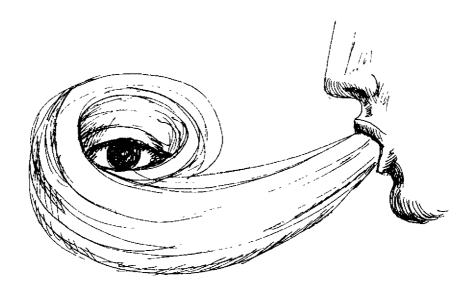
# **HURRICANES**



A family of four Zorks (Zorks never produce more than two offspring) decided it was a good time for a vacation. Mr. Zork had earned two weeks off from work and the two little Zorks were out of school for the summer vacation. It was August.

"Where should we go?" asked Mrs. Zork. The Zorks believed in democracy, so the topic was open for discussion.

"The Grand Canyon!"

"China!"

""Yosemite!"

"Hold it!" shouted Mr. Zork. "Why don't we keep it sensible. Let's go where we can fish and swim and relax and play."

After some discussion of the topic, everyone voted to go to the coast. Mrs. Zork made a list of things to pack for the trip. After all, they would not have the conveniences of home for two weeks. Her list looked something like this:

Bottled water (Mrs. Zork was thrifty and kept plastic bottles)

Extra clothes

Canned food (all of their favorite kinds)

Can opener

Some fruit to munch on

Flashlight (and extra batteries)

Matches and candles

Tea and cakes

Radio with extra batteries (so they could listen to music. Zorks love music)

Things to do (cards, books, games and so on)

With everything packed, and the car filled with gasoline, the Zorks were off. It took about 7 hours to get to the coast from their house, so they left early in the morning, when it was still dark. After about 5 hours of driving, a startling announce-

ment came on the radio; the U.S. Weather Service's information-collecting instruments had located a storm brewing in the Gulf.

"Stay tuned for further information on Hurricane Zelda."

The youngest, most curious Zork asked his father, "Who is Hurricane Zelda?" Mr. Zork read a lot, and so he answered, in the curious clipped manner of a Zork:

Beware of that temporary calm. On the other side of that eye is the second half of the storm. Coming from the opposite direction, it hits without warning; it does not build in intensity as the critical onslaught did. So, "don't count your calms before they storm."

"A hurricane is a cyclonic wind,

moving at a speed of 74 miles per hour or more. Its center, or eye, with a diameter of from 7 to 20 miles, is a spiral of low pressure, a place of calm, where winds blow lazily and skies are clear. Around this core, the air moves at terrifying speeds of up to 200 miles an hour. The earth's spin sets hurricanes in the northern hemisphere whirling in a counterclockwise direction; and in the southern hemisphere, in a clockwise direction. Heavy rains accompany the winds. We give them names of women because old prejudices die hard, I guess."

"Where do they come from?" asked the other little Zork.

"Hurricanes need vast stretches of ocean, heated to at least 82° F., as a breeding ground. The hot, humid air is forced into a spiraling motion by a wind disturbance; the rising hot air sucks in more air, which, cooling as it rises, gives off great energy. This increases the speed of the upward-rising mass, more air is sucked in, more condensation occurs, releasing still more energy. Feeding upon itself, and upon the ocean, the young hurricane is picked up by a wind force, and is on its way."

"Where and when do hurricanes occur?"

"Hurricanes have predictable targets. Born in the warm seas of the Caribbean, the Gulf of Mexico, the tropic and sub-tropic North Atlantic Ocean, they favor latitudes around the equator, and strike at the western shores of the North Atlantic, the shores around the North and South Pacific, the eastern seaboard of the United States, and at the rim of the Indian Oceans. They don't often swing far inland."

Mr. Zork added, "I remember in 1955, Hurricane Diane killed 184 people and destroyed \$500 million worth of property. Hurricane Audrey in 1957 killed 4,000 people."

"Wow," shouted the youngest Zork, "that sounds like a lot."

