FEMA-196/September 1990

Risks and Hazards

A State by State Guide

Disaster: A Fact of Life

Every year, disasters strike cities, towns and rural communities throughout the United States. People are killed or seriously injured. Lives are disrupted, and property damage runs into the billions.

When a disaster occurs, you need to know how to protect yourself and your family. Being aware of the kinds of hazards that could threaten your community—and knowing what to do about them—can mean the difference between life and death.

This booklet can help. It was prepared by the Federal Emergency Management Agency (FEMA) to help you become more aware of hazards and threats that could affect your state. In addition to the *simplified* map depictions of hazard data, the booklet includes information on how you can prepare for disasters and what you can do if a disaster strikes. It is *not* meant, however, to be a substitute for the precise geographical and risk data and detailed information about preparedness for your locality that can be obtained *only* from your local civil defense or emergency preparedness office.

In Case of Disaster

If a disaster does occur, your local government and disaster relief organizations will respond and try to help you. But *you* need to be prepared as well. Local officials could be overwhelmed immediately after a major disaster and might not be able to respond to your needs for hours, days, or in the event of attack, even longer. Self-help in such

situations could represent the first line of defense for you and your family. That's why you should be prepared to be self-sufficient for at least 72 hours in case an emergency hits your community.

How to Use this Booklet

On the following pages you'll find national and state-by-state maps illustrating some common hazards—snow and extreme cold, floods, dams, hurricanes, tornadoes, earthquakes, tsunamis and volcanoes—plus nuclear power plants and potential targets in a nuclear attack.

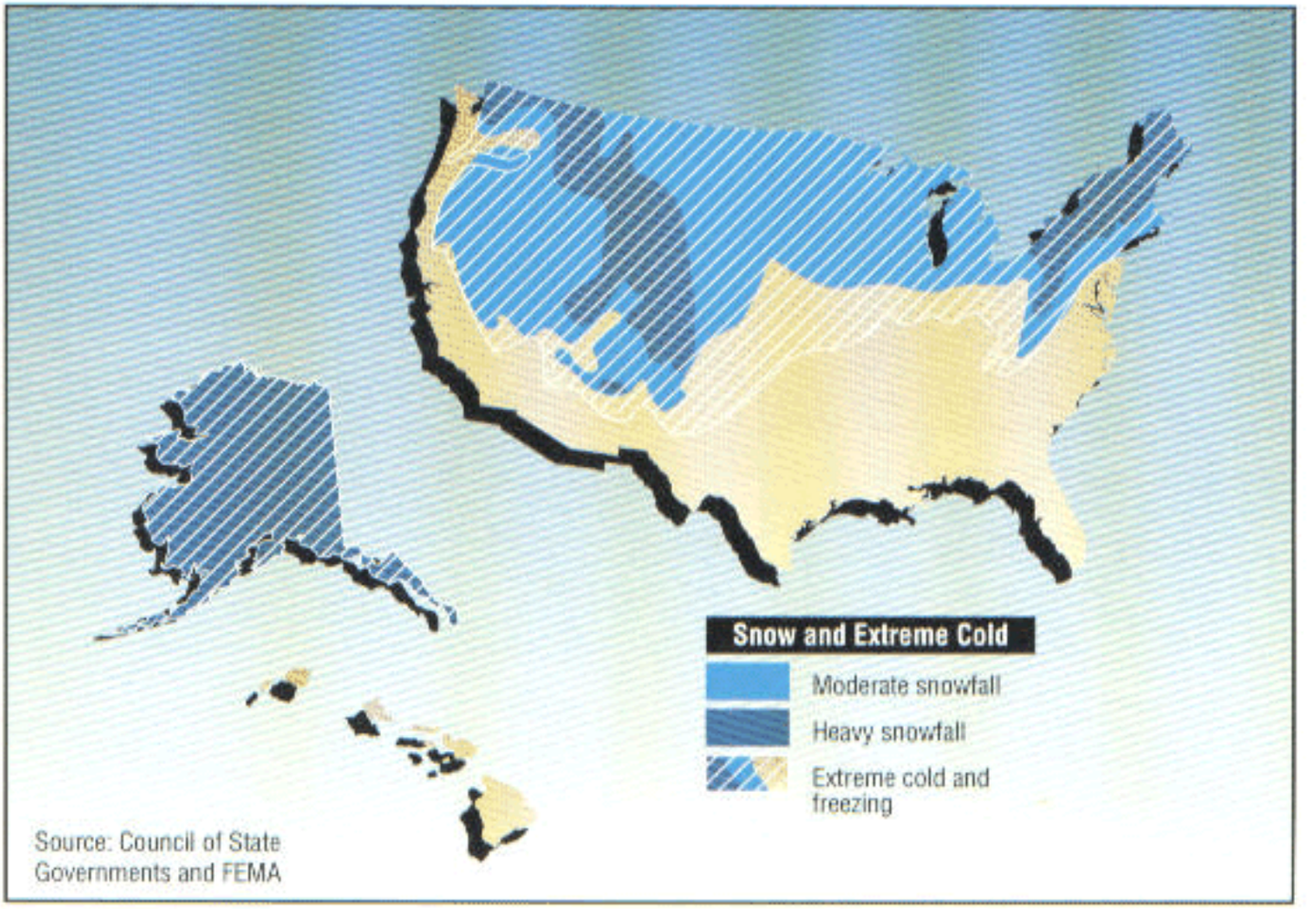
Look over the national hazard maps which begin on the next page, then look for the maps of your state and take a few minutes to review them. You may be surprised to discover the kinds of hazards that could threaten your area. Then turn to the information in the back of the booklet. There, you'll find practical hazard-specific steps to take to protect yourself.

In addition to the hazards illustrated in this booklet, you should also be aware of other common threats: forest and range fires, drought, landslides, chemical spills, and hazardous materials sites and transportation accidents. For more details about the risks your community faces, how your local government is preparing for them and what you can do to protect yourself, contact your community's civil defense office.

What is Civil Defense?

The term "Civil Defense" is used in this booklet because of its broad public, legal, historical and international acceptance. In your community another term may be used: "Emergency Management," "Civil Preparedness," "Disaster Services," etc.

By whatever name, civil defense refers to preparedness and response by government, the private sector and citizens to any kind of disaster or emergency that threatens to overwhelm the normal resources of government to respond, whether as a result of a natural or man-made disaster or a threat by a foreign power.

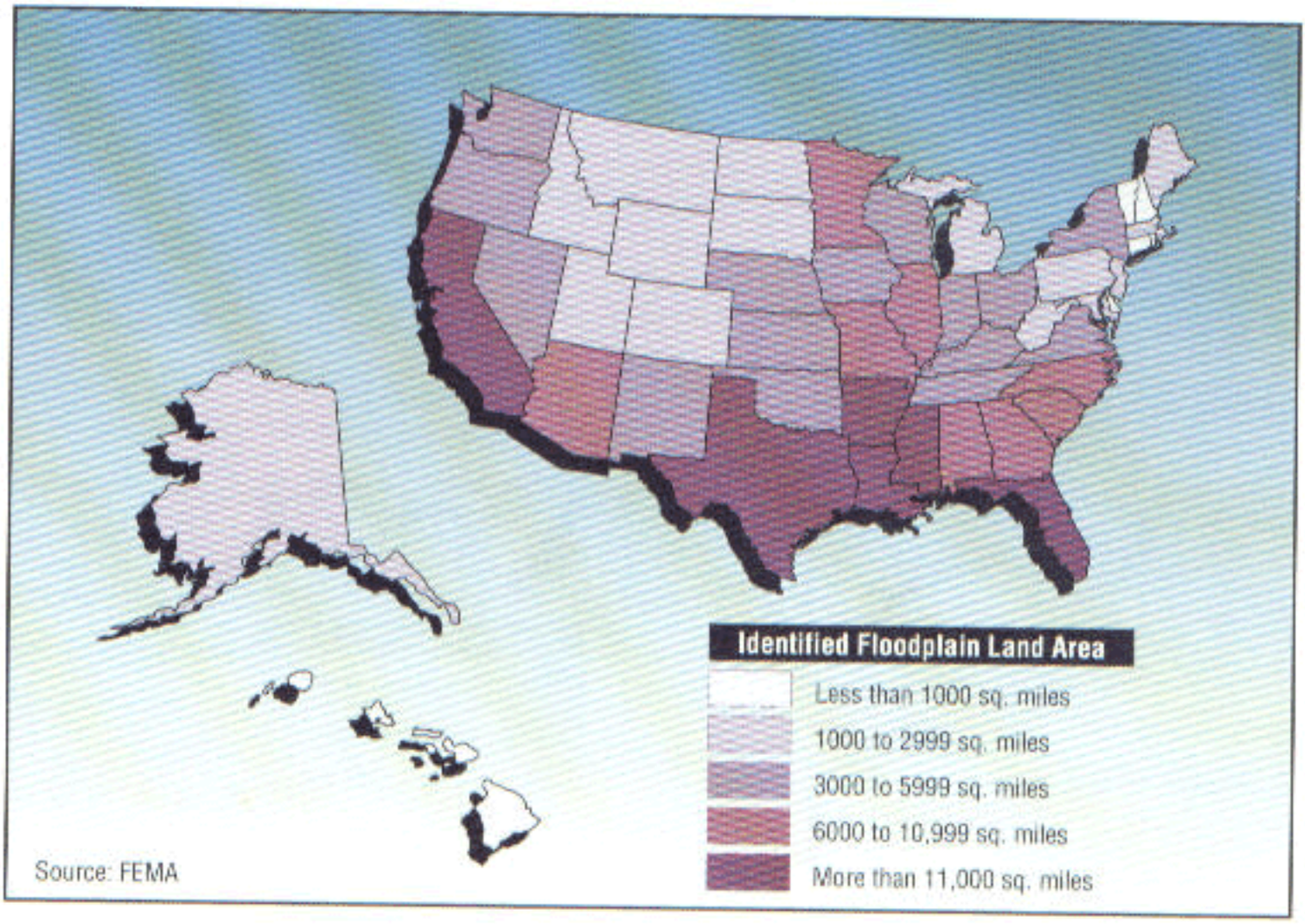


Snow and Extreme Cold

Heavy snowfall and extreme cold can completely immobilize an entire region. Even areas which normally experience mild winters can be hit with a major snow storm or extreme cold. The result is often havoc, isolation and human suffering.

Areas designated as having experienced "heavy" snowfall receive on average at least an inch of snowfall on more than 20 days per year. Areas illustrated by "moderate" snowfall experience on average at least an inch of snowfall on between 10 and 20 days per year.

Areas illustrated by "Extreme Cold" experience on average below freezing temperatures on 90 or more days per year.

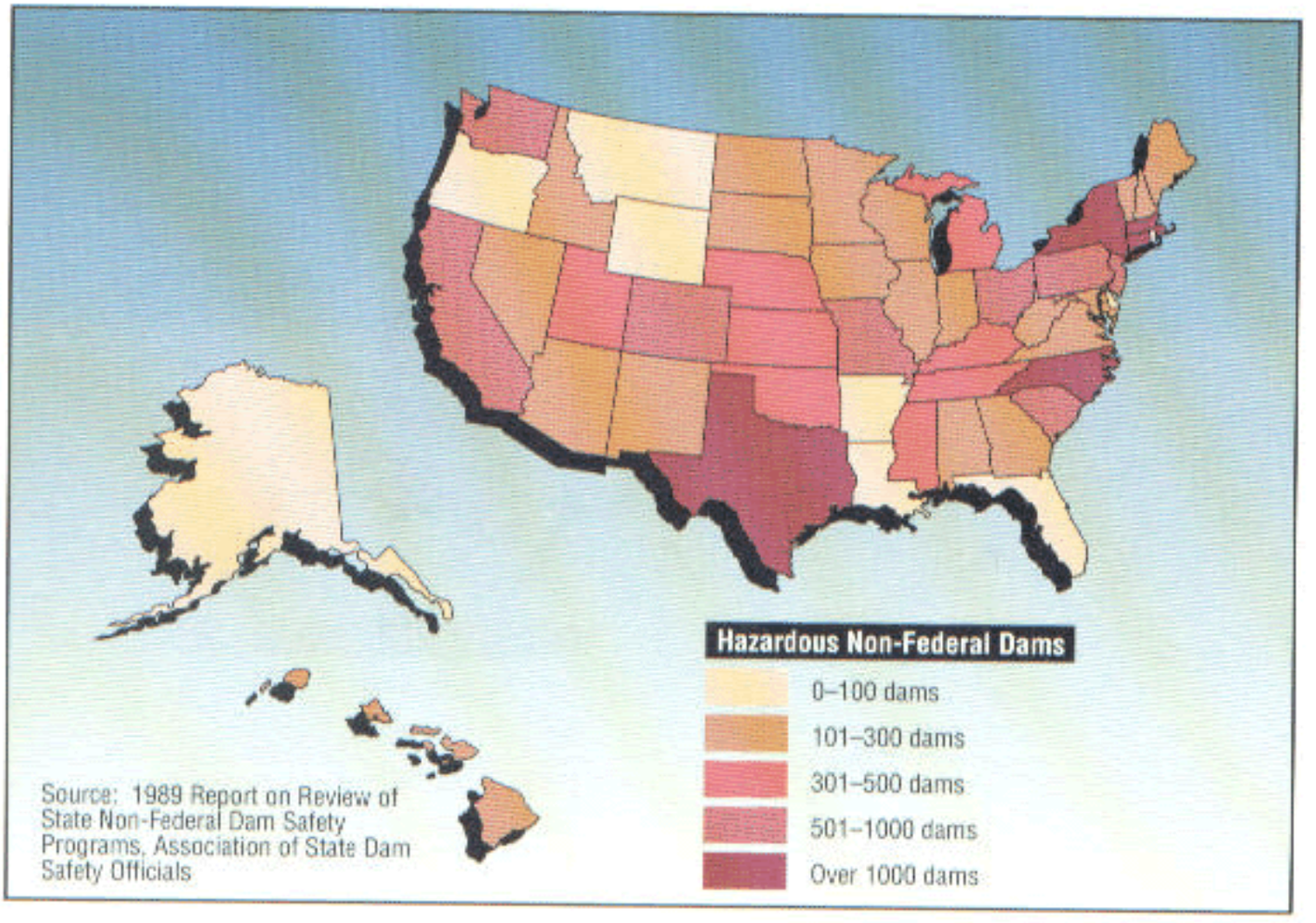


Floods

Floods are the most common and widespread of all natural hazards. Some floods develop over a period of days, but "flash floods" can result in raging waters in a matter of minutes. Even very small streams, gullies and dry streambeds that may appear harmless in dry weather can flood. *Wherever* you live—you should be aware of flooding hazards, especially if you live in a low-lying area, near water, or downstream from a dam.

In the map above, states are shaded according to how many square miles of land in each have been identified as prone to flooding, ranging from pale lavender (less than 1,000 square miles of identified flood plain) to deep purple (more than 11,000 square miles of flood plain).

Note: Because of the localized nature of flooding, this hazard is not illustrated in the state maps that follow. However, if you want more information on flood hazards, you can obtain a detailed flood-plain map of your community for a modest fee. Write to the Federal Emergency Management Agency, Flood Map Distribution Center, 6930 (A-F), San Tomas Road, Baltimore, MD 21227-6227. Or call the National Flood Insurance Program at 1-800-333-1363.

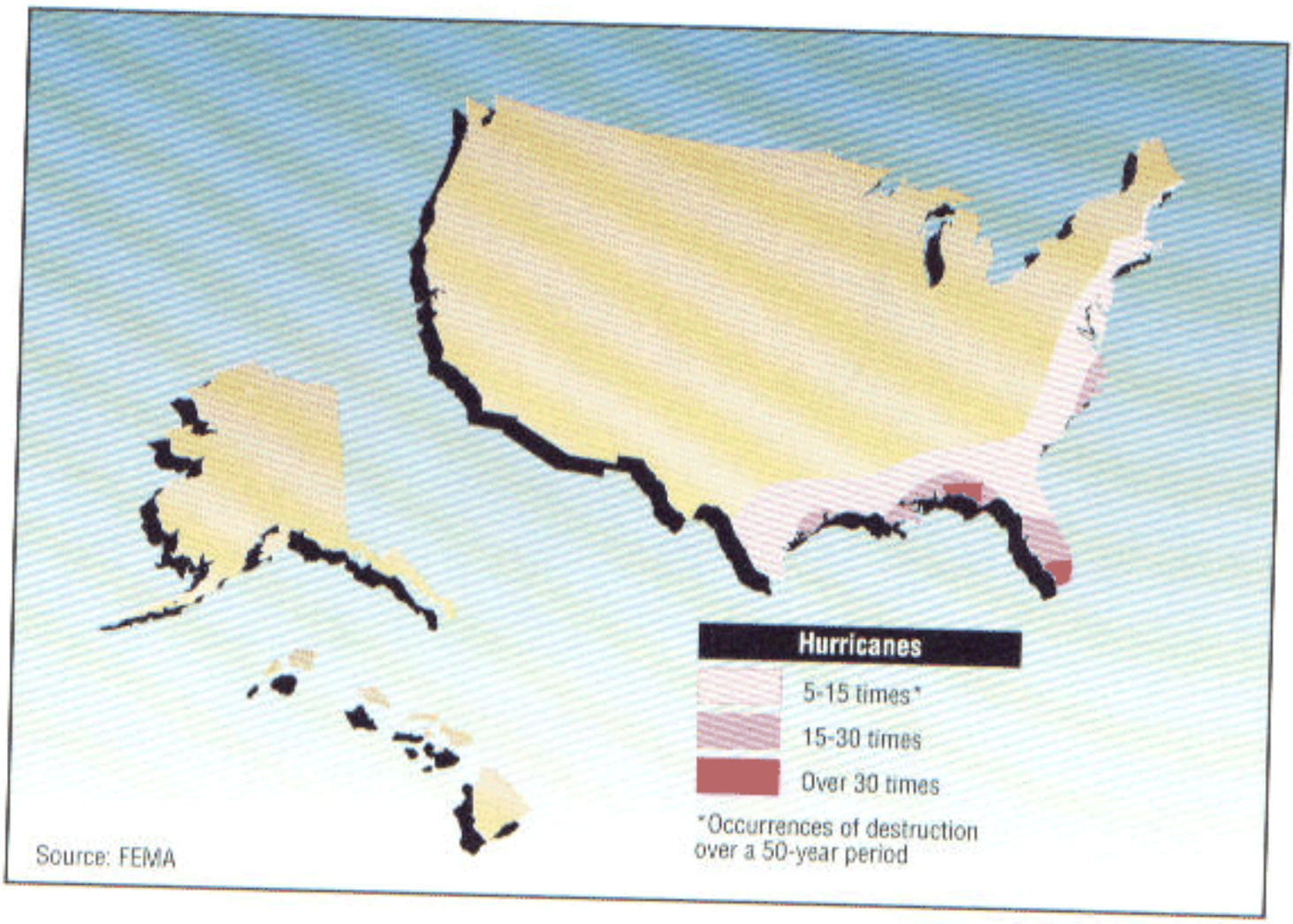


Dams

There are over 80,000 dams in the United States—and over 20,000 of them are classified as posing "high" or "significant" hazards. These designations mean that if such a dam failed, lives would be lost and extensive property damage would be suffered.

Over the years dam failures have injured or killed thousands of people, and caused billions of dollars of property damage. Dams can fail for many reasons, including internal erosion of piping; external erosion; and structural deficiencies caused by faulty construction, earthquakes or ground instability.

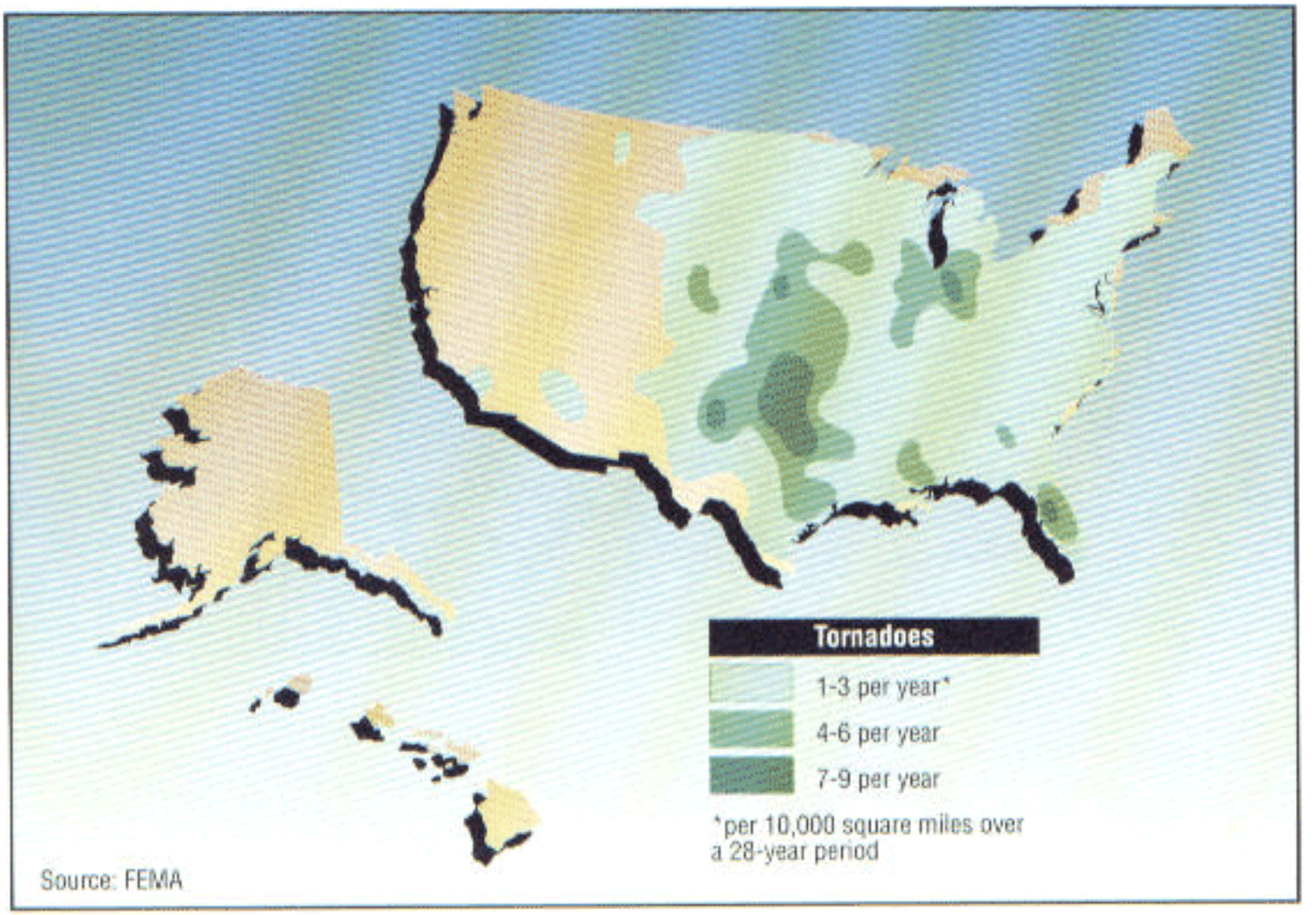
In the map above, states are shaded according to the number of hazardous non-federal dams within their borders, ranging from 100 or fewer to over 1,000.



Hurricanes

Hurricanes are severe tropical storms with heavy rains and winds which blow in a large circle around a center "eye." Hurricane winds can reach well over 100 miles per hour and create huge waves that surge across coastal areas like a giant bulldozer. Hurricanes can also produce tornadoes and cause severe flash flooding of rivers and streams. All the Atlantic and Gulf coastal states, as well as the Caribbean islands, are threatened by hurricanes. Hawaii and U.S. territorial possessions in the Pacific are also at risk to these storms. There they are known as "typhoons."

The hurricane maps in this booklet show the number of times over a 50-year period that destruction was caused by hurricanes in different areas: 5 to 15, more than 15 to 30, and more than 30.

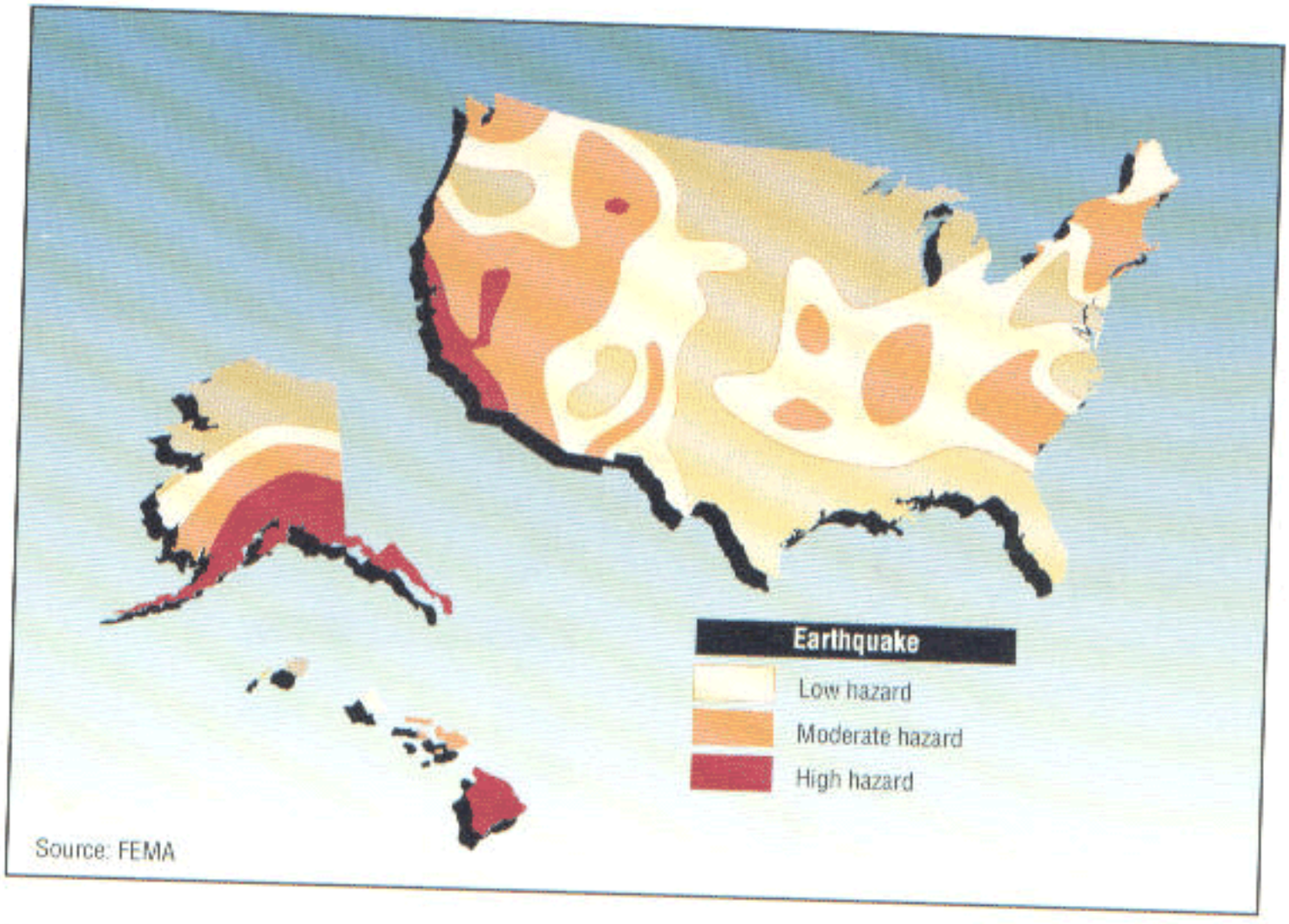


Tornadoes

Tornadoes are one of nature's most violent storms and can leave a path of devastation in a matter of seconds. They are characterized by a funnel cloud which touches the ground with whirling winds of up to 200 miles per hour or more. Although tornadoes normally travel for up to 10 miles, tornado tracks of 200 miles have been reported.

Tornadoes can strike any time of the year, but they occur most frequently during April, May and June. No state is entirely free from the threat posed by this hazard. In fact, the United States has more tornadoes than any country in the world.

The tornado maps in this booklet show the average number of tornadoes occurring each year within a 10,000 square mile area: 1 to 3 tornadoes each year, 4 to 6, and 7 to 9. Data is based on records over a 28-year period.

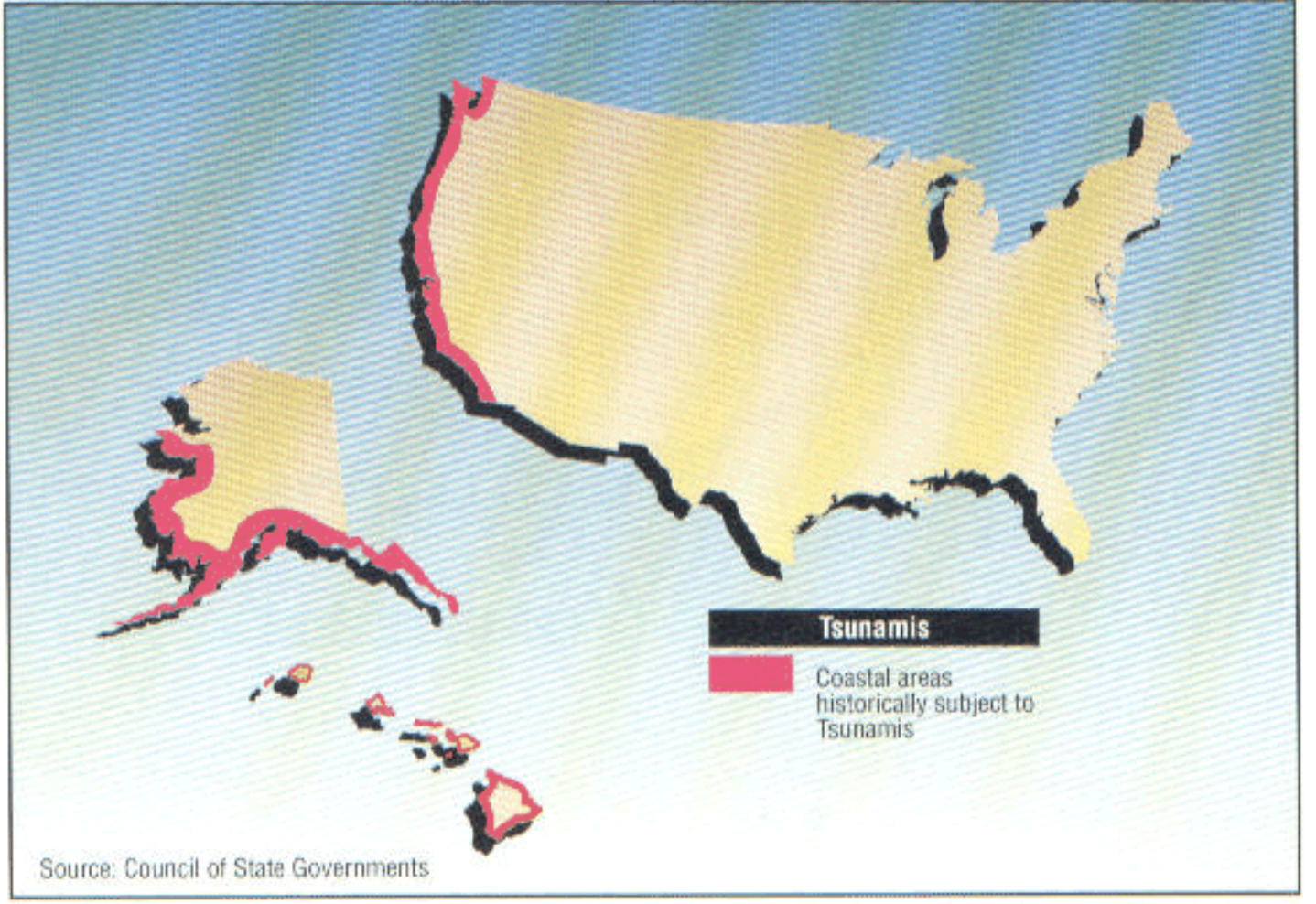


Earthquakes

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. This movement can cause buildings and bridges to collapse, disrupt utilities and result in landslides, fires and huge ocean waves (tsunamis) which can crash into coastal areas.

In the U.S., earthquakes have occurred most often in states west of the Rocky Mountains. Nevertheless, the most violent series of earthquakes occurred in the Eastern U.S. and in the Central Mississippi Valley in 1811-12, and *all* 50 states are at some risk from this hazard.

The earthquake maps in this booklet are a simplified depiction based on studies of the numbers, sizes and locations of past earthquakes, the locations of active faults, and the likelihood of future earthquakes in each region. Areas shaded in maroon represent a "High" hazard; orange, a "Moderate" hazard and cream, a "Low" hazard.

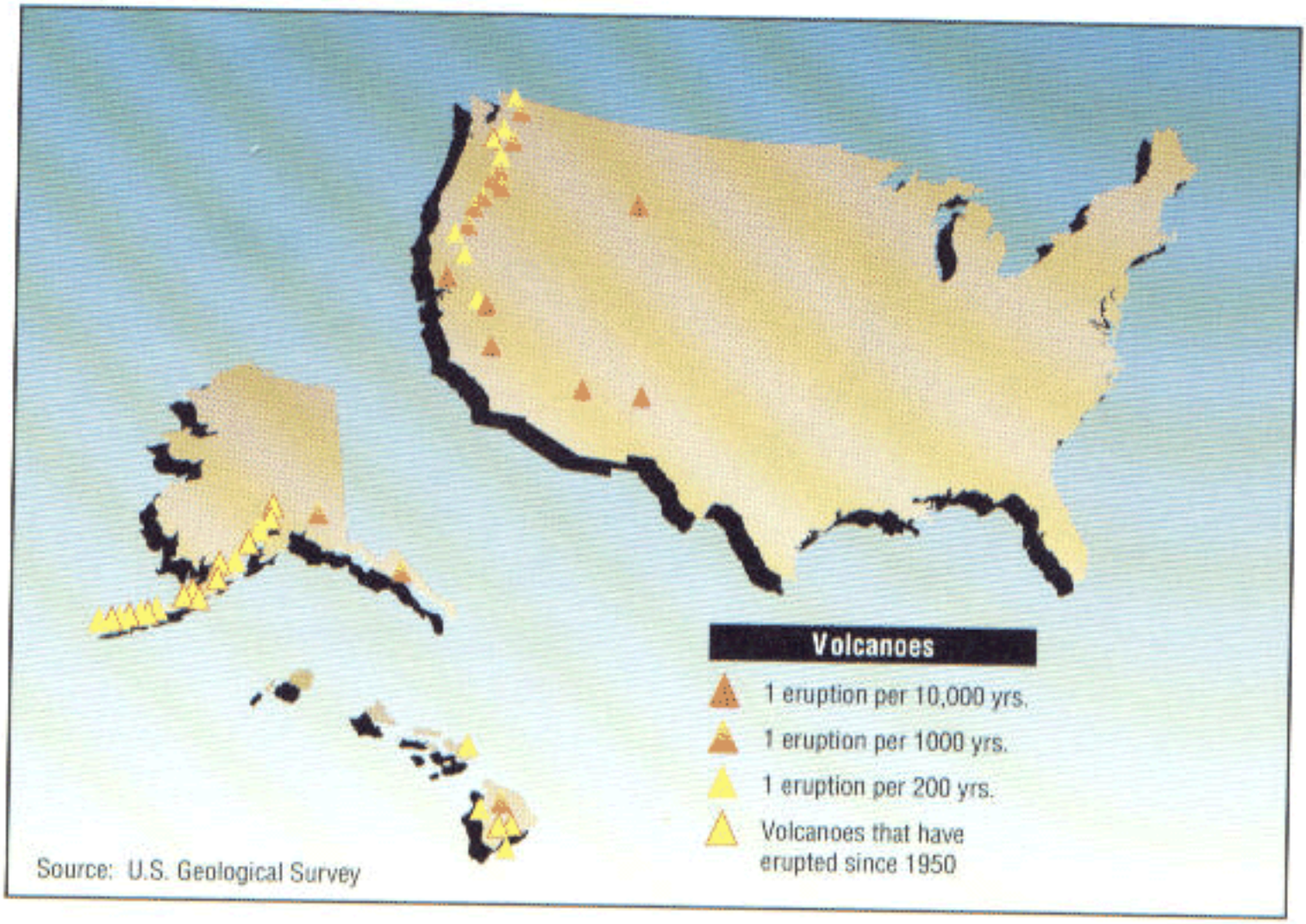


Tsunamis

A tsunami (sometimes called a *tidal wave*) is actually a series of waves caused by an underwater disturbance or earthquake. A tsunami can move hundreds of miles per hour in the open ocean and smash into land with waves more than 100 feet high. In this century, more than 200 tsunamis have been recorded in the Pacific.

All tsunamis are potentially dangerous, even though they may not damage every coastline they strike.

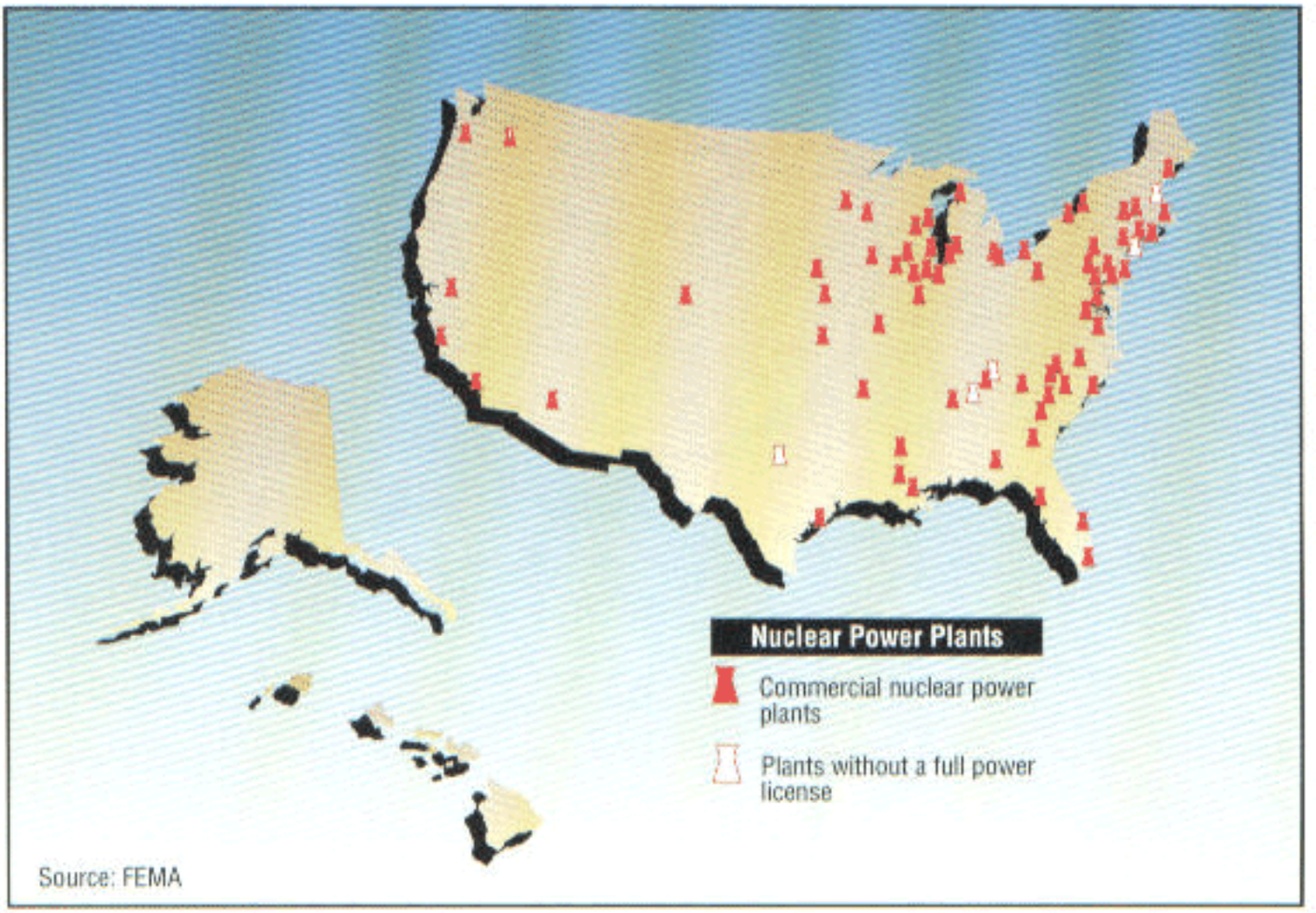
Tsunamis can occur along most of the U.S. coastline, though the most destructive tsunamis have occurred along the coasts of California, Oregon, Washington, Alaska and Hawaii.



Volcanoes

A volcano is a vent in the earth's crust through which molten lava, hot rock and gasses erupt. Volcanic eruptions cause lava flows, mudslides, avalanches, falling ash and floods. Secondary effects include clogged sewers, blocked roads, and disruption of electrical power, water supplies and telephone service. The eruption of Washington's Mount St. Helens in 1980 killed more than 70 people and resulted in over a billion dollars in damage to property.

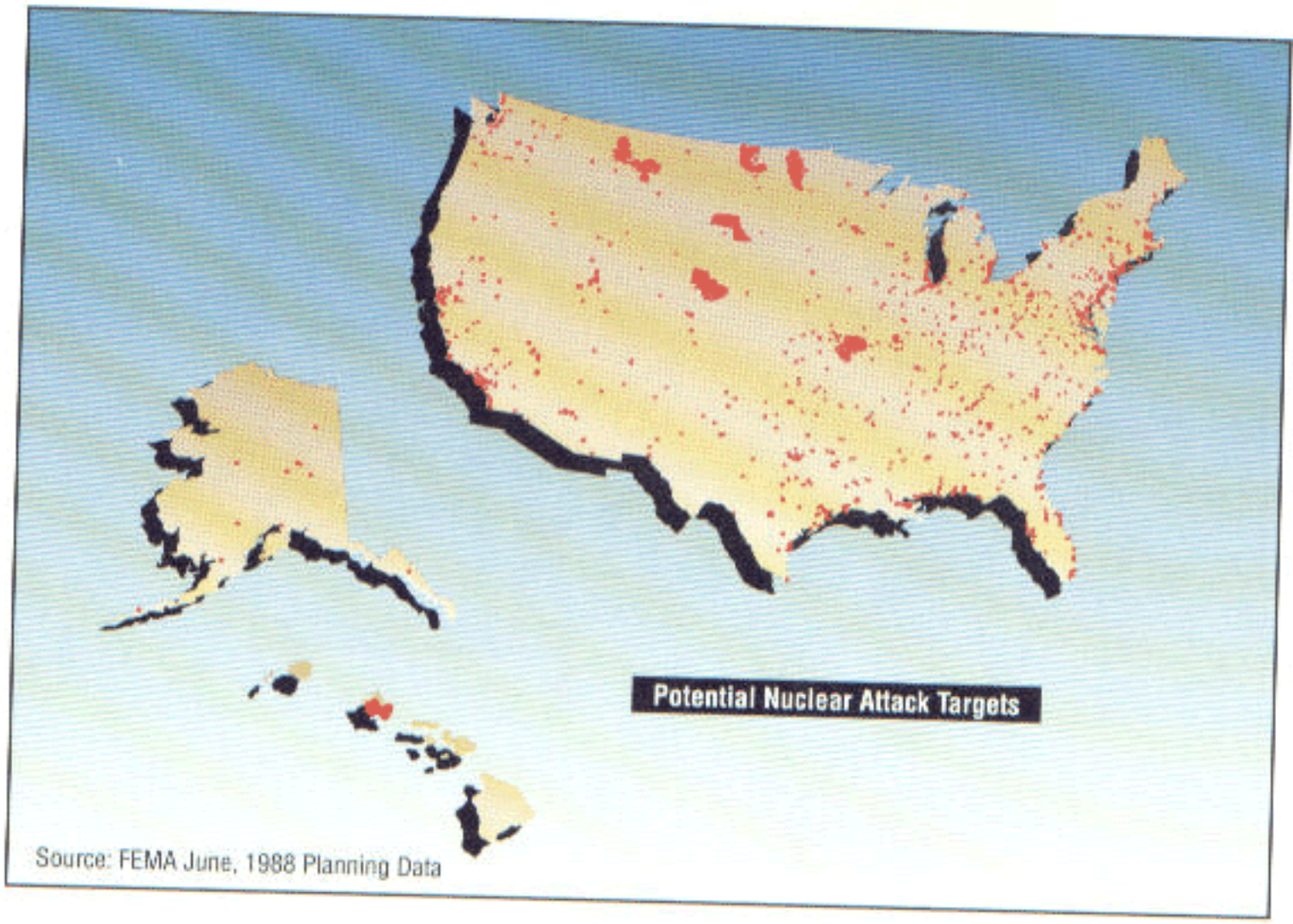
Active volcanoes in the United States are found mainly in Hawaii, Alaska and the Pacific Northwest. Scientists group volcanoes into three categories: volcanoes that could erupt at least once within a 200-year period (volcanoes outlined in red have erupted since 1950), volcanoes that could erupt within a 1000-year period and volcanoes that last erupted more than 10,000 years ago.



