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### NF96-265 Tornado Safety

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## Tornado Safety

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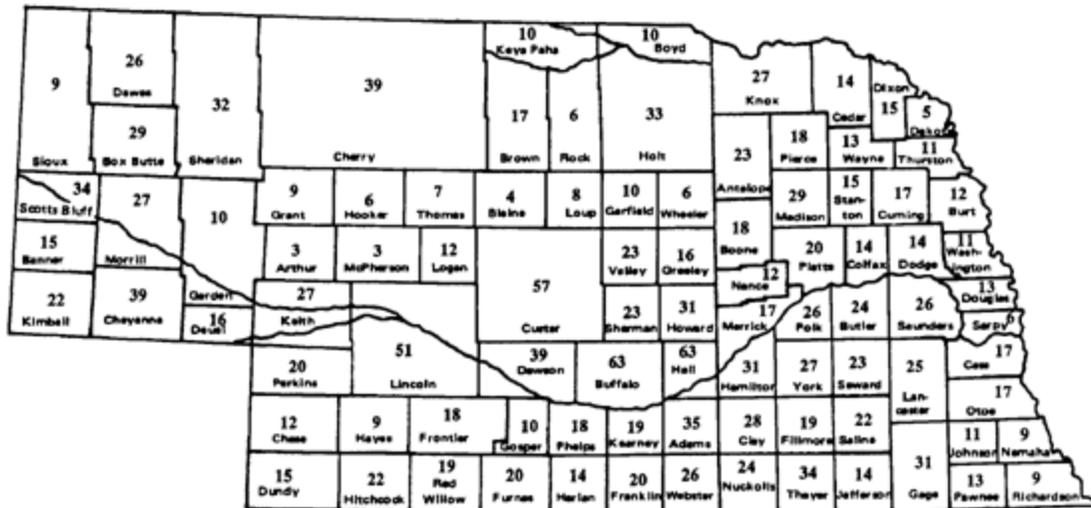
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Tornadoes can be deadly. New technology has greatly improved warning systems, so that scientists now can see wind movement inside a cloud, making it possible to alert the public to possible tornadic activity before the tornado is ever visible. Although this additional lead-time makes tornado survival more likely, during bad weather you always should be alert and tune in for up-to-date weather information. If a tornado strikes, there is no substitute for well-made plans for taking emergency shelter, whether at home, work, or school.

### Tornado Statistics

Tornadoes occur in many parts of the world. However, because of its unique geography, three-fourths of the world's tornadoes occur in the U.S. These violent storms occur most frequently in the Great Plains during the spring and early summer.

Tornadoes have occurred in every county in Nebraska. For some reason currently unknown to scientists, the Buffalo-Hall County area seems prone to tornado-related weather. Both of those counties have reported 63 tornado sightings from 1950-1993 (*Figure 1*).



**Figure 1. Number of tornadoes sighted in each Nebraska county from 1950 to 1993 (Source: Department of Geography, UNL).**

Tornadoes occur most frequently during the late afternoon and early evening hours, largely due to increased instability in the atmosphere. Instability results from rapidly rising air, often the result of intense heating at the earth's surface on warm afternoons. After sunset, air near the earth's surface begins to cool, restoring atmospheric stability and reducing the threat of tornado occurrence.

Any time unseasonably warm and humid conditions exist, the possibility of tornadoes increases. Monitoring television and radio weather bulletins and watching the sky for approaching thunderstorms are two ways to keep abreast of weather conditions.

Tornadoes are classified based on a scale of comparative force. The "F" scale is used for this purpose.

F <sub>0</sub>	40 - 72 mph	"light damage"
F <sub>1</sub>	73 - 112 mph	"moderate damage"
F <sub>2</sub>	113 - 157 mph	"considerable damage"
F <sub>3</sub>	158 - 206 mph	"severe damage"
F <sub>4</sub>	207 - 261 mph	"devastating damage"
F <sub>5</sub>	262 - 318 mph	"incredible damage"

### Tornado Variability

Most tornadoes that occur are classified in the three lower categories (F<sub>0</sub>, F<sub>1</sub>, or F<sub>2</sub>). It should be emphasized that all tornadoes are potentially deadly, no matter what their category.

Tornadoes generally move from west to east, and most frequently travel southwest to northeast. The exact path of any tornado is extremely unpredictable. Tornadoes usually move along the ground at about 30 mph; however, some tornadoes will only move along at 5-10 mph, while others will race at more than 50 mph.