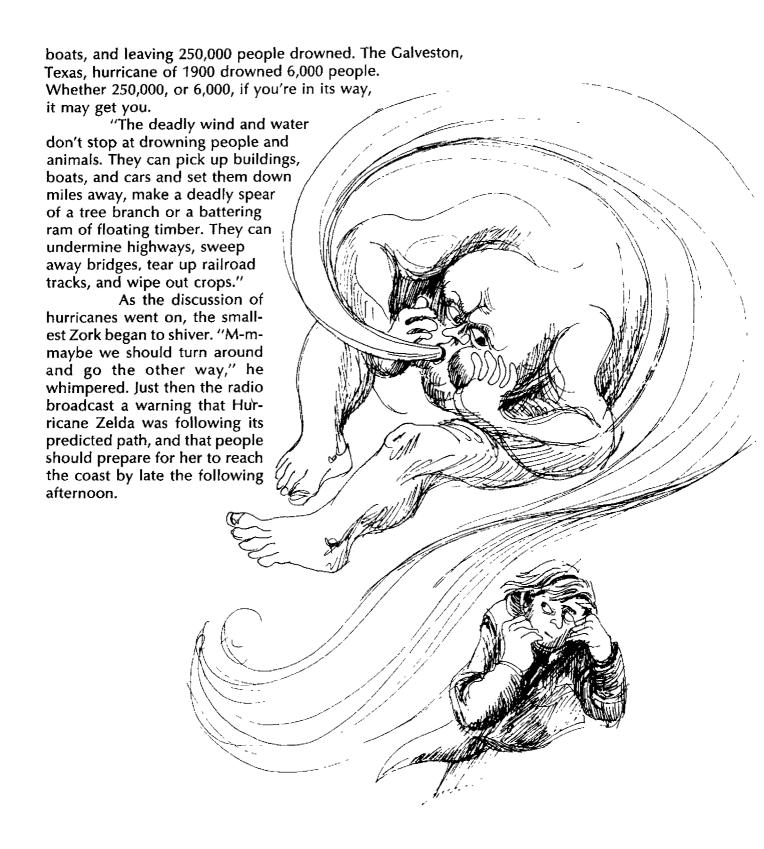
Mr. Zork continued, "It's an ill wind that blows nobody good." Hurricanes are indeed ill winds. Their power is sobering. Taking in and converting to energy a quarter of a million tons of water every second, the average hurricane generates a force equal to 500,000 atom bombs of the Nagasaki type.

"Compared with the 10 million tons of water a major nuclear explosion is capable of lifting into the sky,

In 1570 a Mongol emperor sent an invasion fleet to conquer Japan, which seemed an easy task because the Japanese were vastly outnumbered. But just before the emperor's ships reached Japan, cyclonic winds came and wrecked them. The Japanese believed the gods had sent the storm to save them and called them "kamikaze," which means "divine wind." (During World War II they named their suicide planes kamikazes, hoping these desperate sacrifices might save them as the great wind once did.)

consider that a recorded hurricane over Puerto Rico dumped  $2\frac{1}{2}$  billion tons of water in a few hours—and that was only a fraction of its total outpouring.

"We breathe sighs of relief," Mr. Zork continued, "when some of the 40-odd hurricanes which form in a year swing polewards and dissipate over the cool water in their paths. But what of the hurricane that is not deflected from the land? Water is a hurricane's most destructive force; and the simplest, perhaps the likeliest thing it can do is drown you. In New England in 1635, the tide rose 14 feet at Narragansett and drowned eight Indians fleeing their wigwams. In 1737, a hurricane—or 'cyclone' as it's known there—hurled a 40-foot wave across the Bay of Bengal, destroying 20,000



"I wish we'd gone to Disneyland," said the littlest Zork.

"Don't carp," said his mother. "Let's thank goodness for technology. What if we had no radio to hear the news? At least now we can turn back in time. At home we'll be safe from the hurricane."

Mr. Zork contemplated aloud, "We are partially prepared now for disaster. We have provisions to last a week or so; but we don't have shelter; a car is very poor protection in a hurricane. We did secure our house before we left; and I put away the garden furniture and toys."

"I suppose if we lived in hurricane country we would need a plan," added Mrs. Zork.

"Yes, like the ones the civil defense agency sends us in the mail."

The Zorks spent the trip home playing the game of "what if?" They thought up some rules for coping with the possibility of hurricanes; Zorks being sensible, the rules are, too. Here they are:

### **Food and Emergency Items**

Have an adequate supply of food and emergency equipment on hand at all times; at the first hint of an impending hurricane, check supplies. You should have: Enough canned food to last 4 or 5 days; and a can opener.