Nuclear Power Plants

Commercial nuclear power plants operate in many states in the country. Local and state governments, the federal government, and electric utilities have all developed response plans in the unlikely event of a serious nuclear power plant emergency.

Most emergency plans for commercial nuclear power plants define two emergency zones. One covers an area, usually within a 10-mile radius of the plant, in which potentially harmful direct exposure to escaping radiation is possible. The second zone covers a broader area, usually within a 50-mile radius of the plant, where escaping radioactive materials could enter the food chain through contamination of water supplies, food crops or livestock and their grazing lands.



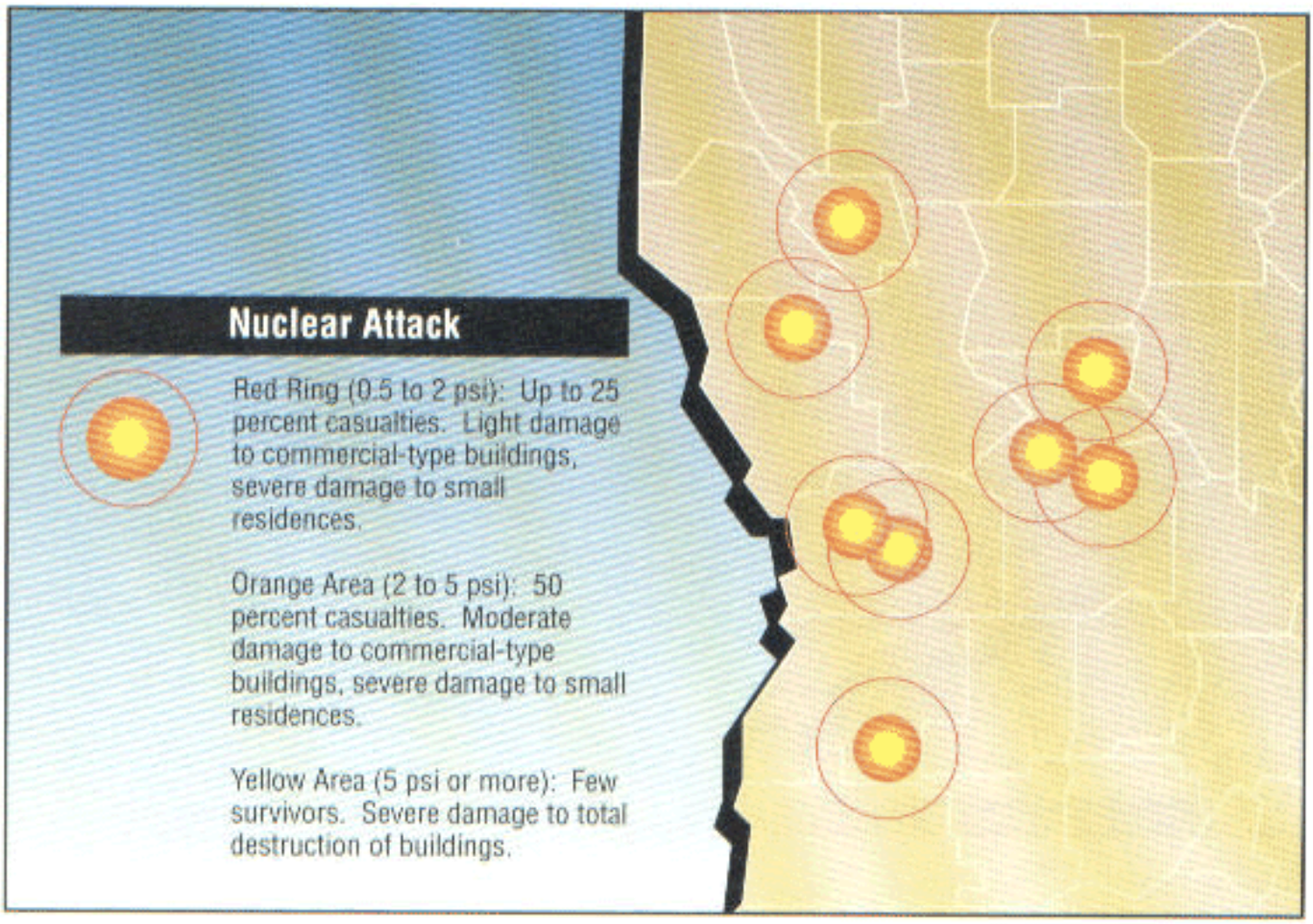
Nuclear Attack

Of all the possible disasters and hazards we can imagine, strategic nuclear attack would be the most devastating and far-reaching in its consequences.

The use of nuclear weapons against the United States is unlikely. Unfortunately, however, as long as such weapons exist there is always the chance that they could be used.

Understanding the effects of nuclear weapons, knowing what could happen and how to respond are critical to survival. Millions of people who would otherwise die could save themselves if they knew what to do.

The national map above and the state maps throughout this booklet show where *potential* nuclear targets are located. These areas represent a range of possible targets, *not* a prediction of what targets would be hit in an actual attack. And when critical factors such as weapon accuracy and the reliability of delivery systems are taken into consideration, it becomes increasingly difficult to calculate which targets, or how many, would be struck.



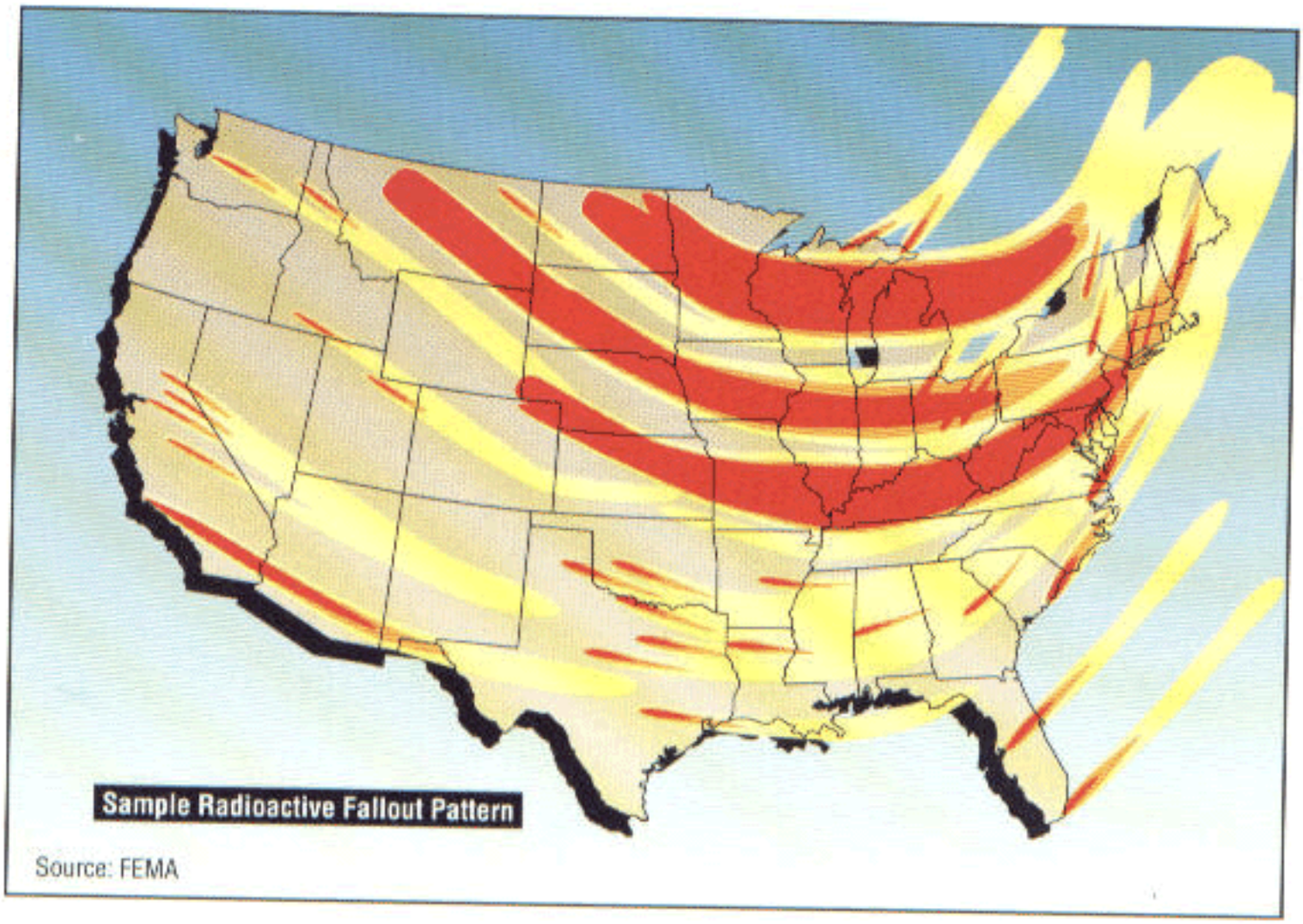
Weapon Effects

When a nuclear weapon explodes, it produces intense heat and a blast wave similar to a tidal wave of air. The blast wave is measured in pounds per square inch (psi) overpressure. The greater the psi, the greater the threat to people.

The state maps in this booklet illustrate three psi zones, as shown above. The yellow area represents greater than 5 psi. Few people in this area could survive. Buildings would sustain severe damage or be destroyed.

The orange area represents from 2 to 5 psi. In this area casualties could be up to 50 percent. (Casualty projections include both deaths and injuries and *assume that no protective actions were taken prior to the detonation.*) Small buildings would be severely damaged; commercial-type buildings would sustain moderate damage.

The outer red ring represents 0.5 to 2 psi. In this area casualties could be up to 25 percent. Small buildings such as homes would be severely damaged; commercial-type buildings would sustain light damage.



Sample Radioactive Fallout Pattern

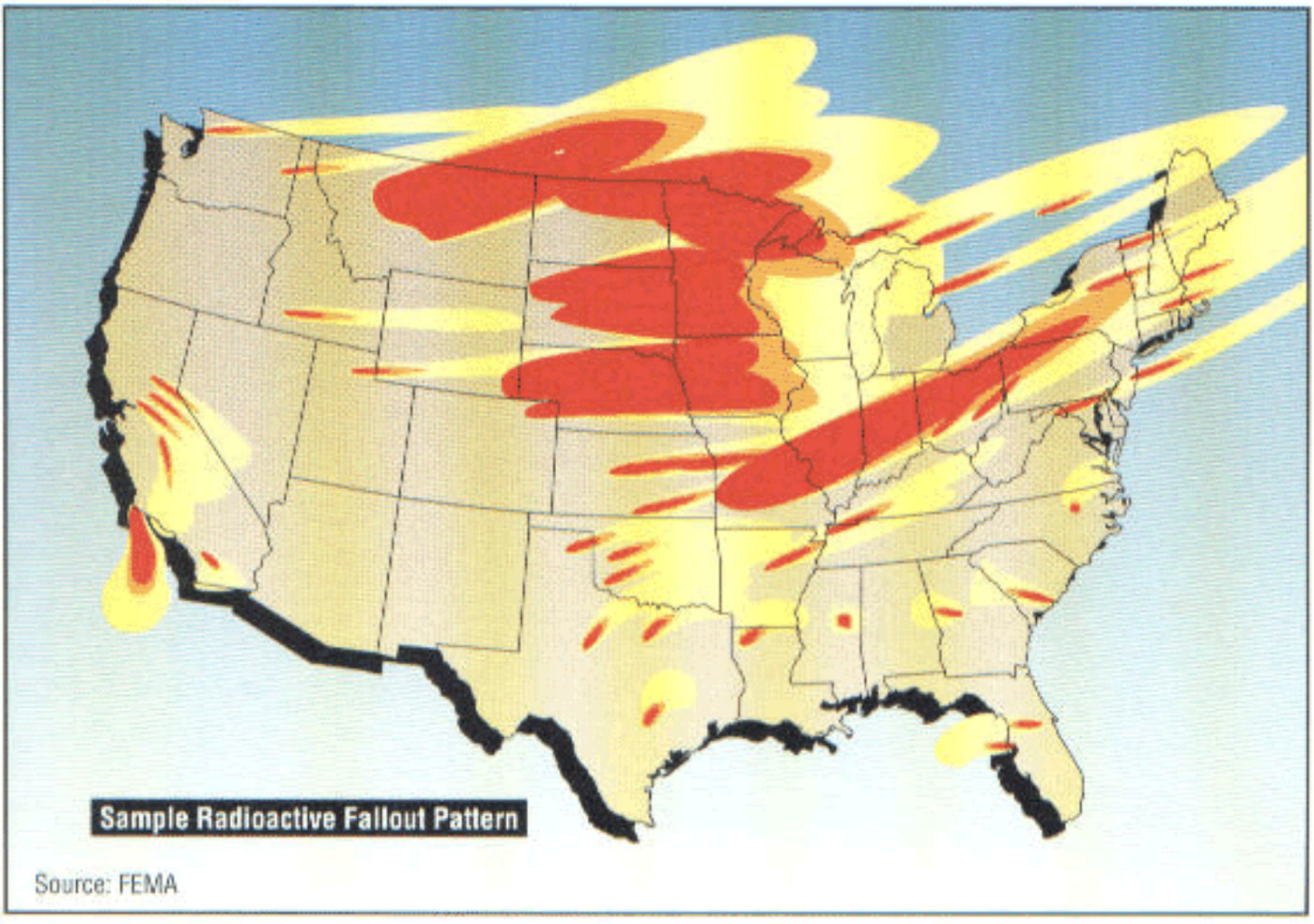
Source: FEMA

Radioactive Fallout

Another effect of nuclear weapons is radioactive fallout. If a nuclear weapon explodes near or on the ground, it sucks up large quantities of earth and debris into a mushroom cloud. This material becomes radioactive, and the particles can be carried by the winds hundreds of miles before they drop back to earth as "fallout."

In an attack, many areas of the United States would probably escape fallout altogether or experience non-life-threatening levels of radiation. However, because of the unpredictability of the weather, which determines where fallout will land, *no* locality in the U.S. can be said to be free from the risk of receiving deadly levels of radiation in the event of a strategic attack.

The fallout map above and the map on the next page are among the infinite number of potential fallout patterns based on different attack scenarios and wind patterns.



Sample Radioactive Fallout Pattern

Source: FEMA

Potential Nuclear Targets

In a strategic nuclear attack against the United States, first priority would most likely be "counterforce targets"—that is intercontinental ballistic missile (ICBM) launch control sites and Strategic Air Command facilities. (Fallout-producing nuclear detonations would generally be limited to "hard" targets such as missile silos where weapons would be exploded on or near the ground.)

Other high-priority targets would likely include other military installations and facilities, "political" targets like Washington, D.C. and state capitals, electric power and chemical industry facilities, and military-supporting industrial sites such as petroleum refineries.

Note: The maps used in this booklet have been adapted from U.S. government planning data developed in 1988. For the most up-to-date information on whether your community is considered at risk from nuclear direct effects, check with your state or local civil defense office.

Snow and Extreme Cold

What To Do

1. Know the terms used to forecast the weather.

• A *blizzard warning* means that heavy snow and winds of 35 miles per hour or more are expected. A *severe blizzard warning* means that very heavy snow is expected with winds over 45 miles per hour and temperatures below 10 degrees.

• A *winter storm warning* means that heavy snow, sleet or freezing rain are expected. A *winter storm watch* means that severe winter weather is possible.

• A *travelers' advisory* is issued when enough ice and snow are expected to hinder travel, but the anticipated weather conditions are not serious enough to require warnings.

2. Keep posted on weather conditions. Keep a battery-powered radio with extra batteries on hand in case electricity is disrupted.

3. Be prepared *before* a storm occurs. Check your battery-powered radio. Make sure you have enough heating fuel. Keep food on hand that can be prepared without an electric or gas stove. Make sure you have candles and flashlights with extra batteries.

4. Dress for the season. Layers of protective clothing are warmer than single layers of thick clothing; mittens are warmer than gloves. Wear a hat. Hoods or scarves should cover your mouth to protect lungs from extremely cold air.

5. Don't risk your life when shoveling snow. Overexertion can bring on a heart attack—a major cause of death during and after winter storms.

6. Take winter driving seriously. Keep your car "winterized." Carry a "winter car kit" containing a flashlight, a blanket and an emergency flare in case you are trapped in a winter storm.

7. If a blizzard traps you in your car:

• Pull off the highway, stay calm and remain in your vehicle where rescuers are most likely to find you.

• Set your directional lights to "flashing" and hang a cloth from the radio aerial or window.

• If you run the engine to keep warm, open a window for ventilation to protect vehicle occupants from carbon monoxide poisoning. Periodically clear away snow from the exhaust pipe.

• Exercise to maintain body heat, but avoid overexertion.

• Never let everyone in the car sleep at one time.

• At night, turn on the inside dome light so work crews can spot you.

Floods

What To Do Before A Flood

1. Keep a stock of food that requires no cooking or refrigeration. Store drinking water in clean, closed containers. Remember, regular electric, gas and water services may be disrupted.

2. Keep a portable radio, emergency cooking

equipment and flashlights in working order; stock extra batteries. Have first aid supplies and any medicines needed by members of your family on hand.

3. If you live in a flood-prone area, you may need materials like sandbags, plywood, plastic sheeting and lumber, so keep them handy.

4. Identify dams in your area. Be aware of what could happen if they fail; become familiar with local emergency action plans.

5. Learn local warning signals; know who will sound them, when they will be sounded and how you should respond.

6. Learn your community's evacuation routes and where to relocate.

7. Know the elevation of your property in relation to nearby streams and dams, and contact your insurance agent to discuss flood insurance coverage.

What To Do During Or After Heavy Rains

1. In heavy rains, be aware of flash floods. If you see *any* possibility of a flash flood occurring, move immediately to a safer location. Don't wait for instructions to move.

2. Stay away from natural streams and drainage channels during and after rainstorms, especially in areas known to flood. Watch out for areas where rivers or streams may flood suddenly.

3. Stay away from flooded areas—the water may still be rising. Never try to cross a flowing stream on foot if the water is above your knees. Know where the high ground is and how to get there in a hurry.

4. Many flood fatalities are vehicle-related. *Never* attempt to drive through floodwaters. The water may have eroded portions of the roadway. Floodwaters may also rise rapidly, making roads impassable.

5. Be prepared to evacuate your home. If you don't own a car, ask your local government how emergency transportation would be provided.

6. Listen for information and instructions on radio and television stations.

7. If you evacuate:

- Secure your home before leaving.

- Turn off utilities at the main switch or valve. Do *not* touch any electrical equipment or appliances if you are wet or standing in water.

- Make sure you have enough gasoline in your car, and follow recommended evacuation routes rather than trying to find shortcuts on your own.

- Leave early enough to avoid being marooned by flooded roads. Even so, look out for washed-out roadways; many roads parallel streams and other drainage channels and may be swept away by flood waters.

- Look out for mudslides, broken sewer or water mains, loose or downed electric wires, and falling or fallen objects.

• If your car stalls in a flooded area, abandon it and move to higher ground, if you can do so safely. Flood waters could rise and sweep both you and your vehicle away.

What To Do After A Flood

1. Water sources may have been contaminated by the flood. Check with local authorities before using any water.

2. Watch out for poisonous snakes in previously flooded areas.

3. Use battery-powered lanterns or flashlights (not oil or gas lanterns or torches) to examine buildings, since flammable gases may be present. Do not handle live electrical equipment in wet areas. Have an expert check all equipment before returning it to service.

4. If your basement has flooded, pump it out gradually (about one-third of the water per day) to avoid damage from hydrostatic pressure.

5. Report broken utility lines to authorities.

6. Do not use food that has come into contact with flood waters.

7. Do not visit the disaster area, unless you're authorized to do so.

8. If you have flood insurance, notify your agent that you have a loss.

Hurricanes

What To Do

1. Know the terms used by forecasters:

• A *hurricane watch* is set up when hurricane conditions pose a possible threat to your area.

• A *hurricane warning* means hurricane conditions are expected to strike in your area within 24 hours.

2. Much of the damage caused by hurricanes comes from flooding. Since there is normally a five-day waiting period *before* a flood insurance policy becomes effective, purchase such coverage now—before flooding occurs in your area.

3. Listen for hurricane *watches* and *warnings*. Pay special attention to weather alerts during hurricane season, which runs from the beginning of June through November. Listen to radio and television newscasts for hurricane preparedness instructions.

4. When your area receives a *hurricane warning*, you should:

• Follow the instructions issued by local officials on radio and television newscasts.

• If you have a boat, remove it from the water, move it to a safe harbor or moor it securely and then return to a safe place on land before the storm arrives.

• Protect your windows with boards, storm shutters or heavy tape.

• Secure outdoor objects or bring them indoors.

• Fuel your car.

• Ready a "family safety kit" containing first-aid items, any special medications or

supplies you might need, important papers and a portable radio with extra batteries.

- Secure several days' supply of water, food and clothing.

- Stay away from the open coast, river banks and streams until all potential flooding is past.

5. Be prepared to evacuate. Areas subject to storm surge and flooding may be evacuated on the advice of your local authorities. You should evacuate your home if:

- Local authorities recommend evacuation.

- You live on the coastline or offshore islands.

- You live in a mobile home.

- You live near a river or on a flood plain.

6. When you are advised or decide to evacuate:

- Follow the instructions of local authorities. Listen for information on evacuation routes and emergency shelters designated for evacuees. If possible, go inland to stay with relatives or friends, or at a motel.

- Make sure you have enough gasoline in your car.

- Leave early enough to avoid being marooned by flooded roads, fallen trees, etc.

- Follow recommended evacuation routes.

- Bring extra clothing and bedding, but don't waste time if you're advised to evacuate immediately.

7. If you don't evacuate, stay indoors during the hurricane, and stay away from windows.

Tornadoes

What To Do

1. Know the terms used to describe tornado threats:

- A *tornado watch* means tornadoes or severe thunderstorms—or both—are possible. Stay tuned to radio and television reports for information on your area.

- A *tornado warning* means tornadoes have been sighted. Take shelter immediately.

2. Whenever severe thunderstorms threaten your area, listen to radio and television newscasts for the latest information and instructions.

3. What to do before a tornado:

- Have emergency supplies on hand during the tornado season.

- Keep on hand a battery-powered radio, flashlight and supply of fresh batteries.

- Know the locations of designated shelter areas in pubic facilities. Most schools, public buildings and shopping centers have such areas.

- Make an inventory of your household furnishings and other possessions. Supplement the written inventory with photographs. Keep inventories and photos in a safe deposit box or some other safe place *away* from the premises.

- If you live in a single-family house in a tornado-prone area, reinforce some interior portion as a shelter.

• *Plan:* Be sure *everyone* in your household knows in advance where to go and what to do in case of a tornado warning.

4. When a tornado has been sighted:

• Take cover *immediately.*

• Stay away from windows, doors and outside walls. Protect your head.

• In homes and small buildings, go to the basement. If there is no basement, go to an interior part of the structure on the lowest level (closets, interior hallways). Get under something sturdy and stay there until the danger has passed.

• In schools, nursing homes, hospitals, factories and shopping centers, go to pre-designated shelter areas. Interior hallways on the lowest floor are usually best.

• In high-rise buildings, go to interior small rooms or hallways on the lowest floor possible.

• In a vehicle, trailer or mobile home, leave immediately and go to a more substantial structure. If there is no shelter nearby, lie flat in the nearest ditch, ravine or culvert with your hands shielding your head.

• Do not attempt to flee from the path of a tornado in a car or other vehicle. They are no match for the swift, erratic movement of these storms.

Earthquakes

What To Do During An Earthquake

1. Keep calm and stay where you are. If outdoors, stay outdoors. If indoors, stay there.

2. If you're indoors, take cover under a sturdy desk, table or bench, against an inside wall or wood-framed doorway, and hold on. Stay away from glass, windows, outside doors and anything that could fall and crush you such as furniture, lighting fixtures, etc.

3. If you're outdoors, move away from buildings and utility wires.

4. If you're in a moving car, stop as quickly as safety permits, but stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses or utility wires.

5. Watch out for aftershocks. These secondary shock-waves are usually smaller than the main quake but can be large enough to do additional damage to weakened structures.

6. If you live near the coast, be aware of possible *tsunamis*, also known as tidal waves. When local authorities issue a tsunami warning, assume that a series of dangerous waves is on the way. Stay away from the beach.

What To Do After An Earthquake

1. Check for injuries. Do *not* attempt to move seriously injured persons unless they are in immediate danger of further injury.

2. Stay out of severely damaged buildings.

3. Cautiously check utility lines, chimneys and appliances for damage. If you

smell gas, open windows and shut off the main gas valve, then leave the building and report gas leakage. Do not search for gas leaks with a match. If electrical wiring is shorting out, shut off current at the main box. Do not switch on gas or electricity again until the power company has first checked your home. If water pipes are damaged, shut off the supply at the main valve.

4. Stay off the telephone, except to report an emergency.

5. Turn on your battery-operated radio (or plug-in radio or television if you still have electricity) to get the latest emergency information.

Tsunamis

What To Do If You Live In A Coastal Area

1. Be aware of the warning signs:

• Earthquakes can cause tsunamis. If you live near the open coast and you hear that an earthquake has occurred, be ready to protect yourself against a tsunami.

• Approaching tsunamis sometimes come after a noticeable rise or fall in the normal depth of coastal water. This is nature's tsunami warning and should be heeded.

• A small tsunami at one beach can be a giant wave a few miles away. Don't let the modest size of one make you lose respect for all.

2. Listen for and heed *tsunami warnings*. Listen to radio or television for information and follow the instructions of your local authorities.

3. If you are advised to evacuate, do so immediately. Do *not* return until local authorities say it is safe. Don't be fooled: a tsunami is not a single wave, but a series of waves.

4. Do not stay in low-lying coastal areas after an earthquake.

5. Do not go to the shoreline to watch for a tsunami. When you can see the wave, you're too close to escape it.

Volcanoes

What To Do

1. Plan ahead. If you live or work in an area that could be affected by an eruption, store water and extra food, have an evacuation route in mind and keep on hand a battery-operated radio.

2. If an eruption is predicted or begins, listen to your radio or television and follow the advice of your local emergency officials.

3. Be prepared to evacuate if so advised. It may be the only way to protect yourself from lava flows, poison gas and rock debris thrown from the volcano. You will be advised by local authorities whether to evacuate or take other precautions.

4. Be prepared to stay indoors if so advised. In some cases it's better to stay where you are rather than evacuate. Your local authorities will determine the best course of action for your area.

5. Do not approach the eruption site; you could be killed by a sudden explosion. Public officials may designate safe viewing sites.

6. If ash is being expelled, avoid areas downwind from the volcano. A building offers good shelter from volcanic ash but not from lava flows and rock debris.

7. Be aware of flying rocks and mudflows. The danger from a mudflow *increases* as you approach a stream channel and *decreases* as you move away from a stream channel toward higher ground. *Mudflows can move faster than you can walk or run.* Look upstream before crossing a bridge and do *not* cross if a mudflow is approaching.

Nuclear Power Plants

What To Do

1. Public information materials are available at all commercial nuclear power plants to tell you what actions to take in the event of an emergency at the plant. If you live within 10 miles of such a facility and have not already received these materials in the mail, call the power company or local civil defense office and ask for a copy.

2. Familiarize yourself with the emergency plans for your area. Learn the warning systems for your community. If an accident occurs, government organizations are required to notify residents promptly. This may be done through the use of sirens, radio and television broadcasts, loudspeakers, door-to-door contacts or other means.

3. If you are notified that an accident has occurred, tune to your local radio or television station for specific emergency information. The advice given by local authorities will depend on the nature of the accident, how quickly it is evolving and how much radioactive material is likely to be released, if any.

4. If a release has occurred, unless officials advise evacuation, stay inside as much as possible. Keep doors and windows closed, and shut down air conditioning, heating and other outside ventilation systems if the weather permits.

5. Don't use the telephone unless it's absolutely necessary; the lines should be kept clear for emergency calls.

6. There are three ways to minimize radiation exposure to your body. They are *shielding, distance* and *time.*

- *Shielding:* Heavy, dense material between you and the source of the radiation can serve as protection.
- *Distance:* The more distance between you and the source of radiation the less radiation you will receive.
- *Time:* Radioactivity "decays" or loses its strength relatively rapidly.

In a serious reactor accident, you may be advised to seek shelter or evacuate the area until the threat of radiation passes. Emergency broadcasts will specify the most advisable course of action.

Nuclear Attack

Direct Weapon Effects: Blast and Heat

When a nuclear weapon explodes, it produces blinding light, intense heat or thermal radiation (which can set buildings and other objects on fire) and a blast wave. These "direct effects" can extend many miles out from the point of impact, known as "ground zero."

If a nuclear weapon is exploded just above the atmosphere, it also creates a phenomenon called "electromagnetic pulse" (EMP) that can damage electrical and electronic equipment for thousands of miles.

Protection From Blast and Heat

In a nuclear attack, people living within several miles of potential targets would need to protect themselves from the direct effects of nuclear weapons. Although the civil defense systems of some countries include "blast shelters" (Switzerland, the U.S.S.R., Norway and Sweden, for example, have such shelters), in the United States no such protection is available. U.S. civil defense, therefore, would rely on evacuating people over a period of days before an attack to areas not considered likely targets. (This could occur during a crisis buildup when U.S. intelligence detected readying of the enemy's ICBM systems, evacuation of their cities, movement of their officials to shelter, protection of their industrial sites, etc.) The Federal government is responsible for working with state and local governments to develop evacuation plans for areas considered potential nuclear targets.

Radioactive Fallout

A secondary effect of nuclear weapons is radioactive fallout. Particles of dust, dirt and debris sucked up by the blast would later drop back to earth as "fallout," that is, radioactive gritty, sand-like particles.

Even in a heavy attack on the U.S., many areas of the United States would probably escape fallout altogether or experience non-life-threatening levels of radiation. Nevertheless, *no* locality can be said to be free from at least the *risk* of receiving levels of radiation that would be life-threatening without protection. Actual fallout patterns would depend on the nature of the attack and the weather conditions.

Protection From Radioactive Fallout

Protection from radioactive fallout requires taking shelter. A fallout shelter does not need to be a special type of building. It can be any space, provided the walls and roof are thick and dense enough to absorb the radiation given off by the fallout particles from outside. The more shielding—heavy, dense materials such as concrete, bricks and earth—between you and the fallout particles, the better.

The best place to build a shelter is in a basement or other underground area such as a storm cellar or crawl space.

In addition to shielding, putting distance between you and the fallout particles is advised. For example, the middle of a basement would offer more protection than a spot near an outside wall because there would be more distance between you and the fallout particles emitting radiation.

In nearly every community, government authorities have identified places that could provide fallout protection. They include public buildings and, in some localities, underground areas such as tunnels and mines. Another option is to build yourself a permanent or temporary fallout shelter.

Because radioactive fallout decays relatively rapidly, most people would be able to leave shelters after a period of time—in most cases, a week or two.

What To Do Now

1. Learn whether you live or work near a potential nuclear target. Such places typically are:

- Strategic missile sites and military bases.
- Centers of government like Washington, D.C. and state capitals.
- Important transportation and communication centers.
- Manufacturing and industrial sites of military importance.
- Petroleum refineries, large electrical power plants, chemical industries, major ports and airfields with runways over 10,000 feet long.

Check with your local civil defense office to learn whether *your* area is considered a potential nuclear target. If it is, you will need to plan to relocate to a safer area during a crisis buildup or on the advice of your state authorities before an attack.

2. Learn about the evacuation plans for your community from your local authorities. Such plans include evacuation routes, listings of places where evacuees can go to receive lodging, and transportation options for people who do not own cars or who have special needs.

3. Plan now where you'd go if you had to evacuate—the home of relatives or friends, for example. As you review the maps in this booklet, you'll notice that many areas of the country are not considered likely nuclear targets. These are areas where citizens could go if advised to evacuate by public officials or if concern spreads during an international crisis that nuclear weapons might be used.

Evacuation

Think about what you would need to do *before* an evacuation in a period of rising international tensions. Here are some suggestions:

1. Gather at least a two-week supply of food (canned foods

and nonperishable items) and drinking water in unbreakable, closed containers.

2. Gather special foods and medicines needed for family members, along with a first-aid kit, personal hygiene items and any publications on family emergency planning.

3. Gather plenty of bedding such as sleeping bags and blankets, and extra clothing and rain gear.

4. Gather tools (such as shovels) and work gloves, in case you need to build a fallout shelter or improve the protection of an existing structure.

5. Make sure you have a battery-powered radio with extra batteries, and a flashlight.

6. Gather important papers (birth certificates, insurance policies, mortgage documents, medical records, etc.).

7. Secure your home. Store valuables in a safe place.

8. Be sure to have enough gasoline in your car.

9. Go over instructions with your family so that everyone understands what to do and where to meet if you are separated.

Shelter

1. Learn where public fallout shelters are located. Regardless of where you live or where you have relocated, you could be threatened by radioactive fallout after a nuclear attack. Ask your local authorities about plans to shelter citizens and whether provisions have been made for food, water and other emergency needs.

2. Learn how to build a temporary or permanent fallout shelter in your home. A temporary shelter can be built with common household materials such as concrete, bricks, doors, furniture, books, or trunks filled with earth. One method is to pile these materials around a sturdy table or workbench—in effect creating an enclosed, shielded area. It probably would not give you as much protection as a permanent shelter, but it might be enough to save your life. Ask your civil defense office for more information.

EMP Protection

Learn how to protect electrical and electronic equipment from electromagnetic pulse (EMP). Radios, televisions, telephones and computers can be damaged; solid state electronics are especially vulnerable. Protect them by unplugging them from powerlines and antennas. Battery-operated radios will probably *not* be affected by EMP.

Publications

The following publications are available without charge from your local or state civil defense office or by writing to the Federal Emergency Management Agency, P.O. Box 70274, Washington, DC 20024. Please refer to title and number when ordering any of the following:

H-14	In Time of Emergency Durante la Emergencia (en español)
L-154	Emergency Preparedness Checklist
FEMA-141	Disaster Planning Guide for Business and Industry
FA-81	The CEO's Disaster Survival Kit
FEMA-20	FEMA Publications Catalog
L-96	Safety Tips for Winter Storms
L-97	Winter Fire Safety Tips for the Home
FIA-13	Flood Emergency and Residential Repair Handbook
FIA-2	Questions & Answers on the National Flood Insurance Program
DAP-16	When You Return to a Storm-Damaged Home
L-146	Flash Floods
L-152	Dam Safety: Know the Potential Hazard
L-105	Hurricane: Safety Tips for Hurricanes
	Big Bird Get Ready for Hurricane Kit
L-148	Tornado Safety Tips
H-12-4.0	Home Shelter (Protection from Nuclear Fallout and Tornadoes)
FEMA-75	Preparedness for People with Disabilities (Earthquake Preparedness)
FEMA-76	Preparedness in High-Rise Buildings (Earthquake Preparedness)

L-111	Earthquakes
L-143	Learning to Live in Earthquake Country—Preparedness in Apartments and Mobile Homes
FEMA-46	Earthquake Safety Checklist
	Big Bird Get Ready for Earthquake Kit
H-20	Planning for Survival (nuclear attack preparedness self-help actions)
H-12-A	Home Fallout Shelter/Modified Ceiling Shelter—Basement Location Plan A
H-12-B	Home Fallout Shelter/Modified Ceiling Shelter—Basement Location Plan B
H-12-C	Home Basement Fallout Shelter/Concrete Block Shelter—Basement Location Plan C
H-12-E	Home Fallout Shelter/Tilt-up Storage Unit Shelter—Basement Location Plan E
H-12-F	Home Fallout Shelter/Lean-to Shelter—Basement Location Plan F
H-12-1	Belowground Home Fallout Shelter (for the yard, designed primarily for homes without basements)
H-12-4.1	Home Shelter—Belowground Shelter
H-12-2	Aboveground Home Fallout Shelter
H-12-3	Blast Shelter
HS-4	Preparedness Planning for a Nuclear Crisis (Home Study Course)
FEMA-52	Soviet Civil Defense
FEMA-161	A Comparison of Soviet and U.S. Civil Defense Programs
RR-27	Summaries of Soviet Civil Defense Research Reports

Checklist

Items pertaining to a nuclear attack only are marked with a ●.

Closing The House

- ● ☐ Remove combustible decorations, books, furniture and other items from window areas
- ● ☐ Remove combustible shades, blinds and curtains from windows
- ● ☐ Cover windows with paint, whitewash, aluminum foil or other opaque or reflective material
- ☐ Close heavyweight or fiberglass draperies or metal blinds
- ● ☐ Remove all combustibles from the attic
- ● ☐ Remove all combustibles and trash from around the outside of the dwelling
- ☐ Unplug all appliances
- ☐ Turn off natural gas, propane or other fuel valves where they enter the house
- ☐ Turn off the main water valve
- ☐ Take all actions needed to prevent damage to water pipes by freezing weather *if necessary*
- ☐ Securely close and lock all doors and windows
- ☐ Make appropriate arrangements for pets

What To Take

Water, Food and Utensils:

- ● ☐ *Water*—3.5 gallons per person (for at least 2 weeks) in non-breakable containers, plastic 2-liter soft drink bottles if possible. This is the *minimum for drinking only*. More needed for cooking, washing and sanitation
- ● ☐ *Food*—non-perishable, needing little or no cooking; enough for 2 weeks: high nutrition-type with little waste
- ● ☐ Eating and drinking utensils, non-breakable
- ● ☐ Bottle and can openers
- ● ☐ Water purifying tablets or household bleach (hypochlorite-type only)
- ☐ Special dietary foods, *if needed*

Clothing and Bedding

- ● ☐ Sturdy work clothes for a variety of weather conditions
- ● ☐ Work gloves for all able-bodied members of the family or group; extras, if possible

CHECKLISTS

- ● ☐ Sturdy shoes
- ☐ Extra socks
- ☐ Extra underwear
- ☐ Baby clothes, *if necessary*
- ● ☐ Outerwear, raingear, coats, jackets, boots, etc.
- ● ☐ Pillows for each person
- ● ☐ Sleeping bags or blankets (2 warm blankets per person)

First-Aid Supplies

- ☐ Keep contents of the first-aid kit in a waterproof metal or plastic box. Keep medicines tightly capped. Check periodically, and throw away any medication with a past expiration date.
- ☐ Adhesive tape, roll, 2 inches wide
- ☐ Applicator, sterile, cotton tips
- ☐ Antacid
- ☐ Antibiotic ointment
- ☐ Antiseptic solution
- ☐ Aspirin or aspirin substitute
- ☐ Baking soda
- ☐ Bandage, sterile roll, 2 inches wide
- ☐ Bandage, sterile roll, 4 inches wide
- ☐ Bandages, large triangular, 37 inches by 37 inches by 52 inches
- ☐ Bandages, plastic strips, assorted sizes
- ☐ Cotton balls
- ☐ Diarrhea medication
- ☐ Eye medication
- ☐ Ear medication
- ☐ First-aid handbook
- ☐ Hot water bag
- ☐ Ice bag
- ☐ Iodine water purification tablets
- ☐ Isopropyl alcohol
- ☐ Laxative
- ☐ Medical items such as spare eyeglasses, hearing-aid batteries, etc.
- ☐ Medical alert tags, *if needed*, for epilepsy, drug allergies, etc.
- ☐ Medicine dropper
- ☐ Motion sickness tablets for nausea
- ☐ Needle
- ☐ Non-prescription medicines
- ☐ Nose drops (water soluble)
- ☐ Petroleum jelly
- ☐ Plastic bags with fasteners
- ☐ Prescription medicines (insulin, heart pills, etc., *as needed*)
- ☐ Safety pins, assorted sizes
- ☐ Scissors
- ☐ Smelling salts
- ☐ Antibacterial soap
- ☐ Splints, wooden, 18 inches long
- ☐ Table salt
- ☐ Toothache remedy
- ☐ Thermometer
- ☐ Tweezers

Personal Items

- ☐ Reading and writing materials
- ☐ Sewing kit
- ☐ Small toys for children
- ☐ Soap, toothbrushes, toothpaste, deodorant, etc.
- ☐ Haircare items
- ● ☐ Insect repellant and insecticide
- ☐ Shaving kit, *if needed*
- ☐ Sanitary napkins and tampons, *if needed*

- ● ☐ Paper towels and toilet paper
- ● ☐ Detergent
- ● ☐ Disinfectant (such as Lysol or similar product)
- ● ☐ Garbage can with tight-fitting lid and plastic garbage bags (for emergency toilet)

Baby Supplies (if needed)

- ☐ Diapers
- ☐ Milk or formula
- ☐ Powders, creams or ointments
- ☐ Bottles and nipples
- ☐ Food
- ☐ Sheets, blankets, rubber pads
- ☐ Portable crib

- ● *Tools and Equipment (for building a fallout shelter)*

- ☐ Work gloves
- ☐ Shovel
- ☐ Axe
- ☐ Pick
- ☐ Saw
- ☐ Hammer
- ☐ Knife
- ☐ Nails, screws, fasteners
- ☐ Crowbar
- ☐ Bucket
- ☐ Wire: heavy, medium, light
- ☐ Rope: heavy, medium, light
- ☐ Wrenches, pliers, wire cutters

Papers and Valuables

- ☐ Social Security cards
- ☐ Birth certificates
- ☐ Driver's licenses
- ☐ Cash and credit cards
- ☐ Wills
- ☐ Insurance policies
- ☐ Deeds
- ☐ Stocks and bonds
- ☐ Savings and checking account books
- ☐ Small valuables: camera, watches, jewelry, etc.

