mapped to a given published LCD site for the express purpose of conveying general climate perspectives information. Thus, the daily values are preserved in spite of siting changes.

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2. METHODOLOGY

Threads for a given published LCD will be developed as follows. The record of a currently active station will be the starting point for a station thread. This station's current record will be used as far back in time as possible, taking precedence over a closed station's record during any periods of overlap (for Automated Surface Observing System (ASOS) locations, this period of record is generally very short – no more than 12 years). A search will be conducted to identify other weather stations in the region that can be used to extend the thread further back in time. In this process, preference will be given to Weather Service/Bureau stations over volunteer COOP stations. The thread will be extended back in time as far as possible using NOAA daily data available in digital form.

For historic overlaps, all else being equal, the station with a more recent record will take precedence, unless partner input (*e.g.*, NWS field offices, State Climatologists, *etc*.) with compelling documentation determines otherwise. An attempt will be made to fill any gaps larger than six months in a station record with data from another station. Partner input will be sought during the development of this data set through a survey.
The period of record used for each portion of a thread will be clearly denoted in the station meta-data.

An example of a station thread for the Chicago area would be:

Chicago O'Hare AP	*11/1/1958 - present*
Chicago Midway AP	*1/1/1942 - 10/31/1958*
Chicago University	*1/1/1926 - 12/31/1941*
Chicago (COOP)	*1/1/1896-12/31/1925*
Chicago (CRB)	*10/9/1871-12/31/1895*

3. DATA SET ACCESS

The threaded data will be available in two formats:

- On xmACIS (the NWS interface for climate record queries) and other systems using the ACIS database (http://www.rcc-acis.org/), the threaded data station daily values will be fully available for query; thus, all data summaries currently available in xmACIS can be applied to this data set. These stations will be clearly identified as threaded stations.

The benefit of an extended record is illustrated using

xmACIS output in Table 1. Presently, the Washington, DC record at National Airport, extends back to 1948. With ThreadEx, daily extremes will be extended back to the 1890s using pre-1948 Weather Bureau station observations, allowing climate perspectives inquiries such as determining the coldest/warmest/wettest Inauguration Day for a substantially longer period of record.

- Another data set containing summary tables for extremes will be produced. This will consist of the top 3 records per calendar day for maximum temperature (highest and lowest), minimum temperature (highest and lowest) and precipitation (highest). Metadata will consist of station information for the station fragments composing the thread. The period of analysis will consist of the earliest data available in digital form through the end of 2004.

Table 1. Sample xmACIS Output

```
WASHINGTON REAGAN NATIONAL AP (KDCA)
Extremes
Lowest Average Minimum Temperature
Days: 1/20 - 1/20
Length of period: 1 day
Years: 1948-2004

Rank  Value  Ending Date
  1    -2.0  1/20/1985
  2     8.0  1/20/1994
  3     9.0  1/20/1984
  4    16.0  1/20/1983
```

4. FUTURE DEVELOPMENT AND UPDATE

A national oversight committee will be established to oversee future updates to the Threaded Extremes Data Set. This committee will seek to include members representing the Regional Climate Centers, AASC, NCDC, NWS field offices, NWS regional offices and NWS Headquarters. This committee will also be charged with making determinations in situations where a partner requests an exception be made to the methodology outlined above.

Both the xmACIS and table derivatives of the data set will be updated on an annual basis to include calendar year updates and extension of period of record based upon digitized daily data rescued from NOAA archives and offices as they are documented (including metadata such as latitude, longitude, elevation, station/instrument and other siting characteristics, *etc*.), quality assured, and made available.

5. CONCLUSION

NOAA's commitment to excellence in climate services is punctuated by its synergies with partners in developing data feedback, quality assurance, and dissemination infrastructure. With the ThreadEx effort, maximized, consistent, updated daily extremes will be available for government, partner, and general public (especially media) use. The consistent use of such information will make clear regional extremes and lay the foundation for the expansion of this technique to additional locations and parameters.