Emergency light and cooking equipment; fuel to keep them running.

Batteries for the radio. Don't be cut off from the source of information.

Dry ice (not essential) to keep things cold if the power is cut off.

Matches and candles or kerosene lamps.

#### Water

Drinking water is of prime importance. You need enough for the duration of the hurricane, perhaps 2 or 3 days, plus a sufficient amount to cover any subsequent shortage due to broken water mains or contamination. Fill the bathtub and any other usable containers (plastic bottles, etc.) with drinking water. Having checked the minimum essential supplies necessary to keep you alive and well during the hurricane, set about making your home and surroundings safe.

### **Safety Precautions**

Remember that the most harmless object left lying around in a hurricane can become a deadly weapon in the grip of the wind. Put away children's toys and garden furniture. Secure the garbage can and the lid. Board windows, making sure to keep them a little ajar in order to equalize pressure. Otherwise they might explode as a result of the enormous suction power of the hurricane.

Empty the swimming pool if you have time, otherwise you may find it dumped in your living room. Make sure the car is full of gas, in case you have to evacuate, but put it away safely from the storm.

If you live in a mobile home, lash it down securely with cables and anchors. Anchoring should be on a permanent basis. You can get the details by requesting DCPA Technical Report TR-75, "Protecting Mobile Homes from High Winds."

Lash your boat securely. Or, as they do in the Bahamas in a hurricane, remove the engine and temporarily sink the boat. Securely moored, it's very safe under the water.

### **Final Safety Precautions**

Before the hurricane strikes, turn off water and follow utility advice on what to do about service lines. This way you can use water already in the pipes without fear of contamination. Board up the doors. Go to more secure shelter if so advised.

#### Comfort

Make sure you have something to help you through the anxious hours ahead. Fill thermos flasks with tea or coffee. Have things to do: read, play cards, knit. Keep a log; this will be a confined situation, and you will be bored before it's over. Once the hurricane is upon you, stay indoors.

### **Keeping in Touch**

Radio stations have a superb record of staying on the air during a hurricane. If you've done your part by making sure you have a battery-operated radio, and the batteries to run it, you will know how the storm is progressing; pay attention to the radio bulletins; if it is advised that you leave your area, leave as directed, and go where you're told to go. Otherwise, sit tight, listen, and follow instructions. Then you'll know when the storm is over, and the danger past.

#### **Terms**

Small-craft warning: When a hurricane moves within a few hundred miles of the coast, advisories warn small-craft operators to take precautions.

Gale warning: Winds of 38-55 m.p.h. (33-48 knots) are expected. Storm warning. Winds of 55-74 m.p.h. (48-64 knots) are expected.





Meanwhile, back on the Person's farm, Marvin the pig began to educate his good friend Ralph the pig on the subject of floods:

"I suppose when most people think of floods," said Marvin, "they envision dams breaking, rivers rising, heavy rains swelling lakes and streams.

"I picture something quite different. A couple of years ago I met "Boom-Boom," a rosy-cheeked child of about 2½ years. She was dressed in a pink-checked dress, and smiled a secret smile. She was very quiet and seemed to have developed that quality all mothers hope for in their children; she had learned to keep busy without having to cop all the adult attention.

"Boom-Boom's mother brought her over one afternoon, and the smiling one disappeared for something like an hour before we wondered idly where she was.

"We found out soon enough.

"She had been busily turning on faucets and plugging up drains.

"When I think of a flood, I always picture opening the bathroom door that afternoon, and Boom-Boom's smiling face as we were washed down the stairs."

Marvin then continued: "Community preparedness is a crucial factor in dealing with floods. Perhaps we should establish a task force to keep a close watch on smiling children, but I suspect that isn't what the authorities have in mind when they talk about preparedness. Whether the flood happens every season and the community expects it, or if it's a sudden flash flood, an adequate warning and evacuation system is essential. If you live in a flood area, heed warnings, and be prepared to move out fast if you have to.

"People have become recently more aware and appreciative of the value of plant life in preventing floods and saving the soil," Marvin went on. "Plant life acts as a sponge to soak up water. People used to go around stripping trees and foliage off the land, and then were surprised when floods eroded the bare soil. Now that we know trees and plants help to prevent certain kinds of floods, and help hold the soil in place, we can save ourselves some agony by making sure that industries and private landowners don't go around pulling up trees and foliage indiscriminately.