Library

- ☐ Newspaper emergency public information articles
- ● ☐ Plans for expedient shelters
- ☐ Medical self-help books
- ● ☐ Civil defense manuals
- ● ☐ Survival books

Communication, Lighting and Safety

- ☐ Battery-operated radio
- ☐ Extra batteries
- ● ☐ Lantern and fuel
- ☐ Flashlights, candles
- ☐ Matches (in a waterproof container)
- ● ☐ Citizen's Band radio
- ● ☐ Fire extinguisher

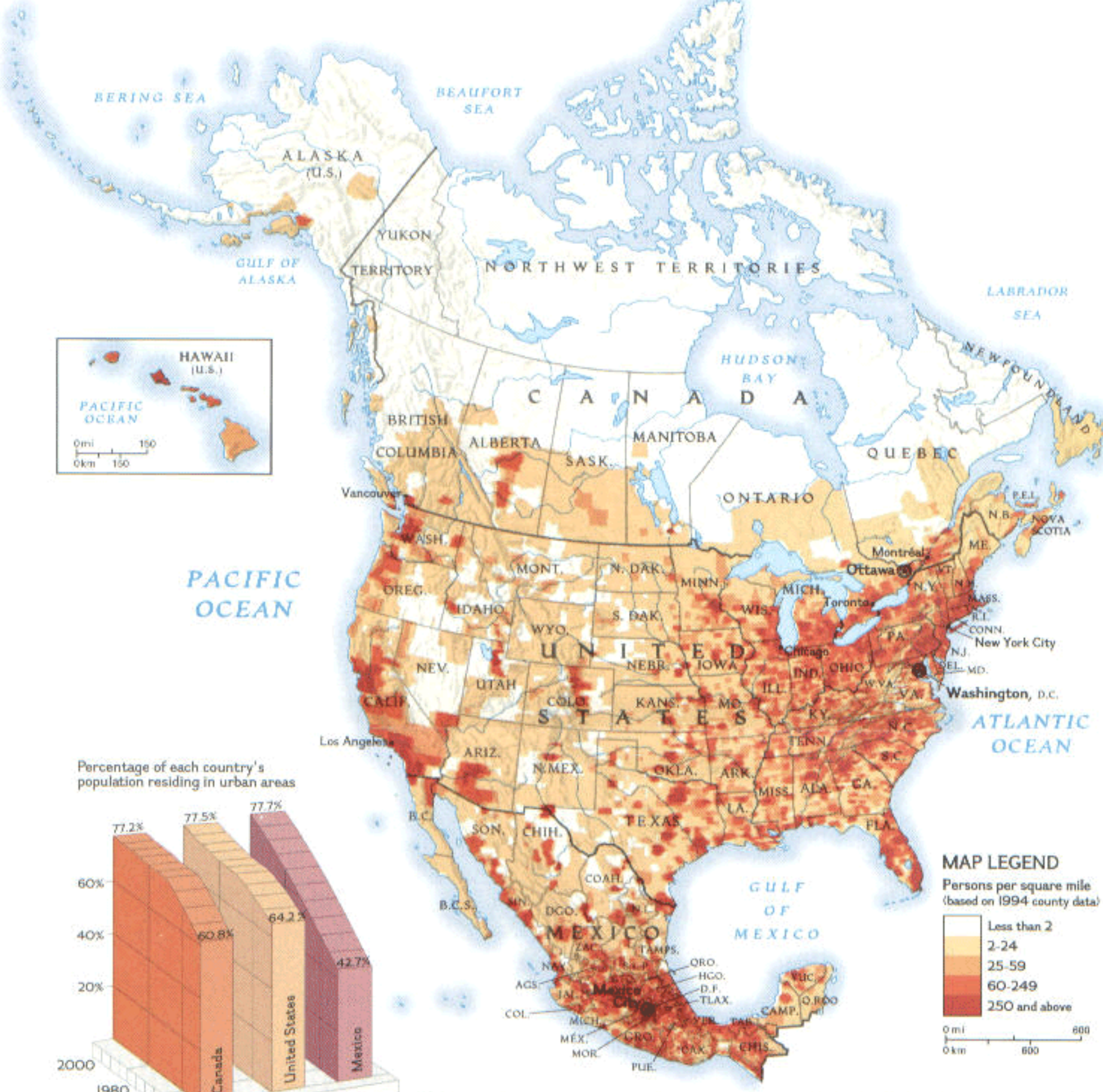
Additional Items of Your Own:

_____

_____

_____

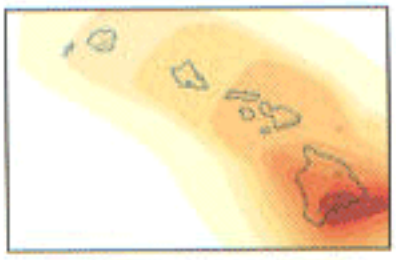
_____



With magnetic pull cities and their suburbs have drawn people from rural areas throughout this century. Showing the steepest rise, Mexican cities now house nearly 80 percent of the population, a slightly higher percentage than in the U.S. or Canada. Tightly packed, cities can be easy targets for natural calamity.

POPULATION: MOVING TOWARD TROUBLE

"A hazard only becomes a disaster when it occurs where people live," says NOAA meteorologist Joe Golden. Unfortunately, people are moving into harm's way at a fast clip. Mexico City has nearly 20 million people living in a region at risk from quakes and volcanoes. The U.S. South and West—prone to drought, fires, hurricanes, quakes, and mudslides—are expected to grow by 32 and 51 percent respectively by the year 2025. Half the U.S. population lives in coastal states, with some 34 million in Texas and Florida, two favorite hurricane targets. And three of Canada's largest cities—Montréal, Vancouver, and Ottawa—lie in seismically active zones. Do people worry? Not much. "There's a certain fatalism about disaster," says Mario Ordaz-Schroeder of Mexico's National Center for Disaster Prevention. Indeed, by desire or lack of choice people still build on volcanic slopes and barrier islands. Says NOAA's Golden, "We don't always learn from our mistakes."

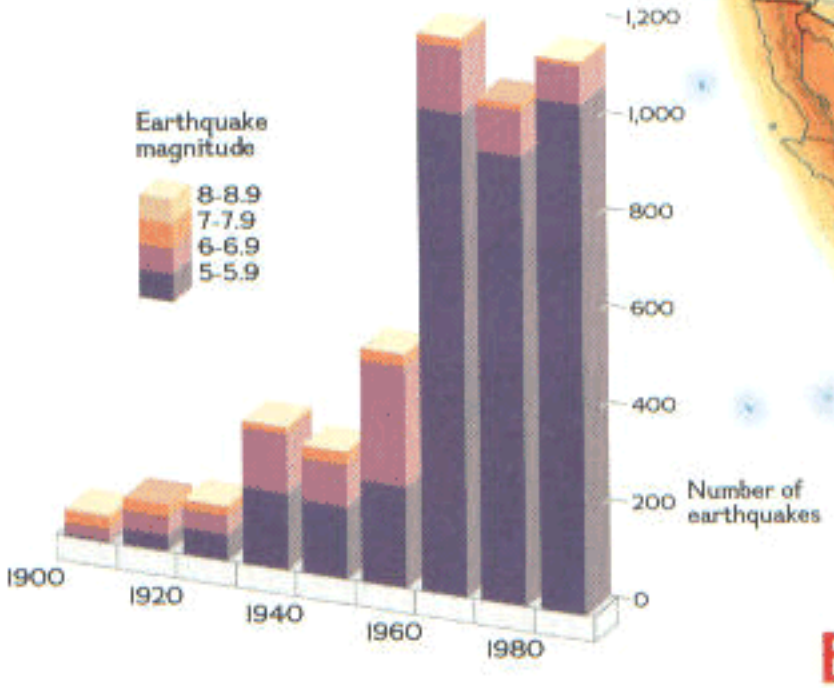


Hawaii's greatest earthquake hazard occurs along faults on the flanks of Big Island volcanoes. A 7.9 magnitude temblor there in 1868 triggered a tsunami and landslides that killed 77 people.

Alaska
CANADA
UNITED STATES
MEXICO
Vancouver Island
Cascade Range
San Andreas Fault
San Francisco
Northridge
San Fernando
Long Beach
Ottawa
Washington
St. Louis
New Madrid
Memphis
Charleston
Colima
Manzanillo
Mexico City

Shading is based on earthquake data, which each country calculates differently. Thus, dramatic color changes at some borders do not necessarily reflect shifts in seismic risk.

Estimated peak horizontal shaking (g = gravitational acceleration)
.04-.07g
.08-.1g
.11-.15g
.16-.22g
.23-.31g
.32-.49g
.5-.74g
.75-.99g
1 and above



Since 1900, 4,643 sizable quakes have been recorded in Canada, Mexico, and the U.S. Only 17 of those have been magnitude 8 or greater, with one off Canada's west coast and eight each in Mexico and Alaska. The apparent increase in earthquakes is due to improved reporting.

EARTHQUAKES: SHOCKS FROM SHIFTING PLATES

The big one. It may not be imminent, but it is inevitable. The greatest earthquake hazard exists where one tectonic plate collides with, grinds past, or dives under another. Plate subduction under Alaska and southwestern Mexico make them the continent's most quake-prone spots, with each having many more strong temblors than California. California's San Andreas Fault is also an active seismic zone. The Cascadia subduction zone potentially could produce quakes stronger than those from California's faults, threatening cities in the Pacific Northwest. The Cascadia zone also makes people on Canada's west coast that nation's most at-risk group. Though less seismically active, the East has also felt huge quakes. Because eastern underground rock is more rigid than that in the West, seismic waves travel farther. A repeat of the 1811-12 quakes in Missouri, which ranged from 7.8 to 8.1 in magnitude, could cause damage from St. Louis to Memphis.

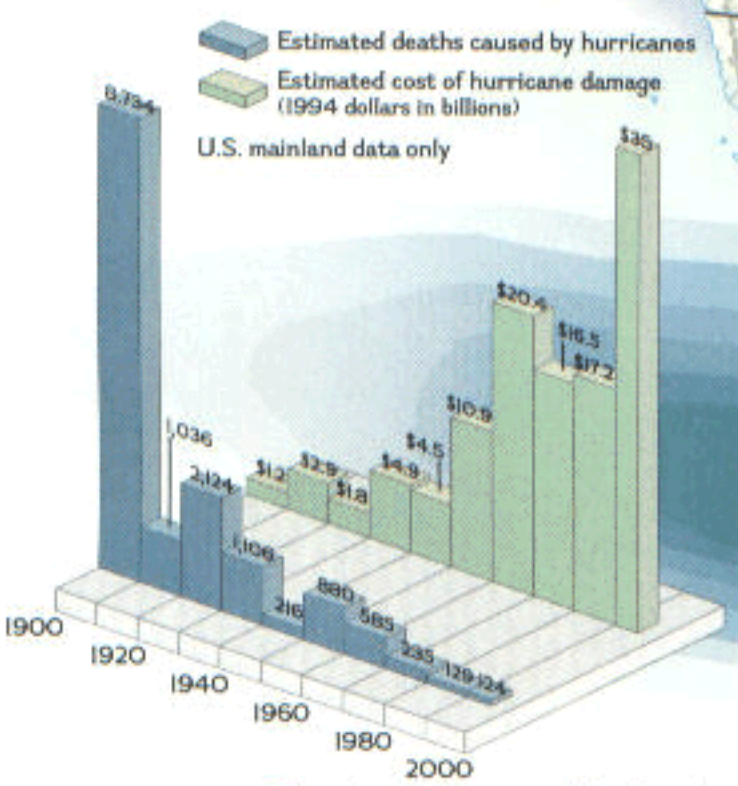
Frequent eruptions of fluid lava from Mauna Loa and Kilauea—two of Earth's most active volcanoes—threaten large areas of Hawaii's Big Island.

Based on 250 years of historic records, the region has experienced 454 volcanic eruptions—391 of those in what is now the U.S. The apparent rise of occurrences in Alaska is due to better reporting. Though quieter in the 20th century than in the 19th, the Cascades could come to life any time.

VOLCANOES: DANGEROUS NEIGHBORS

Two thousand years. It's a blink in geologic time but hardly factors when planning where to build a home or plant a field. Perhaps it's time to reconsider. In Canada, Mexico, and the U.S., 91 volcanoes have been active within the past 2,000 years—74 in the U.S. alone, ranking it third in the world as a volcanic hot spot. Most occur above subduction zones, where ocean plates dive beneath the continent, creating chaos underground. Of particular concern: Mexico's Popocatépetl, which became active in 1994, threatens the 22 million people who live within 60 miles. In the Cascades, Mount Rainier looms steep, icy, and subject to debris flows that could reach Puget Sound. Geologists monitor young calderas such as Wyoming's Yellowstone and California's Long Valley, which have recently been showing seismic activity. Tougher to monitor but still hazardous are areas called monogenetic fields, where destructive cones like Mexico's Paricutín can rise suddenly.

Small target in a vast ocean, Hawaii is seldom directly hit by hurricanes. Iniki in 1992 killed four people and caused 2.4 billion dollars in damage. Iwa in 1982 didn't make landfall but also caused death and destruction.



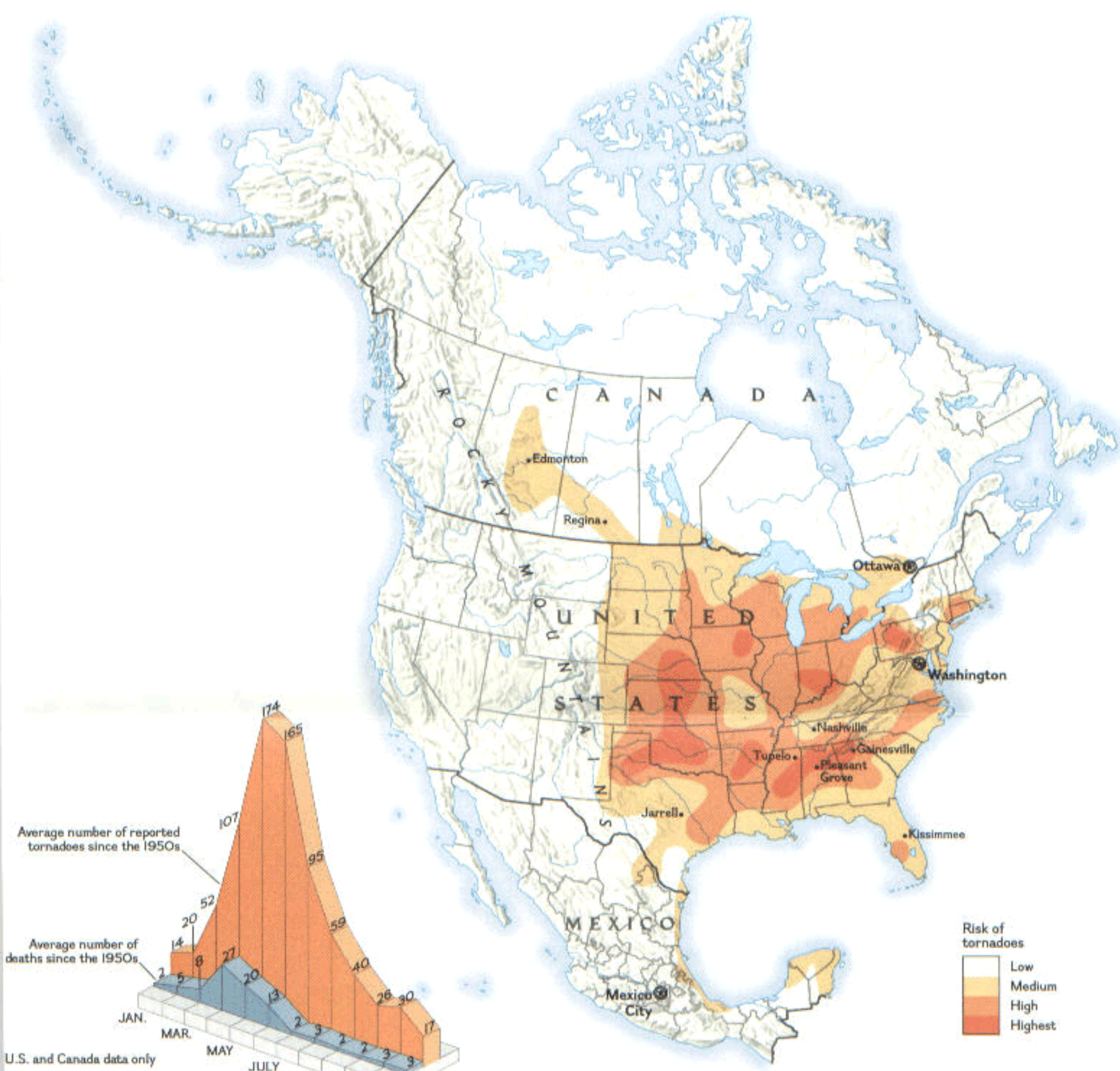
There's good news and bad on the hurricane front. Deaths have fallen with advances in early-warning technology. But with increased coastal development, many more people are vulnerable to hurricanes, and costs have soared. Damage in the 1990s tops that for the '70s and '80s combined.

HURRICANES: WHERE ILL WINDS BLOW

"In virtually every coastal city of any size from Texas to Maine . . . the United States is building toward a hurricane disaster." So concludes a recent report from the National Oceanic and Atmospheric Administration. Coast-hugging crowds are vulnerable to storm-surge flooding, which causes 90 percent of hurricane deaths. The Florida Keys are particularly at risk as they have only one road for evacuation.

Florida, Texas, Louisiana, and the Carolinas get walloped most, during a season that peaks in August and September. Though winds often weaken over land, hurricane rains can cause ruinous flooding well into Canada. Almost twice as many hurricanes form in the Pacific as in the Atlantic; in each case most spin harmlessly out to sea.

On average, 1.6 hurricanes make landfall—meaning the eye crosses land—in the U.S. each year. Yet severe damage from winds, rains, and hurricane-spawned tornadoes often occurs hundreds of miles from the eye.



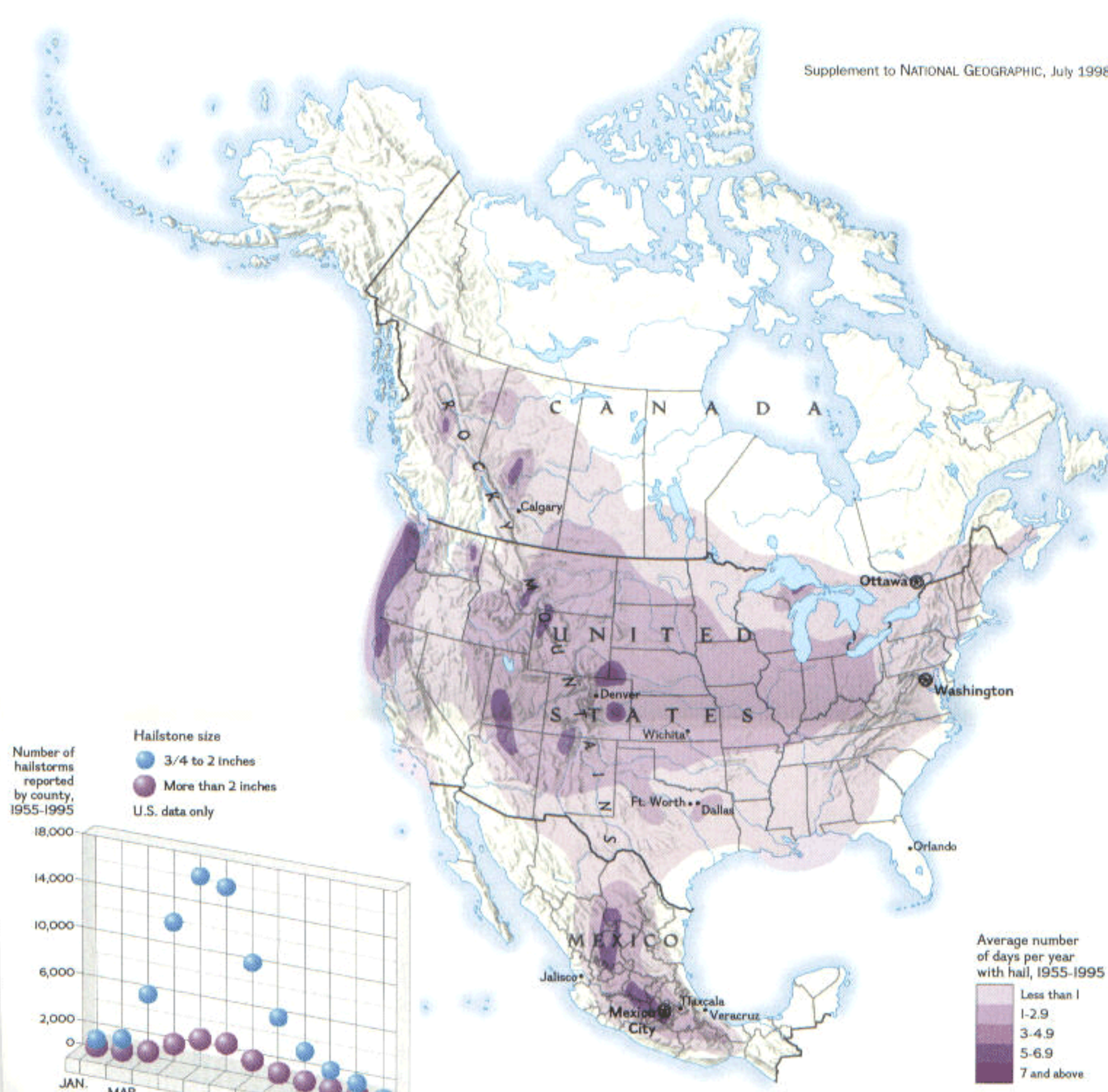
Favored turf for tornadoes, the U.S. and Canada have averaged 799 twisters and 90 deaths a year—the vast majority of both in the States. Most twisters hit the U.S. heartland from April through June. Canada's tornado season peaks later. Just 2 percent of tornadoes cause three-quarters of the deaths.

TORNADOES: TERRORS OF THE HEARTLAND

"You don't usually think weather is evil. But this was," said one survivor of a tornado that hit Jarrell, Texas, in 1997. From 800 to 1,100 tornadoes now scour the U.S. each year—more than in any other nation. Canada reports 50 to 160. Twisters find fertile spawning ground where humid winds from the Gulf of Mexico underlie swift dry westerlies from the Rocky Mountains. Texas, Oklahoma, and Kansas are hardest hit, but tornadoes have nicked every state, and sightings are up as population and cell phones proliferate. (Mexico does not track tornadoes.)

Twisters are ranked on the Fujita damage-intensity scale of F0 to F5. The vast majority of touchdowns do little harm and vanish quickly. Canada has never had an F5 storm; the U.S. has had many. With wind speeds topping 260 miles an hour, these monsters can wipe homes off the map and suck asphalt off streets. But even low-grade tornadoes—especially those that linger—can leave tragic scars.

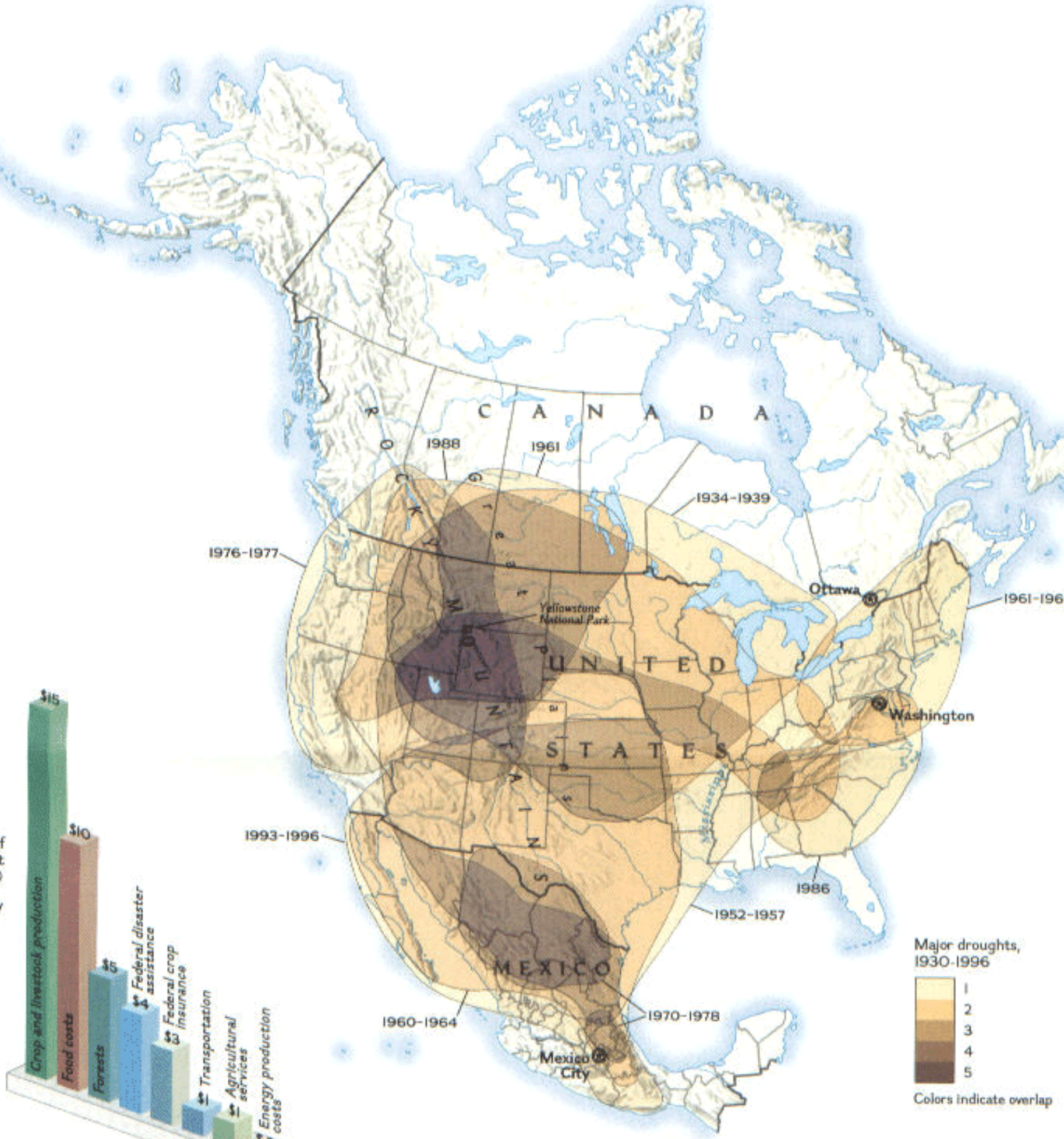
Supplement to NATIONAL GEOGRAPHIC, July 1998



HAIL: SHOWERS OF ICY STONES

Balmy afternoons in May and June have seen most of the nearly 91,000 hailstorms reported since 1955. Property damage generally begins when hail reaches three-quarters of an inch wide. A stone found in Kansas in September 1970 set the record at more than seven inches wide and 1.7 pounds.

Like fistfuls of marbles tossed by wind, hail pelts most of the continent at some time each year. Much of what falls in the Northwest is graupel, or small, soft hail. In the lee of the Rockies—from Alberta through the High Plains to Texas—hail falls fat and deadly, killing livestock and destroying crops, cars, and roofs with dismal regularity. Though the number of hailstorms has remained stable, property losses have soared. "We've made ourselves vulnerable to hail damage by increasing the size of the targets," says U.S. climatologist Stanley Changnon. As cities have blossomed in the hail belt, property losses have hit a par with those for crops—a combined total of some 2.3 billion dollars a year in the U.S. In Canada crop losses alone run 175 million dollars. Though rarely lethal, hail has killed eight people in the U.S. in the 1990s. In 1976, 12 died in Mexico City when a hail-weighted roof collapsed. Cloud-seeding efforts have had some success in suppressing hail.



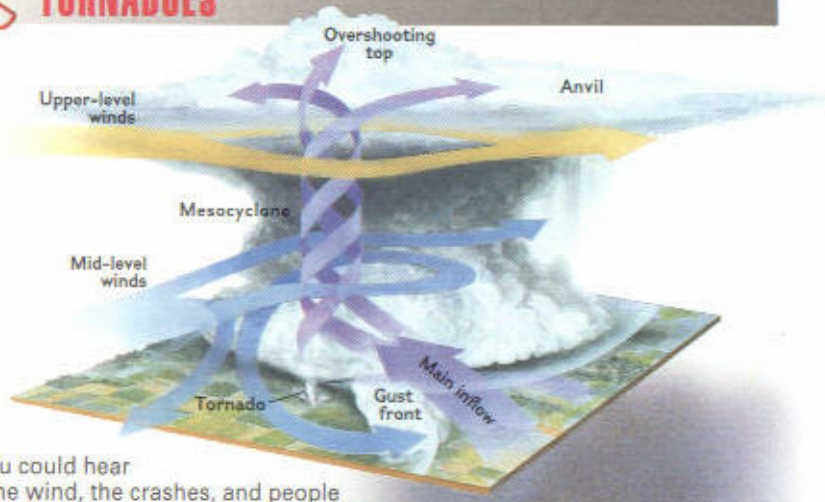
The 1988 drought was the costliest natural disaster in U.S. history. Beyond losses to corn, wheat, and other crops, accounting for slightly less than half the 39.2-billion-dollar total, fires burned 12.6 million acres, hydroelectric power dipped, and Mississippi River traffic slowed to the tune of 220 million dollars.

DROUGHT: THE LAST GASP

Like an insidious plague, drought builds slower, spreads farther, lasts longer, and touches more lives than any other natural disaster. Roughly 10 percent of the continent experiences drought in any given year. Canada's Prairie Provinces, the western and central U.S., and north-central Mexico most frequently feel drought's grip, but all corners of the continent have suffered periods of water shortage.

Drought's impact ripples like heat off pavement. Crops die, food costs soar, livestock starve, water tables drop, fires rage, and heat takes human lives. Most infamous, the Dust Bowl of the 1930s withered crops from the Prairie Provinces through the Great Plains. Mexico's 1960-64 drought devastated the nation's cattle industry. A vicious 1988 drought left Yellowstone ablaze and caused from 5,000 to 10,000 heat-related deaths. Natural periods of low rain and growing competition for limited water supplies mean vulnerability to drought is on the rise.

TORNADOES



"All you could hear was the wind, the crashes, and people praying," said a resident of Xenia, Ohio, after surviving the largest tornado outbreak on record. In less than 24 hours during April 3-4, 1974, 148 twisters ripped through 13 states and parts of Canada, extinguishing 316 lives.

Deadlier still, the Great Tri-State Outbreak of March 18, 1925, mowed a path of devastation through Missouri, Illinois, and Indiana. One churning rage of wind three-quarters of a mile wide covered 219 miles in just three and a half hours, breaking records for speed, path length, and death. In all, 695 people died, with the worst single-city toll in Murphysboro, Illinois. There 234 people lost their lives, two dozen of them schoolchildren crushed by collapsing brick walls.

Few sights are more awesome and unpredictable than a tornado touchdown (right). Favoring a belt from Texas to Nebraska, tornadoes cause 70 to 80 U.S. deaths a year. Mesocyclones, or rotating updrafts, can spawn tornadoes when upper and lower wind speeds vary greatly (above). But science has yet to learn exactly when a twister will form.

HOWARD B. LUESTEN

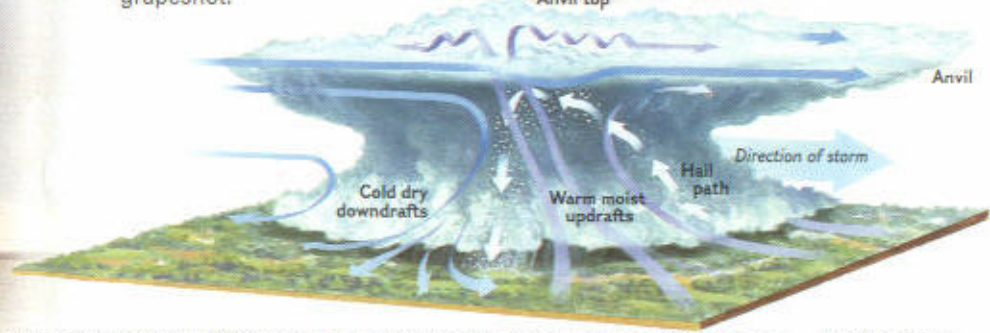
HAILSTORMS

Celebration turned to desperation at a Fort Worth, Texas, Mayfest parade in 1995 when hailstones the size of softballs began to pummel the crowd. Ninety people were injured as the wind-driven chunks of ice pelted flesh and shattered glass in buildings and cars. Wind, rain, and hail from the May 5 calamity caused nearly two billion dollars' damage in the Dallas-Fort Worth area, a record for such storms.

Ruin can be rapid. A Calgary hailstorm in 1991 caused some 315 million dollars' damage in just 15 minutes, one of Canada's costliest storms. In 1996 Calgary was coated with fist-size hail (right). In Mexico, hail dents subsistence housing but does relatively little damage to the overall economy. A hailstorm that swept Tlaxcala in 1992 left some 2,000 families homeless. Crops also suffer severely from hail, which levels fields of wheat, corn, and cotton like a scythe.

Hail forms within strong thunderstorms when updrafts hold particles of ice aloft at levels where moisture can freeze to the embryos (below). With a certain balance of wind, water, and temperature, hail grows fatter, then blasts down like grapeshot.

JIM WELLS CALGARY SUN

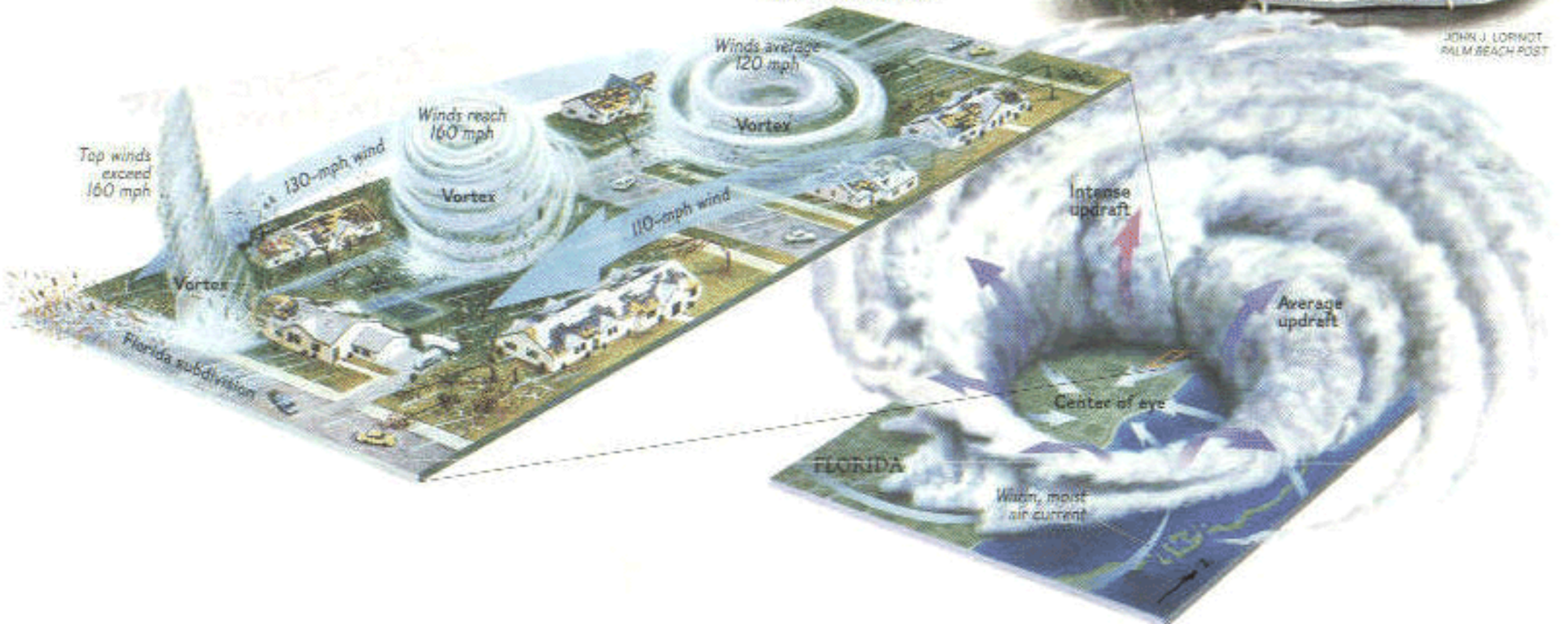


HURRICANES

Andrew, Agnes, Hazel, Camille. Such sweet names, such bitter memories. When Hurricane Andrew sliced into southern Florida early on August 24, 1992, it was a wake-up call for anyone complacent about the power of wind. In just three hours it left 160,000 people homeless and caused 25 billion dollars in damage. Winds of up to 175 miles an hour tossed powerboats like bathtub toys. Intense updrafts in Andrew's eyewall bred tornado-like vortices that demolished homes (below). In Florida and Louisiana 61 people died. Camille was even stronger. Ranked a Category Five (on a scale of One to Five), it slammed the South in 1969 and left 256 dead. Agnes, a "mere" Category One, caused 122 deaths in 1972.

It's not wind but water that most often kills. Flooding accounts for almost all hurricane fatalities. When Hazel pushed north into Canada in 1954, it deluged Toronto with rain. Torrents swept away streets, killing 81, one of Canada's deadliest natural disasters.

JOHN J. LORINOT
PALM BEACH POST

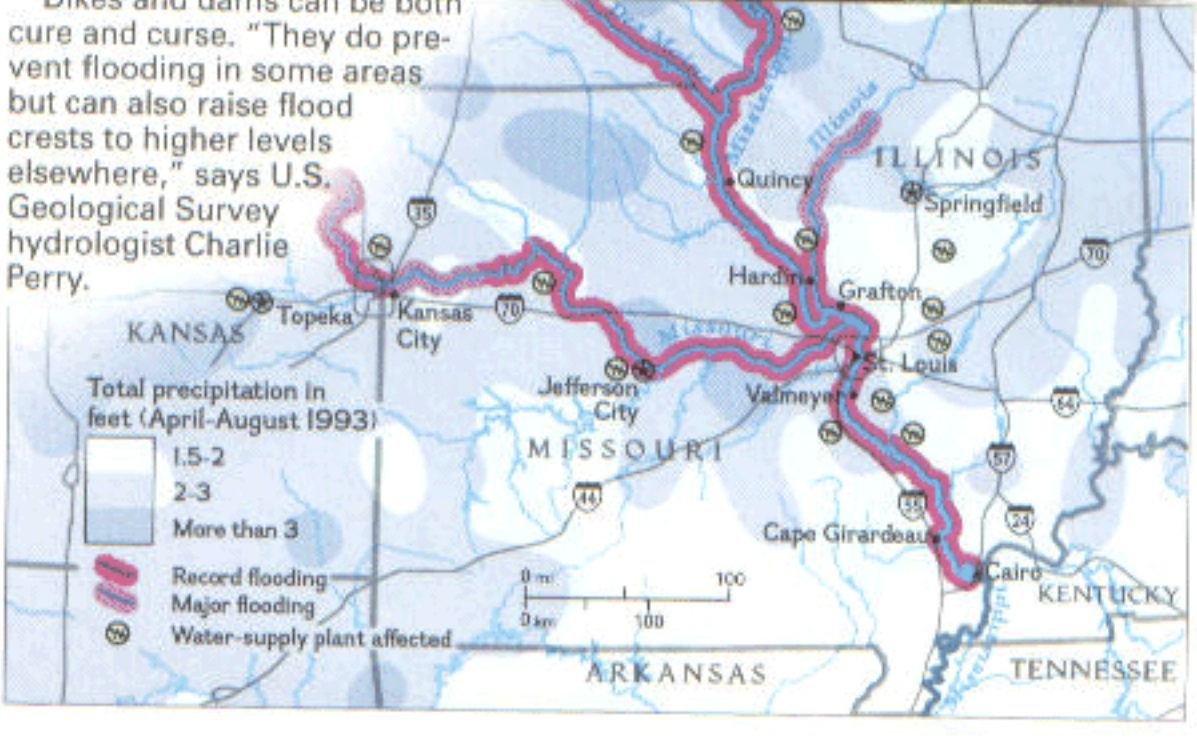


FLOODS

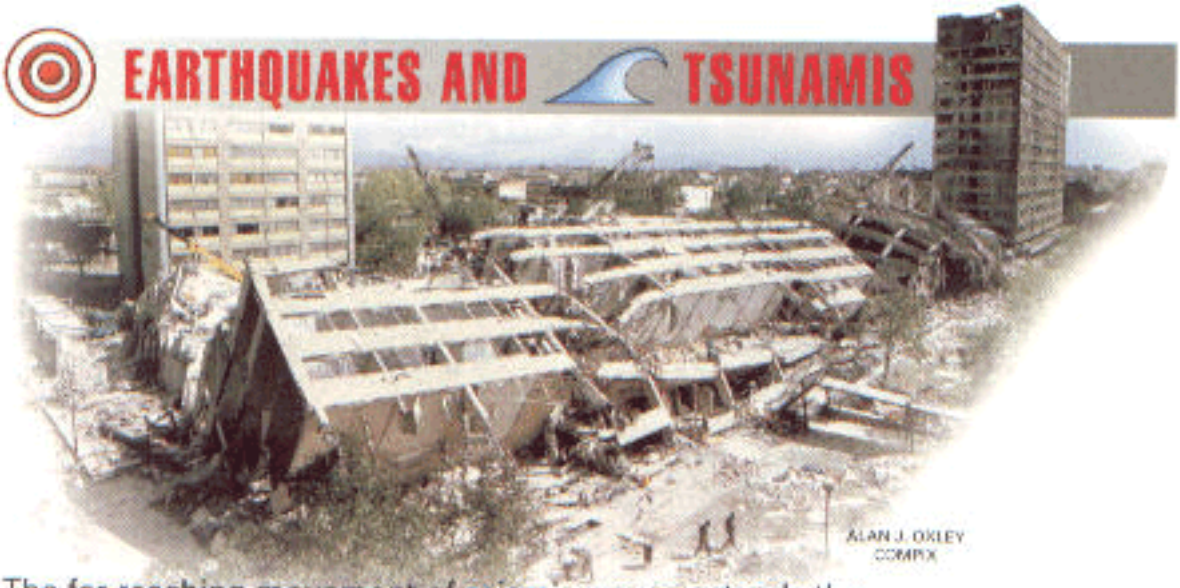
It seemed the rain would never end in the summer of 1993. The deluge left vast tracts of nine U.S. states inundated, pushed the Mississippi and Missouri Rivers to record highs (below), and breached countless levees, turning farmland and towns like Valmeyer, Illinois (right), into muddy lakes. Spreading slowly, regional floods caused by persistent rains or spring snowmelt can stun with their scope. Far more swift and lethal, flash floods hit with shocking surprise. In Mexico they're often spawned when hurricane rains run off arid earth. When Hurricane Liza slammed Baja California in 1976, it turned the normally dry El Cajoncito Creek into a rain-swollen torrent. The waters tore through a diversion dike and drowned 600 people in La Paz.

TONY STONE IMAGES

Dikes and dams can be both cure and curse. "They do prevent flooding in some areas but can also raise flood crests to higher levels elsewhere," says U.S. Geological Survey hydrologist Charlie Perry.