6. REFERENCES

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Appendix C – ASOS Local Climatological Data Stations

ALASKA		
	ANC	ANCHORAGE INTL AP
	ANN	ANNETTE ISLAND AP
	BRW	BARROW POST-ROGERS AP
	BET	BETHEL AIRPORT
	BTT	BETTLES
	CDB	COLD BAY AP
	FAI	FAIRBANKS INTL AP
	GKN	GULKANA
	HOM	HOMER
	JNU	JUNEAU AP
	AKN	KING SALMON AP
	ADQ	KODIAK STATE CG BASE
	OTZ	KOTZEBUE RALPH WEIN
	MCG	MCGRATH
	OME	NOME MUNICIPAL AP
	SNP	ST PAUL ISLAND AP
	TKA	TALKEETNA
	VWS	VALDEZ
	YAK	YAKUTAT STATE AP
ALABAMA		
	BHM	BIRMINGHAM INTL AP
	HSV	HUNTSVILLE INTL AP
	MOB	MOBILE REGIONAL AP
	MGM	MONTGOMERY DANNELLY
ARKANSAS		
	FSM	FT SMITH MUNICIPL AP
	LIT	LITTLE ROCK ADAMS FD
	LZK	NORTH LITTLE ROCK
AMERICAN SAMOA		
	NSTU	TAFUNA PAGO PAGO INTL AP
ARIZONA		
	FLG	FLAGSTAFF AP
	PHX	PHOENIX INTL AP
	TUS	TUCSON INTL AP
	INW	WINSLOW AP
CALIFORNIA		
	BFL	BAKERSFIELD AP
	BIH	BISHOP AP
	EKA	EUREKA WSO CITY
	FAT	FRESNO AIR TERMINAL
	LGB	LONG BEACH AP
	CQT	LOS ANGELES DOWNTOWN AP
	LAX	LOS ANGELES INTL AP
	RDD	REDDING MUNICIPAL AP
	SAC	SACRAMENTO EXEC AR
	SAN	SAN DIEGO LINDBERGH
	SFO	SAN FRANCISCO INTL AP
	SFOC	SAN FRANCISCO CITY
	SMX	SANTA MARIA PBLC AP
	SCK	STOCKTON METRO AP
COLORADO		
	ALS	ALAMOSA BERGMAN FLD
	COS	COLORADO SPRGS MUNI
	DEN	DENVER INTL AP
	GJT	GRAND JUNCTION WLKR
	PUB	PUEBLO MEMORIAL AP
CONNECTICUT		
	BDR	BRIDGEPORT SIKORSKY
	BDL	HARTFORD BRADLEY INTL AP
DELAWARE		
	ILG	WILMINGTN NEW CASTLE
FLORIDA		
	DAB	DAYTONA BEACH INTL AP
	FMY	FORT MYERS PAGE FLD AP
	GNV	GAINESVILLE MUNI AP
	JAX	JACKSONVILLE INTL AP
	EYW	KEY WEST INTL AP
	MLB	MELBOURNE
	MIA	MIAMI INTL AP
	MCO	ORLANDO INTL AP
	PNS	PENSACOLA REGIONL AP
	TLH	TALLAHASSEE MUNI AP
	TPA	TAMPA INTL AP
	VRB	VERO BEACH MUNI AP
	PBI	W PALM BEACH INTL AP
GEORGIA		
	AHN	ATHENS MUNI AP
	ATL	ATLANTA HARTSFIELD INTL
	AGS	AUGUSTA BUSH FIELD
	CSG	COLUMBUS METRO AP
	MCN	MACON REGIONAL AP
	SAV	SAVANNAH INTL AP
GUAM		
	PGUM	GUAM INTL APRT
HAWAII		
	ITO	HILO INTL AP
	HNL	HONOLULU INTL AP
	OGG	KAHULUI AP
	LIH	LIHUE AP
IOWA		
	DSM	DES MOINES INTL AP
	DBQ	DUBUQUE MUNI AP
	SUX	SIOUX CITY MUNI AP
	ALO	WATERLOO MUNI AP
IDAHO		
	BOI	BOISE AIR TERMINAL
	LWS	LEWISTON NEZ PERCE CO. AP
	PIH	POCATELLO MUNICIPAL AP

