OZARK WEATHER OBSERVER

NATIONAL WEATHER SERVICE - SPRINGFIELD, MO

Vol. 6 No. 1 November 2001

NEW WIND CHILL INDEX

by Andy Foster

Summer heat will be replaced by winter cold before you know it. Although the winter season is enjoyed by many, extreme cold is a big danger during the winter months in Missouri. Prolonged exposure to the cold can cause frostbite, hypothermia, or in extreme cases, death. In fact, excessive cold is one of the leading weather-related causes of death in the state. Since 1990, 117 lives have been lost due to extreme cold in Missouri.

WINTER WEATHER AWARENESS DAY:
November 14, 2001

Frostbite occurs when the skin becomes cold enough to actually freeze. A loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the nose are symptoms of frostbite.

Hypothermia (Low Body Temperature) can occur during longer periods of exposure when the body temperature drops below 95F. A person will become disorientated, confused, and shiver uncontrollably, eventually leading to drowsiness and apparent exhaustion. In severe cases, death is possible.

One of the gravest dangers of winter weather is wind chill. The wind chill is based on the rate of heat loss from exposed skin by combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

The wind chill shows how cold the wind makes exposed flesh feel and is a good way to determine the threat of frostbite or hypothermia. Remember, wind chill temperatures apply only to people and other living things. The wind chill factor does not apply to non-living objects.

The NWS will implement a replacement Wind Chill Temperature (WCT) index for the 2001/2002 winter season. The reason for the change is to improve upon the current WCT Index used by the NWS which is currently based on a formula developed in 1945.

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62

For a color image that relates wind chill to frostbite times, see the following Internet site: http://205.156.54.206/om/windchill/

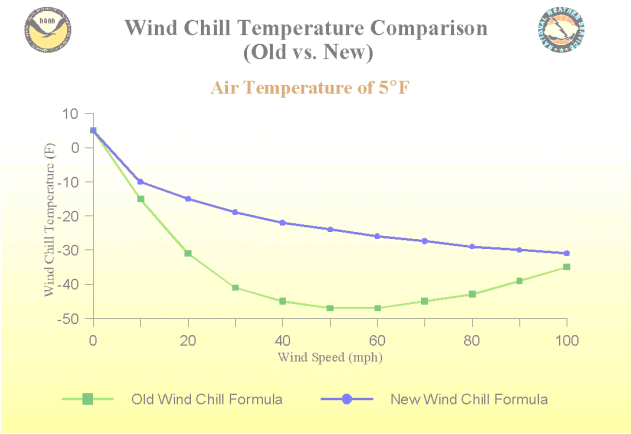
The goal is to upgrade and standardize the WCT index. Standardization of the WCT Index among the meteorological community is important, so that an accurate and consistent measure is provided and public safety is ensured.

The new formula will make use of advances in science, technology, and computer modeling to provide a more accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures. In addition, clinical trials have been conducted and the results of those trials have been used to verify and improve the accuracy of the new formula. Specifically, the new WCT index will:

- Use wind speed calculated at the average height (5 ft.) of the human body's face instead of 33 ft. (the standard anemometer height)
- Be based on a human face mode
- Incorporate modern heat transfer theory (heat loss from the body to its surroundings, during cold and breezy/windy days)
- Lower the calm wind threshold to 3 mph
- Use a consistent standard for skin tissue resistance
- Assume the worst case scenario for solar

radiation (clear night sky).

Below is a comparison between the old (bottom) and new (top) index.



Based on the new criteria, a wind chill advisory will be issued for anticipated readings at and below -10 degrees, and a wind chill warning for readings at and below -25 degrees.

