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ARM Facilities Newsletter

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Winter Weather Outlook

The official weather outlook for the upcoming winter season — from the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center — is for a winter very similar to last year's. Without the influence of the El Niño southern oscillation (ENSO), winter weather patterns will be variable.

The absence of the El Niño and La Niña climate patterns allows other climate factors to prevail. Two factors are the Arctic oscillation, which controls the numbers of cold air outbreaks in the South and Nor'easters on the East Coast, and the Madden-Julian oscillation, which influences the number of heavy rain storms and floods in the Pacific Northwest.

National Weather Service (NWS) forecasters use improved technology to predict exactly how these climate factors will affect the nation's winter weather extremes. Forecasters are expecting large temperature and precipitation swings across the nation this winter, with wet and mild weather specifically for the Southern Great Plains states.

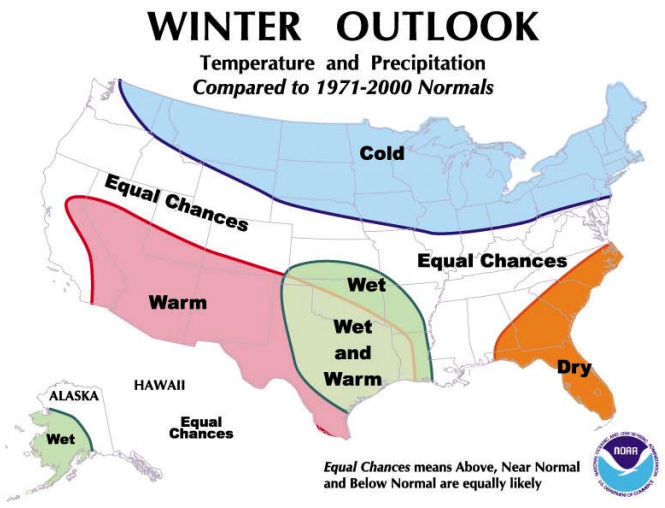

Figure 1. The Climate Prediction Center's weather outlook for winter 2001-2002 (NOAA).

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One improvement to be implemented this year by the NWS is a new formula for computing

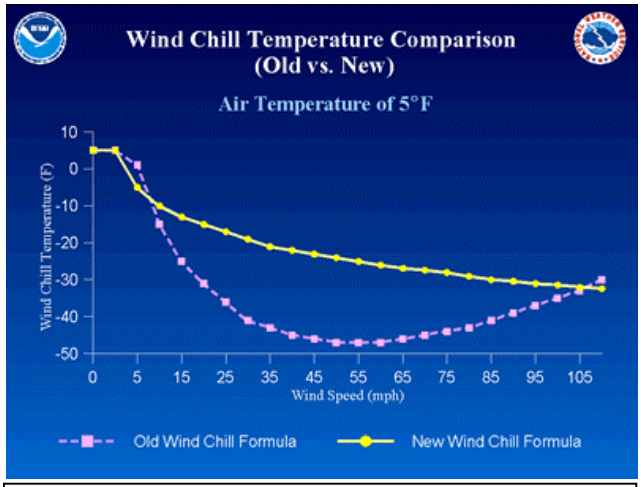

Figure 2. A comparison of results for the new wind chill formula versus the old method (NOAA).

wind chill temperatures. The new formula is the result of work done by scientists from the academic sector and from the U.S. and Canadian governments. The year-long project produced a more accurate method for determining wind chill values and frostbite danger. Details of the new wind chill index include the following:

1. Use of calculated wind speed at an average height of five feet above the ground, which is the typical location of an adult human face, instead of at the height of the anemometer, which is usually 33 feet above the ground.
2. Use of a human face as the modeled target.
3. Incorporation of modern heat transfer theory to model heat loss from the body and its surroundings on cold, windy days.
4. A decrease in the calm wind threshold to three miles per hour.
5. Incorporation of a consistent standard for skin tissue resistance.
6. Assumption of no effect from the sun, yielding a more accurate index for a clear night sky.

The previous wind chill method, in use by the NWS since 1973, was based on theories derived by Antarctic explorers in 1945. The new formula makes use of advances in science, technology, and computer modeling to provide more accurate, understandable, and useful calculations of the dangers due to the combination of winter winds and freezing temperatures. For example, the new wind chill index will yield specific time-to-frostbite warnings. The graph in Figure 2 shows how the new wind chill temperature calculation differs from the old.

One goal of the NWS is to protect lives by giving the public more accurate knowledge about the dangers posed by winter weather. Wind chill reports are issued hourly when weather conditions warrant.

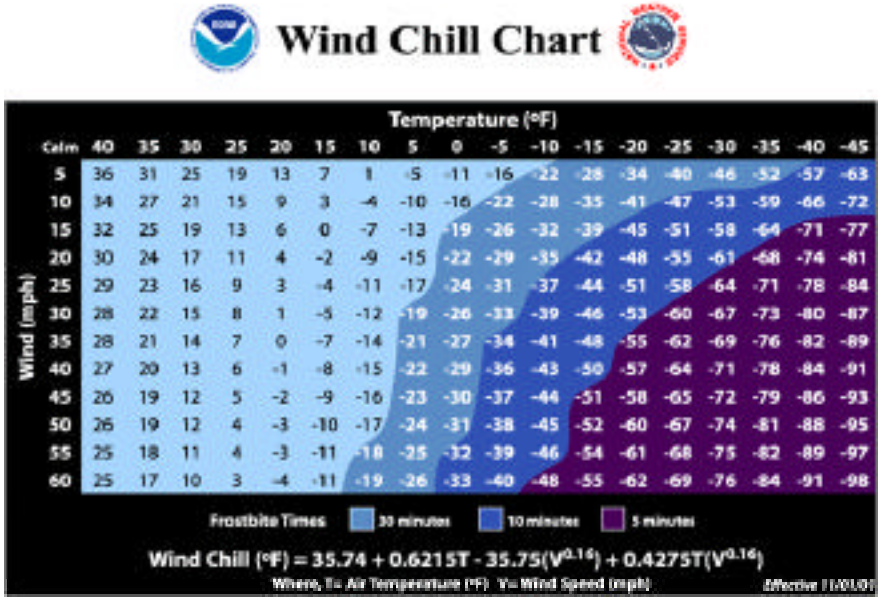

Figure 3. The new wind chill chart, based on the newly implemented wind chill temperature index formula (NOAA).