ILLINOIS		
	ORD	CHICAGO OHARE INTL AP
	MLI	MOLINE QUAD CITY AP
	PIA	PEORIA GTR PEORIA AP
	RFD	GREATER ROCKFORD AP
	SPI	SPRINGFIELD CAPTL AP
INDIANA		
	EVV	EVANSVILLE REG AP
	FWA	FORT WAYNE INTL AP
	IND	INDIANAPOLIS INTL AP
	SBN	SOUTH BEND ST JOSEPH AP
KANSAS		
	CNK	CONCORDIA BLOSSER MUNI AP
	DDC	DODGE CITY REG AP
	GLD	GOODLAND RENNER FLD
	TOP	TOPEKA MUNI AP
	ICT	WICHITA MID-CNTNT AP
KENTUCKY		
	JKL	JACKSON J CARROLL AP
	LEX	LEXINGTON BLUEGRASS FLD
	SDF	LOUISVILLE STANDIFRD
	PAH	PADUCAH BARKLEY FLD
LOUISIANA		
	BTR	BATON ROUGE RYAN AP
	LCH	LAKE CHARLES MUNI AP
	MSY	NEW ORLEANS INTL AP
	SHV	SHREVEPORT REGIONAL AP
MASSACHUSETTS		
	BOS	BOSTON LOGAN INTL AP
	MQE	MILTON – BLUE HILL OBS
	ORH	WORCESTER MUNI AP
MARYLAND		
	BWI	BALT-WASHGTN INTL AP
MAINE		
	BGR	BANGOR INTL AP
	CAR	CARIBOU MUNI AP
	PWM	PORTLAND INTL JETPRT
MICHIGAN		
	APN	ALPENA PHELPS COL AP
	DTW	DETROIT METRO AP
	FNT	FLINT BISHOP AP
	GRR	GRAND RAPIDS INTL AP
	HTL	HOUGHTON LAKE ROSCMN AP
	LAN	LANSING CAPITAL CITY AP
	MKG	MUSKEGON CO AP
	MQT	MARQUETTE CTY AP FAA
	ANJ	SAULT STE. MARIE AP
MINNESOTA		
	DLH	DULUTH INTL AP
	INL	INTERNATL FALLS INTL AP
	MSP	MINNEAPOLIS/ST PAUL INTL
	RST	ROCHESTER INTL AP
	STC	ST CLOUD MUNI AP
MISSOURI		
	COU	COLUMBIA MUNI AP
	MCI	KANSAS CITY INTL AP
	SGF	SPRINGFIELD REG AP
	STL	ST LOUIS LAMBERT INTL
MISSISSIPPI		
	JAN	JACKSON INTL AP
	MEI	MERIDIAN KEY FLD
	TUP	TUPELO C D LEMONS AP
MONTANA		
	BIL	BILLINGS LOGAN INTL AP
	GGW	GLASGOW INTL AP
	GTF	GREAT FALLS INTL AP
	HVR	HAVRE CITY/COUNTY AP
	HLN	HELENA AP
	GPI	KALISPELL GLACIER AP
	MSO	MISSOULA JOHNSN-BELL
NORTH CAROLINA		
	AVL	ASHEVILLE REGIONL AP
	HSE	HATTERAS BILLY MITCHELL
	CLT	CHARLOTTE DOUGLAS INTL
	GSO	GREENSBORO REG AP
	EWN	NEW BERN CRAVEN CO AP
	RDU	RALEIGH DURHAM AP
	ILM	WILMINGTON NEW HANVR
NORTH DAKOTA		
	BIS	BISMARCK MUNI AP
	FAR	FARGO AP
	GFK	GRAND FORKS INTL AP
	ISN	WILLISTON SLOULIN AP
NEBRASKA		
	GRI	GRAND ISLAND AP
	LNK	LINCOLN MUNI AP
	OFK	NORFOLK STEFAN AP
	LBF	NORTH PLATTE L BRD FLD
	OMA	OMAHA EPPLEY AIRFLD
	BFF	SCOTTSBLUFF CNTY AP
	VTN	VALENTINE MILLER FLD
NEW HAMPSHIRE		
	CON	CONCORD MUNI AP
	MWN	MT. WASHINGTON
NEW JERSEY		
	ACY	ATLANTIC CITY INTL AP
	ATLN	ATLANTIC CITY MARINA
	EWR	NEWARK INTL AP
NEW MEXICO		
	ABQ	ALBUQUERQUE INTL AP
	CAO	CLAYTON MUNI ARPK
	ROW	ROSWELL INDSTRL ARPK