Winter Weather Observations

by Paul Murphy and Larry Dooley

The days have already become noticeably shorter and the past several mornings brought cooler temperatures to the area. Fall arrived on the 23nd of September, with winter not far behind. With the winter season comes the challenge of making an accurate measurement of the days precipitation. During the winter season, mother nature will sometimes produce just about every type of precipitation conceivable in just a matter of hours. For the observer recording this type of an event, reasonable care must be taken to obtain a measurement representative of the conditions. The measurement of liquid precipitation is relatively easy. However, when rain and snow are mixed the job offers more of a challenge, both in the amount of snow that has fallen and the water equivalent of the snow. Sleet is often another type of winter precipitation received in the Ozarks and believe it or not thunderstorms with snow occur. The last of the difficult situations to handle comes in the form of freezing precipitation which is common during the early winter months.

The following document was developed by the National Weather Service for Cooperative Observers. Please take a few minutes and review this guide before the snow season begins. If you have any questions, you may contact your CPM Team at 1-800-762-4363. Team members include Paul Murphy, Larry Dooley and Gene Hatch. If these members are not available you may leave us a message and we will return your call or the question may be answered by other staff members.

Snow Measurement Guidelines for National Weather Service Cooperative Observers

by

U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Preface

Snowfall and snow depth and their water equivalent are some of the most difficult, but important, weather elements to measure in an accurate, consistent manner. Snow has a profound effect on the national economy. Large snowstorms can paralyze large metropolitan areas and even isolate entire regions for days, affecting millions of people and resulting in loss of lives and billions of dollars. On the other hand, winter recreational activities that depend on snow generate tens of billions of dollars of revenue and melting western-mountain snowpacks provide beneficial moisture for human and agricultural consumption during the summer.

Effective use of snow data can result in more efficient decision making that affects many sectors of our economy, and in the process, saves millions of dollars. Snow data are used by a wide variety of users, including National Weather Service (NWS) weather and hydrologic forecasters, climate-change researchers, water-resource managers, construction engineers, plow operators, airport managers, winter resort managers, farmers, among many others.

Given the increasing importance of snowfall and snow depth measurements for the diverse applications noted above, there has been a commensurate increase in the concern for the accuracy and consistency of these measurements that make up the “official” national data base. Additionally, as NWS modernization progresses and airport snow observations cease at some locations, other observing options are required (e.g.,

the cooperative observers network) to preserve climate records and enhance local operational support.

This booklet was prepared by the NWS Office of Meteorology for use by NWS cooperative weather observers. In addition to clarifying previously existing documentation on snow measurement, these guidelines extend (as an option) the standard frequency of four measurements a day (one every 6 hours) from manned NWS stations to the volunteer networks. The NWS strongly encourages adherence to these guidelines for all climatological snow observations to improve the consistency and quality of snowfall data.

Snow Measurement Guidelines

Introduction:

The following guidelines were developed from previously existing National Weather Service (NWS) procedures, Federal interagency standards, and input from a broad array of expertise from climatologists, snow specialists, weather observers, and data users that was collected at a conference co-sponsored by the NWS and Colorado State University (CSU) in September 1996. The guidelines are intended to be used as a supplement for NWS Guide WS TA B-0-26 (appendix A). Some of the materials have been extracted from "The Snow Booklet" by Nolan J. Doesken and Arthur Judson, CSU, 1996.

It is essential for all observers to understand the importance of taking standard measurements in the prescribed consistent manner. Inconsistent observing and reporting methods result in incompatible data that can result in profoundly incorrect differences between stations and observers.

Each Season Before the First Snow Falls:

Review these instructions for measuring snow. It is easy to forget what needs to be measured, especially in those parts of the country where snow falls infrequently.

At the beginning of each snowfall/freezing season, remove the funnel and inner measuring tube of the 8-inch manual rain gauge to expose the 8-inch diameter overflow can so that it can more accurately catch frozen precipitation. Put your snowboard(s) out and mark its location with a flag or some other indicator so it can be found after a new snowfall. The snowboard should be located in the vicinity of your station in an open location (not under trees, obstructions, or on the north side of structures in the shadows).

Check your gauge to make sure there are no leaks. If there are leaks, take appropriate action. Once your equipment has been readied for winter, you are prepared for taking snowfall measurements.