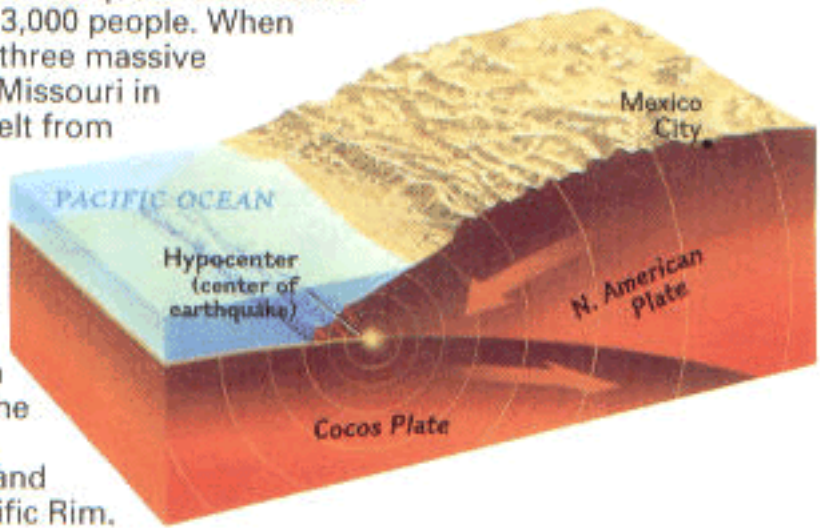
EARTHQUAKES AND TSUNAMIS



ALAN J. OXLEY
COMPIX

The far-reaching movement of seismic waves extends the impact of earthquakes well beyond their epicenters. After the oceanic Cocos plate slipped under the North American plate in September 1985, seismic waves raced toward Mexico City, 220 miles east (below). Those waves were amplified by the soft sediments of an ancient lake bed on which the city is built. With its base wiggling like Jell-O, parts of the city toppled (above). The official death toll was 5,500, but many observers believe that more than 10,000 died.

Deadliest in the U.S., the 1906 quake that rocked San Francisco killed some 3,000 people. When intraplate stresses caused three massive temblors beneath frontier Missouri in 1811-12, their power was felt from Quebec to Louisiana, and one briefly backed up the Mississippi River. Submarine quakes can send tsunamis thousands of miles. Towering sea waves from a 1960 Chilean quake—at magnitude 9.5 the strongest ever recorded—killed 61 people in Hawaii and hundreds more on the Pacific Rim.



WILDFIRES

A lightning bolt ignites a swath of Canada's boreal forest. An arsonist's blaze races down tinder-dry hills in Los Angeles County and destroys hundreds of homes in Laguna Beach (right). A fire set by farmers clearing land in Mexico burns out of control. Every year roughly 120,000 wildfires torch millions of acres in these three nations—with more than 100,000 fires in the U.S. alone. Though lightning-sparked fires consume the most acreage, the vast majority of individual wildfires are caused by human acts. And the toll is enormous. A 1916 blaze in Matheson, Ontario, snuffed out 244 lives in a flash. Flames destroy 700 million dollars' worth of timber in Canada each year. The costliest inferno on record hit Oakland, California, in 1991 when a wildfire stirred by hot Santa Ana winds destroyed 3,300 homes, causing 1.5 billion dollars in losses. Such "urban interface" fires, where developments push into previously wild land, pose a growing threat to hearth and health.

ROBERT A. EPLETT
OES

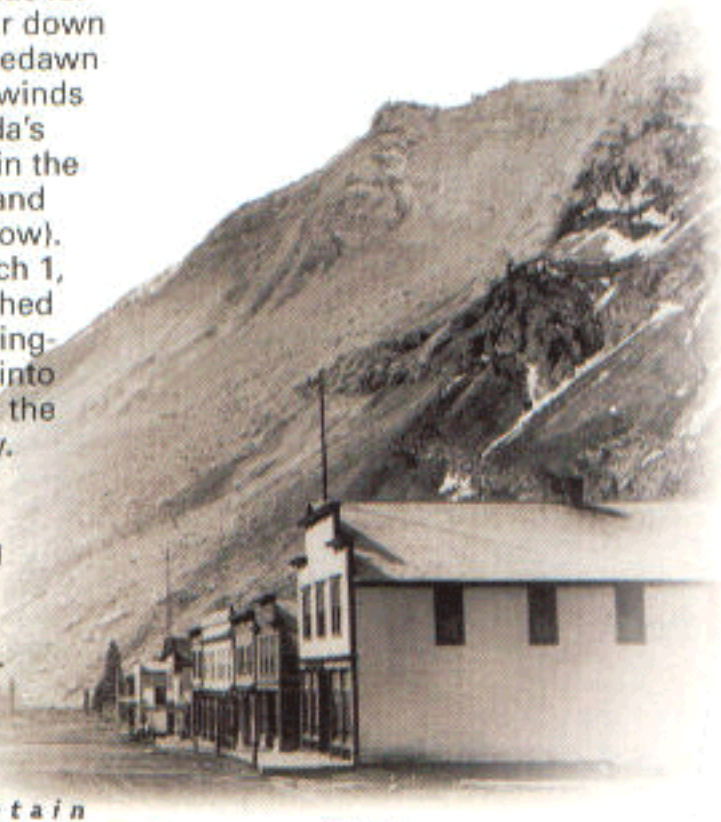
LANDSLIDES AND AVALANCHES

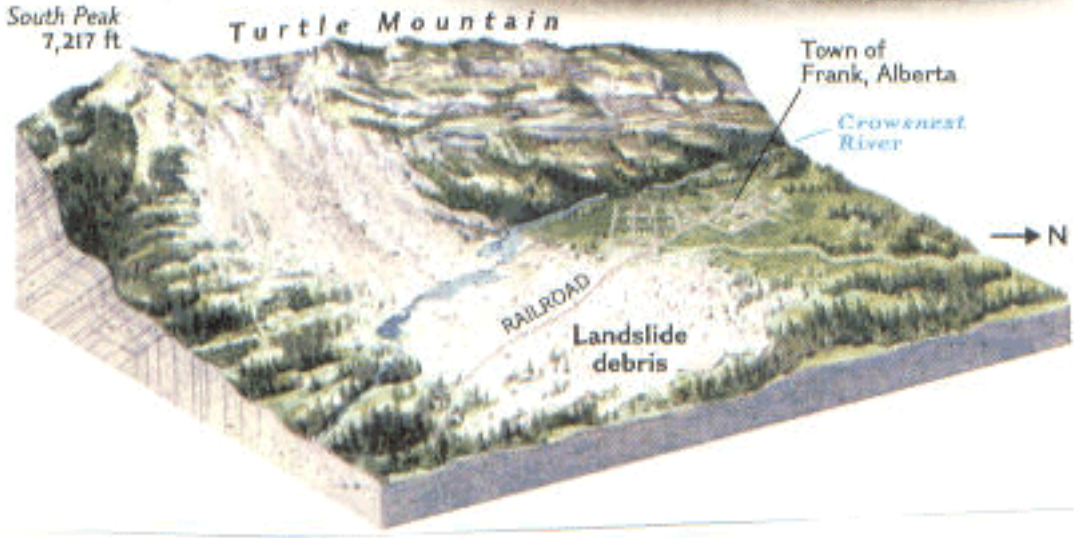
Rock. It took only a hundred seconds for 90 million tons of limestone to roar down Alberta's Turtle Mountain in the predawn chill of April 29, 1903. Generating winds that tore branches off trees, Canada's deadliest slide crushed 70 people in the coal-mining town of Frank (right) and dammed the Crowsnest River (below).

Snow. In the early hours of March 1, 1910, a massive wall of white crashed down a slope in Wellington, Washington, knocking two stranded trains into a gorge and killing 96 passengers, the deadliest avalanche in U.S. history.

Mud. Late on October 29, 1959, rain-soaked soils slid off the hills above Minatitlán, Mexico, burying 800 villagers. Scores more died after being bitten by snakes and scorpions unearthed by the slides. Gravity propels such collapses in response to imbalances in slopes of rock, snow, and earth.

PROVINCIAL ARCHIVES OF ALBERTA

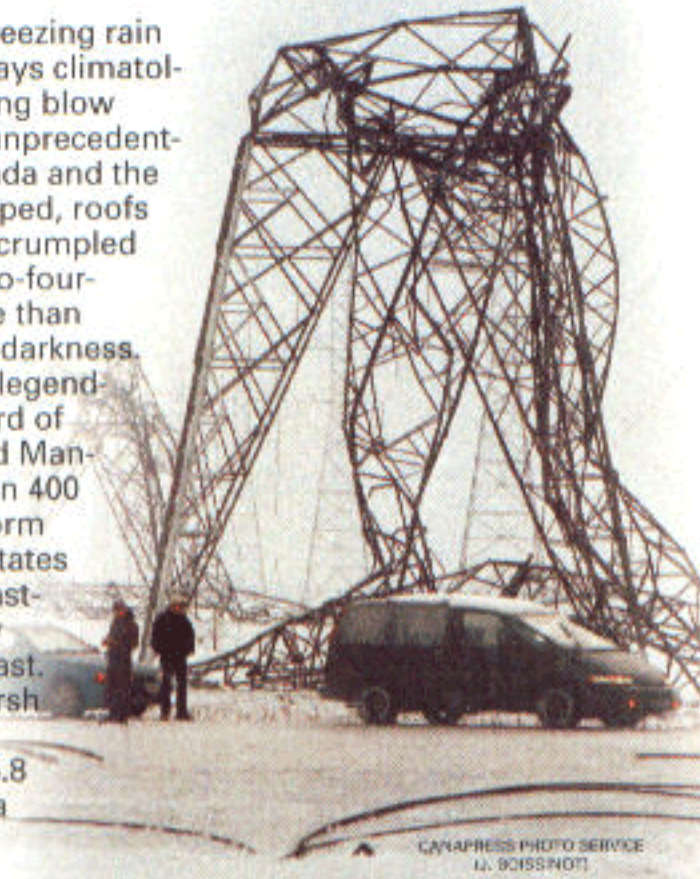




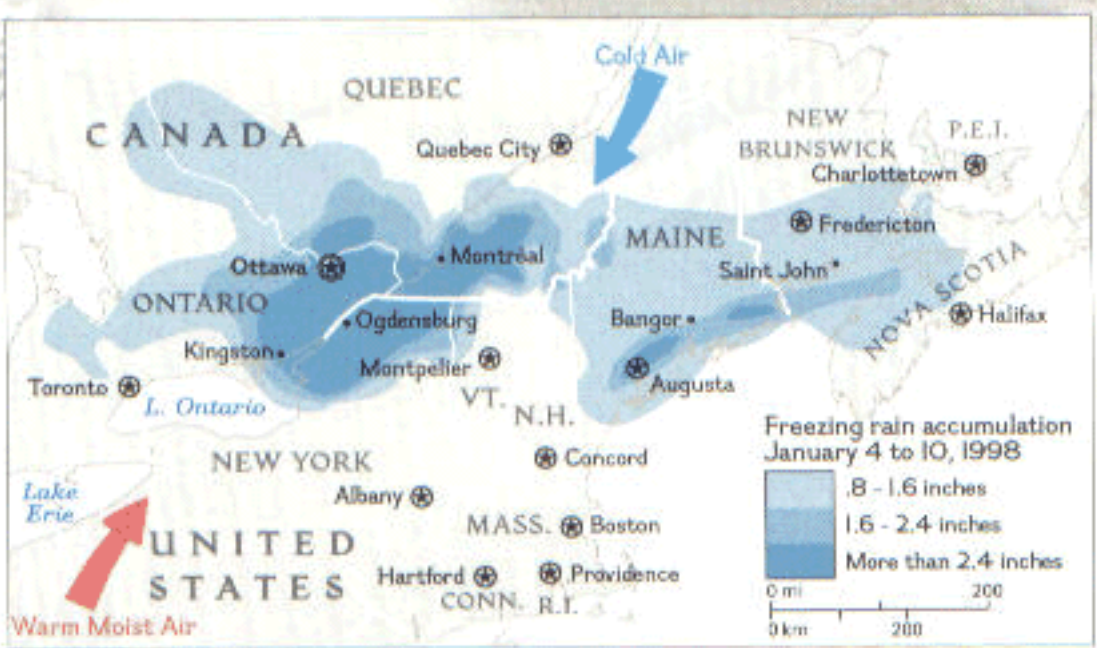
WINTER STORMS

"Canada is used to cold, but freezing rain can bring us to our knees," says climatologist David Phillips. A crippling blow came last January when an unprecedented ice storm hit eastern Canada and the northeastern U.S. Trees snapped, roofs collapsed, and utility towers crumpled (right) under a weighty two-to-four-inch coat of ice, leaving more than four million people in frozen darkness.

Winter's bite in the East is legendary. In the freak March blizzard of 1888, 20-foot drifts entombed Manhattan pedestrians. More than 400 people died. In 1993 the "Storm of the Century" affected 26 states from Florida to Maine and eastern Canada and closed every major airport on the East Coast. The West, too, knows the harsh grip of winter. Back in 1921 Silver Lake, Colorado, got 75.8 inches of snow in 24 hours, a U.S. record that still stands.



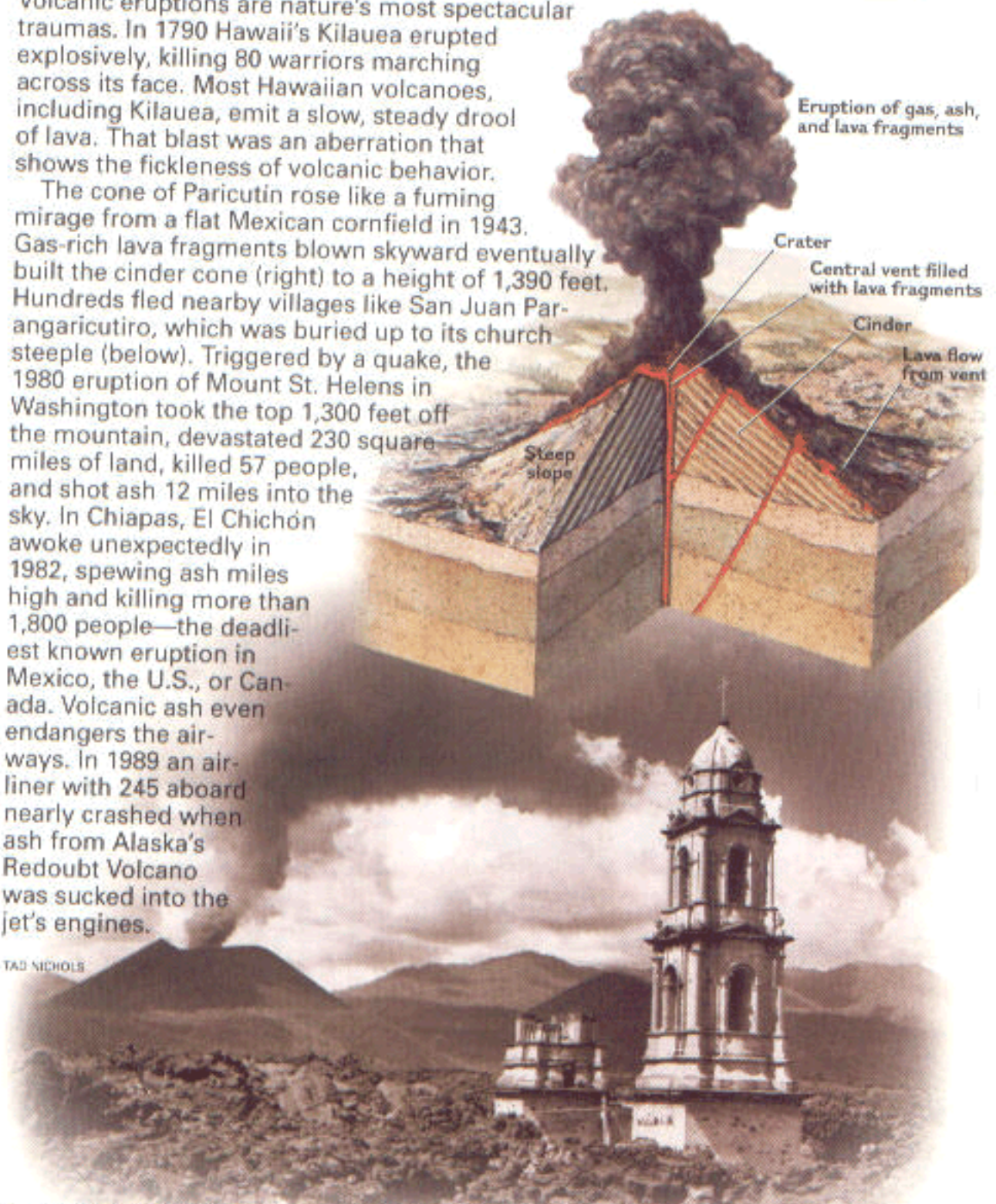
CANAPRESS PHOTO SERVICE
G. BOISSINOT



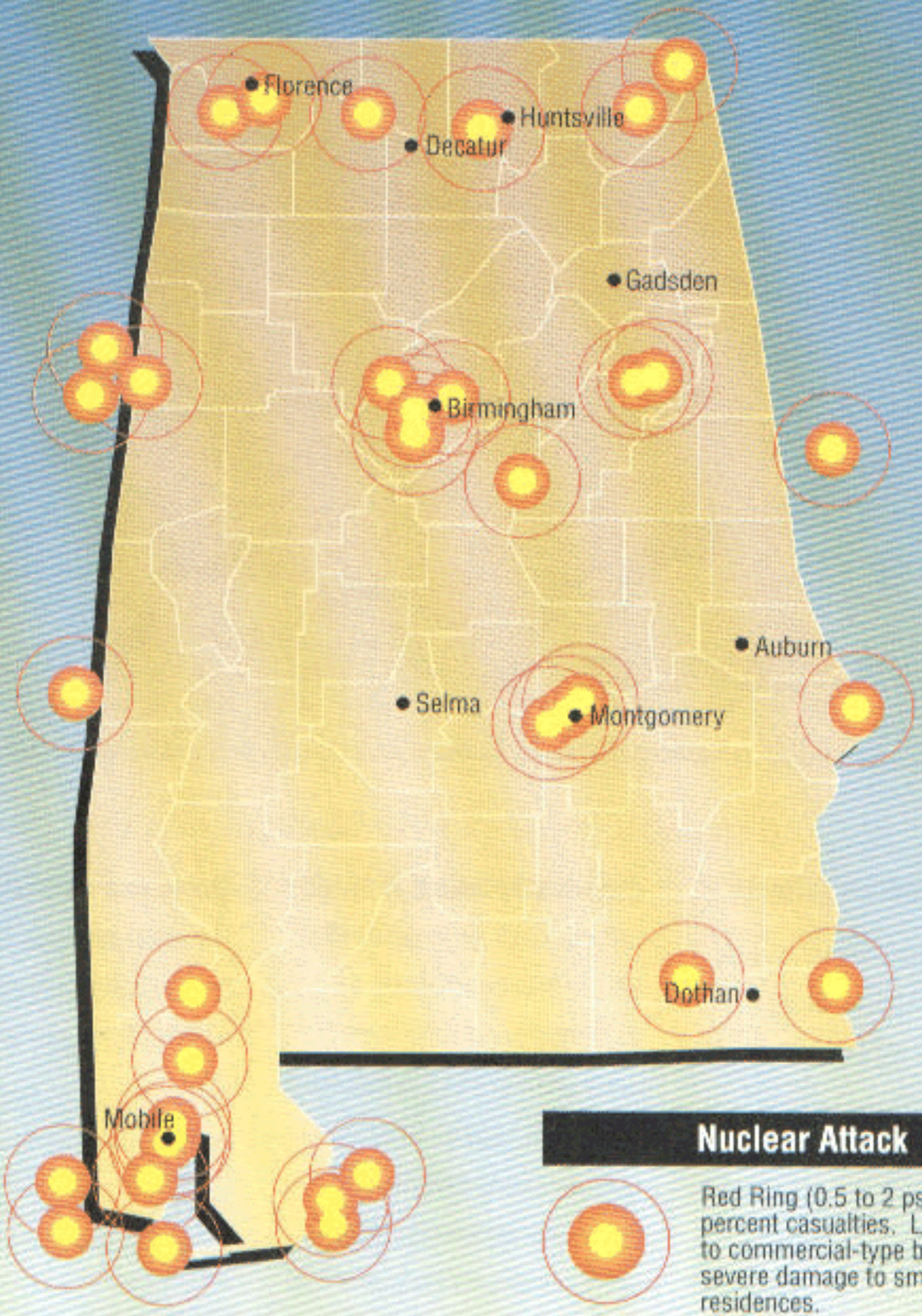
VOLCANOES

Volcanic eruptions are nature's most spectacular traumas. In 1790 Hawaii's Kilauea erupted explosively, killing 80 warriors marching across its face. Most Hawaiian volcanoes, including Kilauea, emit a slow, steady drool of lava. That blast was an aberration that shows the fickleness of volcanic behavior.

The cone of Paricutin rose like a fuming mirage from a flat Mexican cornfield in 1943. Gas-rich lava fragments blown skyward eventually built the cinder cone (right) to a height of 1,390 feet. Hundreds fled nearby villages like San Juan Parangaricutiro, which was buried up to its church steeple (below). Triggered by a quake, the 1980 eruption of Mount St. Helens in Washington took the top 1,300 feet off the mountain, devastated 230 square miles of land, killed 57 people, and shot ash 12 miles into the sky. In Chiapas, El Chichón awoke unexpectedly in 1982, spewing ash miles high and killing more than 1,800 people—the deadliest known eruption in Mexico, the U.S., or Canada. Volcanic ash even endangers the airways. In 1989 an airliner with 245 aboard nearly crashed when ash from Alaska's Redoubt Volcano was sucked into the jet's engines.



TAD NICHOLS



Nuclear Attack

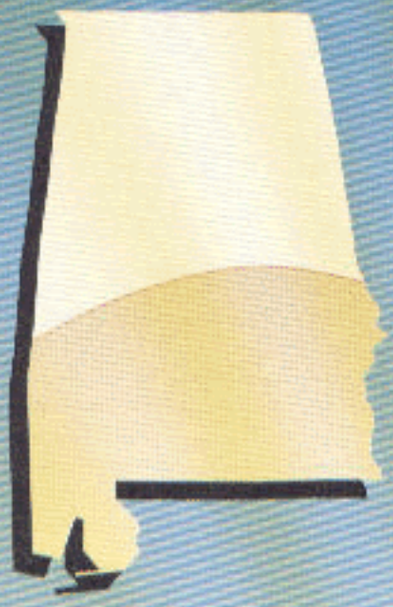
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

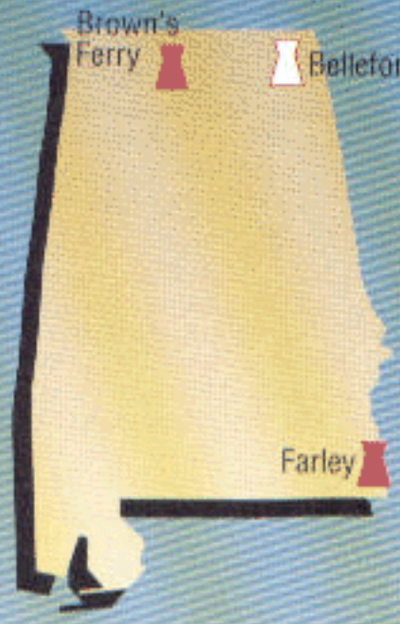
Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

ALABAMA



Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

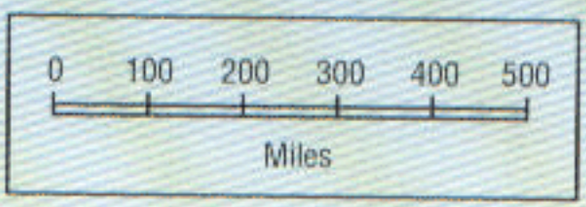
*Occurrences of destruction over a 50-year period

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

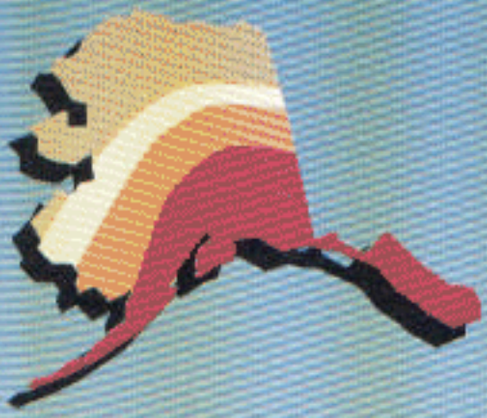
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

ALASKA

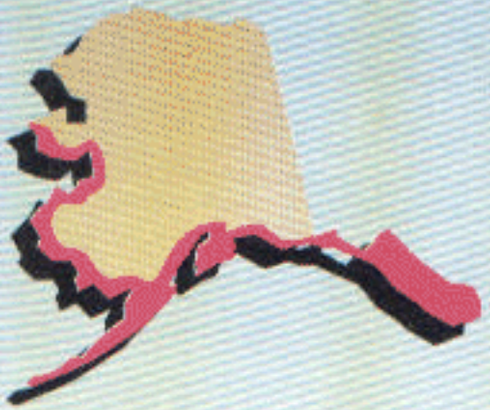


Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

The entire state is subject to heavy snow, extreme cold and high winds. For more information, contact local authorities.



Tsunamis

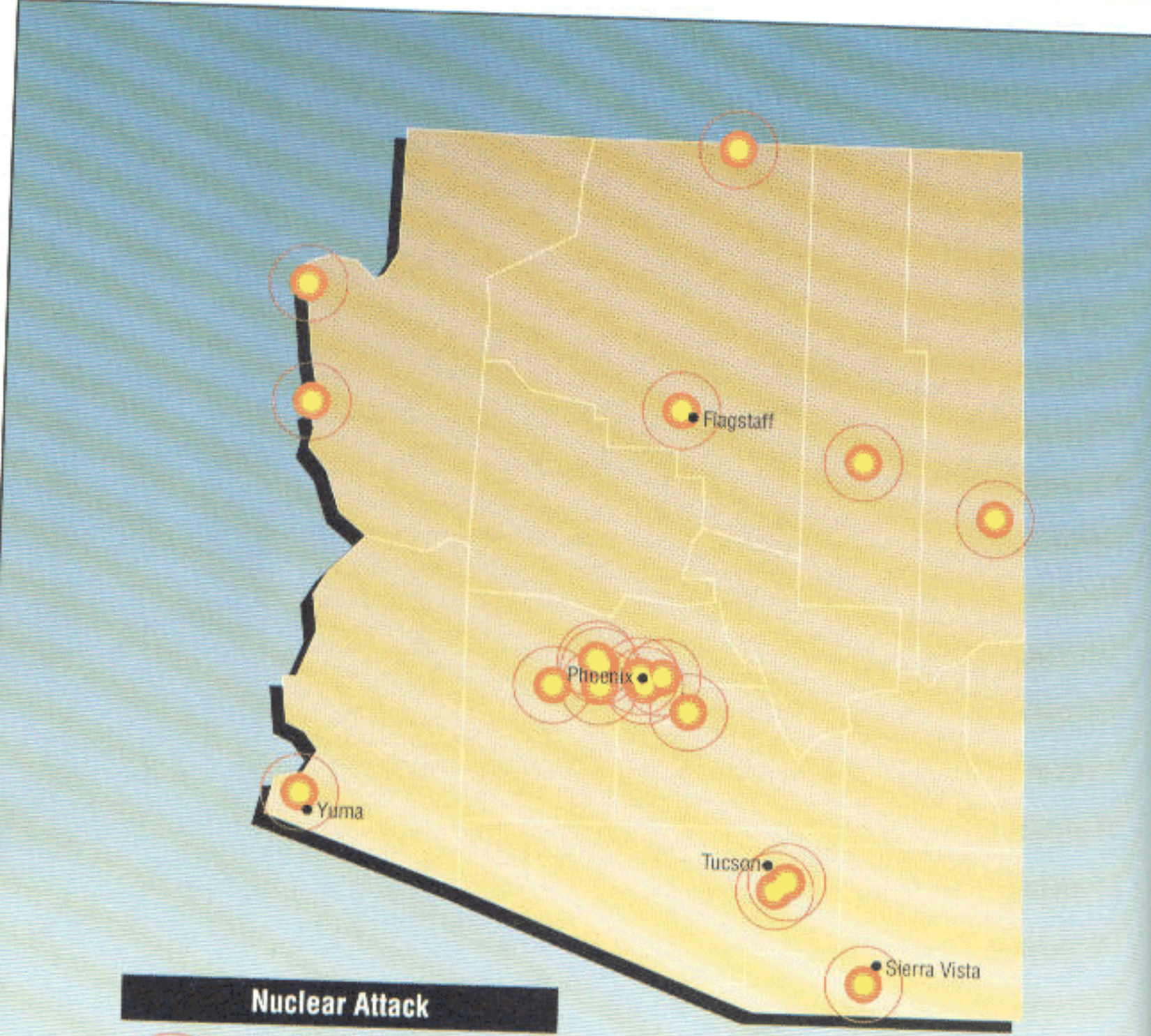
Coastal areas historically subject to Tsunami

Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.
- Volcanoes that have erupted since 1950

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

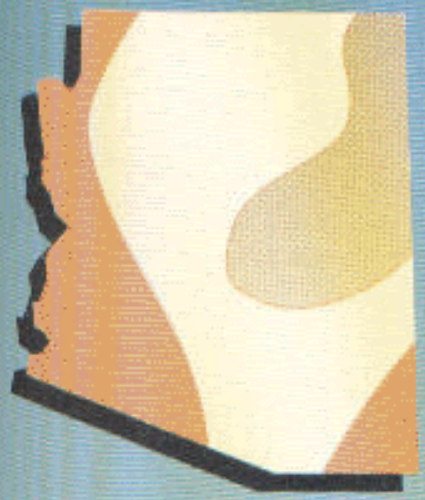
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

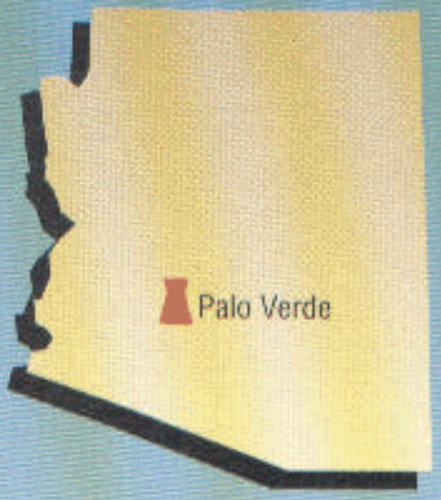
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



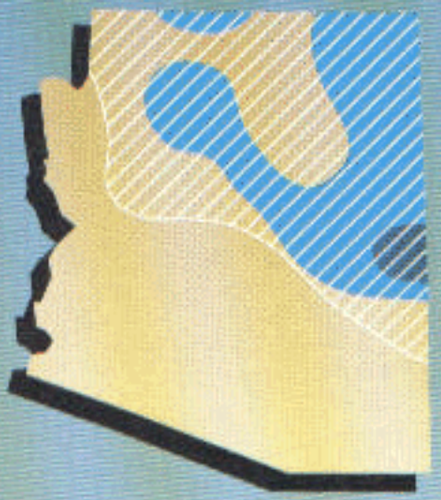
Earthquakes

- Low hazard
- Moderate hazard
- High hazard



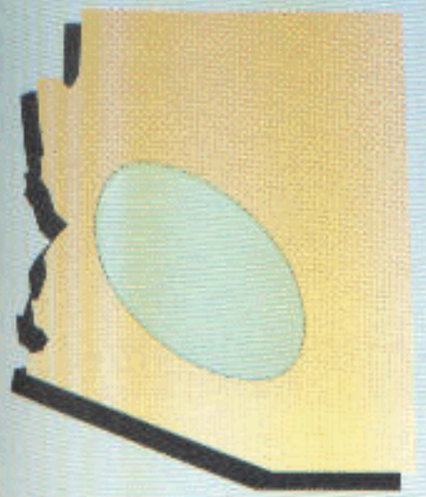
Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing



Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

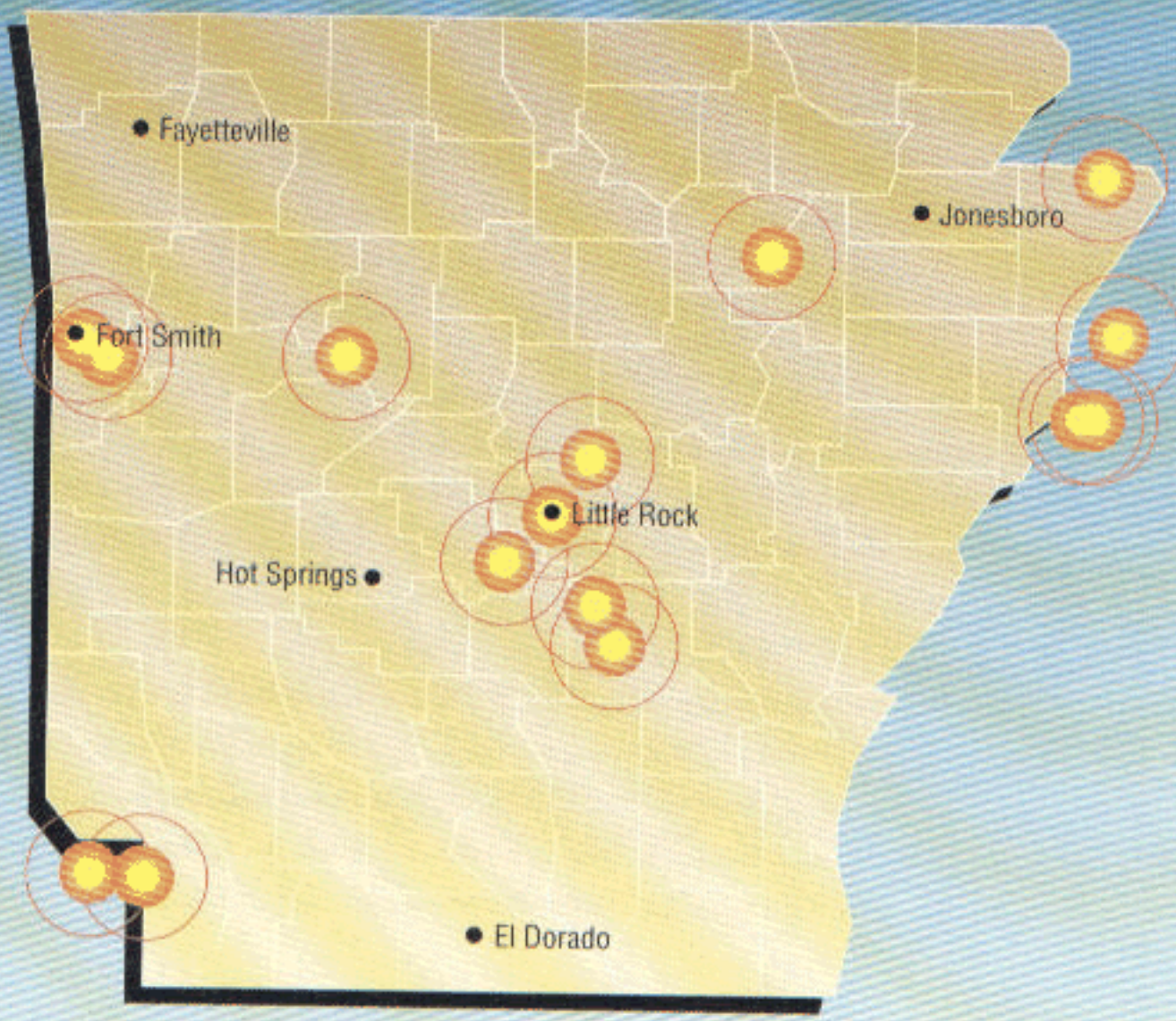
*per 10,000 square miles over a 28-year period

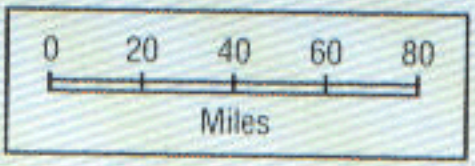
Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.

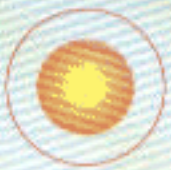
Floods

Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.

Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

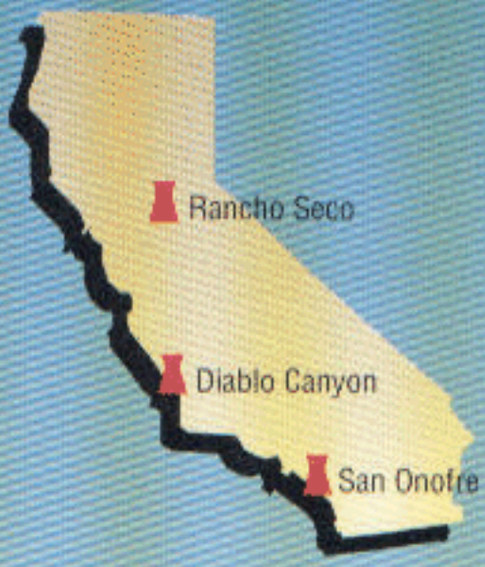
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

CALIFORNIA

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Tsunamis

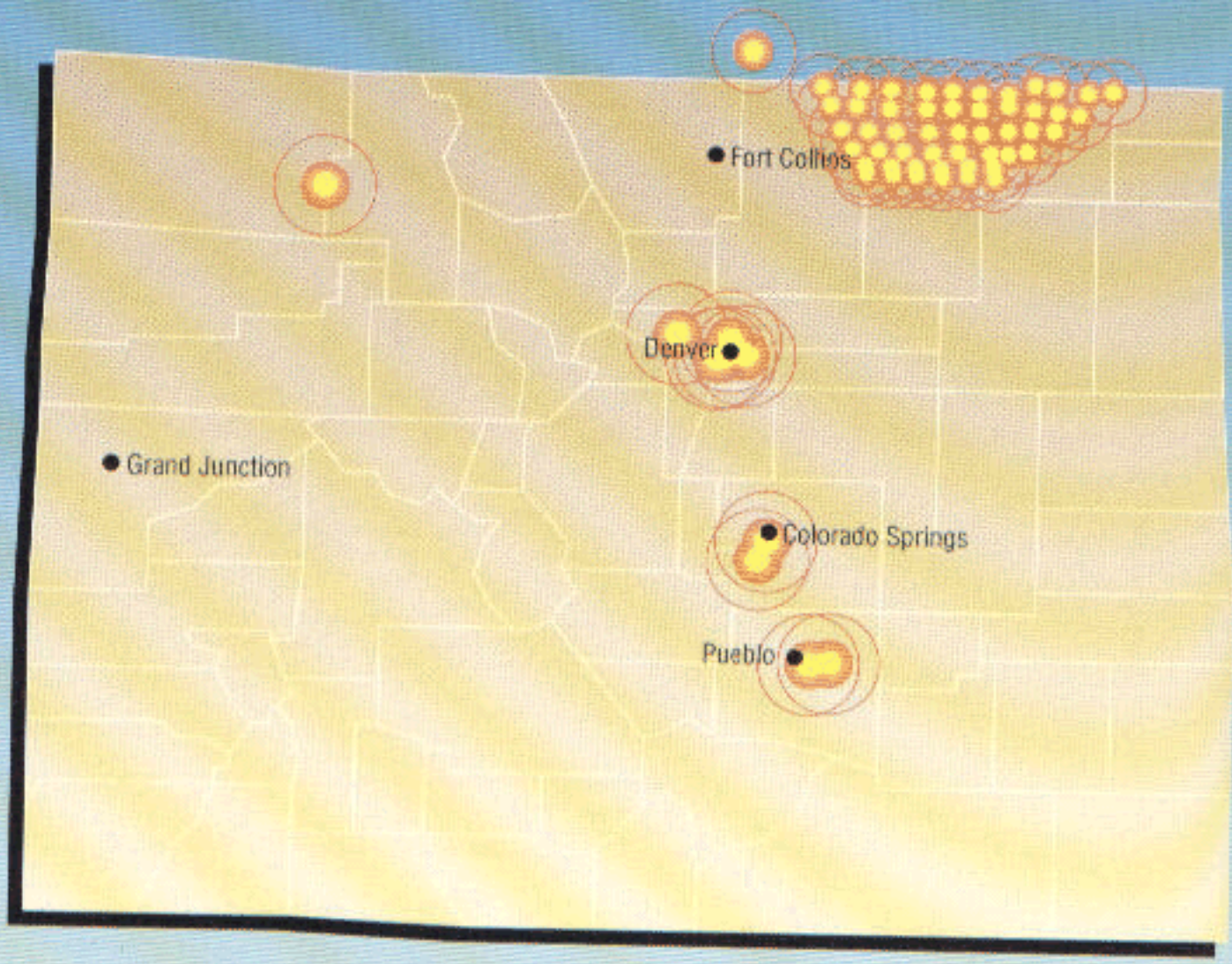
- Coastal areas historically subject to Tsunami

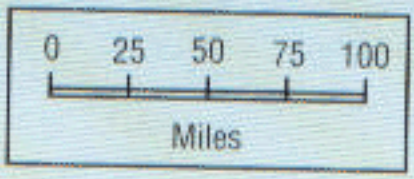
Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.