NEVADA		
	EKO	ELKO REGIONAL AP
	ELY	ELY YELLAND FIELD
	LAS	LAS VEGAS MCCRN INTL
	RNO	RENO CANNON INTL AP
	WMC	WINNEMUCCA MUNI AP
NEW YORK		
	ALB	ALBANY INTL AP
	BGM	BINGHAMTON LINK FLD
	BUF	BUFFALO GR BUFFLO INTL
	ISP	ISLIP L I MACARTHUR
	NYC	NEW YORK CITY R
	JFK	NEW YORK J F KENNEDY
	LGA	NEW YORK LAGUARDIA
	ROC	ROCHESTER INTL AP
	SYR	SYRACUSE HANCOCK INTL
OHIO		
	CAK	AKRON-CANTON REG AP
	CLE	CLEVELAND HOPKINS INTL
	CMH	COLUMBUS INTL AP
	CVG	CINCI-NORTHERN KY AP
	DAY	DAYTON INTL ARPT
	MFD	MANSFIELD LAHM AP
	TOL	TOLEDO EXPRESS AP
	YNG	YOUNGSTOWN MUNI AP
OKLAHOMA		
	OKC	OKLA. CITY ROGERS INTL
	TUL	TULSA INTL AP
OREGON		
	AST	ASTORIA CLATSOP AP
	BNO	BURNS MUNICIPAL AP
	EUG	EUGENE MAHLON SWEET
	MFR	MEDFORD ROUGE VLY INTL
	PDT	PENDLETON MUNICPL AP
	PDX	PORTLAND INTL AP
	SLE	SALEM MCNARY FIELD
PENNSYLVANIA		
	ABE	ALLENTOWN A-B-E INTL
	AVP	AVOCA WILKES-BARRE SCRN
	ERI	ERIE INTL AP
	MDT	MIDDLETOWN HARRISBRG
	PHL	PHILADELPHIA INTL AP
	PIT	PITTSBURGH INTL AP
	IPT	WILLIAMSPRT-LYCOMING AP
PACIFIC ISLANDS		
	PTKR	KOROR ROP
	PKWA	KWAJALEIN RMI
	PKMR	WSO MAJURO, RMI
	PTTP	WSO POHNPEI, FSM
	PTKK	CHUUK INTL APRT FSM
	PTYA	YAP INTL APRT FSM
PUERTO RICO		
	SJU	ISLA VERDE INTL AP
RHODE ISLAND		
	PVD	PROVIDENCE GREEN ST AP
SOUTH CAROLINA		
	CHS	CHARLESTON INTL ARPT
	CHLS	CHARLESTON CITY
	CAE	COLUMBIA METRO AP
	GSP	GREER GREENV'L-SPART
SOUTH DAKOTA		
	ABR	ABERDEEN REGIONAL AP
	HON	HURON REGIONAL AP
	RAP	RAPID CITY REGINL AP
	FSD	SIOUX FALLS FOSS FLD
TENNESSEE		
	TRI	BRISTOL TRI CITY AP
	CHA	CHATTANOOGA LOVELL
	TYS	KNOXVILLE MCG TYSON
	MEM	MEMPHIS INTL AP
	BNA	NASHVILLE METRO AP
	OQT	OAK RIDGE, TN
TEXAS		
	ABI	ABILENE MUNI AP
	AMA	AMARILLO INTL AP
	AUS	AUSTIN BERGSTROM INTL
	ATT	AUSTIN/CAMP MABRY ANG
	BPT	BEAUMONT/P. ARTHUR REG
	BRO	BROWNSVILLE INTL AP
	CDS	CHILDRESS MUNI AP
	CRP	CORPUS CHRISTI INTL
	DAL	DALLAS-LOVE FIELD
	DFW	DALLAS-FT WORTH AP
	DRT	DEL RIO INTL AP
	ELP	EL PASO INTL AP
	IAH	HOUSTON INT'CNTNL AP
	LBB	LUBBOCK REGIONAL AP
	MAF	MIDLAND-ODESSA INTL AP
	SJT	SAN ANGELO MATHIS FD
	SAT	SAN ANTONIO INTL AP
	VCT	VICTORIA REGIONAL AP
	ACT	WACO MADISN COOPR AP
	SPS	WICHITA FALLS MUN AP
UTAH		
	SLC	SALT LK CITY INTL AP
VIRGINIA		
	LYH	LYNCHBURG MUNI AP
	ORF	NORFOLK INTL AP
	RIC	RICHMOND BYRD AP
	ROA	ROANOKE WOODRUM AP
	WAL	WALLOPS ISLAND FLGT FAC
	DCA	WASHINGTON DC NATL AP
	IAD	WASHINGTON DC DULLES