Observers should determine and record three values when reporting solid precipitation. They are:

Snowfall: Measure the snowfall (snow, sleet, or snow pellets) since the previous snowfall observation,
Snow depth: Determine the total depth of snow on the ground at the normal observation time, and
Water equivalent: Measure the water equivalent of snowfall since the previous day's observation.

1. Snowfall:

Measure the greatest amount of snowfall that has accumulated on your snowboard (wooden deck or ground if board is not available) since the previous snowfall observation. This measurement should be taken minimally once-a-day (but can be taken up to four times a day, see note below) and should reflect the greatest accumulation of new snow observed (in inches and tenths, for example, 3.9 inches) since the last snowfall observation. If you are not available to watch snow accumulation at all times of the day and night, use your best estimate, based on a measurement of snowfall at the scheduled time of observation along with knowledge of what took place during the past 24 hours. If you are not present to witness the greatest snow accumulation, input may be obtained from other people who were near the station during the snow event. If your observation is not based on a measurement, record in your remarks that the "snow amount based on estimate." Remember, you want to report the greatest accumulation since the last observation. **If snowfall occurred several times during the period, and each snowfall melted either completely or in part before the next snowfall, record the total of the greatest snowdepths of each event** and enter in your remarks "snowfall melted during the OBS period." For example, three separate snow squalls affect your station during your 24-hour reporting day, say 3.0, 2.2, and 1.5 inches. The snow from each event melts off before the next accumulation and no snow is on the ground at your scheduled time of observation. The total snowfall for that reporting 24-hour day is the sum of the three separate snow squalls, 6.7 inches, even though the snow depth on your board at observation

time was zero.

Snow often melts as it lands. **If snow continually melts as it lands and the accumulation never reaches 0.1 inches on your measuring surface, record the snowfall as a trace (T),** and record in your remarks that the "snow melted as it landed."

It is essential to measure snowfall (and snow depth) in locations where the effects of blowing and drifting are minimized. Finding a good location where snow accumulates uniformly simplifies all other aspects of the observation and reduces the numerous opportunities for error. In open areas where windblown snow cannot be avoided, several measurements may often be necessary to obtain an average depth. The measurements should not include the largest drifts. In heavily forested locations, try to find an exposed clearing in the trees. Measurements beneath trees are inaccurate because large amounts of snow can accumulate on trees and never reach the ground.

If your daily schedule permits, you may wish to make a snowfall observation every 6 hours, beginning with your regularly scheduled time of observation. This procedure is followed by Weather Service Forecast Offices. Follow the same rules for a once-a-day observation; the snow accumulation reported will be the greatest for the previous 6 hours instead of 24 hours. If you take your observations at this frequency, **make sure that you clear your snowboard (or other measuring surface) no more than once every 6 hours.** Record the frequency of observations during the day in the comments section of your report. **Never add more than four 6-hourly observations to determine your 24-hour snowfall total.** If you add more than four observations, it will inappropriately inflate the snowfall total.

Freezing rain (glaze ice) should never be reported as snowfall. This precipitation type is liquid precipitation and should be reported as such.

2. Snow Depth:

Determine the total depth of snow, sleet, or ice on the ground. This observation is taken once a day at the scheduled time of observation with a measuring stick. It is taken by measuring the total depth of snow on exposed ground at a permanently mounted snow stake or by taking the average of several depth readings at or near the normal point of observation with a measuring stick. When using a measuring stick, make sure the stick is pushed vertically into the snow until the bottom of the stick rests on the ground. Do not mistake an ice layer or crusted snow as "ground." **The measurement should reflect the average depth of snow, sleet, and glaze ice on the ground at your usual measurement site (not disturbed by human activities). Measurements should not be taken from rooftops, paved areas, etc.**

Note: Even though the depth of hail (usually associated with spring, summer, or fall thunderstorms) at observation time is also reported in the same manner as snow depth, make sure you record in your remarks that the "accumulation on ground is from hail."