Because of the diversity of their movement and the speeds at which they move, tornadoes demand alertness, especially after a warning has been issued for your area. Refrain from driving to locate family or friends. Make phone calls to notify those who may have missed the tornado warning broadcast, but keep an alert eye on the sky.

## **Tornado Identification**

Violent storms associated with strong cold fronts or intense surface heating (particularly on days with high humidity) can spawn a tornado. Tornadoes often form near the area of strongest updraft, usually the southwest corner of a thunderstorm. Quite often a tornado will form out of a "wall cloud," an isolated lowering of the cloud base. If the wall cloud is rotating (observed by watching cloud movement), there is a strong possibility of tornadic development. Hail also is common before a tornado.

Once a funnel is sighted, take shelter immediately. Keep in mind, however, that a newly formed tornado is not always visible to the observer. It is only after the tornado has picked up enough dust and debris that it becomes visible. Also remember that tornadoes can advance upon you within a few minutes and other funnels can spawn directly overhead.

Tornadoes may "mature" in a classic fashion, but be aware that violent storms can produce more than one tornado. It is important to have a good view of the entire sky to avoid being surprised by another funnel that was obscured behind a ridge, buildings or a row of trees.

Any time you are observing a storm, be alert to the potential of being struck by lightning. Lightning has accounted for 38 percent of all weather-related deaths from 1940-1991 (compared to 26 percent for tornadoes). Standing near a tree or house that projects above the landscape during violent weather puts you at risk of being in a deadly path of lightning discharge. Any vertical projection, especially metal structures, can readily attract a fatal electrical current.

Tornadoes occur in all parts of Nebraska. Therefore, it is important to have a tornado plan and review it annually. If changes in a community warning system have occurred or a better shelter is now available nearby, take advantage of the new opportunities.

## **What Can Be Done to Prepare?**

### ***Before the storm:***

- Develop an emergency storm plan for all family members whether at home, work, school, or outdoors.
- Teach children the name of their county and neighboring counties; storm alerts are given by county name.
- Keep highway maps in several convenient locations to follow storm movements given by weather bulletins.

- Conduct frequent storm drills.
- Have an NOAA Weather Radio with a battery back-up and warning alarm to receive warnings.
- Listen to radio or watch TV for weather updates.
- If your activity is outdoors, listen to the latest forecasts and take necessary precautions, possibly delaying activities until the threat of danger is long past.

***If a tornado warning is issued:***

- Move to a previously designated safe area, preferably a basement.
- If an underground shelter is not available, move to an interior room or hallway on the lowest floor. A bathroom without windows usually offers good protection (plumbing inside the walls provides strength). An interior closet is another good choice. Crouching under a sturdy desk or rugged furniture is advisable if they are located near a central wall. Place pillows or blankets over your head and upper body for extra protection, as most tornado fatalities are due to head injuries as a result of flying debris.
- Stay away from doors and windows; flying glass is one of the leading causes of tornado injuries.
- Do not try to outrun a tornado in your car. Instead, leave the car immediately. If caught outside or in a vehicle, get out and lie flat in a nearby ditch or depression.

***If a tornado strikes, watch out for fallen power lines. Stay out of damaged areas until power is disconnected to avoid accidental shock.***

**Basic Steps for Developing a Family Tornado Disaster Plan**

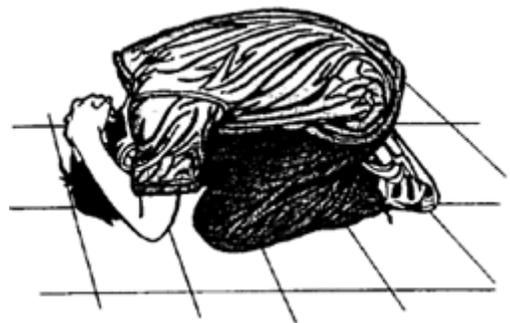
1. Find out if your community has tornado warning sirens.
2. Have a family meeting to identify the safest areas in your home to go for shelter should severe weather strike.
3. Practice emergency drills.
  - Ask questions to make sure each family member remembers the meeting place;
  - assemble in the assigned tornado shelter;
  - post emergency phone numbers and safety rules by the telephone, and
  - teach children how and when to call 911 or the local emergency medical service number.
4. Always look for ways to improve your plan. For example:
  - install fire extinguishers and teach family members how to use them;

- teach family members how and when to turn off water, gas, and electricity;
  - review basic safety measures (consider taking a course or refresher course in CPR and first aid classes); and
  - assemble a disaster supplies kit that includes first aid supplies, a flashlight, nonperishable food items, and fresh water (replace stored water every six months). These items are best stored in sturdy, easy-to-carry containers such as backpacks or duffel bags. **DO NOT** use candles and matches (following a tornado, natural gas lines may be open).
5. Protect valuable records.
- Maintain a safety-deposit box for family and business papers that cannot be replaced;
  - review specific wind and flood damage protection provided by your insurance policy;
  - prepare records that will help verify losses for insurance, tax or federal disaster declarations.