VERMONT		
	BTV	BURLINGTON INTL AP
WASHINGTON		
	OLM	OLYMPIA AP
	UIL	QUILLAYUTE AP
	SEA	SEATTLE-TACOMA AP
	SEW	SEATTLE SAND POINT
	GEG	SPOKANE INTL AP
	YKM	YAKIMA AIR TERMINAL
WISCONSIN		
	GRB	GREEN BAY AUSTIN STR
	LSE	LA CROSSE MUNI AP
	MSN	MADISON DANE CNTY AP
	MKE	MILWAUKEE MTCHLL FLD
WEST VIRGINIA		
	BKW	BECKLEY RALEIGH AP
	CRW	CHARLESTON KNWA AP
	EKN	ELKINS RNDLPH CO AP
	HTS	HNTNGTN TRI-STATE
WYOMING		
	CPR	CASPER NATRONA CO AP
	CYS	CHEYENNE MUNI AP
	LND	LANDER HUNT FIELD
	SHR	SHERIDAN COUNTY AP

Appendix D - Request for National Climatic Extremes Committee (NCEC) Activation for Potential Extreme Events

The NOAA policy source for the following is provided at
http://www.ncdc.noaa.gov/oa/climate/monitoring/extremes/ncec.html

When the possibility that a new national climate extreme has occurred, the NCEC will consider requests for activation to evaluate and decide the validity of the event using the following procedures**.**

i. NCEC chair (NCDC) will accept direct requests for activation only from the following official requesting contacts. Observers (or reporters of automated events) can report to any one of these contacts for forwarding to NCEC except all WFO observations or WFO received reports will be forwarded through one of their NWS Regional Headquarters (c).

a) State climatologists

b) Regional Climate Center directors

c) NWS Regional Headquarters (any one of the following; Regional Climate Services Program Managers, Regional Warning Coordination Meteorologist, or Regional COOP Program Manager).

d) NWS Climate Services Division (W/OS4)

e) NWS Observing Services Division (W/OS7)

f) NCDC Data Operations Division (E/CC1)

ii. Official requesters can make activation requests by email to the NCEC chairman with cc the other NCEC members or by a telephone call to the NCEC chair. If the chair is unavailable via telephone, other NCEC members may be called. Requests should include the following information:

a) Name and affiliation of requester and address, e-mail, telephone, etc.

b) Observer or reporter name and affiliation (COOP, FAA or NWS contractor, WFO, etc.) and address, e-mail, telephone, etc.

c) Station and instrument types; COOP, ASOS, snowboards, stakes, rulers, etc.

d) Type of event being requested for evaluation as per list of existing records

e) Time of event (date, month, year, and time of day)

f) Place of event (distance and direction from known landmark, city, etc.) (e.g. 30 miles west of Sioux Falls, 2 miles south of Mt. Rushmore)

iii. Official requesters should screen the observation or report to ensure that the event falls under the charter of the NCEC's authority (i.e., a national climate record is in question as per list of existing records).

iv. Requests for NCEC activation will receive a response from the chair or backup member as soon as possible. NCEC should expedite responses to requests with "perishable" evidence such as hail or snow.

Appendix E - State Climate Extremes Committees

1. Purpose

The formation of a State Climate Extremes Committee (SCEC) addresses the consideration of potentially record-setting extreme meteorological elements observed at the statewide level. The purpose of the SCEC is to mirror the activities of the National Climatic Extremes Committee (NCEC), but for observations challenging state records, rather than national ones. It is proposed that the SCEC serve as an advisory panel that will make recommendations regarding state records to the director of the NCDC. With the agreement of the NCDC Director, such records will become officially sanctioned, and recognized by the meteorological and climatological community.