"But floods happen anyway," he continued. "Mountain snows slowly melt and trickle down until the water level rises above the river banks. A fierce, dense rain can produce flood levels in a very few hours. That's why everyone should know what a *forecast river height* means: How far is your property above or below anticipated flood levels? How far is it from the flood water?

"Where are the safe areas? Some communities have flood mapping programs: this means that information on safe areas is available to you. If your community doesn't have such a program, you might want to organize one."

Marvin then rummaged around in the trough, and came up with the following list of precautions:

## Before a Flood Happens

- Always keep fuel in your car. If electric power is cut off, gasoline pumps may not operate.
- Stockpile enough food and water to keep you and your family and pets for 3 or 4 days at least. Store food that doesn't need to be cooked, and a can opener.

- 3 Keep a battery-operated radio so you'll know what's happening, a flashlight with extra batteries, matches, blankets, and candles.
- 4 Keep a first aid kit.

All these things are necessary in case you have to evacuate.

### When You Receive a Flood Warning

- 1 If you're told officially to evacuate, follow the directions.
- If you don't have to evacuate, fill available containers with water, including the bathtub. Water supplies often are contaminated by floods, so you may have to rely on what you have on hand. You can use water in toilet tanks in emergencies. Shut off water at the mains before flood waters rise so that contaminated water won't back up into your supply.
- Dry ice will keep your refrigerator and freezer cold if there is no electricity. If you don't open your freezer or refrigerator at all, the food inside will be safe for a minimum of 2 days.
- Books, games, cards or anything to keep everyone from sitting and staring at one another for several days are all nice to have.

## **During the Flood**

- Stay indoors. If you must go out, or find yourself trapped outside, go to high ground.
- Don't drive over flooded roads, especially where they cross overflowing streams and rivers. Currents are often strong, and cars and people get swept away.



#### After the Flood

- Don't use water or foods which have come in contact with flood waters. They could be contaminated.
- 2 Unless officially advised that water supplies are safe, boil water until the supply has been tested. To be safe, bring water to a rolling boil for 10-15 minutes.
- If you need medical aid, food, shelter or clothes, go to the nearest Red Cross station.
- Don't go to disaster areas unless you have some real help to offer. Sightseers are like the rest of the debris—they're in the way and have to be moved.
- Use your head in unfamiliar situations. Don't look for gas leaks with a lighted match; gas explodes. Don't handle wet electrical equipment; you could get electrocuted. Don't use the telephone unless you have a genuine emergency to report. The lines will be needed for emergency traffic.
- Try to clear away mud and wreckage around your home and areas close to you. Maybe you can offer some shelter, comfort, or food to those in worse shape than you are.

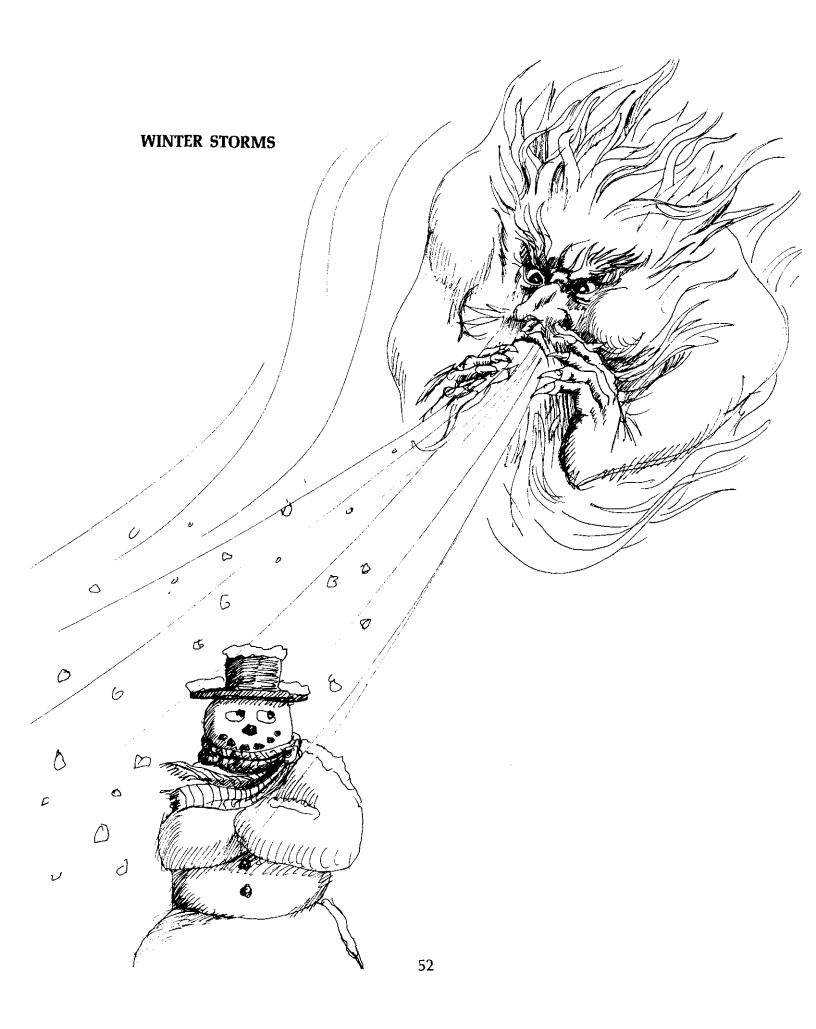
After digesting all that, Ralph was feeling a little hungry. He generally felt a little hungry—but Marvin wouldn't let him start rooting around until he fed him a little more kernels of information concerning floods.