Floods

Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

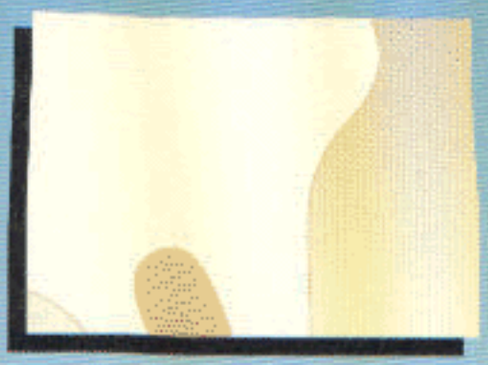
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

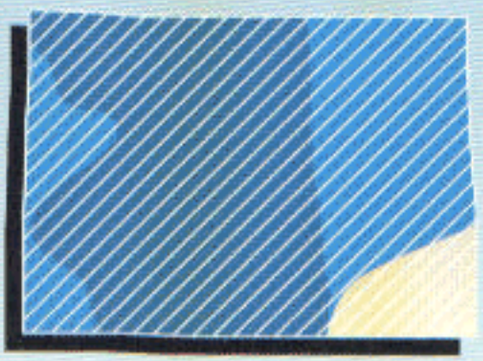


Earthquakes

- Low hazard
- Moderate hazard
- High hazard

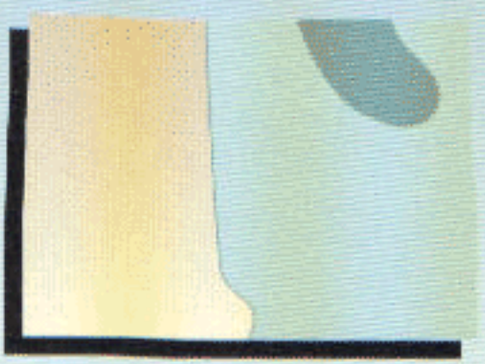
Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing



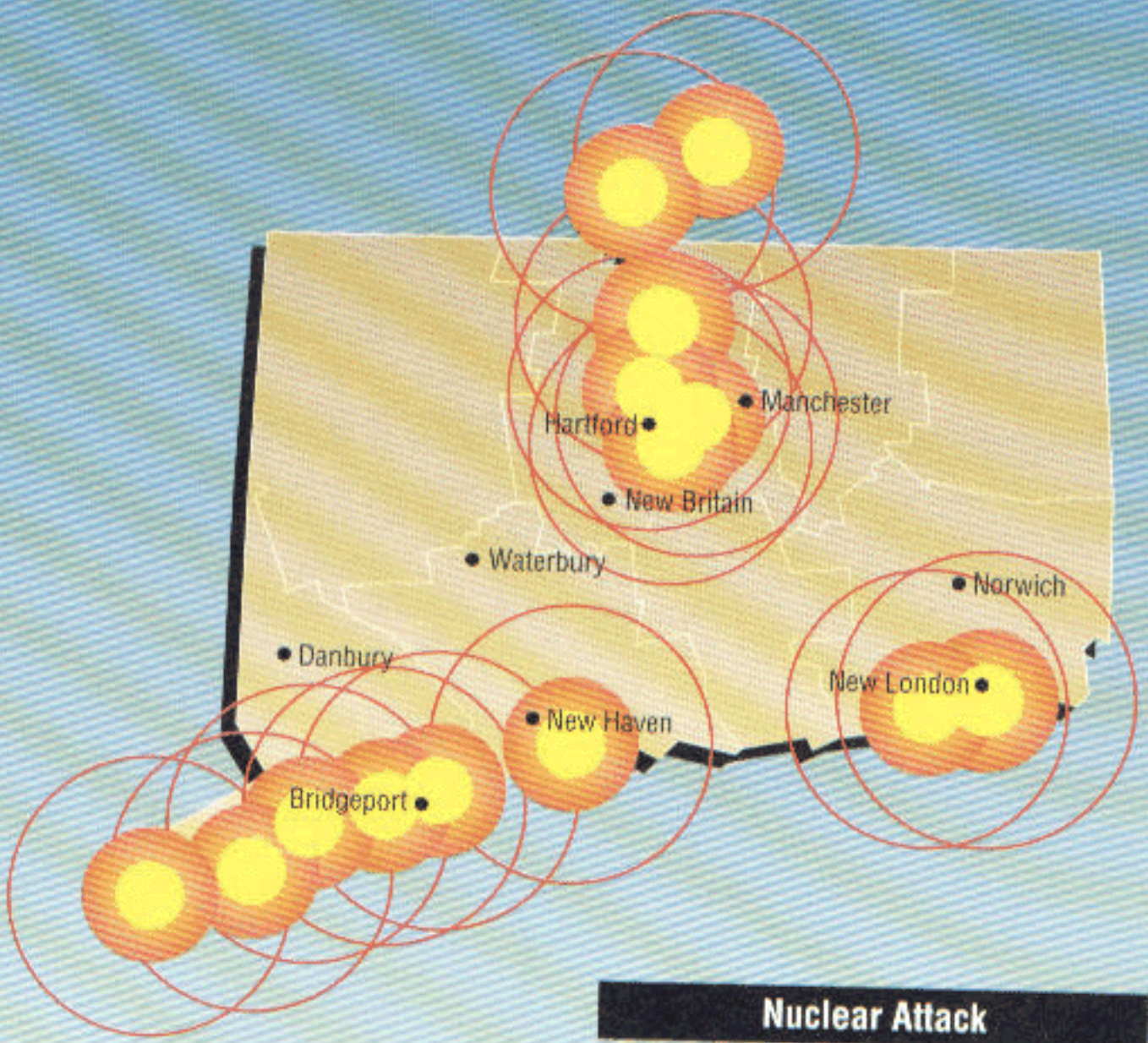
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

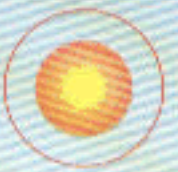
*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

CONNECTICUT

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

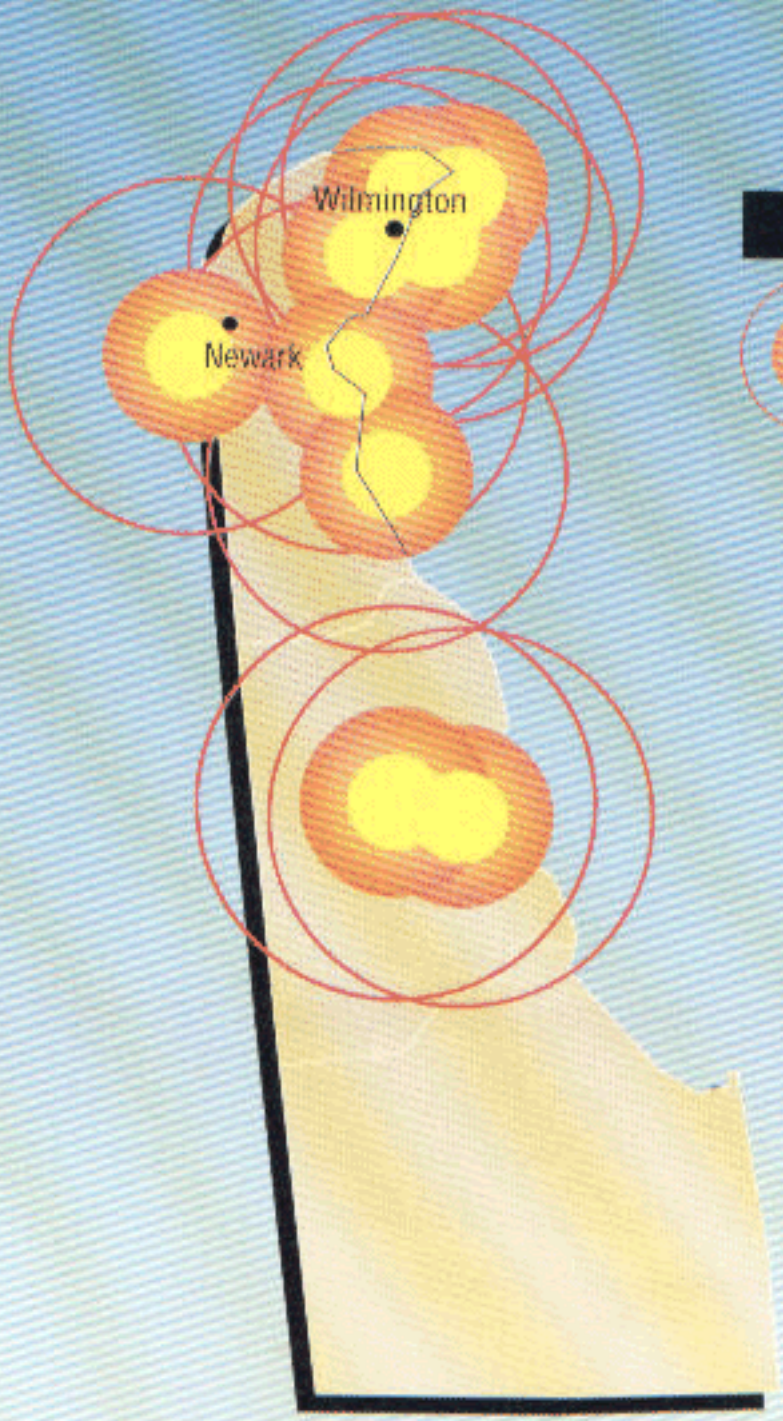
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

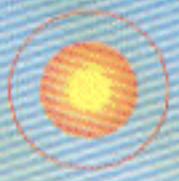
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



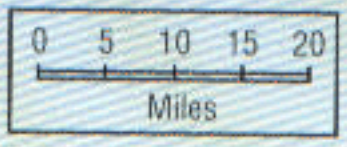
Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.



Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

DELAWARE

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.

Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

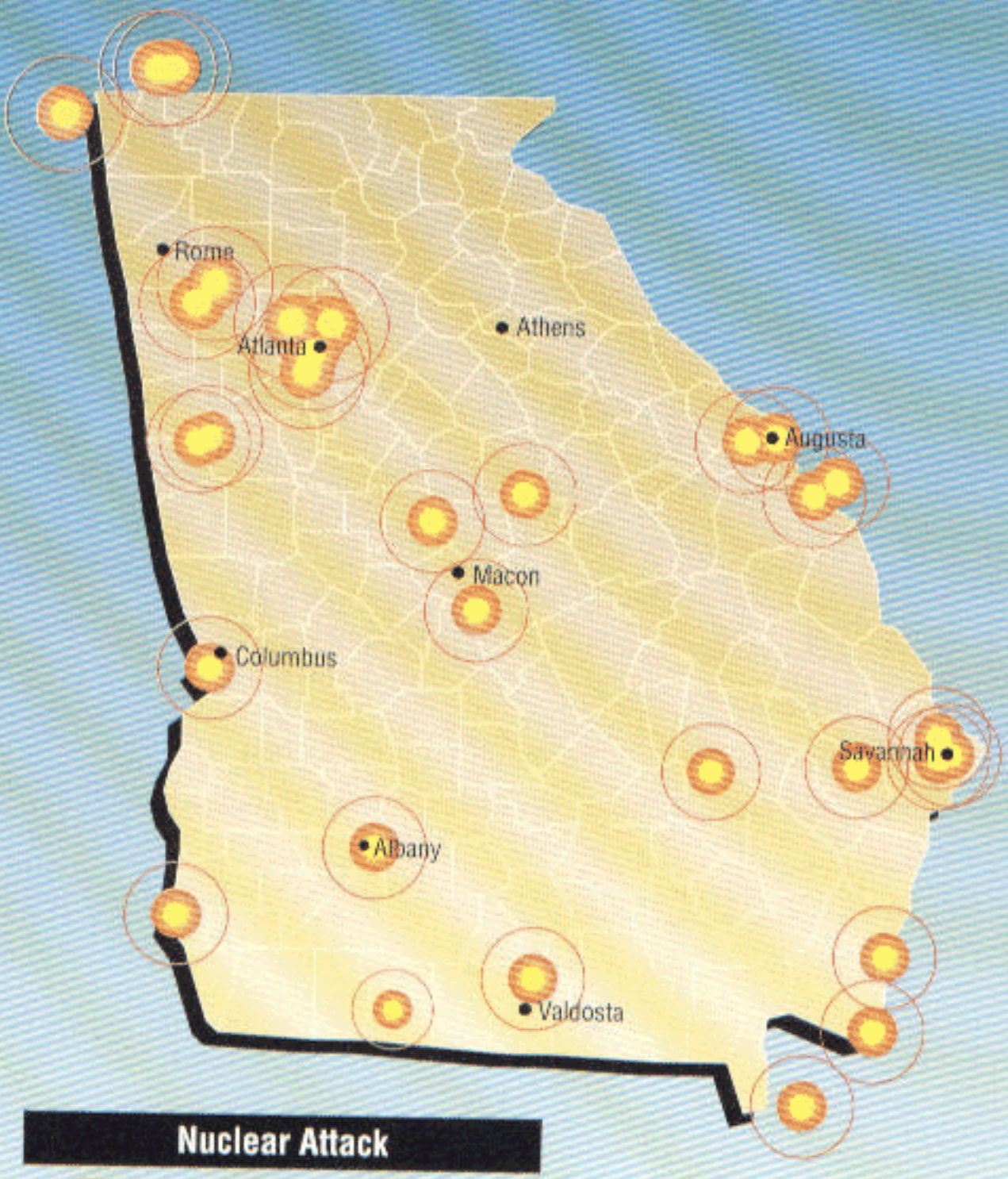
- Commercial nuclear power plants

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

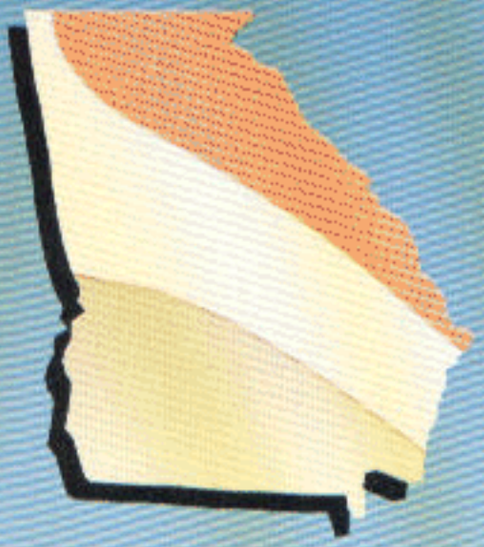
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

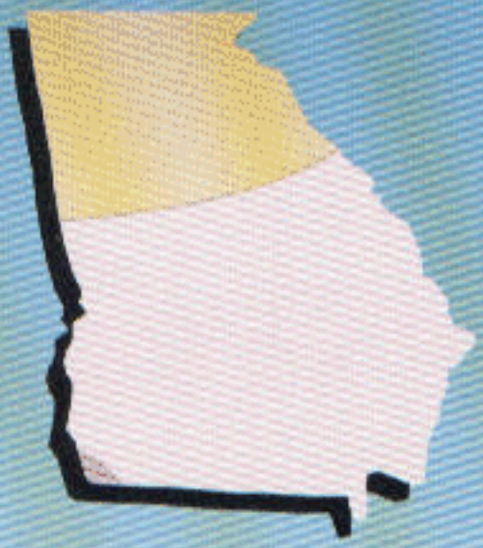
Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

GEORGIA



Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

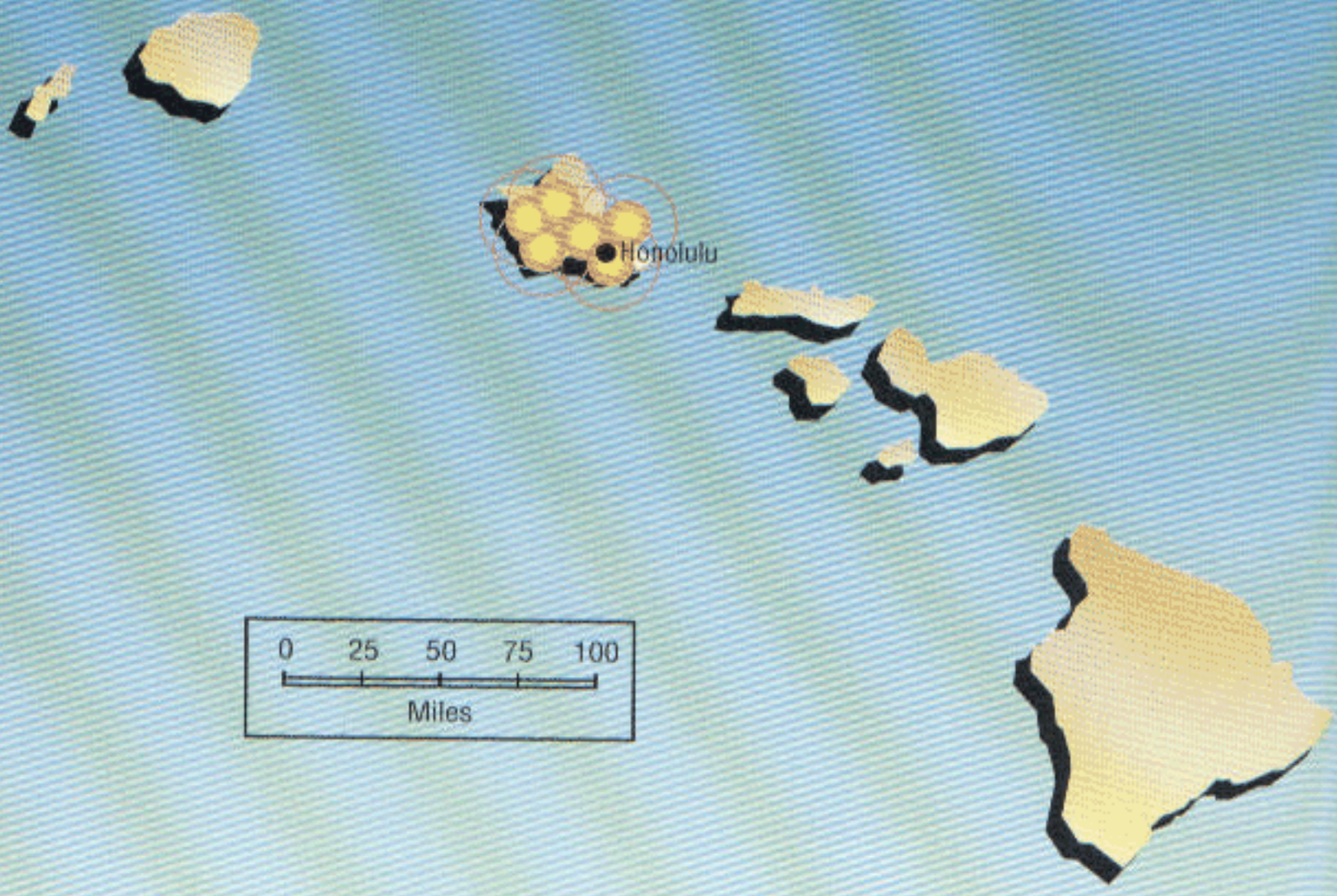
- Commercial nuclear power plants

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

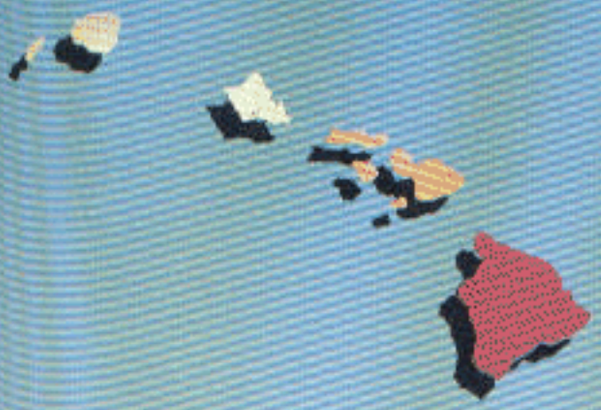
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

HAWAII



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Tsunamis

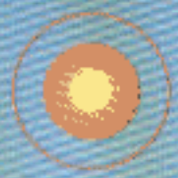
- Coastal areas historically subject to Tsunami

Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.
- Volcanoes that have erupted since 1950

Typhoons and Floods Typhoons and floods are potential hazards in areas throughout the state.

Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

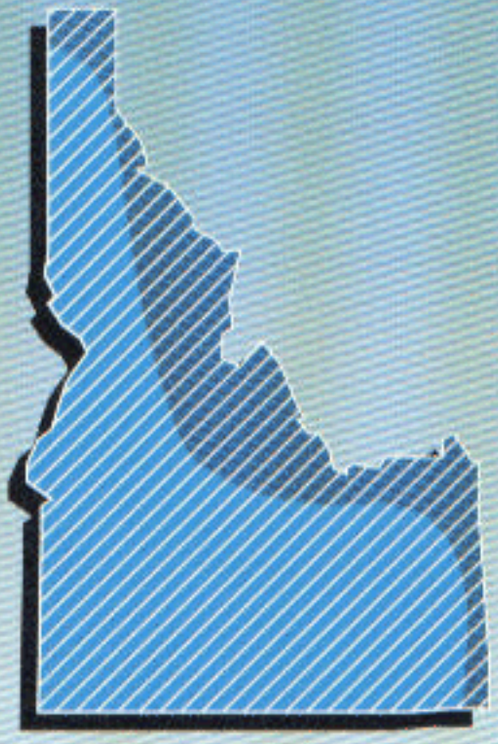
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

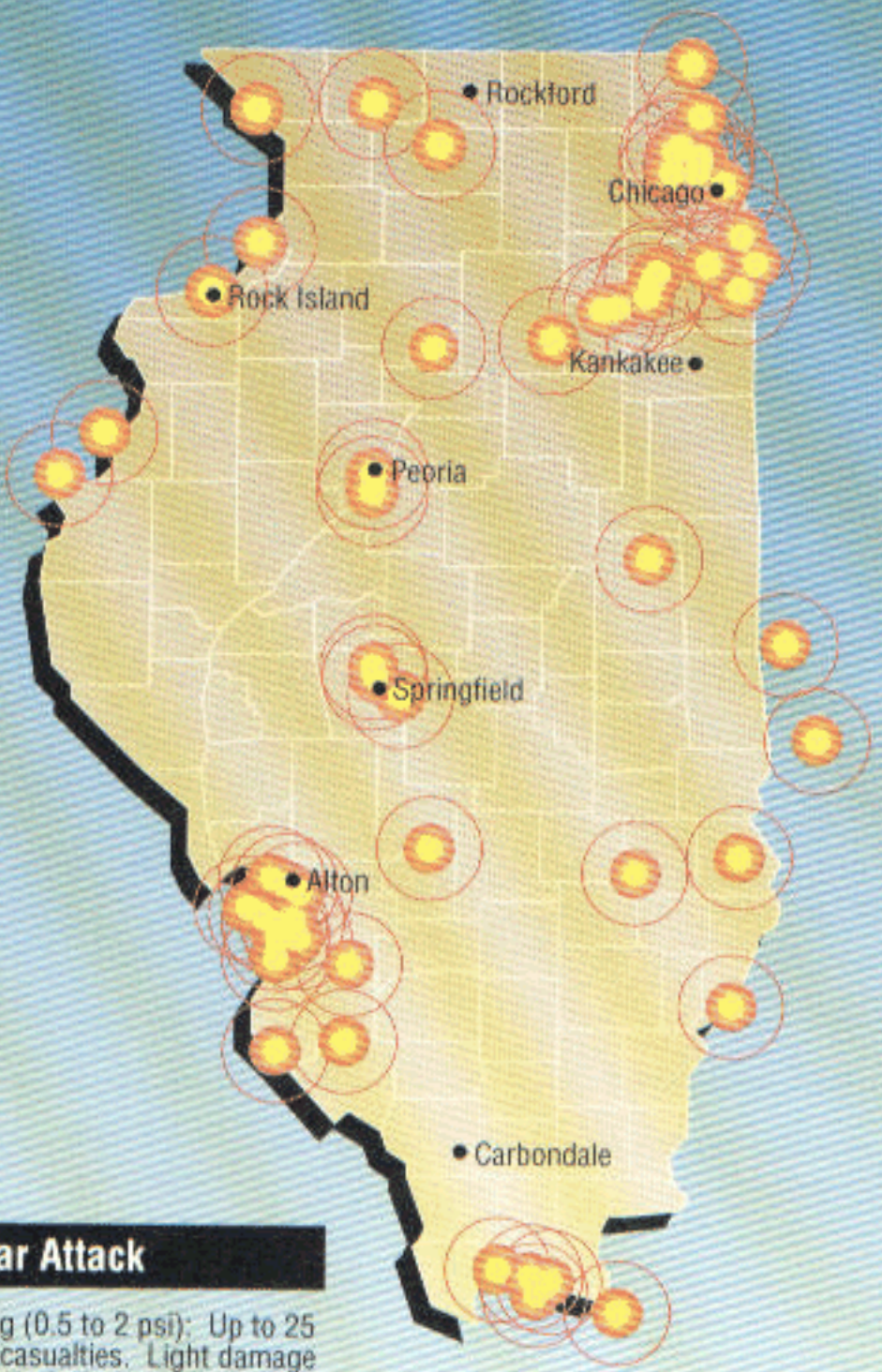
- Low hazard
- Moderate hazard
- High hazard



Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Floods Flooding is a potential hazard in areas throughout the state.

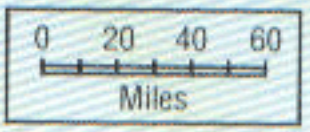


Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

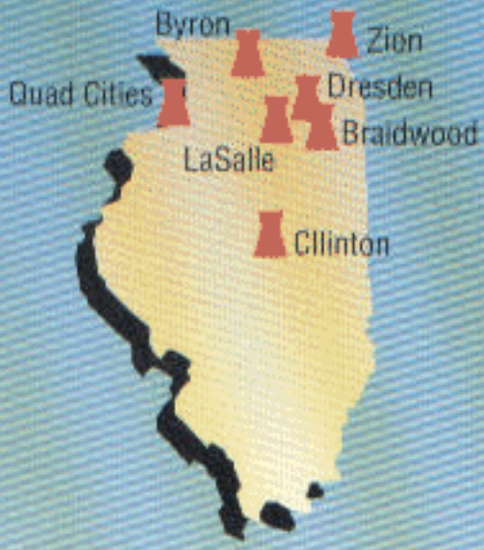


Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

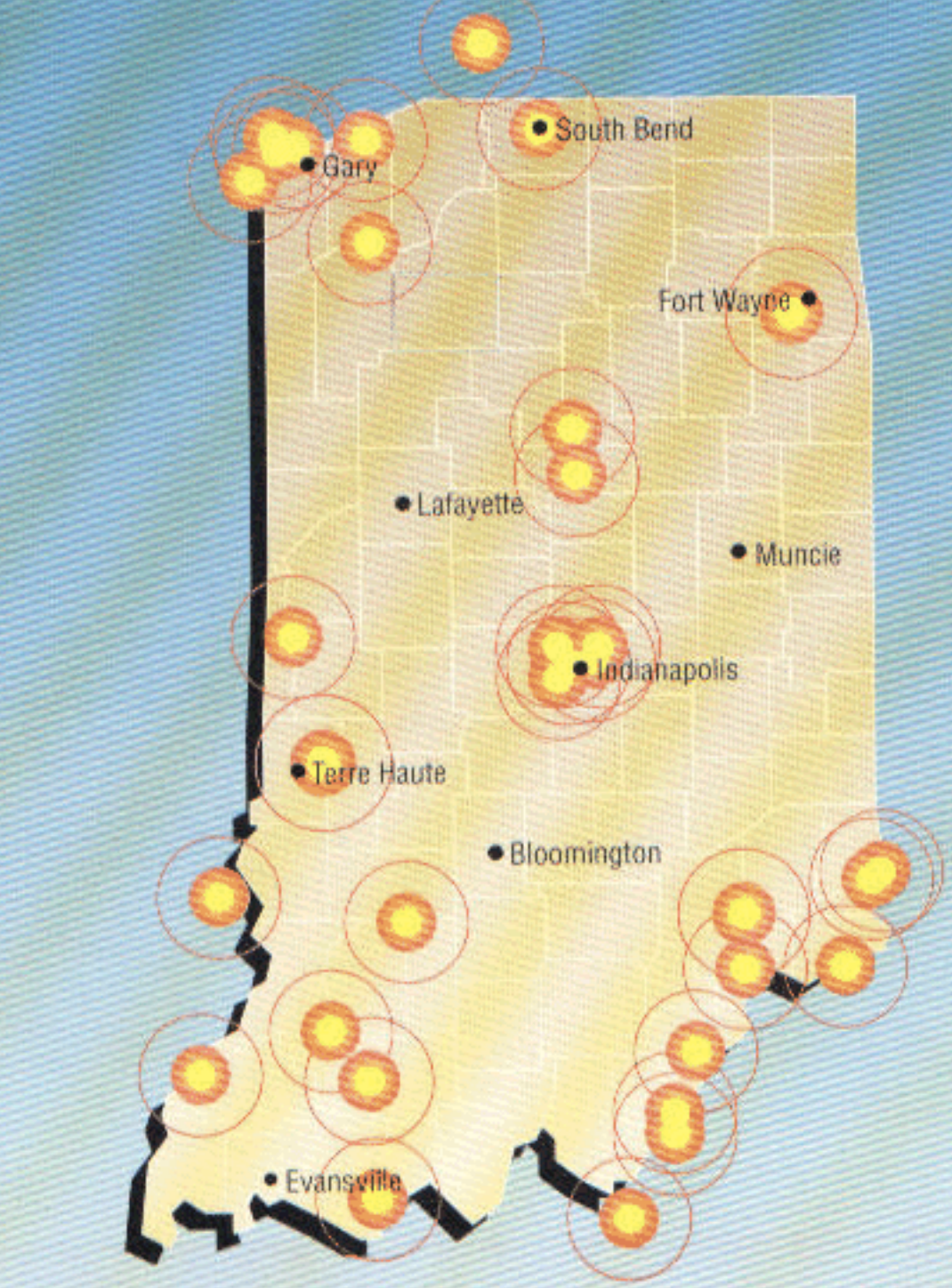
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

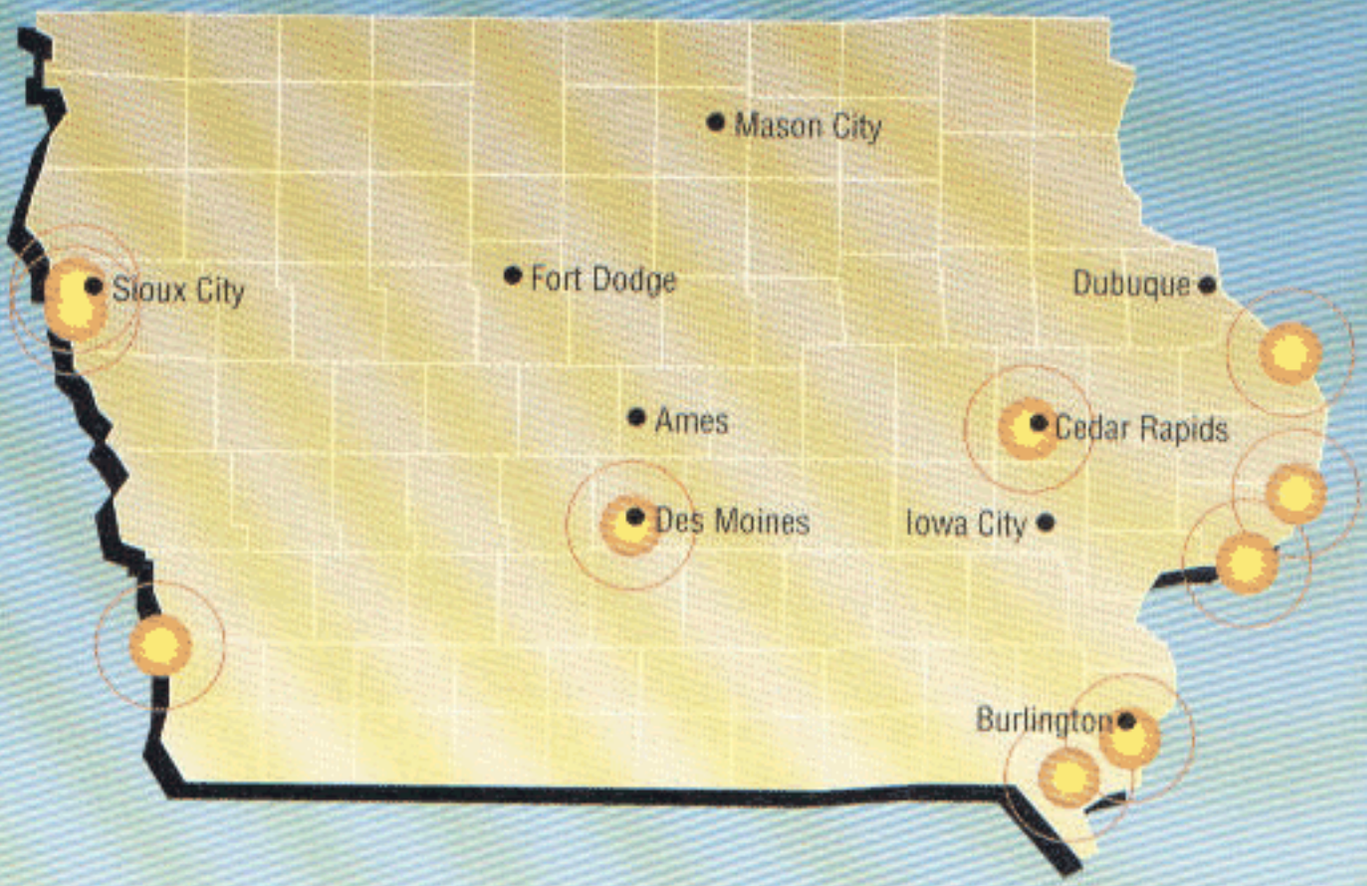
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

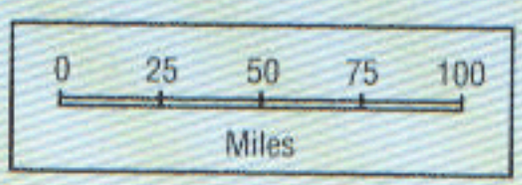
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





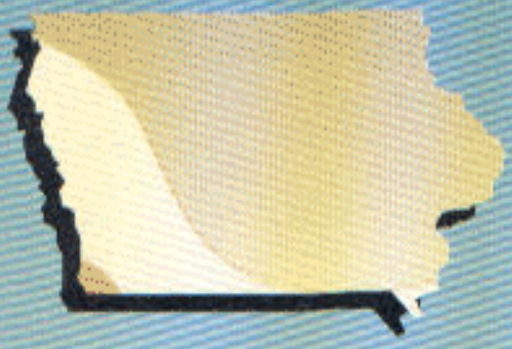
Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

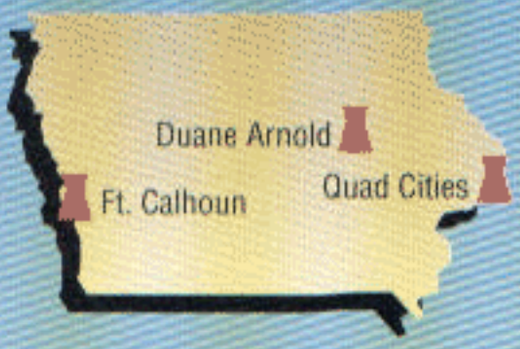
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

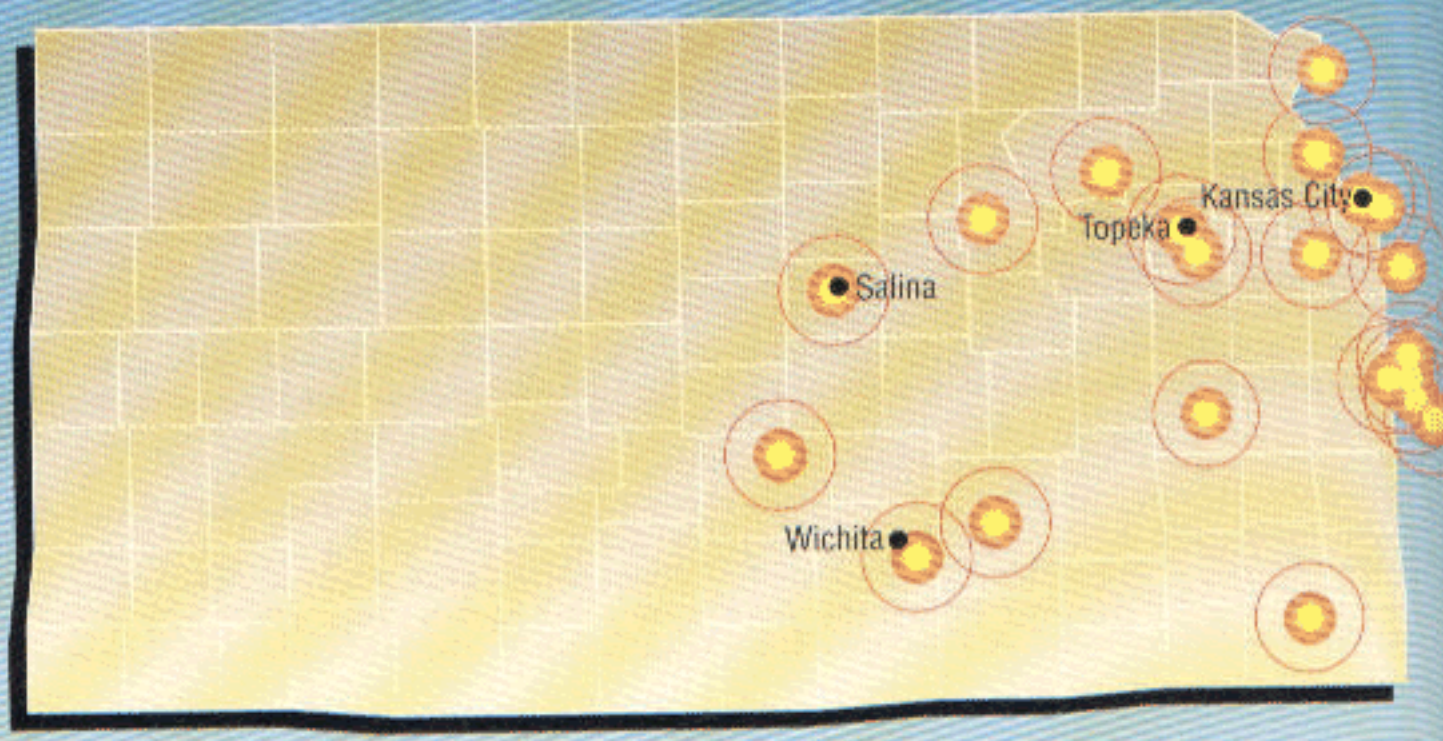
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

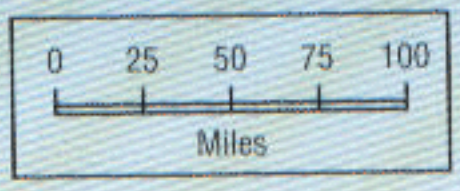
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

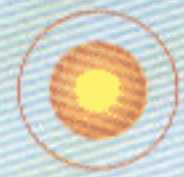
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

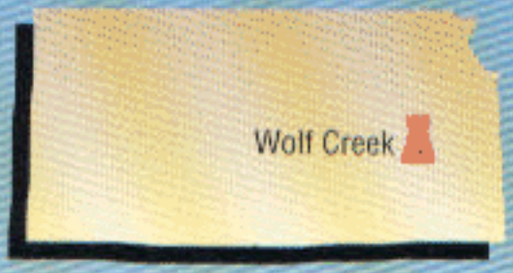
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

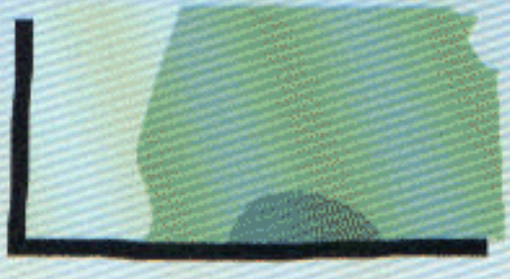


Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

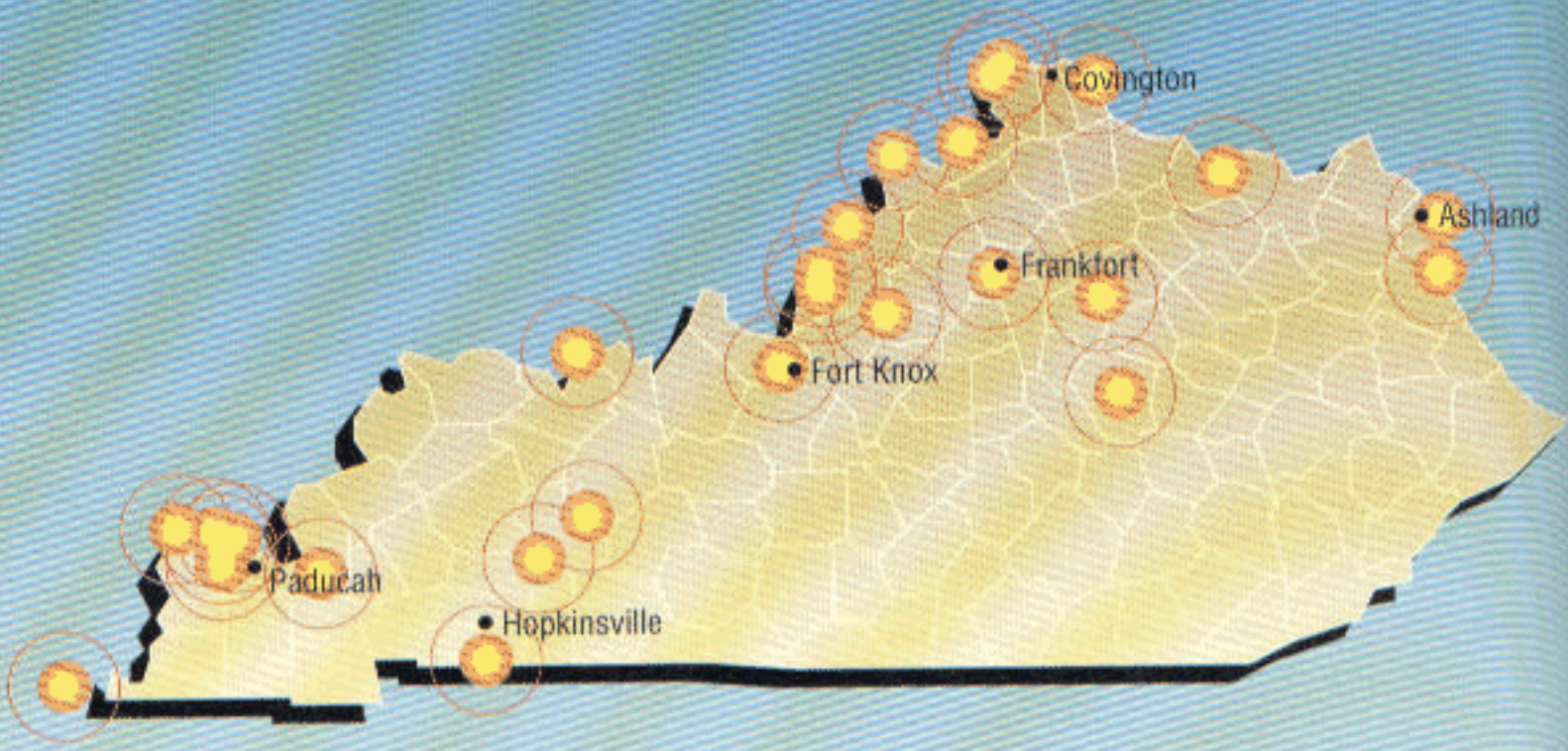


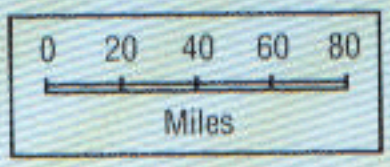
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

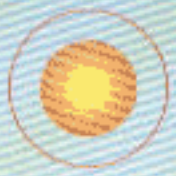
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

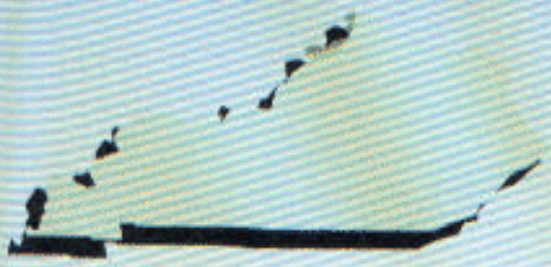
KENTUCKY

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

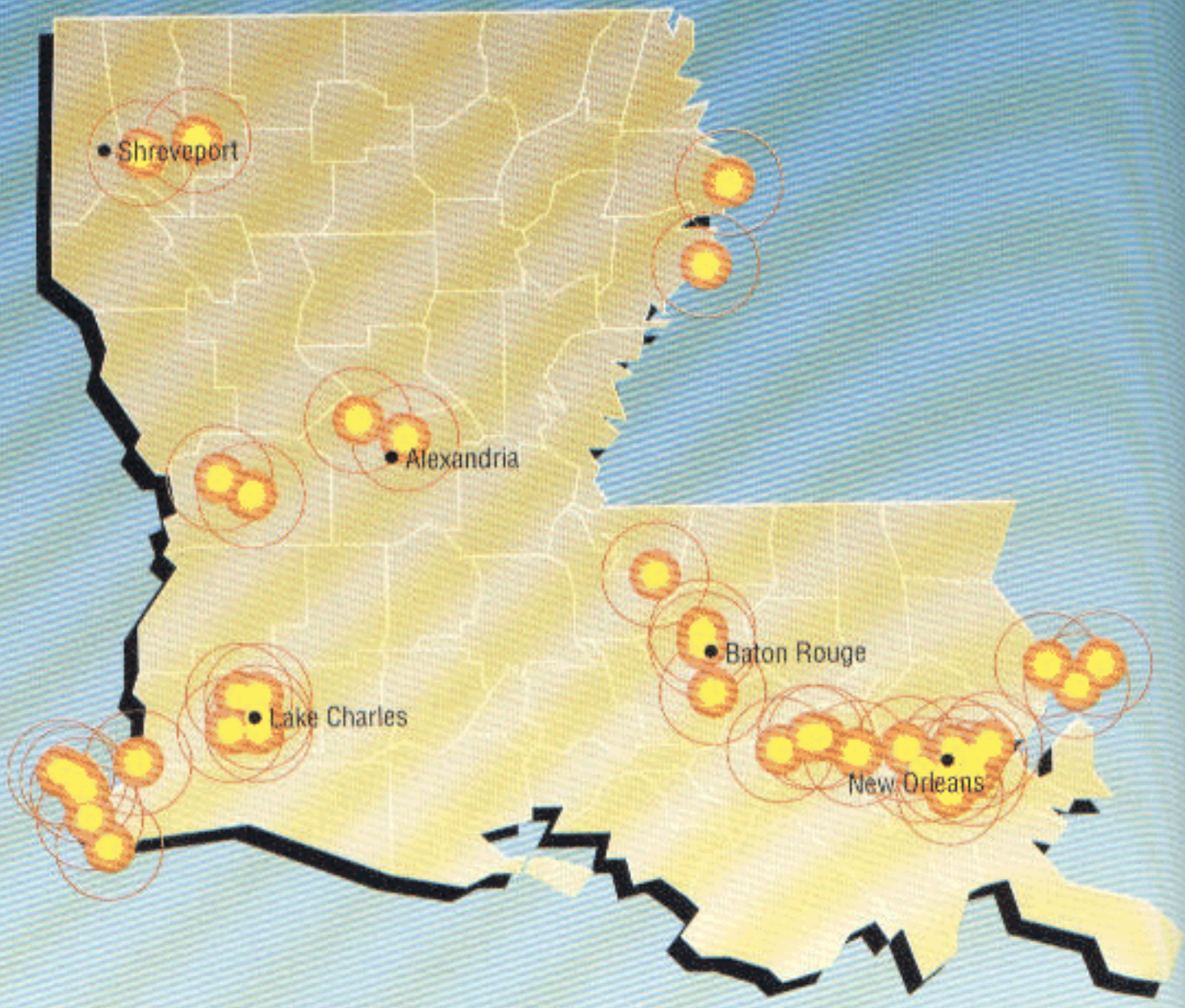


Tornadoes

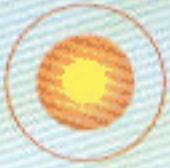
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



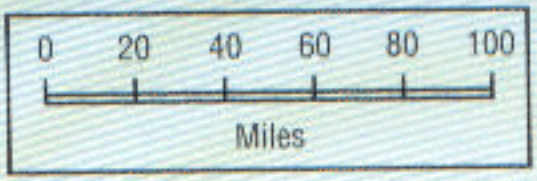
Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.