2. Scope

The SCEC is to provide counsel and a recommendation regarding the status of an observation of a meteorological element (e.g., maximum temperature) that challenges the existing, official record value for that element for a given state. If such observations also may challenge a national record, the involvement of the SCEC will be to render a recommendation regarding the state record only. The case will be forwarded and considered separately by the NCEC

While many aspects of meteorological elements may be tracked, and record extremes determined, it is felt that most of these extremes are anecdotal in nature (e.g., greatest 1-hour rainfall total) and are therefore outside the scope of the SCEC. However, based upon the meteorological elements routinely collected on a daily basis from the extensive network of official observation stations across the United States, there exists a subset of records that may readily be tracked, and for which data validation tools are available. These core records are listed in table 1, and many (marked with asterisks) correspond with the records tracked by the NCEC.

Acronyms for available networks listed in Table 1:

COOP (Cooperative Observers Network)
ASOS (Automated Surface Observing System)
CRN (Climate Reference Network)
SA (Surface Airways, pre ASOS era data)
HPN (High Density Precipitation Network)

Element	Records tracked	Available Network(s)
Surface Air Temperature	All-time max.*	COOP, ASOS, CRN, SA
	All-time min.*	do
	All-time maximum 24-h change*	do
	Monthly max. temperature	do
	Monthly min. temperature	do
	Calendar day all-time max.	do
	Calendar day all-time min.	do
Snowfall	All-time max. 24-h total*	COOP, SA
	All-time max. seasonal (Jul-Jun) total*	do
	Monthly max	do
Snow Depth	All-time max *	do
Precipitation	All-time max. 24-h total*	COOP, ASOS, HPN, SA, CRN
	Min. annual total*	do
	Max. annual total*	do
	Duration of longest dry period*	do
	Duration of longest wet period	do
	Max. monthly total	do
	Monthly max 24-h total	do
Detected Sky Condition	Max. annual number of clear days	ASOS, SA
	Max. annual number of cloudy days	ASOS, SA

* tracked by NCEC
do=”ditto”

Table 1. Statewide meteorological elements tracked by SCEC

Table 1 above does not include several elements that are tracked by NCEC. These are maximum wind gust, largest and heaviest hail, highest and lowest pressure. Additional values that are not currently considered by the SCEC may be considered in the future. Extremes of these values are maintained in the NCDC archives, but because they are not significant to many states, such extremes will not be considered by the SCEC unless they are specifically requested by the state’s SC. For example, the State Climatologist (SC) for Alaska may wish official SCEC consideration of maximum and minimum barometric pressure for Alaska. New Hampshire might desire SCEC consideration of maximum wind gust (i.e., for Mt. Washington). The SCEC reserves the right to add or remove extreme record elements from consideration, and may do so on a state by state basis or for all states.

For meteorological elements that are not tracked by the SCEC for record status, the NCDC archives remain the official source for querying state meteorological records. The SCEC makes no claim on the veracity of such data, and it should be noted that the NCDC certification given to data held by the NCDC is only a certification that a copy of the data resides in the NCDC archives. It does not certify the correctness of the data that has been obtained from the NCDC; such determinations are left to the

user of the data.

3. Composition and convening

The SCEC will be an ad hoc committee comprised of the following five voting members.

A. A representative from the Weather Forecast Office (WFO) holding jurisdiction over the station recording a potential record. The Meteorologist in charge (MIC), or the climate focal point is preferred.
B. The SC for the state in which the record is being challenged. If the state does not have an SC, the SC from a neighboring state will be asked to serve.
C. The NWS Regional Climate Services Program Manager (CSPM) for the relevant Regional Headquarters (RH). If the CSPM is not available, the Regional COOP Program Manager will be asked to serve.
D. The Regional Climatologist from the supporting Regional Climate Center (RCC)
E. The Data Quality Administrator (DQA) at the NCDC. If the DQA is not available, the NCDC National Liaison Officer will be asked to serve.

Any voting member, may at their discretion, and if their stated alternate is unavailable, appoint a temporary proxy representative to discuss and vote on their behalf. A quorum of the committee is considered to be three of the five voting members, but a quorum may not exist unless the participation of all five members has been solicited in advance and members have been given the opportunity to announce their recusal or abstention.