Report snow depth to the nearest whole inch, rounding up when one-half inch increments are reached (example 0.4 inches gets reported as a trace (T), 3.5 inches gets reported as 4 inches). Frequently, in hilly or mountainous terrain, you will be faced with the situation where no snow is observed on south-facing slopes while snow, possibly deep, remains in shaded or north-facing areas. Under these circumstances, you should use good judgment to visually average and then measure snow depths in exposed areas within several hundred yards surrounding the weather station. For example, if half the exposed ground is bare and half is covered with 6 inches of snow, the snow depth should be entered as the average of the two readings, or 3 inches. When, in your judgment, less than 50 percent of the exposed ground is covered by snow, even though the covered areas have a significant depth, the snow depth should be recorded as a trace (T). When no snow or ice is on the ground in exposed areas (snow may be present in surrounding forested or otherwise protected areas), record a "0."

When strong winds have blown the snow, take several measurements where the snow was least affected by drifting and average them. If most exposed areas are either blown free of snow while others have drifts, again try to combine visual averaging with measurements to make your estimate.

3. Water Equivalent:

Measure the water equivalent of snowfall since the previous day's observation. This measurement is

taken once a day at your specified time of observation. Melt the contents of your gauge (by bringing it inside your home or adding a measured amount of warm water) and then pour the liquid into the funnel and smaller inner measuring tube and measure the amount to the nearest .01 inch just as you use for measuring rainfall (use the NWS-provided measuring stick). Do not measure the melted precipitation directly in the large 8-inch outer cylinder. Make sure the inner measuring tube cannot fall over when pouring the liquid back into it. If the melted water equivalent (including any added warm water) exceeds 2 inches and cannot fit into the measuring tube all at one time, empty the full measuring tube and pour the remaining liquid from the large 8-inch outer cylinder into the emptied measuring tube. Add and record the water equivalent of the multiple measurements. If you added warm water to the gauge to melt the snow, make sure you accurately measure the amount of warm water added before pouring it into the gauge. Then, when you take your liquid measurement, subtract the amount of warm water added from the total liquid measurement to get your final liquid water equivalent of the snowfall.

As winds increase, gauges collect less and less of the precipitation that actually falls. Generally speaking, the stronger the wind and the drier the snow, the less is captured in the gauge. If you notice that less snow is in the gauge than accumulated on the ground, you should first empty any existing snow from inside the 8-inch cylinder, then use it to take a snow sample, sometimes referred to as "take a core" or "cut a biscuit" from your snow board with the 8-inch overflow can. Melt the biscuit of snow, pour the liquid into the small measuring tube to measure the water equivalent.

Hydrologic Changes for the Springfield Hydrologic Service Area

by David Cissell

Several changes will go into effect beginning November 15. Some changes will refer to hydrology product headers, while other changes refer to the situation why a particular product was issued. A summary is listed below:

ID	OLD PRODUCT **NEW PRODUCT**
ESF	Flood potential outlook (ESF) Water supply outlook (ESS) **Hydrologic outlook**
FFA	Flood watch (FFA) Flash flood watch (FFA) **Flood watch**
FFW	Flash flood warning (FFW) **Flash flood warning**
FFS	Flash flood statement (FFS) **Flash flood statement**
FLW	Flood warning (FLW) **Flood warning**
FLS	Flood statement (FLS) Urban/small stream flood advisory (FFS) **Flood statement**
RVS	River statement (RVS) River rec. statement (RVR) River ice statement (RVI) Misc. river product (RVM) **Hydrologic statement**
RVA	River summary (RVA) **hydrologic summary**

A **HYDROLOGIC OUTLOOK (ESF)** will be issued when flooding is possible beyond 36 hours. If flooding does not materialize, another ESF will be issued explaining the situation.

A **FLOOD WATCH (FFA)** will be issued when flooding or flash flooding is possible within 36 hours.

A **FLASH FLOOD WARNING (FFW)** will be issued when flooding is imminent, and endangers life & property within 6 hours

A **FLASH FLOOD STATEMENT (FFS)** will be issued to supplement information in a flash flood warning. IT WILL ALSO BE USED TO CANCEL A FLASH FLOOD WARNING.