"How else are you going to grow up smart, and go to market?" asked Marvin. "A flood can happen anywhere," Marvin reminded Ralph, "but there are some areas of the United States which are flooded almost every year, at about the same dates. And there are other places with a continuing flood potential, as when a community is built below a dam. If you live in an area where the possibility of flooding exists, you can find out whether or not you are protected. Are there dam codes? Are they adequate? Are they complied with? Does your community have an adequate flood warning system?

"Sometimes it's hard to find out," Marvin continued, "whether gaps exist in any program of protection. But many programs have vocal, often political, critics. Check out the details at the City Hall. Begin with the local civil defense office.

"One often hears that a tragedy 'never should have happened'," Marvin noted sadly. "Translated, that means human ignorance and human apathy were at least as much to blame as natural forces. Then again, human apathy and ignorance may be natural forces too."

Ralph shivered a little when the thunder rumbled, but each time he looked at Marvin and remembered all the comforting facts he had just heard. He grunted, took a nice, leisurely roll in the mud, and snuffled up some more corn. A pig's life is not a bad one, he decided, yawning contentedly—especially when the farm is on nice high ground!



### Sanderella: A Feary Tale

A long time ago in a land of snow and ice there lived a young woman named Sanderella. Sanderella's mother and father died and she was homeless and penniless, so it was arranged that she was to go live with her nasty stepmother and her two steppy uglisters. They had hearts as cold as a *blizzard*, which is a storm defined by the U.S. Weather Service as having winds of at least 32 m.p.h., temperatures well below freezing, and visibilities reduced by snow to 500 ft. or less.

Sanderella was treated like a slave, and forced to do the bidding of her wealthy step-relations. She cooked and cleaned, swept and sewed, etc., etc.

One day Sanderella came upstairs from her dingy basement quarters to find the house in a state of excitement. An invitation had been received from the Royal Palace. The two uglisters were chattering gleefully.

"A masked ball! Just think of it," cried Flora, the elder. "Whatever shall I wear?"

"Whatever you wear you would still be a fright," answered Flossie, the younger, sweetly. "The only important question is, how should I wear my hair?"

Sandy approached the uglisters hesitantly. "May I go too?" she stammered. Flora and Flossie whirled on poor Sanderella like snow squalls. Snow squalls are brief, intense falls of snow and are comparable to summer rain showers. They are accompanied by gusty surface winds.

"Just who do you think you are, you poor, mousie scullery maid, to embarrass this house by going to a Royal ball? You must be dreaming," sniffed Flossie.

"You are going to spend all your time between now and the day of the ball fixing our hair and sewing new gowns for us," added Flora.

But the nasties were wrong. For a winter storm was gathering over the land. Because Sanderella was good and pure, she was assigned a godmother with a meteorology degree, and this godmother dropped in on Sanderella a few days later, as Sanderella was hemming a bow for Flora's dress.