## **Basic Steps for Developing a School Tornado Disaster Plan**

*(Hospitals, nursing homes and other institutions should develop similar plans.)*

1. Assign responsibility for activating the severe weather plan. This includes continually monitoring severe weather with NOAA Weather Radio and local radio/TV.
2. If the primary power for the school's alarm is electricity, provide a charged-battery backup or have a compressed air horn or megaphone to activate the alarm during power outages.
3. Each school structure should be inspected and tornado shelter areas designated by a registered engineer or architect. Schools without basements should use interior rooms and hallways on the lowest floor and away from windows.
4. Move students quickly into interior rooms or hallways on the lowest floor. Have them assume the tornado protection position (*Figure 2*).
5. Be keenly aware of special circumstances at your school that may need your immediate attention (for example, students with disabilities and students who may be housed in portable classrooms).
6. Conduct frequent storm drills.
7. Make sure several leaders know how to turn off electricity and gas in the event the school is damaged.
8. Auditoriums, cafeterias, gymnasiums or other structures with wide, free-span roofs offer no protection from tornado-strength winds. Lunches, classes, or assemblies in these areas should be delayed if severe weather is anticipated.



**Figure 2. Take the correct position if in danger of a tornado.**

9. Keep children at school beyond regular hours if threatening weather is expected. Children are safer at school than in a bus or car. Students should not be sent home early if severe weather is approaching.

## **Tornado Safety Locations**

### ***Homes with basements***

Seek refuge near the basement wall in the most sheltered and deepest below-ground part of the basement. Beneath basement stairs, or under heavy furniture or a workbench is a good refuge.

### ***Homes without basements***

Take cover in the smallest room with stout walls. An interior closet or a bathroom without windows provides good cover (plumbing within the walls provides good support). Under heavy furniture, or a tipped-over, sturdy upholstered couch or chair near the center of the house is a good option. The first floor is safer than the second or third. Don't take time to open or close windows; get away from them and go to a safe area immediately. Construction of a storm cellar is particularly advisable for homes without basements.

### ***Mobile homes and modular buildings***

Abandon mobile homes. Arrange for the use of a convenient safe area in advance, should violent weather occur. Consider basements, a storm cellar, the ground floor of a sturdy structure or a nearby culvert or deep ditch.

### ***Factories, auditoriums and other large buildings with wide, free-span roofs***

These buildings are particularly vulnerable to tornadic wind damage due to the large roof expanse upon which wind forces act and the distance between roof-supporting walls. Basements of these buildings offer reasonably good protection. Smaller interior rooms at ground level or nearby sturdy buildings are options, depending on their construction and the urgency for shelter.

Pre-select and mark designated safe areas. Hold tornado safety drills. Train building employees to direct occupants to designated safe areas. Trained spotters should assume their posts when conditions become threatening.

### ***Office Buildings***

The basement or an interior hallway on a lower floor of an office building is safest. Upper stories are unsafe. If there is not time to reach one of the lower floors, a small room with stout walls (closet or bathroom) or an inside hallway provides some protection against flying debris. Otherwise, getting under heavy furniture must do.

Select and mark designated safe areas in office buildings. Train building employees to direct the occupants to designated safe areas.

**The Difference Between a Tornado Watch and a Tornado Warning**

**TORNADO WATCH...** Weather conditions are right for the formation of tornadoes. Remain alert for approaching storms. Listen to NOAA Weather Radio, commercial radio or watch TV for weather information.

**TORNADO WARNING...** A tornado has been sighted or indicated by weather radar. If you are in the path of the storm, move to a previously designated safe area.

Tornado watches and warnings are issued as soon as the conditions are identified. Use the available time, once you note a warning, to prepare for one of nature's most destructive storms. Stay informed about the approaching storm.

Sometimes tornadoes develop so rapidly that advance warning is not possible. Remain alert for signs of an approaching tornado.

***Acknowledgments:***

This information was adapted from a University of Arkansas Cooperative Extension Service factsheet entitled *Tornado Safety* by N. Skiles and Gary Huitink, University of Arkansas, Little Rock, AK.

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***File NF265 under: SAFETY***

***D-1, General***

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