A **FLOOD WARNING (FLW)** will be issued for flooding expected greater than 6 hours beyond the time of issuance. This may be issued for RIVER FORECAST POINTS, AREAS ALONG

RIVERS, AND FOR COUNTIES.

A **FLOOD STATEMENT (FLS)** will be issued to supplement information on "flood watches and warnings". It may also be used to highlight elevated stream/river flows, ponding of water in urban areas. IT WILL ALSO BE USED TO CANCEL OR EXPIRE A FLOOD WATCH / WARNING and is used for small stream flooding lasting for more than 6 hours.

A **HYDROLOGIC STATEMENT (RVS)** will be issued to discuss significant rises in river stages or lake levels

A **HYDROLOGIC SUMMARY (RVA)** will be issued to discuss river stages, lake levels, and precipitation amounts

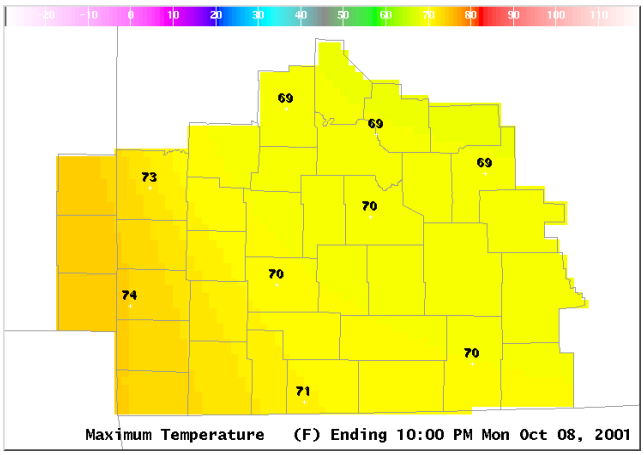
A **DAILY RIVER SUMMARY (RVD)** will be issued for river levels, changes and forecasts

New Software Allows NWS to Generate Graphical Forecasts

by Megan Terry

A new component of the National Weather Service Automated Weather Interactive Processing System (AWIPS) now allows forecasters to generate graphical forecasts of temperature, precipitation, sky cover and wind.

Through the use of digital and graphical editors, forecasters can interact with meteorological databases to generate graphical forecasts for daily maximum and minimum temperature for 7 days, chance of precipitation out to 4 days, precipitation and sky cover out 54 hours into the future, wind speed and direction out to 36 hours into the future, and dewpoint temperature, which gives an indication of how much moisture is in the air, out to 54 hours.



The experimental forecast graphics can be viewed through our Internet site at: http://www.crh.noaa.gov/sgf

Summer 2001: Warm and Dry For Many Areas Across the U.S. Near Normal for the Ozarks

by Gene Hatch

Much of the nation experienced above normal temperatures and below normal rainfall during the summer season of 2001. Overall, the U.S. recorded the fifth warmest summer on record from 1895 to present.

For the Springfield area, in the heart of the Ozarks, the summer was typical at best. Areas experienced above normal temperatures for brief periods, but overall temperatures were near normal for the entire season. The summer season of 2001 in the Springfield CWA tied with the 21st warmest summer since 1895.