The committee may be called by any member, but in general, it will be expected that either the relevant WFO or the SC for the affected state will call for the committee to convene. The committee will dissolve once a recommendation has been reached regarding a challenged record value, or when the challenge has been withdrawn. Recommendations will carry with a simple majority vote. The director of the NCDC renders the final decision regarding any SCEC recommendation, and may override SCEC voting results.

It is expected that most discussion and voting of the committee will take place via either E-mail or teleconference (see Section 4). Occasionally, it may be necessary for the committee to meet in person. If the in-person meeting is to discuss a particular state record, the meeting should occur in the state in question (as a site visit may be necessary). Such a meeting should be arranged by a member based in that state. In-person meetings for reasons other than the consideration of a state record may be proposed and arranged by any member of the committee.

4. Record Recognition Process

Upon its inception, the SCEC will compile a list of the extant records listed in Table 1 for each state of the United States. These records will be reviewed to determine their validity and, if found to be acceptable, will be recommended to the NCDC Director for inclusion in the statewide records data set.

Thereafter, the challenge of an SCEC officially recognized statewide record is expected to follow the following guidelines:

A. If the WFO or the SC thinks a statewide record may have been set, a representative from the WFO or SC office (preferably the WFO) should visit the site of the record within 2 days of notification of the record and take the following action.
    i. Test equipment to ensure proper working order.
    ii. Examine and describe exposure and take pictures.

B. After the site visit, the WFO MIC or SC should send an E-mail to all members of the SCEC (see Section 3) informing them of a challenge to the record. Information/photos from the site visit should be attached to the E-mail.

C. At this point, the WFO should transmit a preliminary Record Event Report (RER). The RER should clearly indicate that the record is under review, and final determination will be forthcoming.

D. Once the WFO MIC or SC sends the initial E-mail, the CSPM should set up a teleconference call that includes all members of the SCEC.
    i. The teleconference should take place no later than 5 business days after the E-mail from the WFO MIC or SC is received.
    ii. If any member of the SCEC is unavailable during those 5 business days, they should notify the committee of their absence. They may provide input via E-mail, but their vote would either be abstained, or cast by their alternate or other proxy acceptable to the committee.

E. Each SCEC member will review the validity of the proposed record value, using all tools available to them, prior to the teleconference. They should be prepared to discuss and vote on the validity of the record during the conference call.

F. The SCEC will vote for or against recommending to the director of the NCDC that the record be updated. A simple majority will carry the vote.

G. The director of the NCDC will be informed of the challenge to the record, and will be given the recommendation of the SCEC. The director, or their officially designated proxy, will render an official decision on the record. The decision of the NCDC Director will be final

In General, only meteorological observations from weather stations that are recognized by the National Oceanic and Atmospheric Administration (NOAA) as official stations, and which have been assigned a registration number (e.g., COOP ID, WBAN, NCDC) will be considered for record status. However, if a record observation is recorded from a site that does not meet the above requirements, it is the responsibility of the SCEC to determine the validity of the observation. Additionally, upon establishment of a new record value, the data will reside in the official archives of weather data that is maintained by the NCDC.

Due to the more frequent nature of daily temperature records (especially during a period of extreme weather when multiple daily records may be broken), teleconference calls may be difficult to arrange. In the case of a daily temperature record, the committee may conduct all business, including voting, via E-mail, and may allow the WFO to defer a site visit if not practicable and if the station has been visited within the past year.

5. Erroneous records

If upon future examination, it comes to the attention of a member of the SCEC that an officially recognized statewide record may be in error or otherwise invalid, that member of the SCEC should send an E-mail to the committee, informing them of the questionable record, and including documentation in support of the challenge. The challenging member should then invite all members to a teleconference, where the record will be discussed and a recommendation to the NCDC Director voted upon.

If a challenge to the validity of an existing official statewide record is made by someone outside the committee structure, the challenge should be directed toward the relevant WFO, who will review the challenge and, if the evidence warrants it, forward the challenge to the committee as per the steps outlined in the previous paragraph. If the NCDC Director determines that a record value should be changed, they may order the change without involving the SCEC.

6. Public visibility

NCDC, State Climatologists, and/or the American Association of State Climatologists may wish to publish a table of state records and/or post them on the web. The table may include the officially sanctioned record values, the date on which the records were set, and the stations at which they were set. Web postings may also describe the SCEC mission, the records it tracks, and the steps for reporting potential records or challenging existing records.