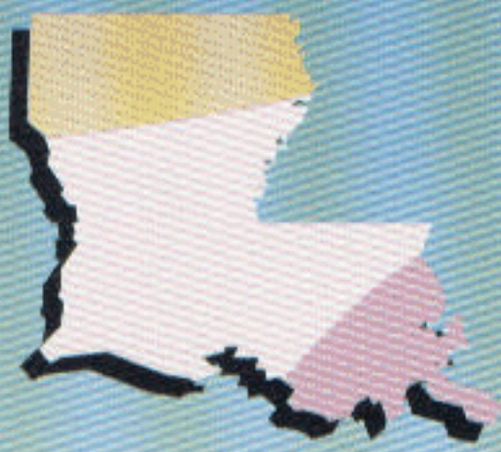
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

LOUISIANA

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

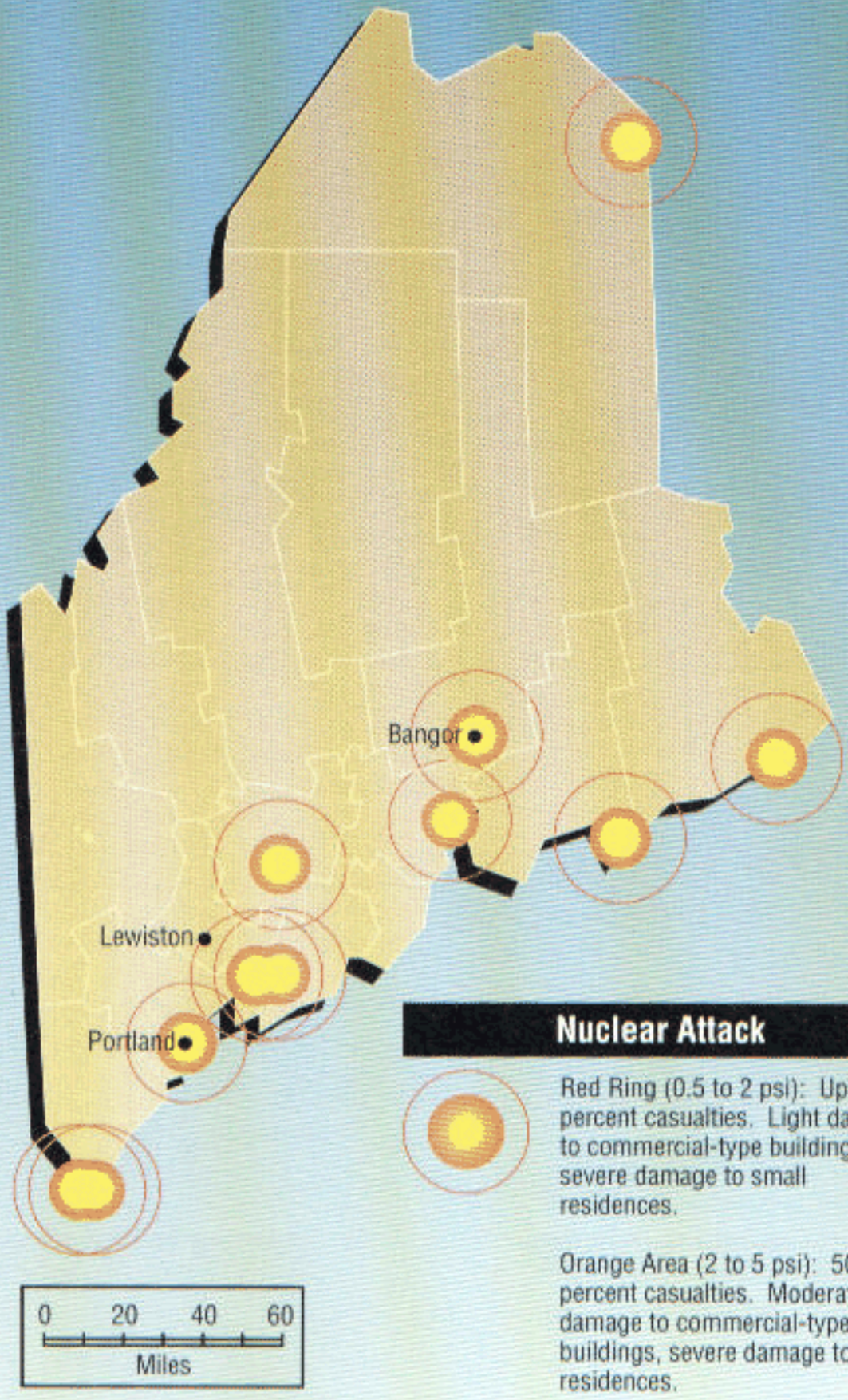
- Commercial nuclear power plants

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

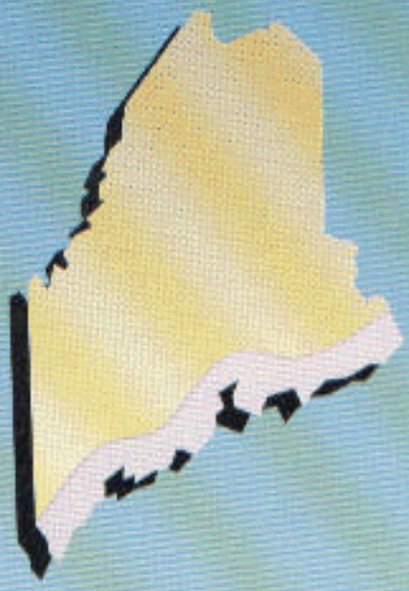
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

MAINE

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



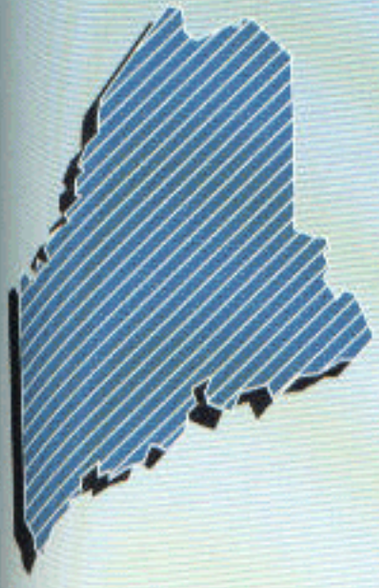
Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

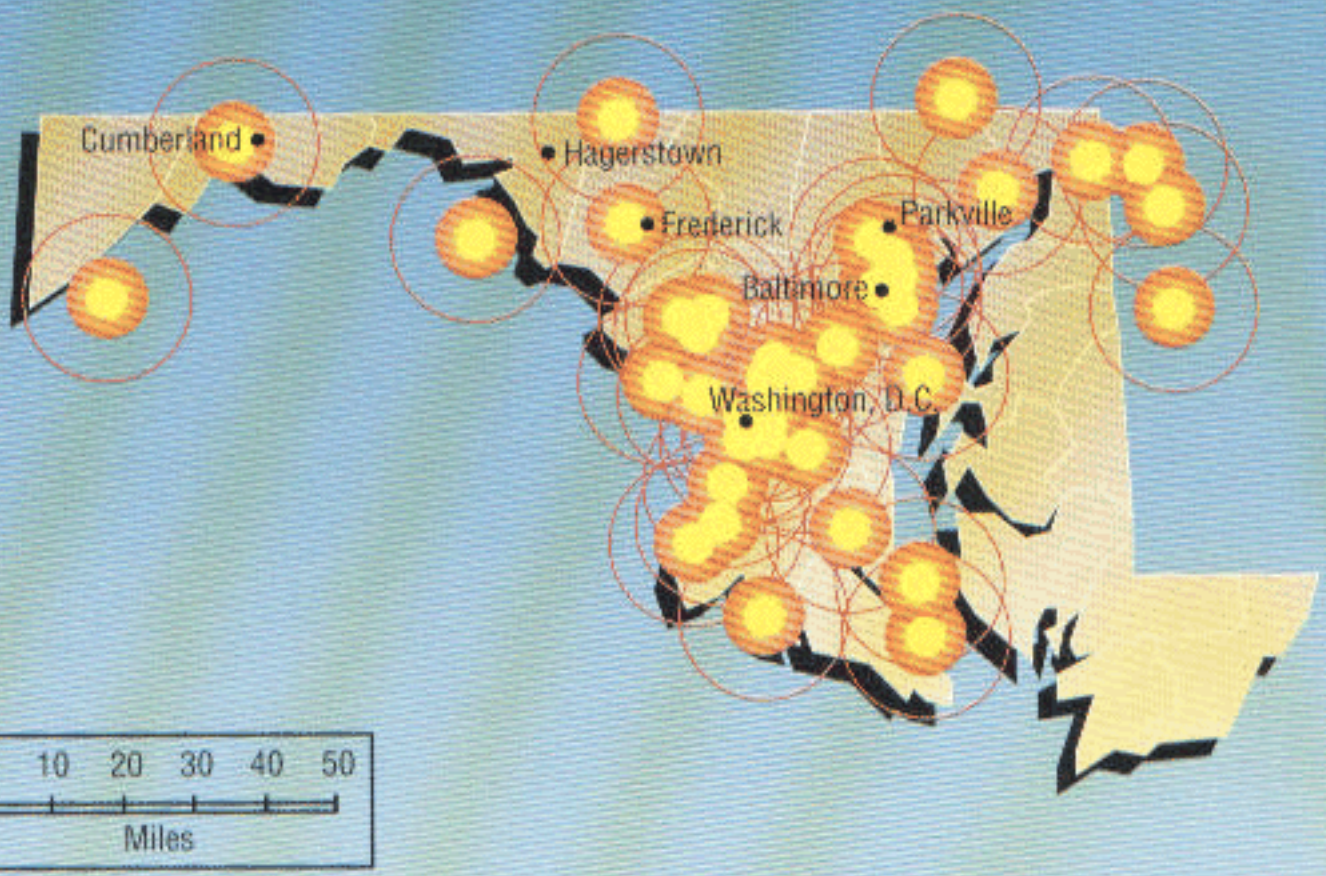
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

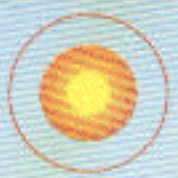
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

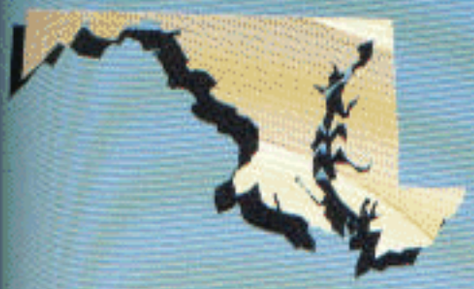
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

MARYLAND



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

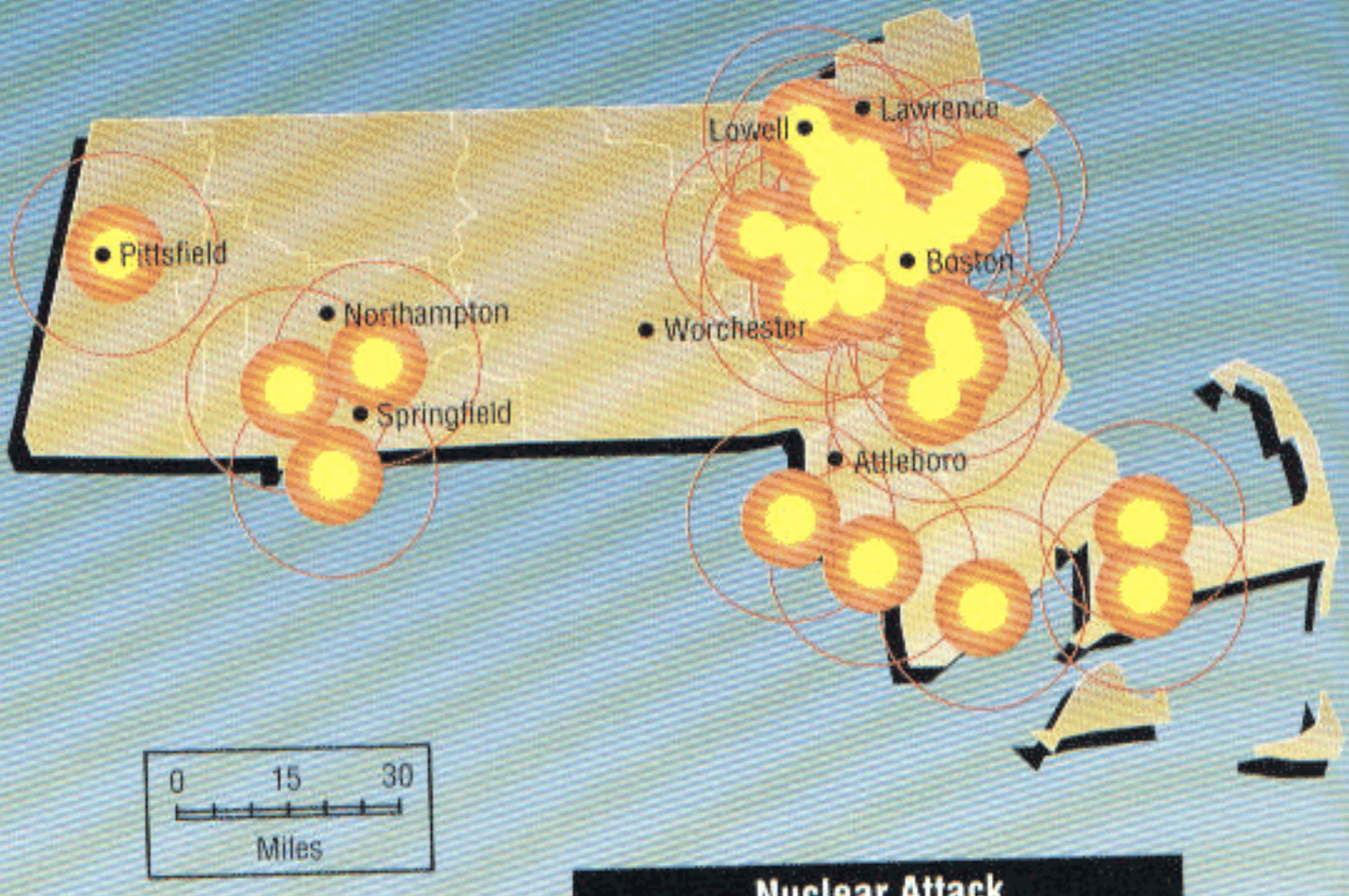
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

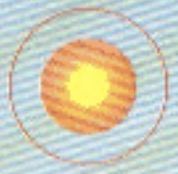
*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

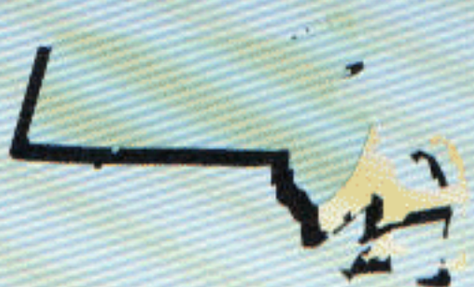
*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

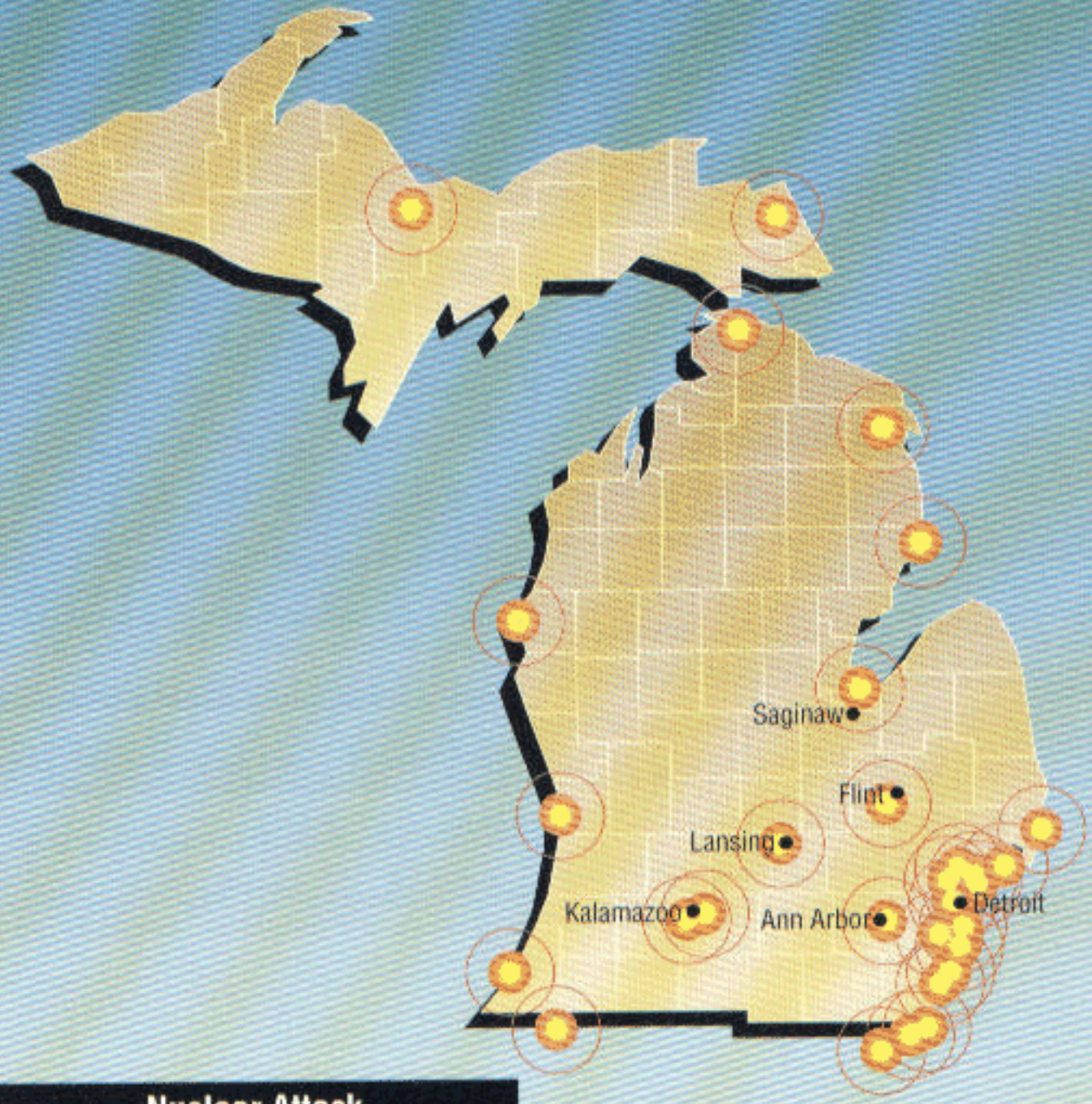


Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

MICHIGAN

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

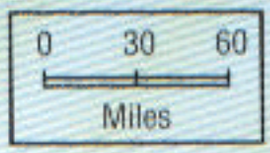
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

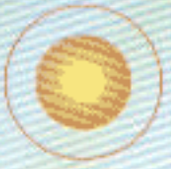
*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

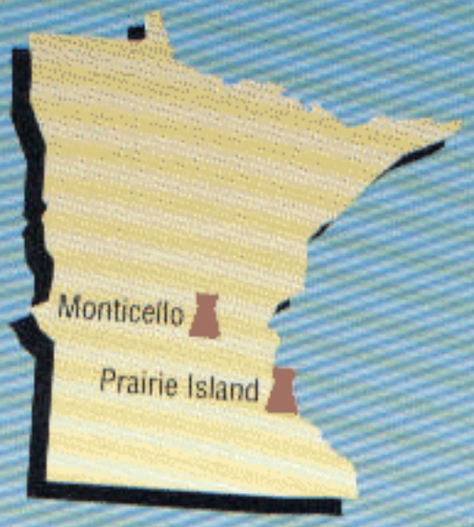
Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

MINNESOTA



Nuclear Power Plants

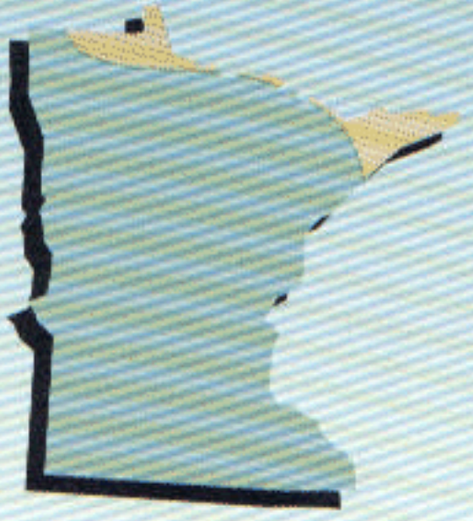
Commercial nuclear power plants

Snow and Extreme Cold

Moderate snowfall

Heavy snowfall

Extreme cold and freezing



Tornadoes

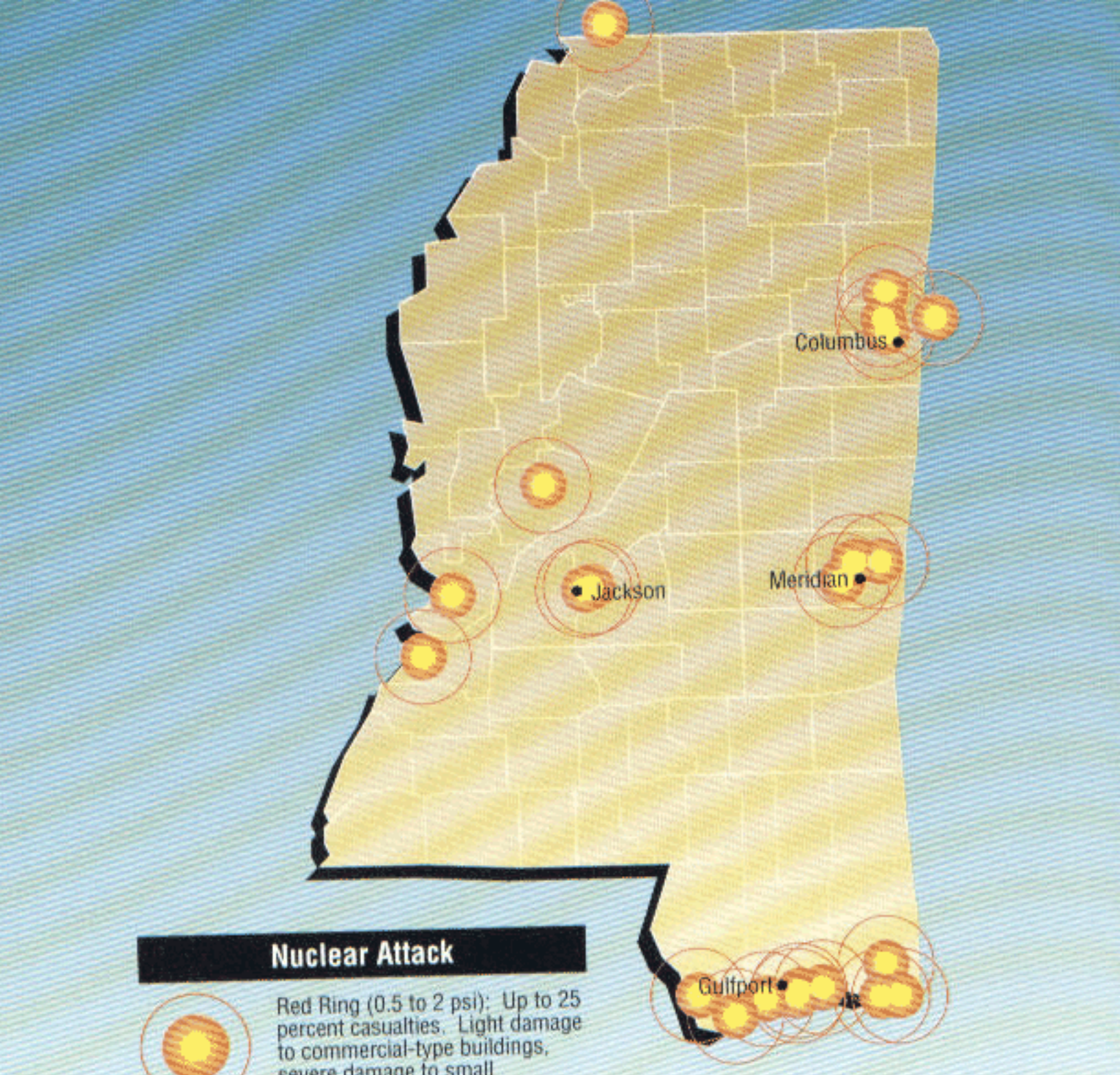
1-3 per year*

4-6 per year

7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

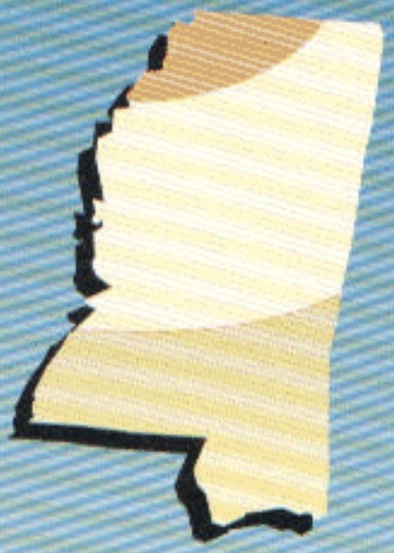
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

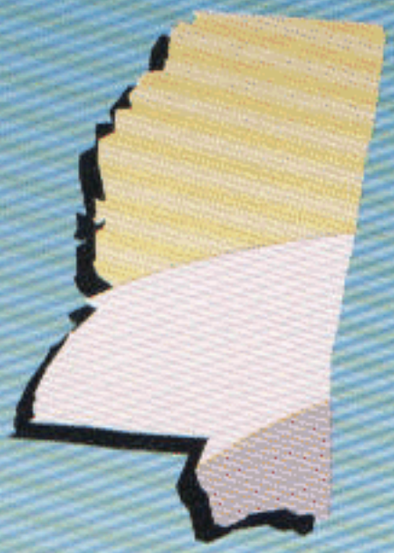
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

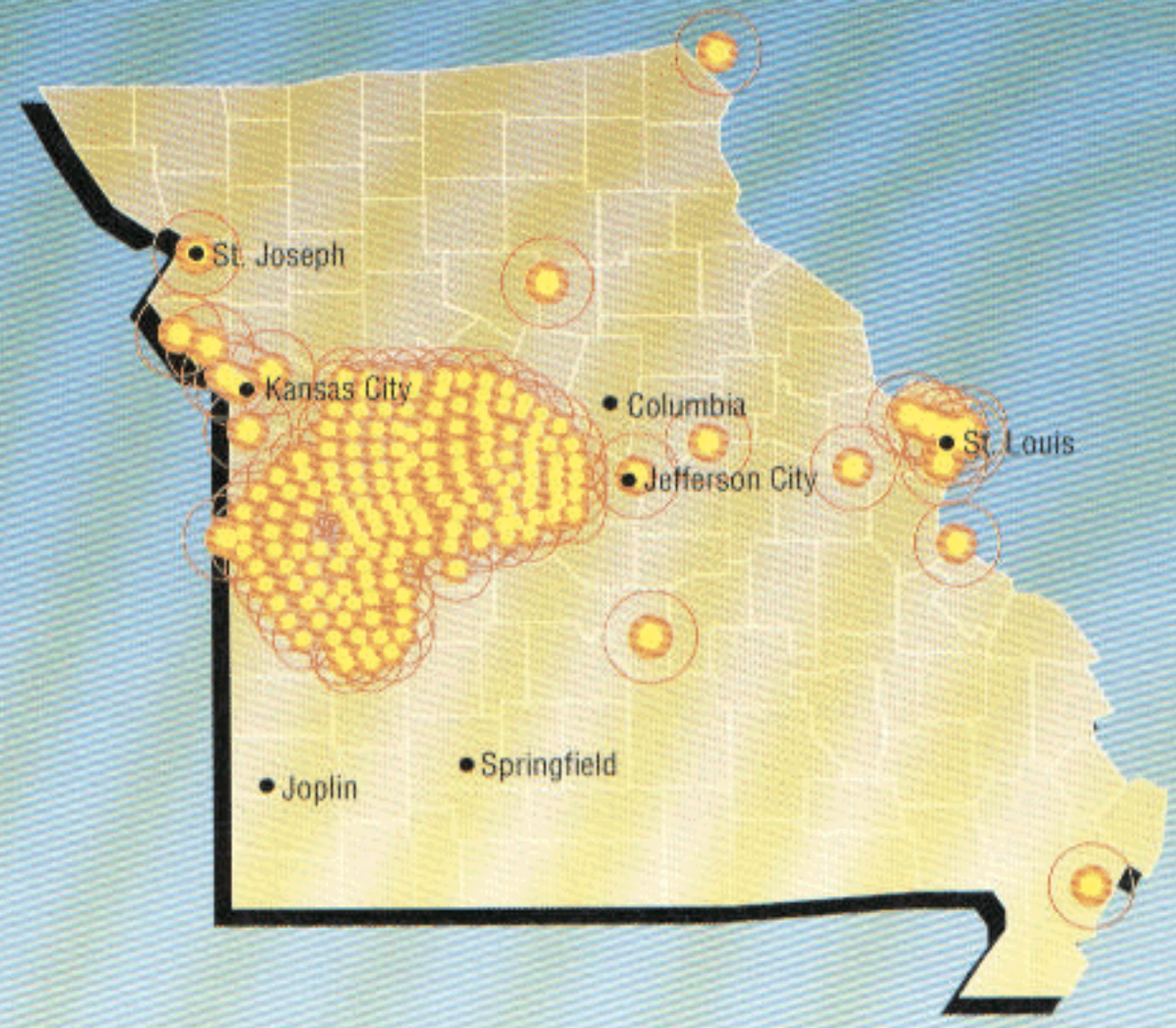
- Commercial nuclear power plants

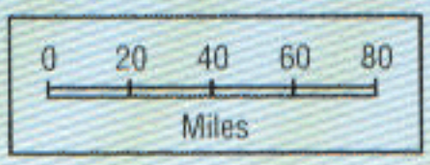
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

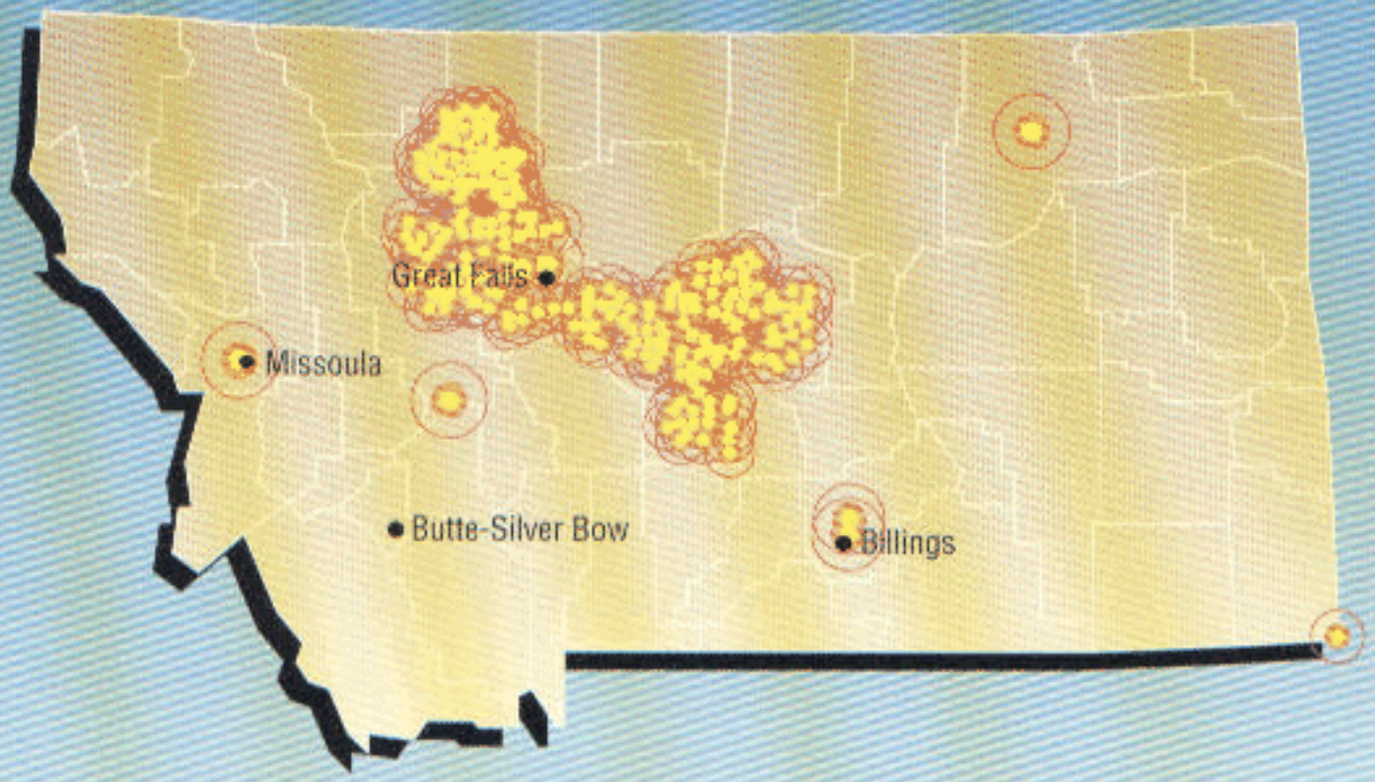
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

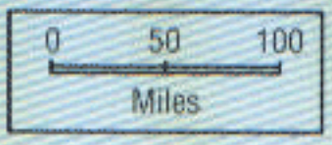
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

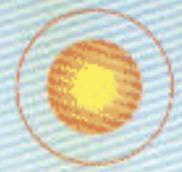
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

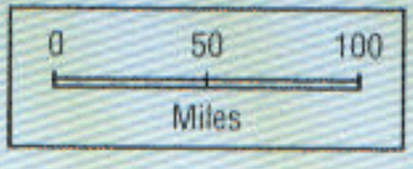
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

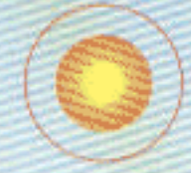
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

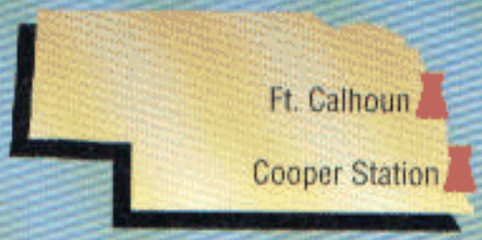
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

NEBRASKA

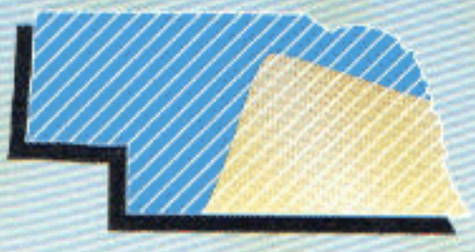
Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

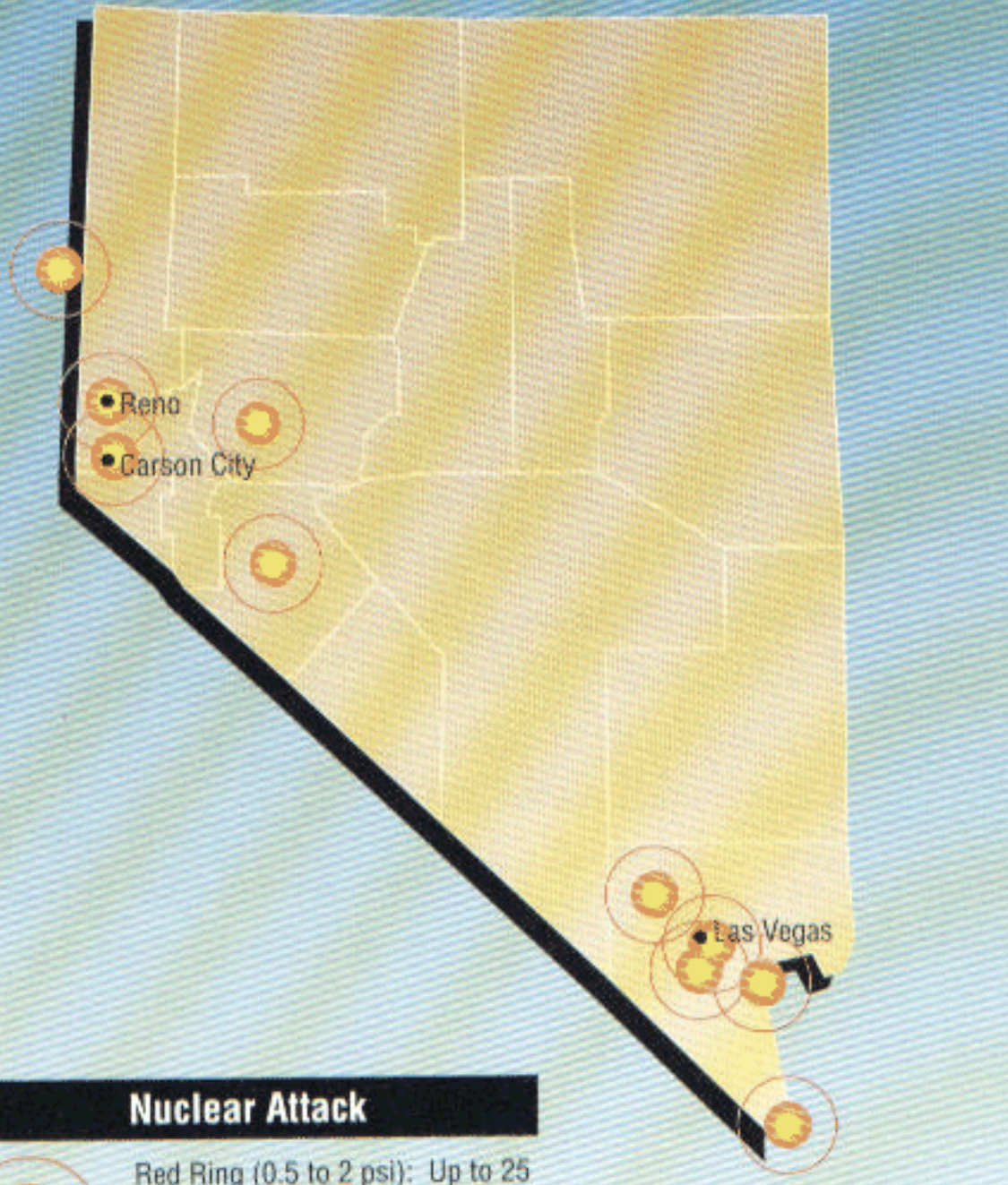
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

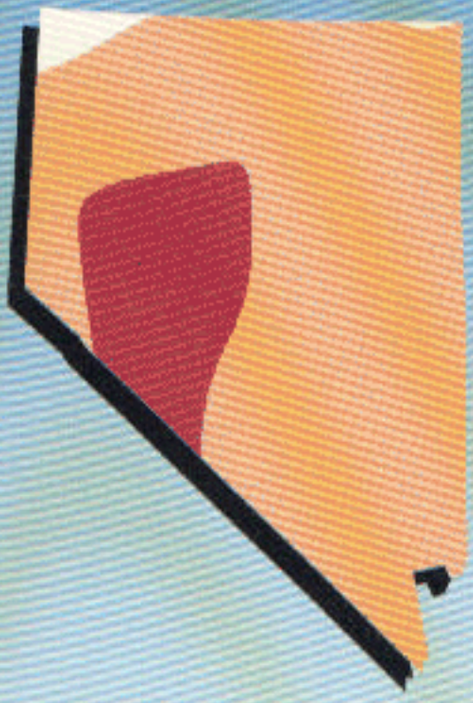
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

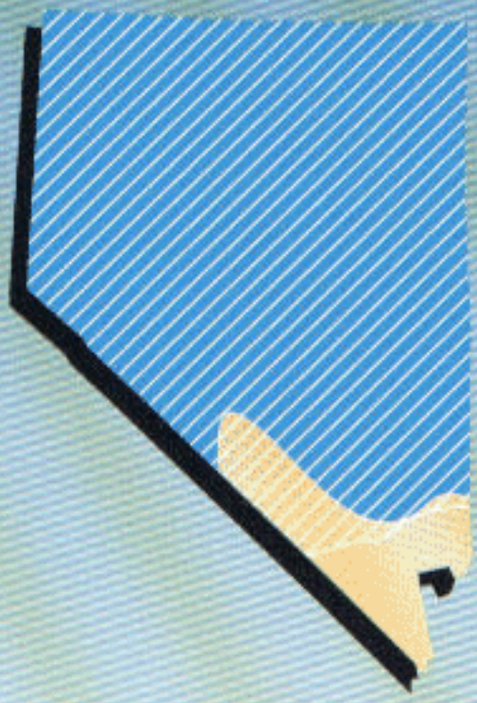
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

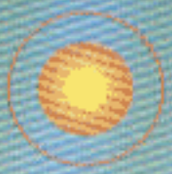


Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Floods Flooding is a potential hazard in areas throughout the state.