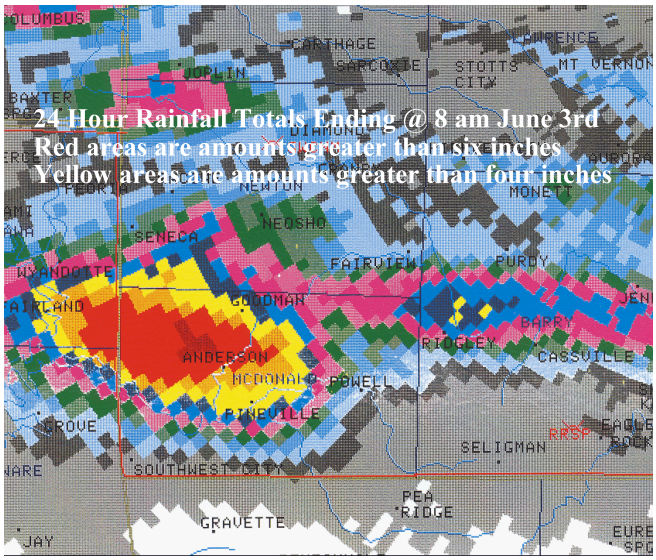
Rainfall amounts were above normal for the Springfield area. However, much of the rain that fell was isolated or hit and miss thunderstorms. Few organized systems moved through the region during the summer months. Springfield received 5.24" of above normal rainfall during the summer months. In comparison, Joplin received a seasonal rainfall that was near 1" below normal. Summer normals for both locations are 11.52" and 12.44", respectively.

While the rainfall amounts were above normal for Springfield, the amount was only in the top 30 as far as rankings. Springfield had the 18th wettest summer on record. In all respects for the region, the overall summer season was not very remarkable save for a few isolated events.

Severe Weather Summer 2001

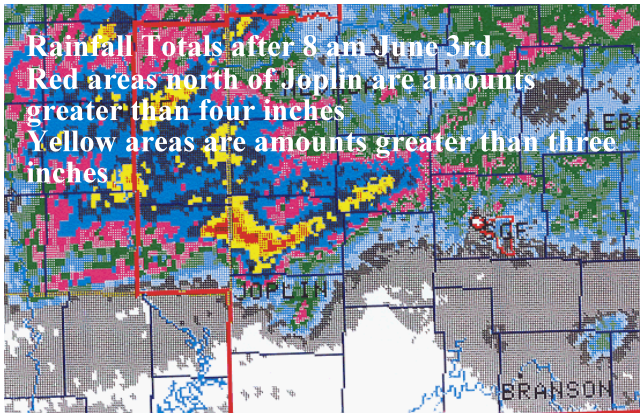
by James Taggart

There were two significant weather events that happened over the last three months. The first event occurred during the morning and early afternoon of June 3rd. It was associated with a strong disturbance which caused significant flooding in southwest Missouri, especially over McDonald County which had nearly 8 inches of rainfall in less than 3 hours.



For a color image, please see our Internet site at: http://www.crh.noaa.gov/sgf

The rainfall caused nearly three quarters of a million dollars in damage to numerous roadways, homes, cars, businesses and recreational facilities. Portions of Jasper County received between three and six inches of rainfall between 7 and 11 am. Rescue officials reported nearly 2 ½ feet of flowing water around the Joplin area by noontime. The St. Johns Regional Medical Center parking lot in Joplin had flowing water up to car windows during the height of the storm. The flood water slowly subsided during the late afternoon, but local officials estimated that it would take weeks to repair the numerous washed out railroad beds and roadways near Anderson.



For a color image, please see our Internet site at: http://www.crh.noaa.gov/sgf

The other significant event occurred during the afternoon of June 26th when a tornado was reported near the Springfield Branson Regional Airport. Although tornadoes are a rare event in the Ozarks, it's extremely rare for the National Weather Service Office to actually observe a tornado right outside their door! Although it did not cause any damage, the tornado was observed by both the employees at the National Weather Service, and the FAA control tower for approximately 10 minutes before it dissipated in a field northwest of the airport. As the tornado collapsed, it produced an outflow boundary which caused a 60 mph wind gust at the National Weather Service Office.

How to Contact Us

Our Mailing Address is:
National Weather Service
Springfield-Branson Regional Airport
5805 West Highway EE
Springfield, MO 65802-8400

E-mail address is:
W-SGF.Webmaster@noaa.gov

Our phone numbers are:
(417) 869-4491 (public forecast line)
(417) 864-8535 (media line - unlisted)
1-800-762-4363 (cooperative observers, severe weather, and CWIP reports)

Visit NWS Springfield on the Internet at:
http://www.crh.noaa.gov/sgf