"Sanderella," said her godmother sweetly, "I have news for you. There is to be a winter storm here soon. Guess what kind it is to be."

"Listen, Godmother," said Sanderella testily, "I'm not ready to play quiz games with you this afternoon. I have to finish this dress, and besides, I don't know that much about winter storms."

"Are you interested in learning?" asked the godmother.

"Not in the least," said Sanderella, "but thanks anyway."

"Excellent," said the godmother, "We will begin with freezing rain. Freezing rain is rain which occurs when temperatures are below freezing. The moisture freezes on impact, causing a coating of ice on all exposed surfaces. Freezing rain or drizzle is called an *ice storm* when a substantial

glaze layer accumulates. (In some parts of the country, ice storms are called "silver thaws.")

"Sleet is frozen rain drops (ice pellets) which bounce on surface impact. Sleet does not stick to objects, but in sufficient depth can cause dangerous driving conditions.

"The U.S. Weather Service issues heavy snow warnings in areas where a large accumulation is expected. This term usually is used in a forecast when a fall of 4 inches or more is expected in a 12-hour period, or when a fall of 6 inches or more is expected in a 24-hour period.

"Blowing and drifting snow generally occur together and result from strong winds and falling snow or loose snow on the ground. Drifting snow is a term used in forecasts to warn that strong winds will blow falling or loose snow into sizeable drifts. In the Northern Plains, the combination of blowing and drifting snow, after a large snowfall has ended, is often called a ground blizzard."

"A cold wave warning indicates an expected rapid fall in temperature within a 24-hour period which will require special protection for agricultural, industrial, commercial, and social activities. This warning is an alert to the public that an expected cold wave will require greater than normal protection measures."

"Something people often don't realize, Sandy," said the godmother, "is that a very strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower, combined with a calm atmosphere. For instance, if the temperature outside is 20° F., and the air is calm, the wind chill factor is nothing; but if the temperature is 20° F., and the wind is blowing at 30 m.p.h., the effect on your body is the same as if the temperature were minus 18° F. A strong wind can make any temperature 'chilling'."

"Why are you telling me all this, Godmother?" asked Sanderella.

"Because, my dear, you have enormous feet, so I think you will have to make an impression on the Prince another way. Now listen carefully."

## Winter Storm Safety Rules

"There is to be a blizzard the night of the ball. Make yourself a nice little dress and go to the ball. I will tell you how to save the kingdom from the blizzard:

- 1 Listen to and heed the latest Weather Service warnings and bulletins on radio and television.
- 2 Check battery-powered equipment, emergency cooking facilities, and flashlights before the storm arrives so you won't be without heat or light.
- Check your supply of heating fuel, because fuel carriers may not be able to move if the storm buries your area in snow.
- Stock an extra food supply. Include food that needs no cooking or cooling in case of power failure. The food in your freezer and refrigerator is safe from spoilage for a minimum of 2 days if you don't open your refrigerator or freezer at all.
- Prevent fire hazards by preventing your stove, heater or furnace from overheating. Don't leave a fireplace unattended.
- Stay indoors during cold snaps and storms unless you are in top physical condition. If you must go out, don't over-exert. Particularly, don't kill yourself shoveling snow. If you're out of shape, it can bring on a heart attack, a comon cause of death during and after winter storms.

- If outdoors, dress in loose-fitting, lightweight, warm clothes in several layers, because you can remove layers to prevent perspiring and subsequent chill, and layers trap warm air close to your body.

  Outer clothes should be tightly woven, water-repellant, and hooded. Cover your mouth to ensure warm breathing and to protect your lungs from extreme cold.
- 8 Get your family's car winterized before the storm season. Keep water out of the fuel by keeping the tank filled.

## If You Must Travel Any Distance By Car

1 Have your family take care of everything on this checklist before you leave:

ignition system
battery
lights
snow tires installed
cooling system
fuel system
lubrication
exhaust system

extra gas in portable safety can

heater
brakes
wiper blades
defroster
tire chains and tow chains
antifreeze
winter-grade oil
flares



- 2 If the storm tests your limits, seek refuge immediately.
- 3 Select alternate routes to travel in case your preferred route isn't passable.
- 4 Listen to and heed latest weather information.
- Try not to travel alone; two or three people are better because they can help one another. Travel with another car if you can.
- Always fill your gas tank before entering open country, even for a short distance. You are less likely that way to run out of gas and be stranded, or to be unable to heat your car by running the motor if you are stranded.