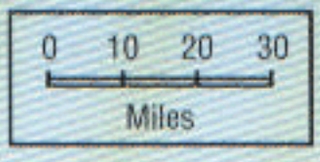
Nuclear Attack

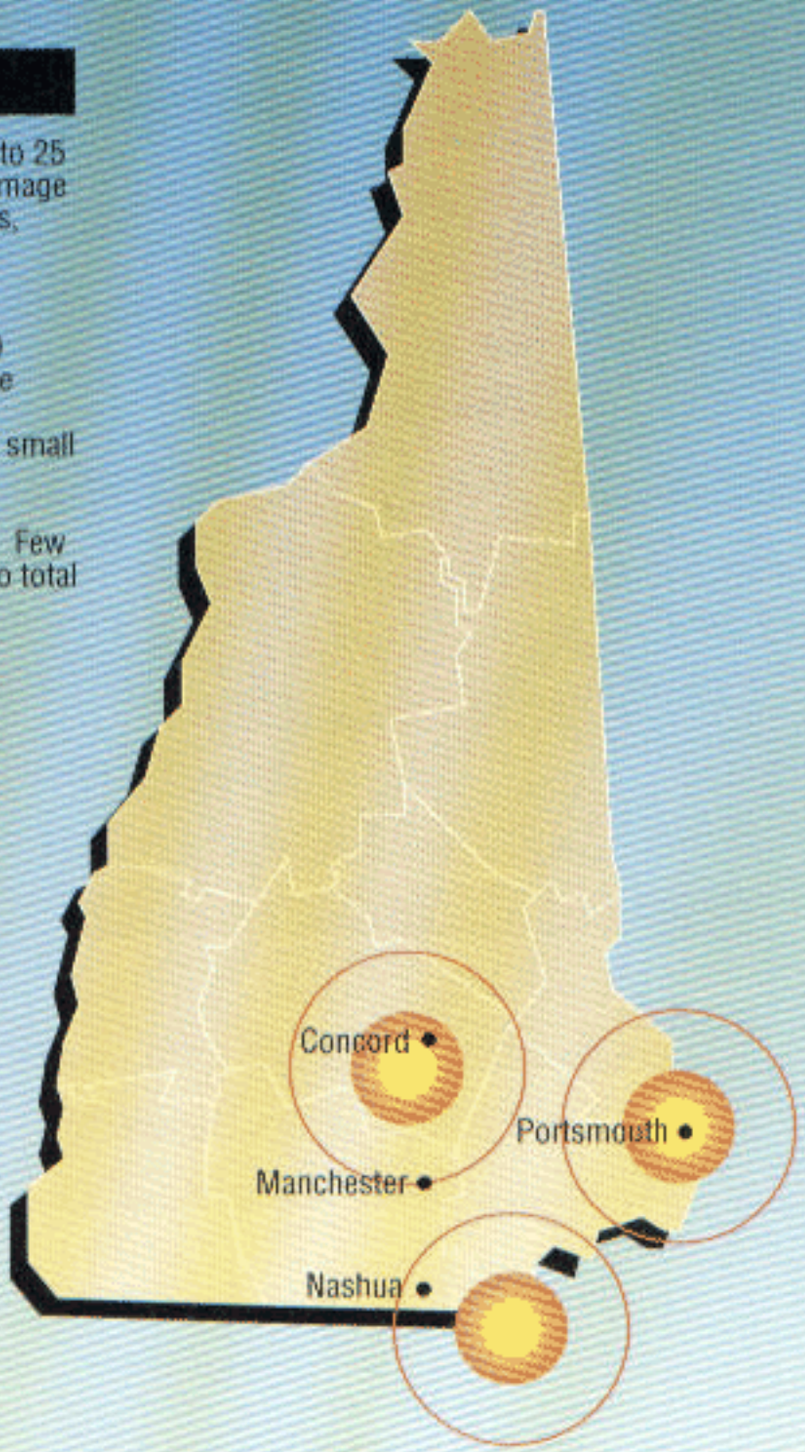


Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

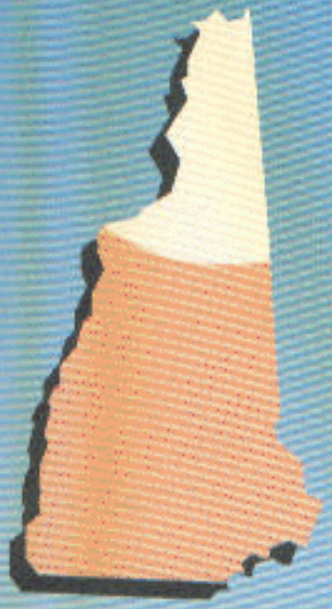




Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

NEW HAMPSHIRE



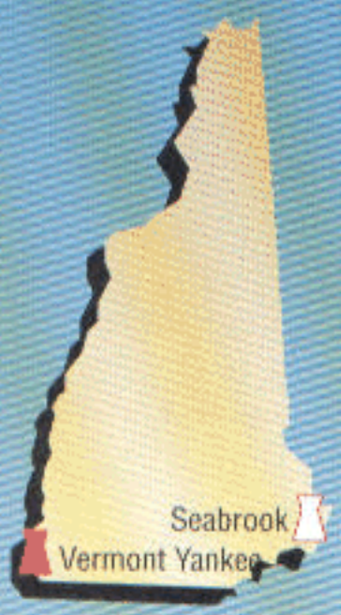
Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

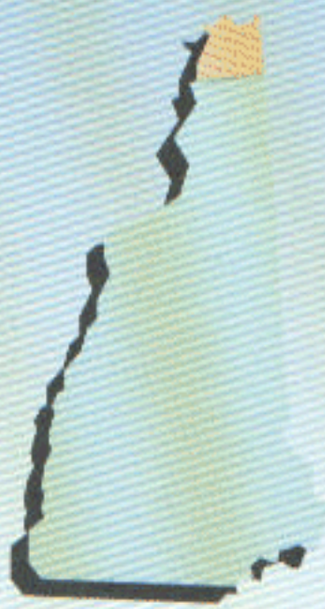


Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing



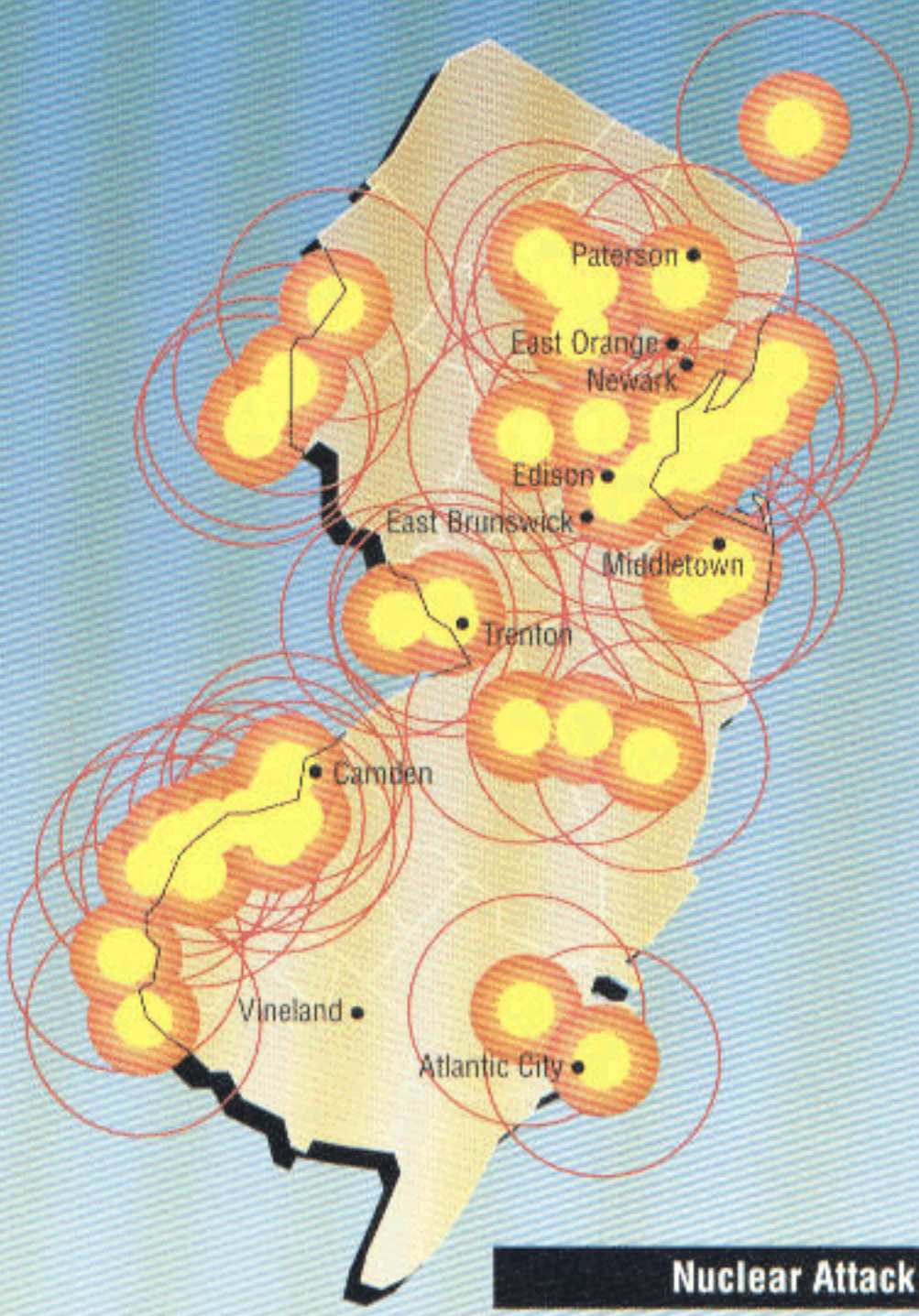
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

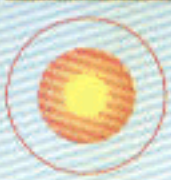
*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.



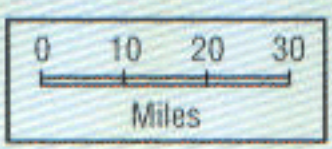
Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

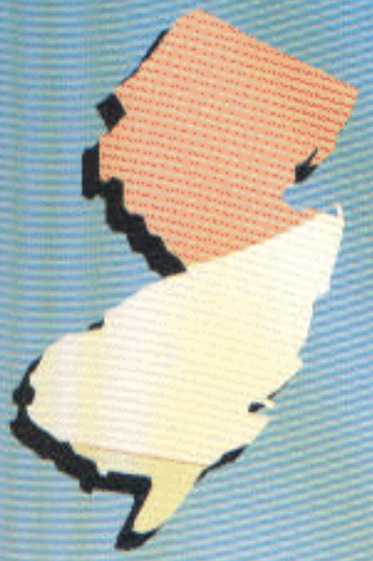
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.



Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

NEW JERSEY



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

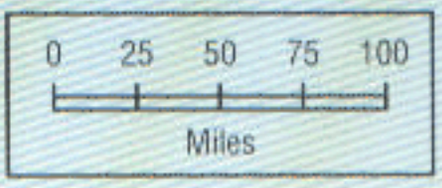
Floods Flooding is a potential hazard in areas throughout the state.

Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

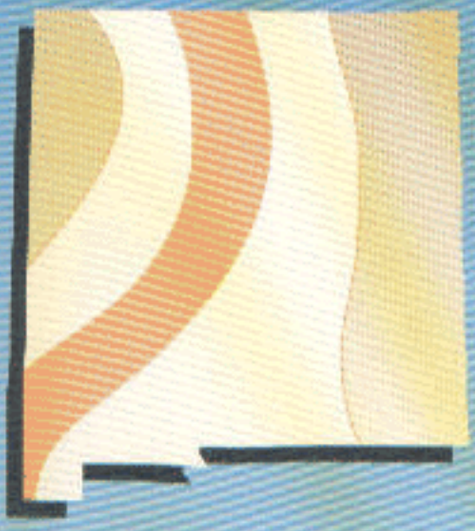
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.



Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

NEW MEXICO



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

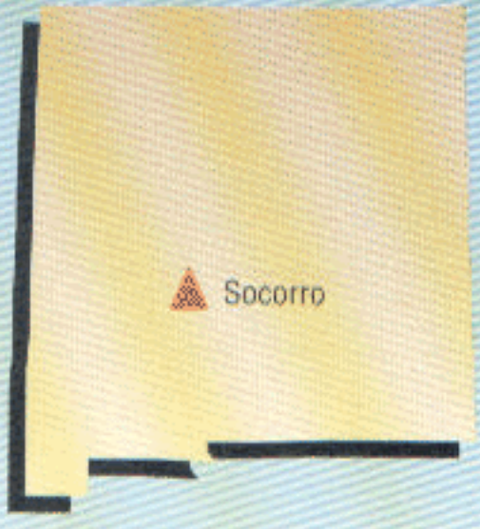
Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

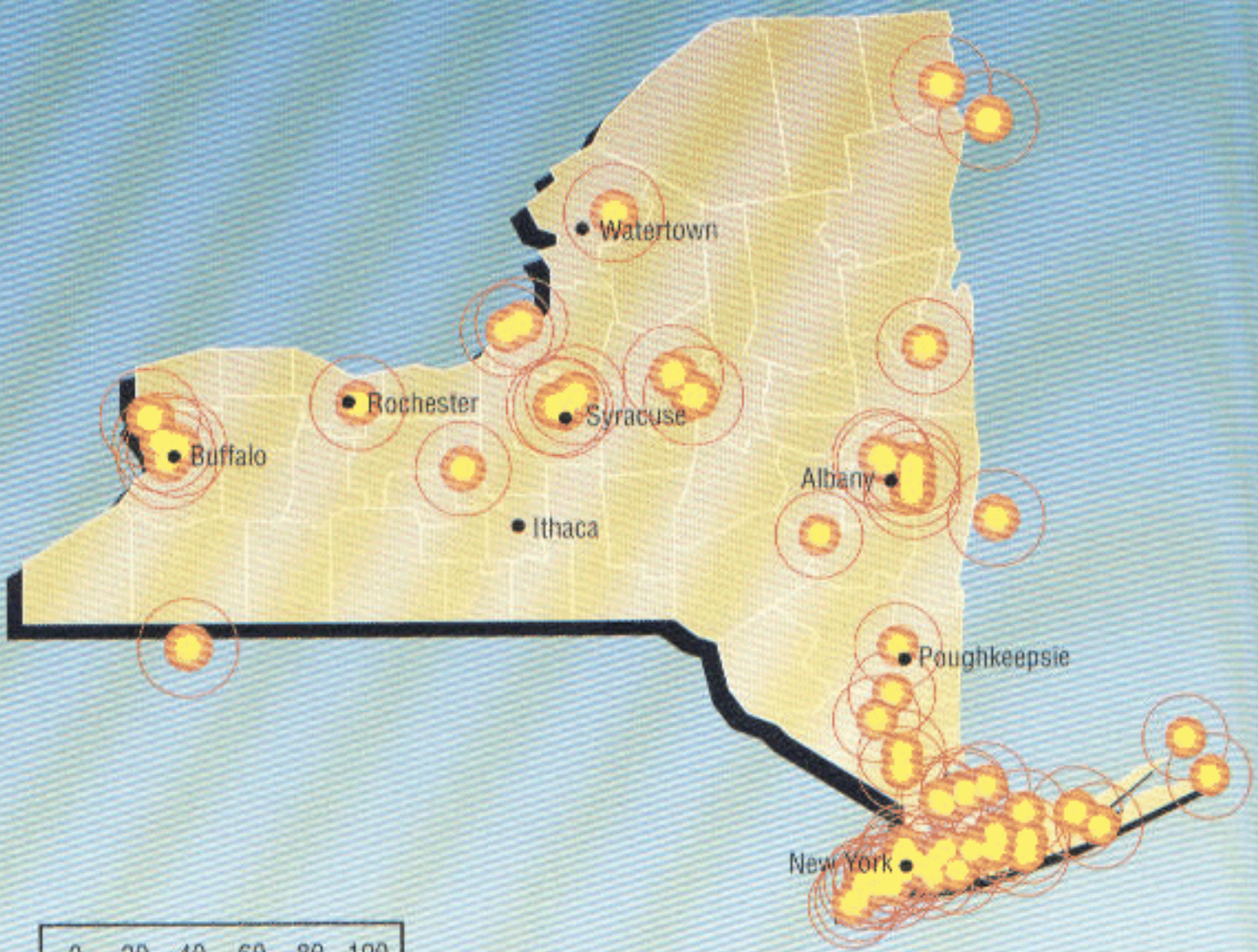


Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.

Floods

Flooding is a potential hazard in areas throughout the state.



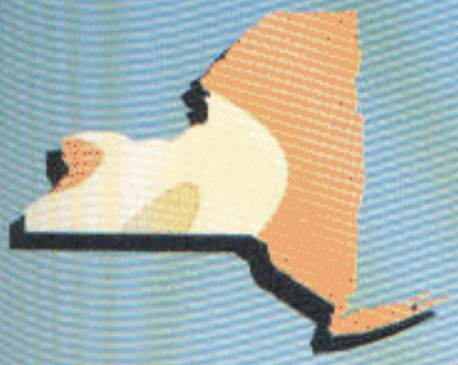
Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

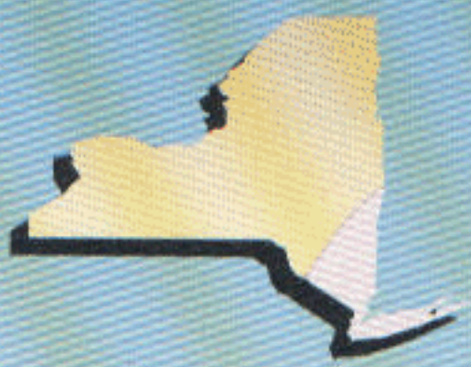
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

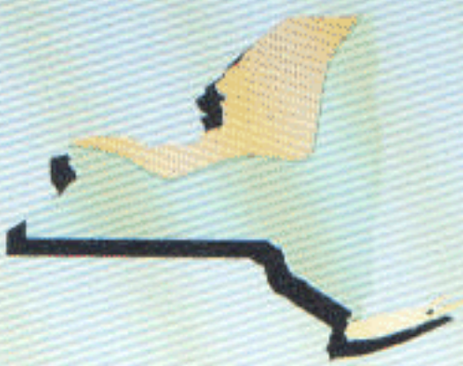
*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing



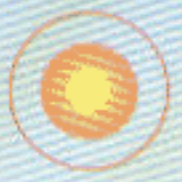
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.

Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

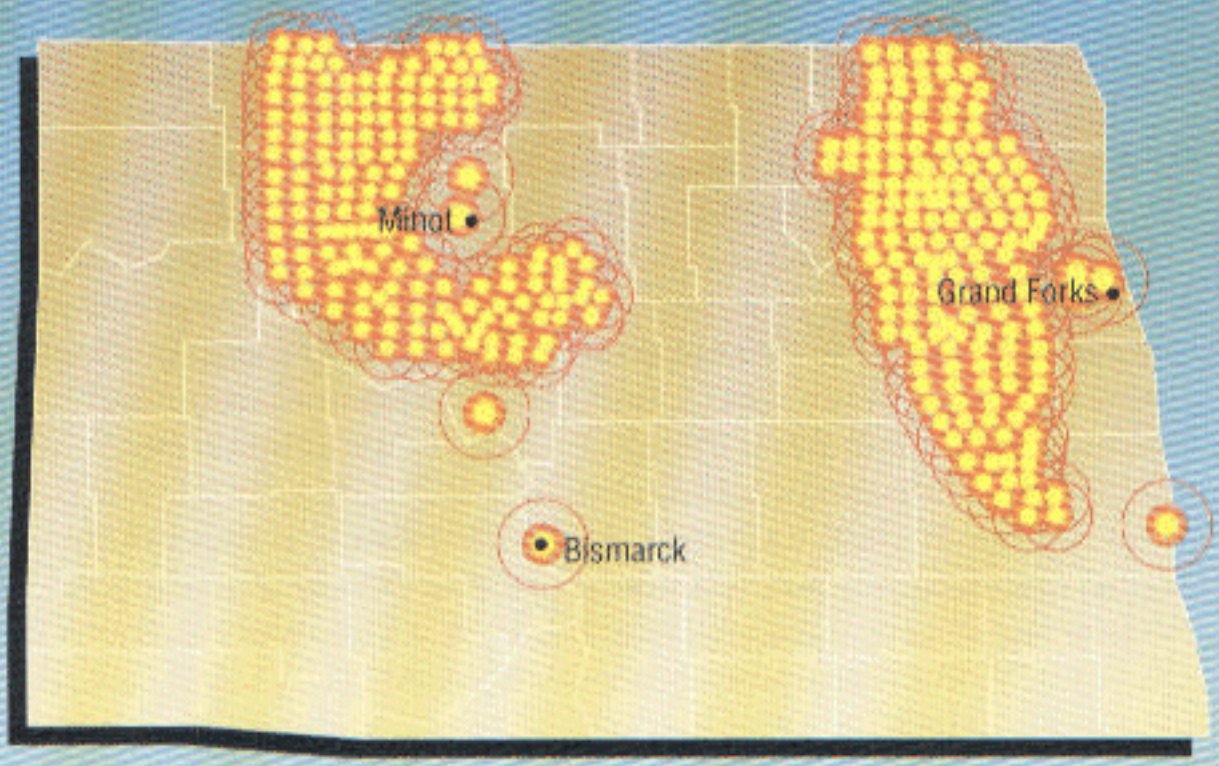
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

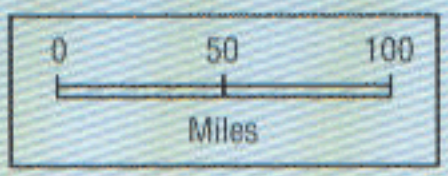
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

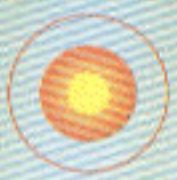
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

NORTH DAKOTA

Snow and Extreme Cold

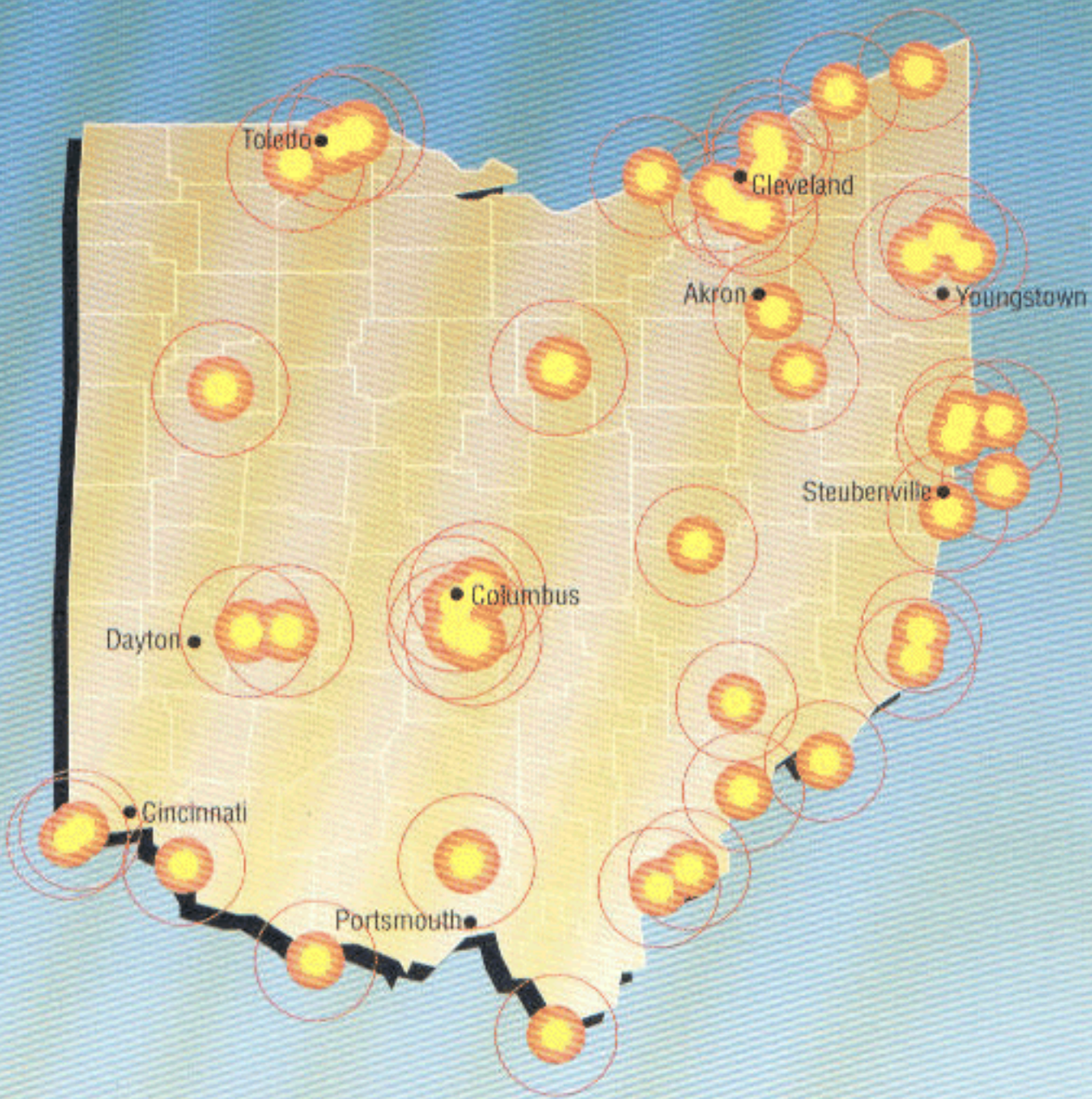
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

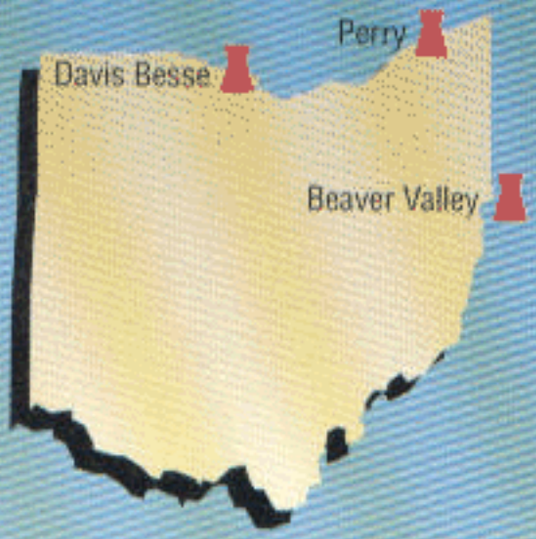
Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

OHIO

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

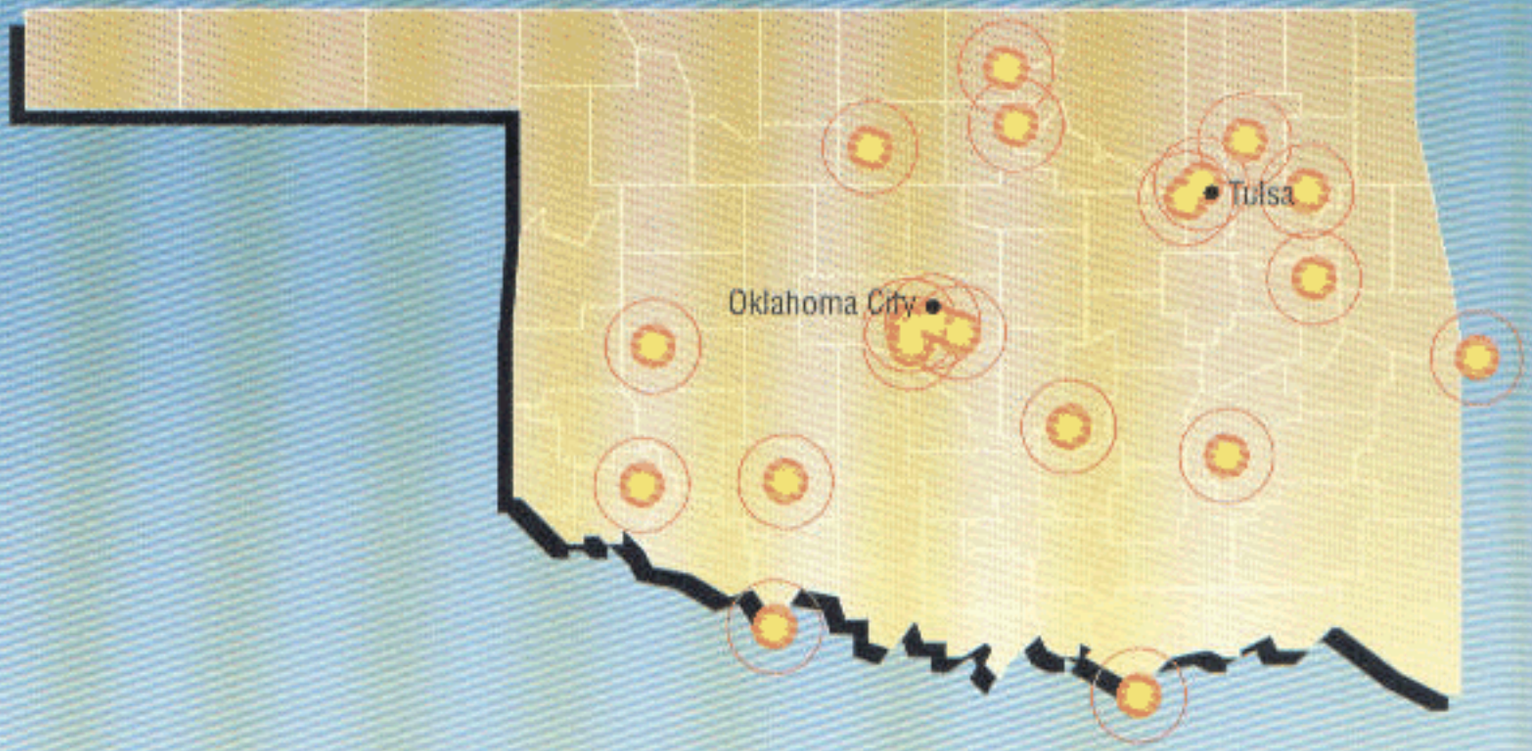
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

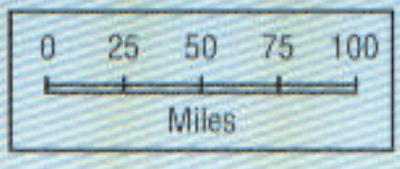
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

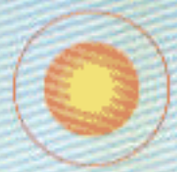
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



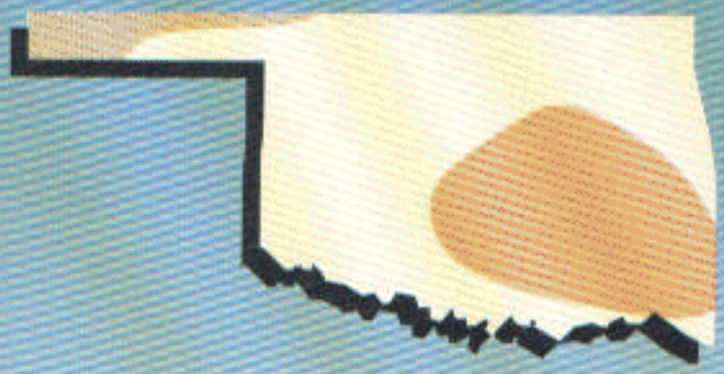
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

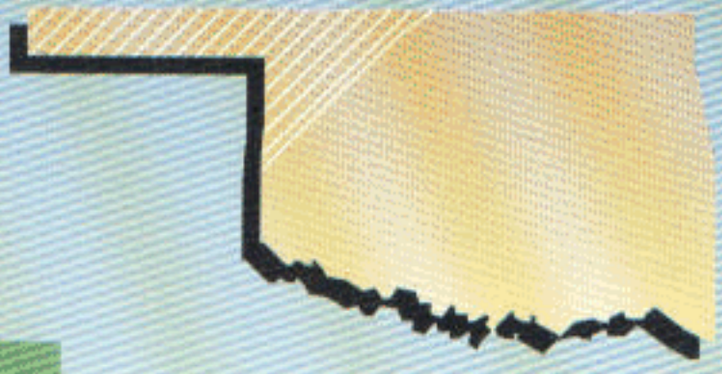
Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

OKLAHOMA



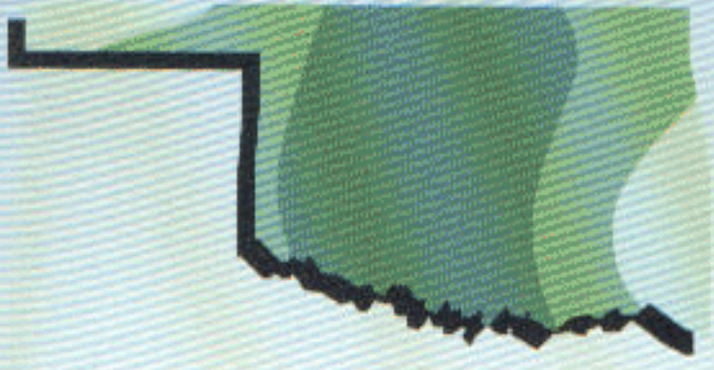
Earthquakes

- Low hazard
- Moderate hazard
- High hazard



Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

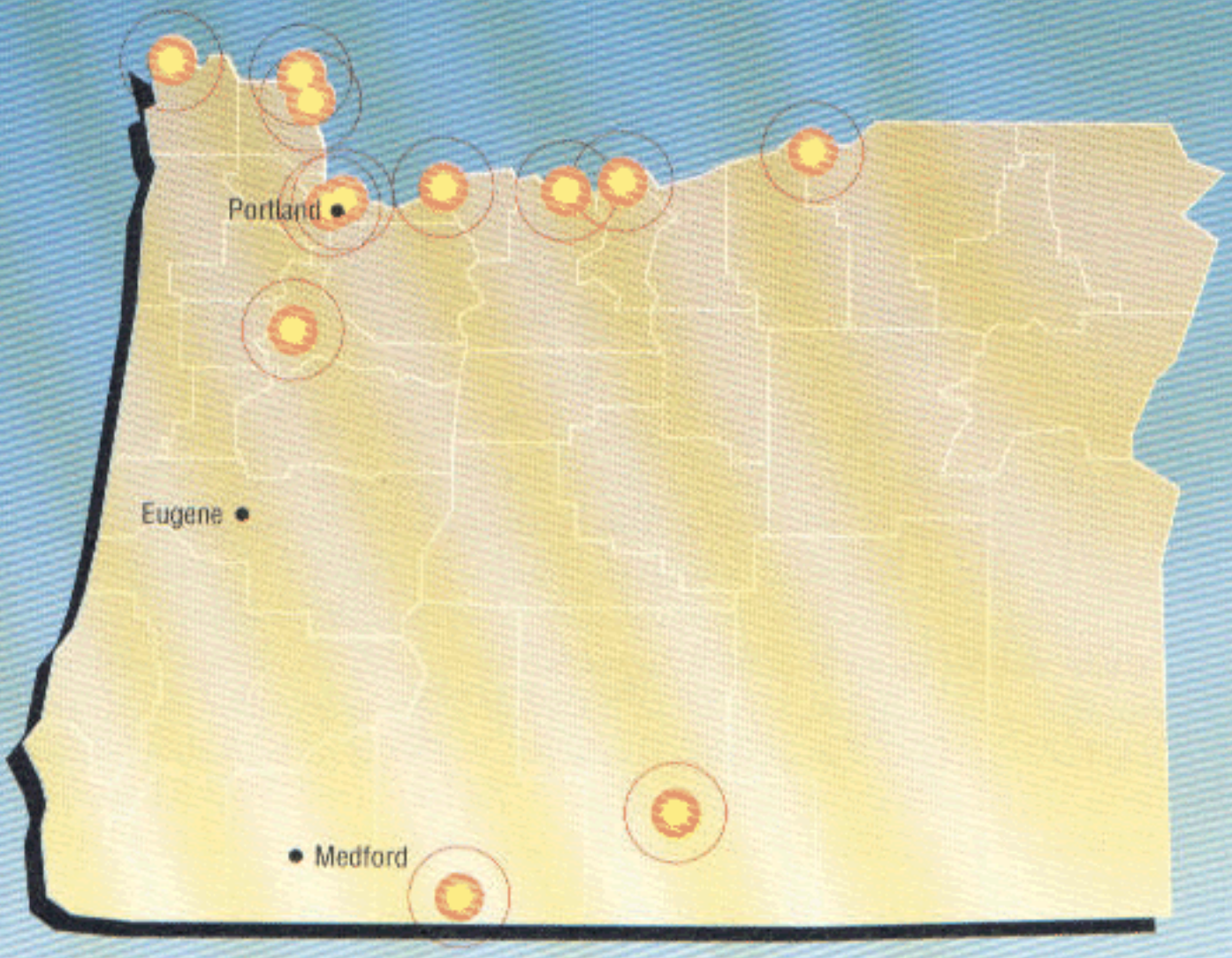


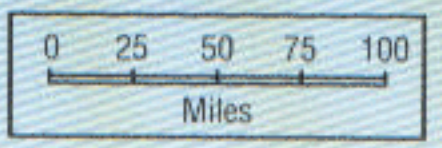
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

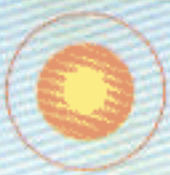
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

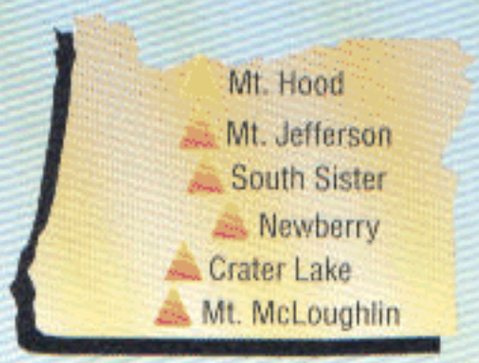
- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tsunamis

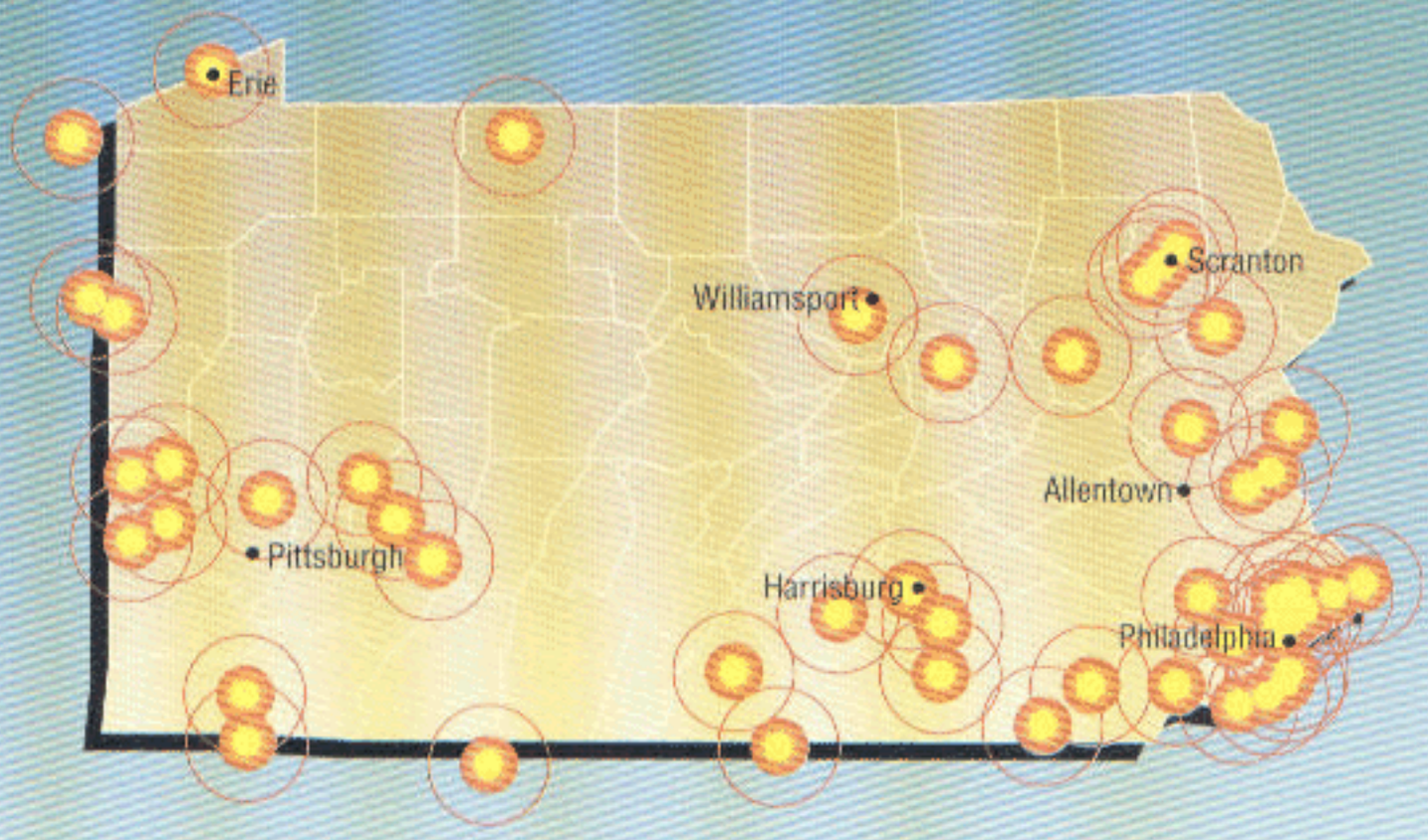
- Coastal areas historically subject to Tsunami

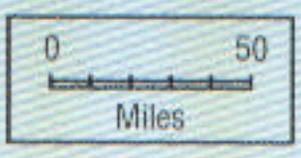


Volcanoes

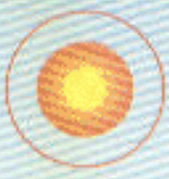
- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



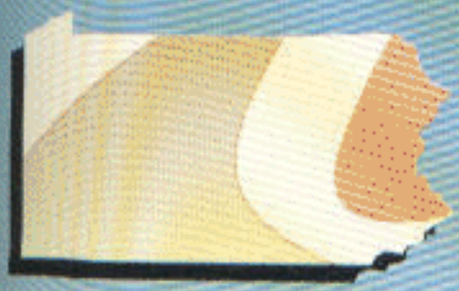
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

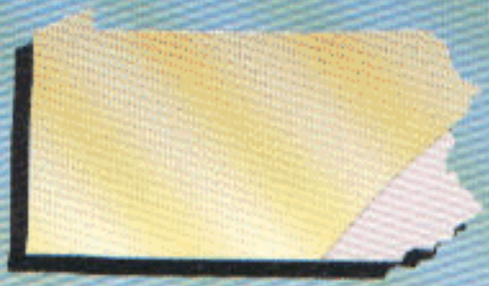
Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