- 7 Drive defensively.
- Carry a winter-storm car kit: Blankets or sleeping bags to keep you warm, matches and candles for light, an empty 1-lb. coffee can with plastic cover to use as a toilet, facial tissue and paper towels, extra clothes, high-calorie nonperishable food, a compass and road maps, a knife, first aid kit, shovel, sack of sand in case you get stuck, flashlight or signal light, a windshield scraper, booster cables, two tow chains, a fire extinguisher, a catalytic heater, and an axe.

### If a Blizzard Traps You

- Avoid overexertion and exposure. Strenuous acts like pushing your car, shoveling snow, and so on can cause a heart attack in extreme weather conditions.
- Stay in your car. Disorientation happens fast in blowing snow, and you are sheltered and more likely to be found in your car.
- 3 Don't panic.
- Keep fresh air in your car. Freezing wet and wind-driven snow can seal the passenger compartment and suffocate you. Keep the *downwind* window open, when you run the motor and the heater.
- To avoid freezing, exercise by clapping hands and moving arms and legs vigorously from time to time. Don't stay long in one position.
- 6 Turn on dome light at night to make the car visible.
- 7 Keep watch. Don't allow all the people in the car to sleep at once, or all of you may freeze to death.

#### Rural Residents—How To Protect Livestock

Large numbers of livestock are killed in blizzards. For humane and also economic reasons, stockmen should:

- Move livestock, especially the young, into sheltered areas. Shelter belts, properly oriented and laid out, are better protection for range cattle than shed-type shelters, which may cause cattle to overcrowd, with consequent overheating and respiratory disorders.
- Haul extra feed to feeding areas before the storm arrives. Length of storm is the greatest determinant of livestock loss; if the storm lasts over 48 hours, emergency feed methods are required.
- Autopsies of cattle killed by winter storms show the cause of death to be dehydration, not cold or suffocation. Because cattle cannot lick enough snow to quench their thirst, stockmen should use heaters in water tanks to provide livestock with water and feed after long exposure to winter storm conditions.

"Now, Godmother," sighed Sanderella, "I know why you are telling me all this, but do I have to remember all of it?"

"Silly girl," answered the godmother, "It should be plain to you by now, that by paying attention, and *learning*, you'll be able to escape your obnoxious situation at home. Make preparations for the storm now, and you will save the kingdom. On your

way to the ball, your winter-storm car kit will save the Prince, whom you will find on the road in a stalled car. Your other preparations will save the kingdom from freezing and starvation."

"Godmother," said Sanderella, "how am 1 to know you're for real?"

Godmother ignored the remark, and went on with her feary tale:

"Sanderella," she said, "the unprepared don't do well in a winter storm. In 1966, blizzards hit from New England to Virginia, and the cold extended southward all the way to central Georgia. The storm caused more than 50 deaths and marooned thousands of people."

"The great Chicago storm of 1967 snarled the entire city for days. No transportation was available, and the snow deepened so quickly, commuters were stuck all along the roads. Thousands abandoned their cars and took shelter anywhere they could. People were trapped all over the city. Many couldn't make it home for two days or longer. More than 45 deaths were attributed to the storm. Oh, it was a mess."

"Okay," said Sandy, "I see the point. I will do exactly as you say."

For days, Sanderella made careful preparation for the storm, checking equipment and gathering materials. The night of the ball, Sanderella got dressed, and as she prepared to leave the house, Flora and Flossie appeared. "Where do you think you're going?" they shrieked.

"To the ball," answered Sandy, "and unless you know winter storm survival rules, I'd stay home if I were you."

Of course they didn't listen to her, but set out on foot for the royal palace, and were never seen again.

Sanderella climbed into her car; and, driving carefully, happened upon the Prince in his marooned auto. She knew right away that he was her Prince, because he looked marooned, just like the godmother had said he would.

"Here I am," said Sanderella.

"And who are you?" asked the Prince.

"I have come to save you with my winter-storm car kit," answered Sander-ella, "and your whole kingdom from destruction by the storm."

So the Prince married Sanderella, who then went about the kingdom dispensing tedious lectures on winter storms.