PENNSYLVANIA



Earthquakes

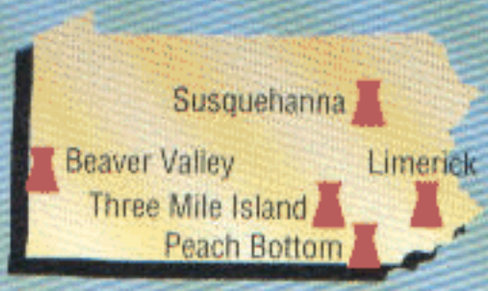
- Low hazard
- Moderate hazard
- High hazard



Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

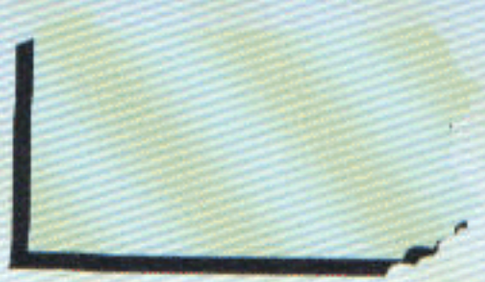


Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

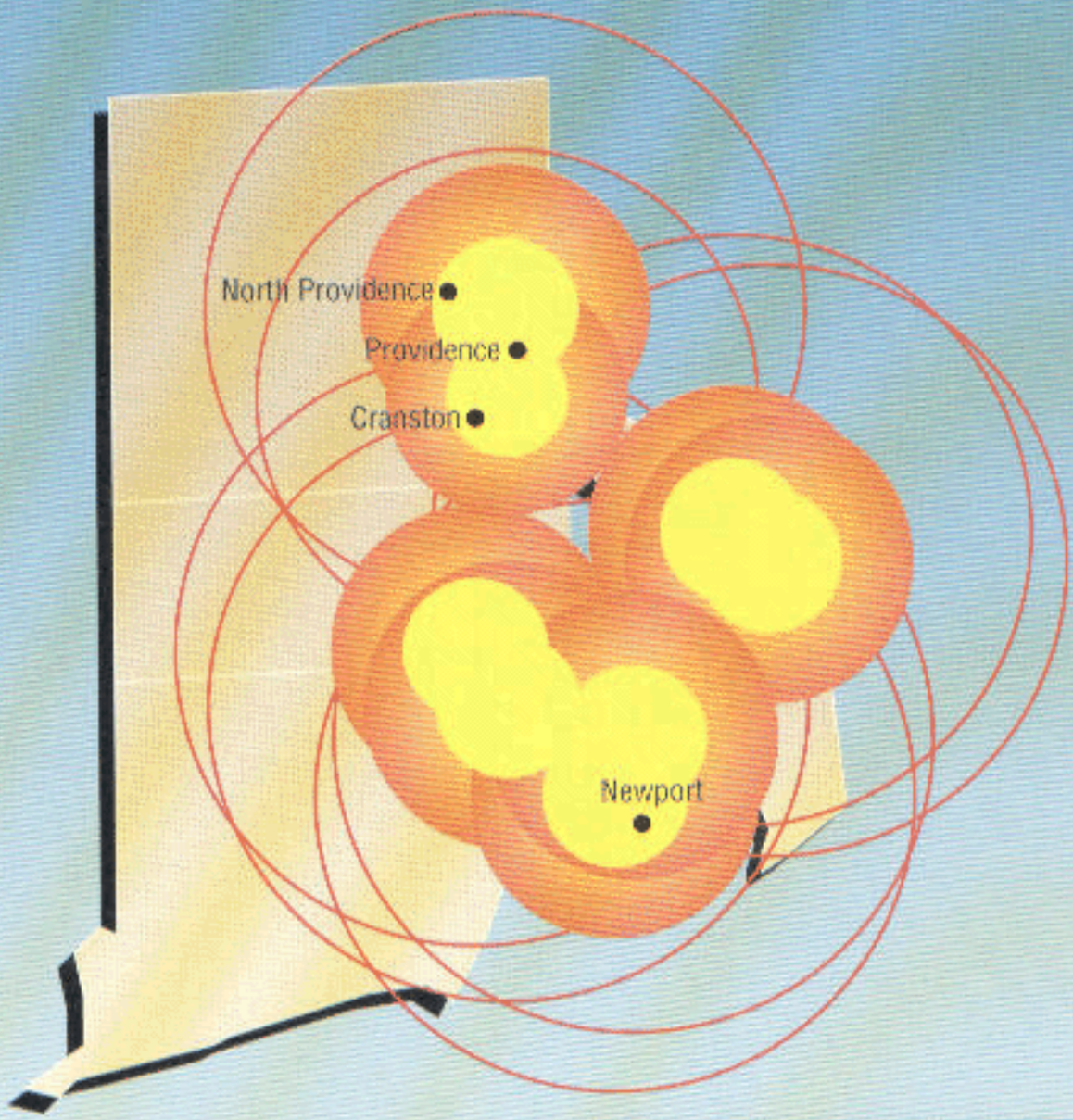


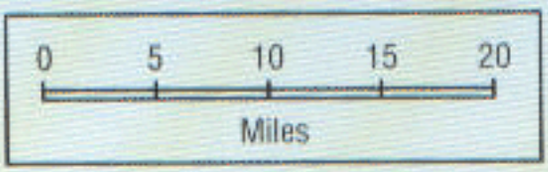
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

RHODE ISLAND

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Snow and Extreme Cold

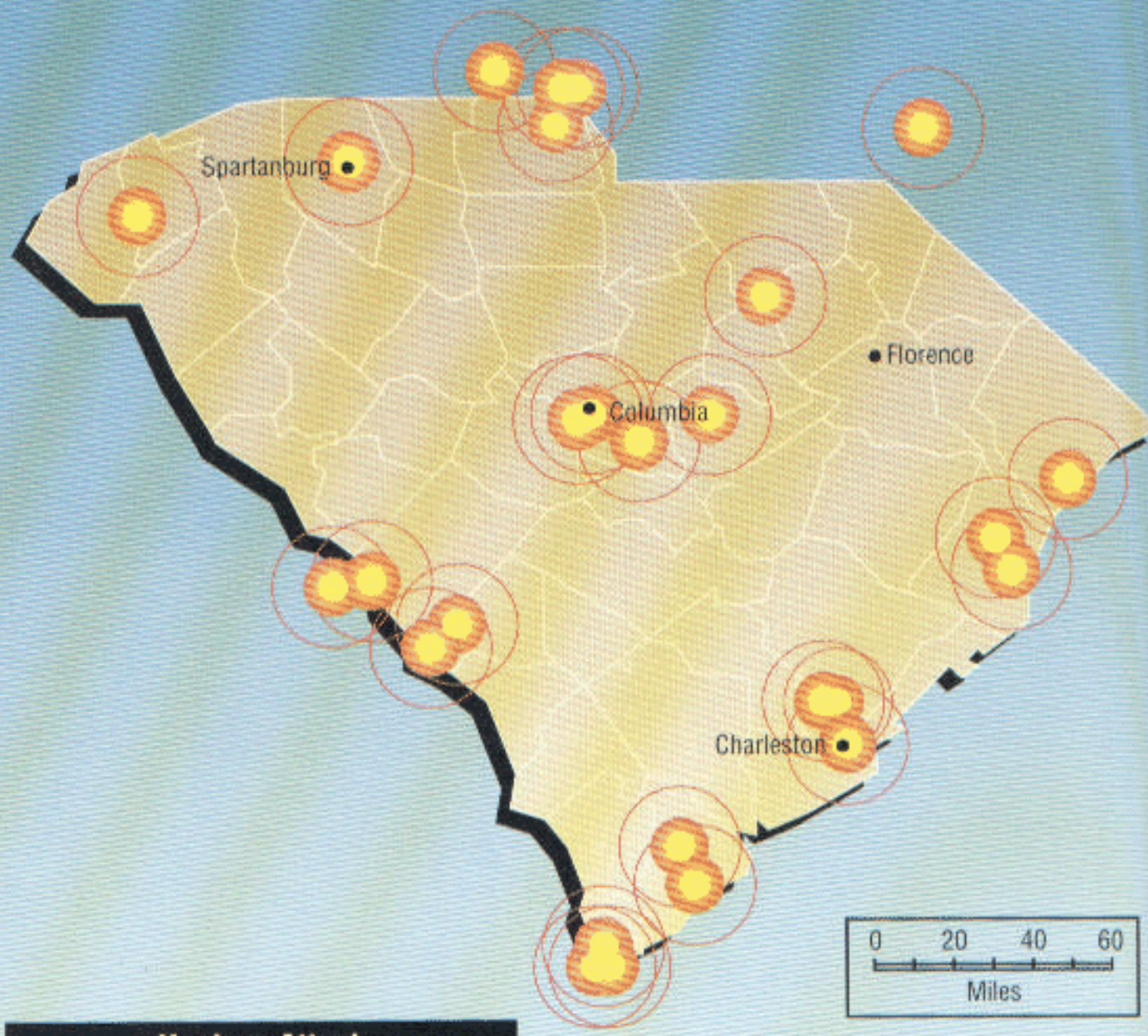
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

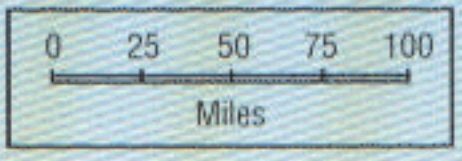
- Commercial nuclear power plants

Tornadoes

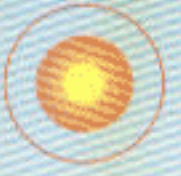
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



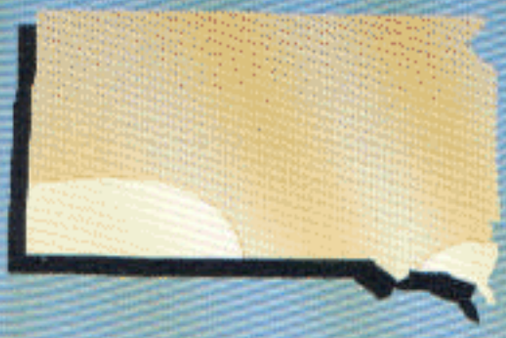
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.



Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

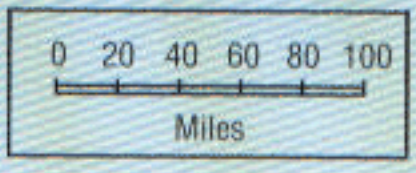
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

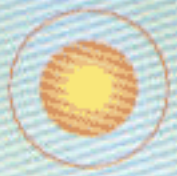
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

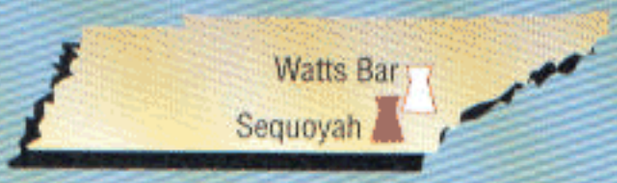
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

TENNESSEE

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

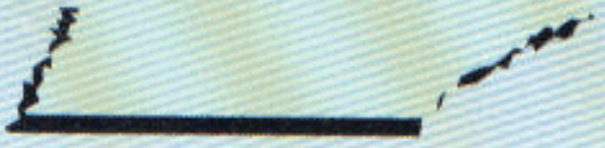


Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

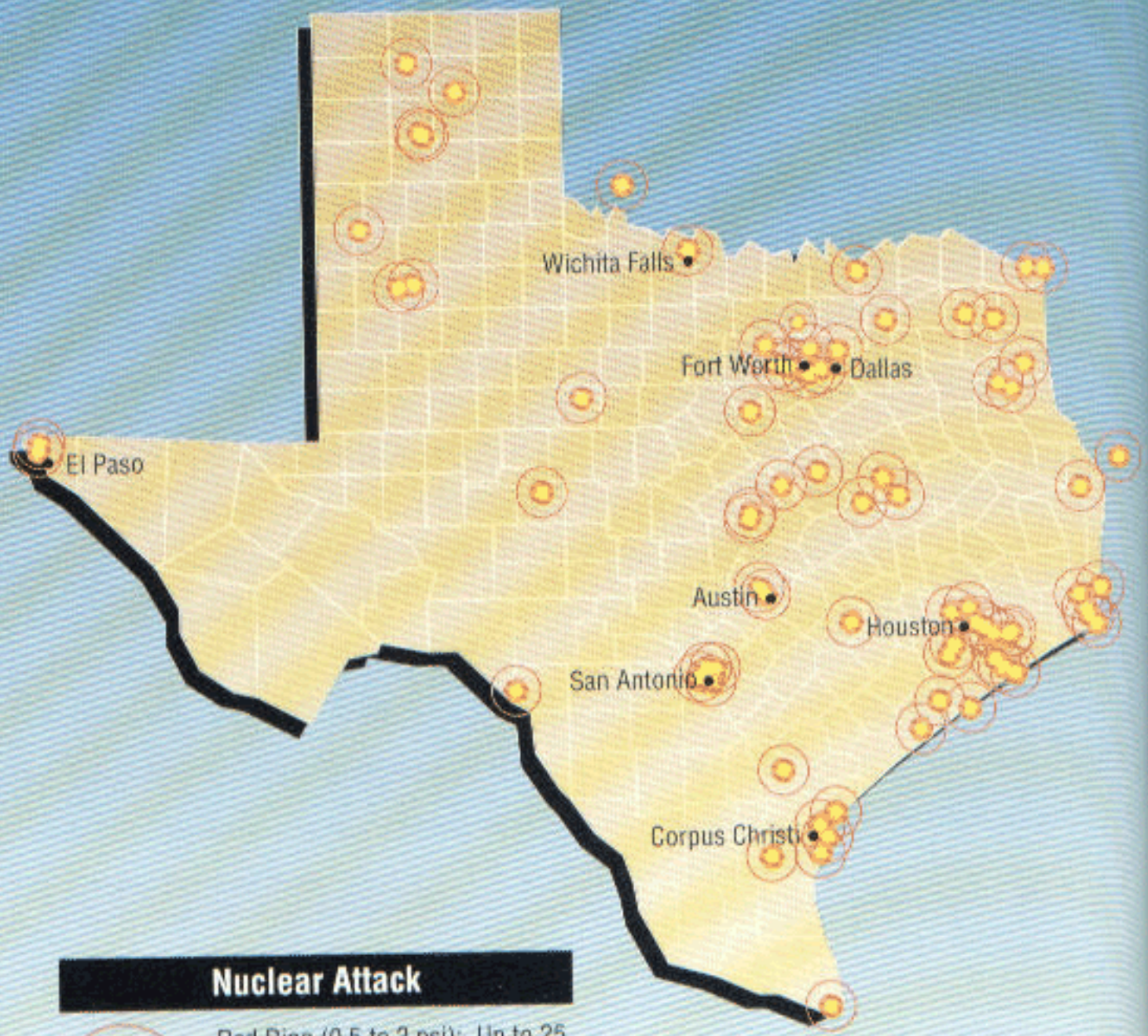


Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

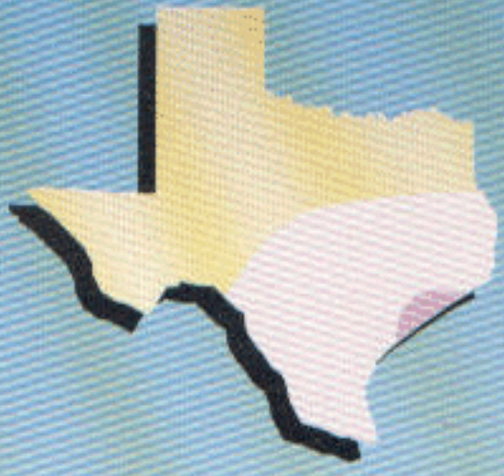
Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard



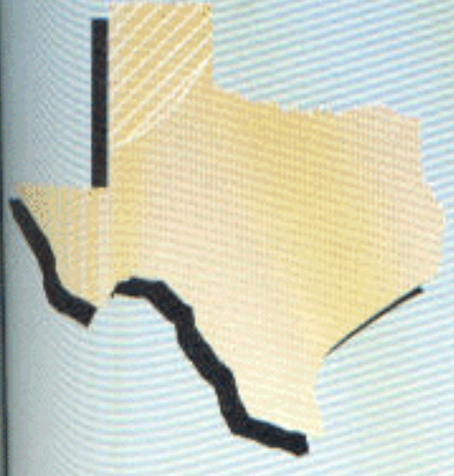
Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

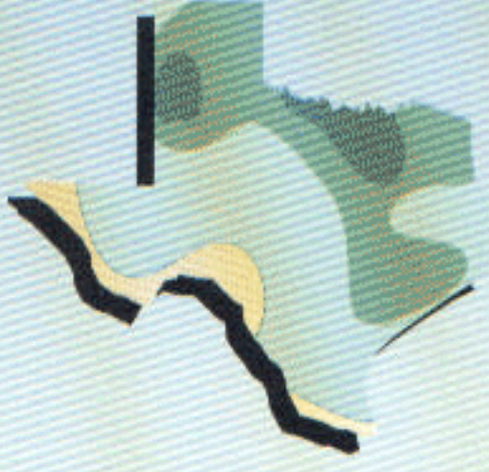
Nuclear Power Plants

- Commercial nuclear power plants
- Plants without a full power license



Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

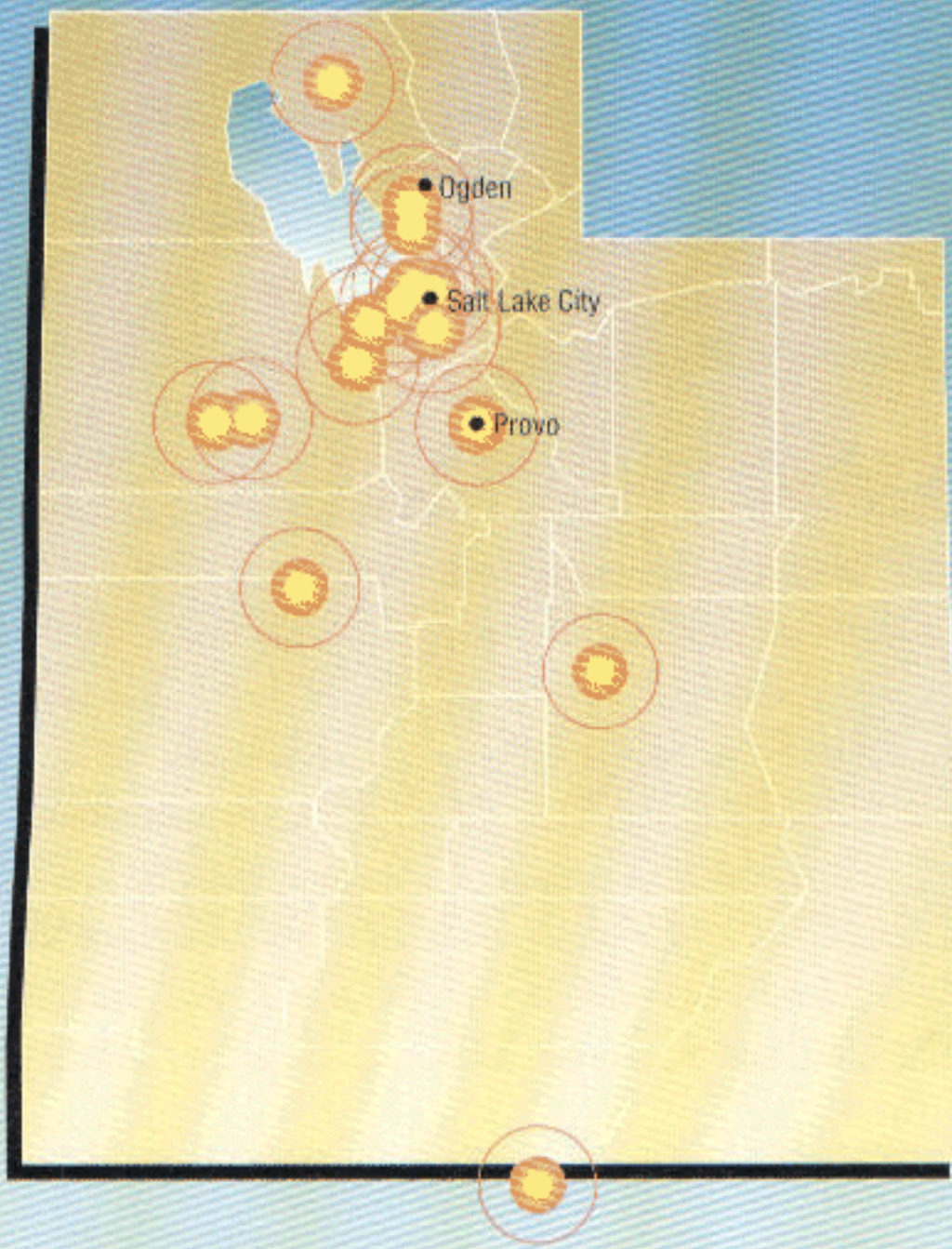


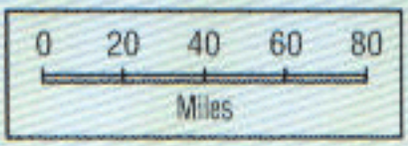
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

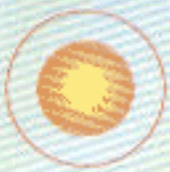
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

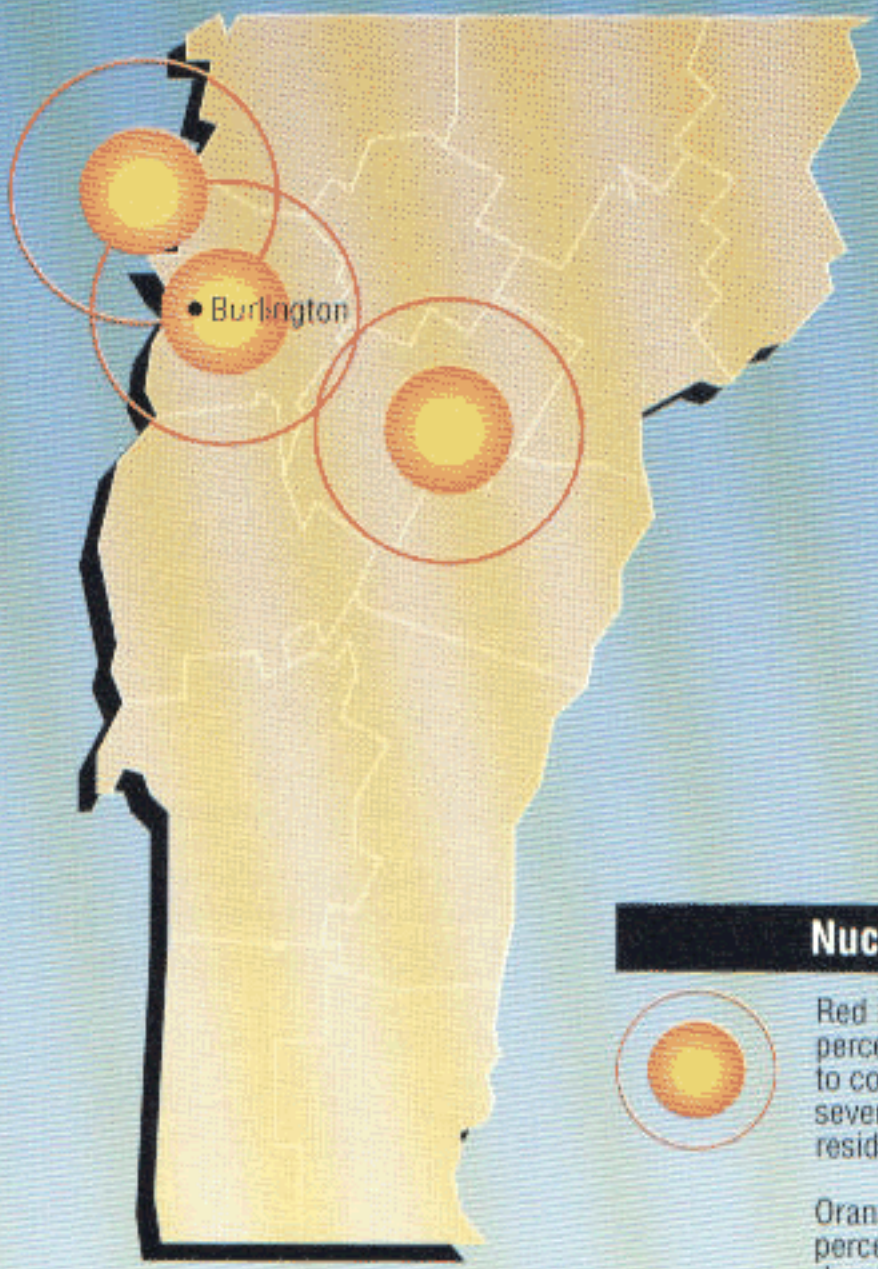
Earthquakes

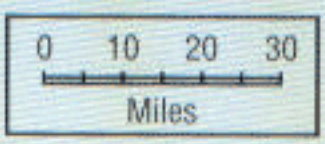
- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

VERMONT

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

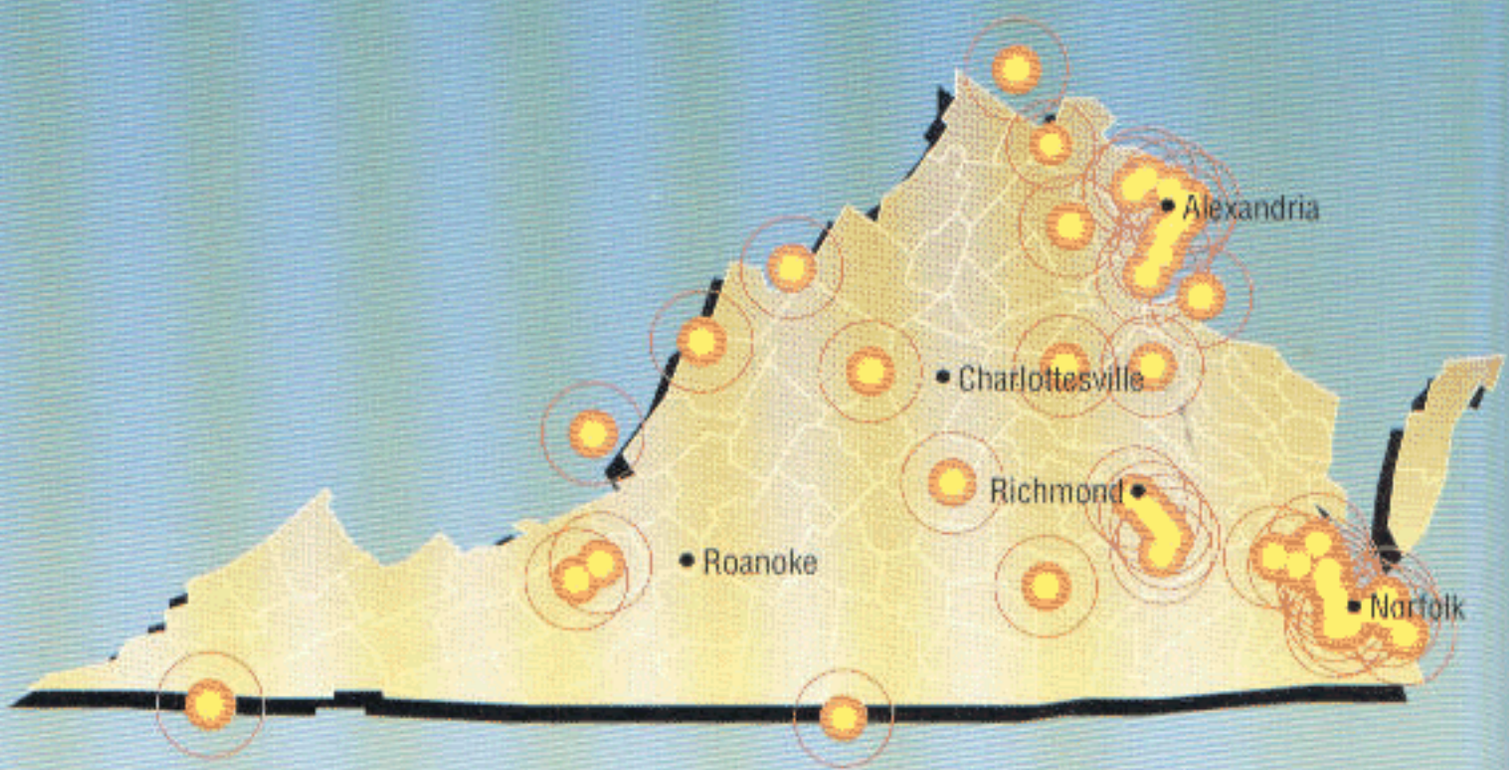
Tornadoes

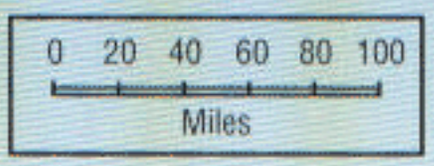
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods

Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

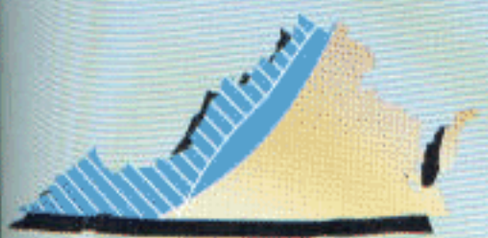
Hurricanes

- 5-15 times*
- 15-30 times
- Over 30 times

*Occurrences of destruction over a 50-year period

Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

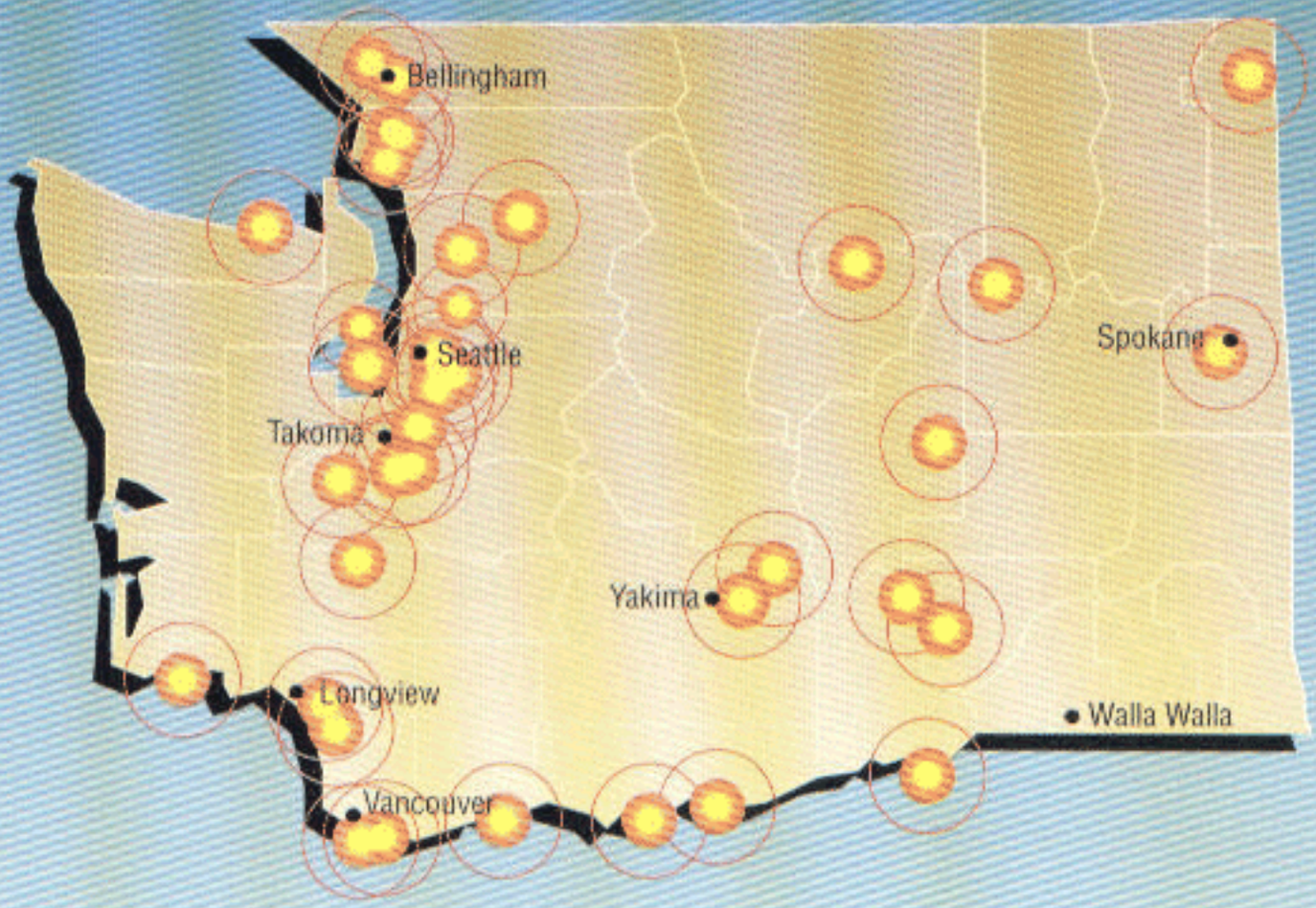
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tornadoes

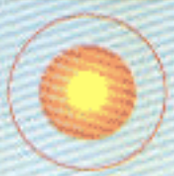
- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.



Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants

Snow and Extreme Cold

- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

Tsunamis

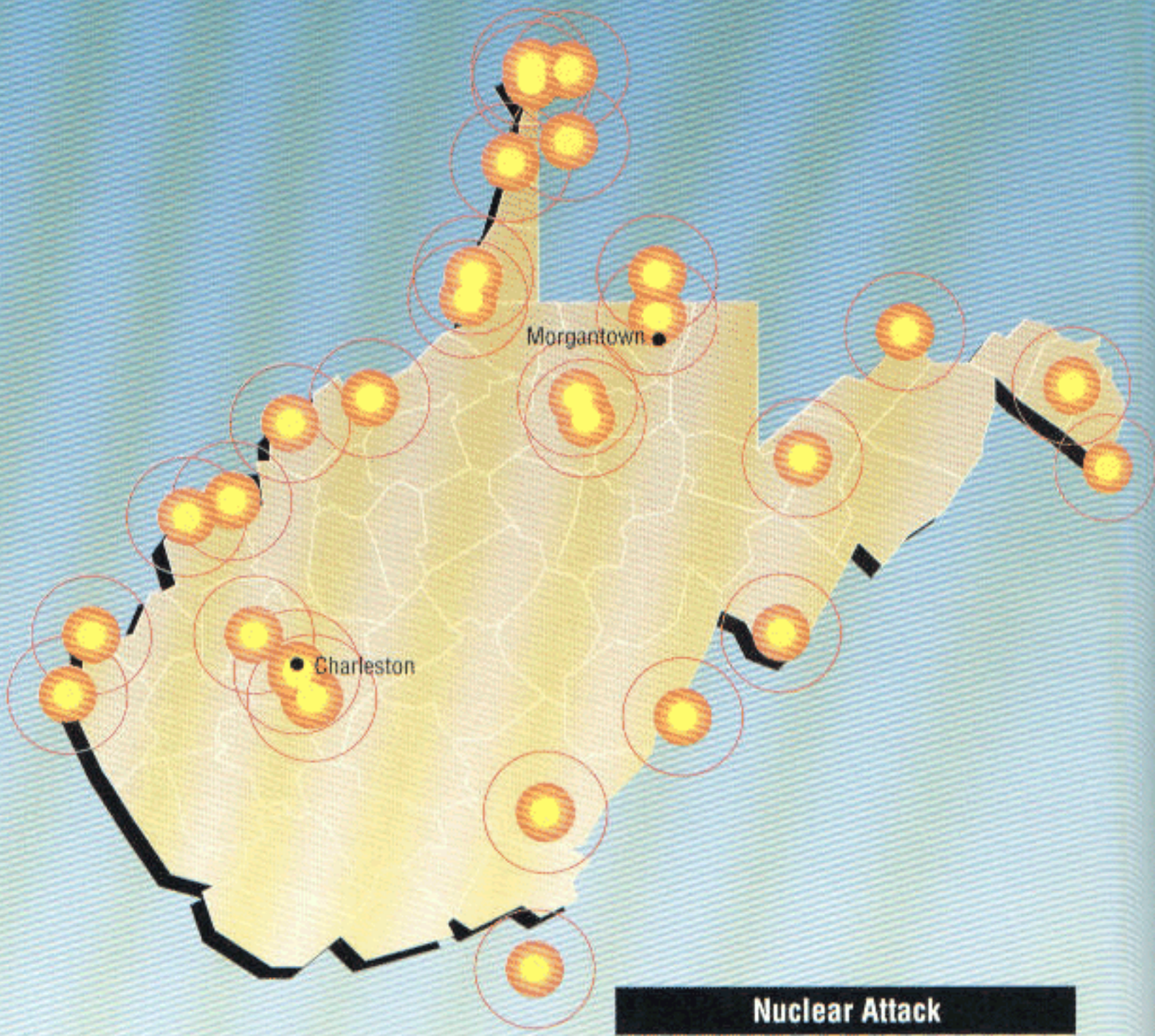
- Coastal areas historically subject to Tsunami

Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.
- Volcanoes that have erupted since 1950

Floods

Flooding is a potential hazard in areas throughout the state.



Nuclear Attack

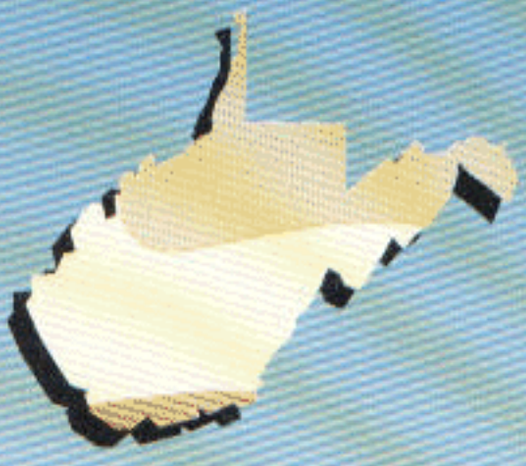
Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

WEST VIRGINIA

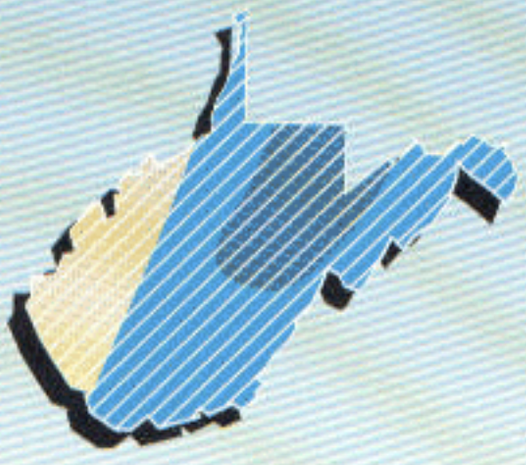


Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Nuclear Power Plants

- Commercial nuclear power plants



Snow and Extreme Cold

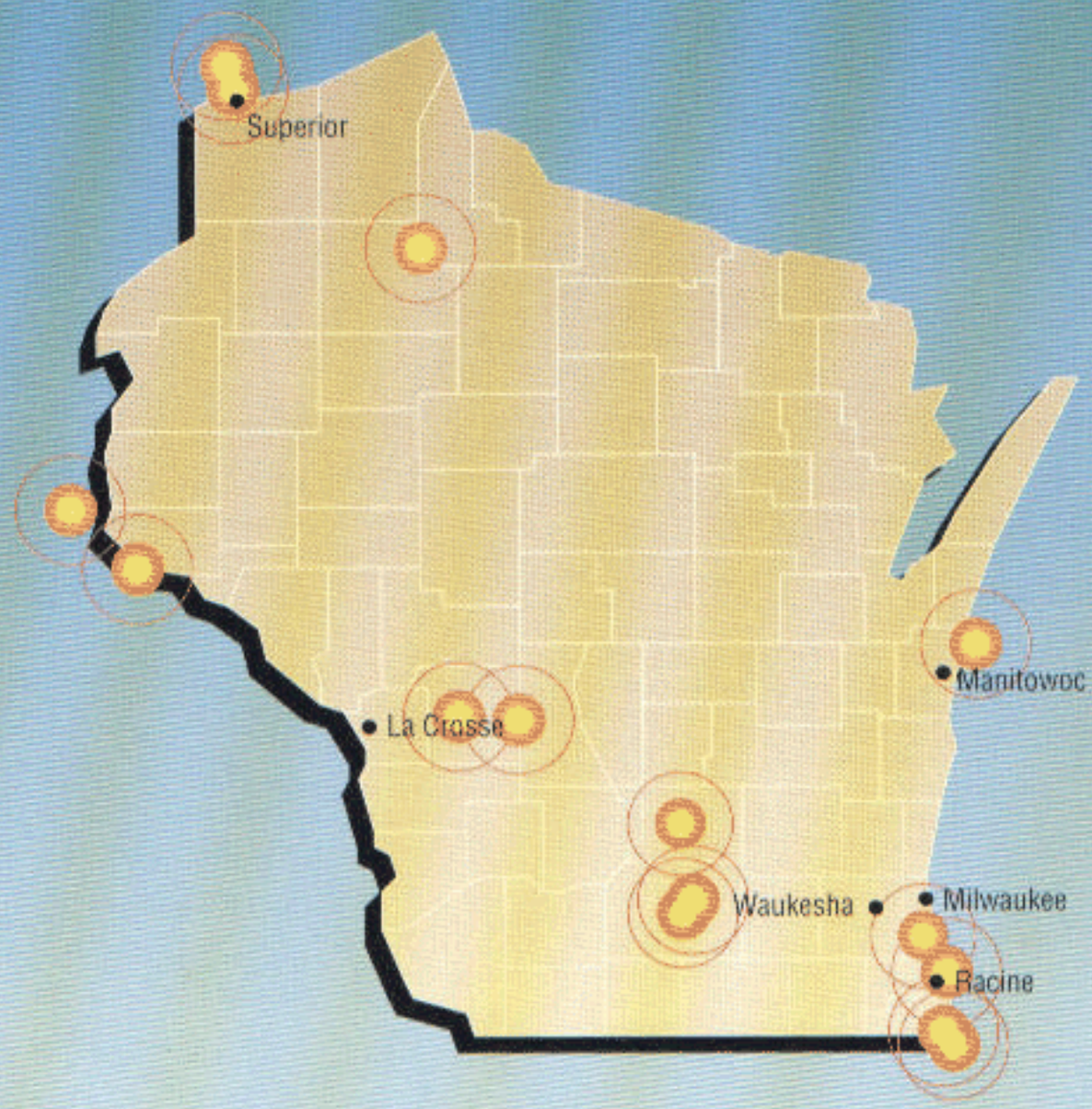
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

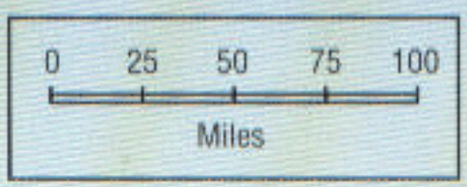
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack

Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

WISCONSIN

Nuclear Power Plants

Commercial nuclear power plants

Snow and Extreme Cold

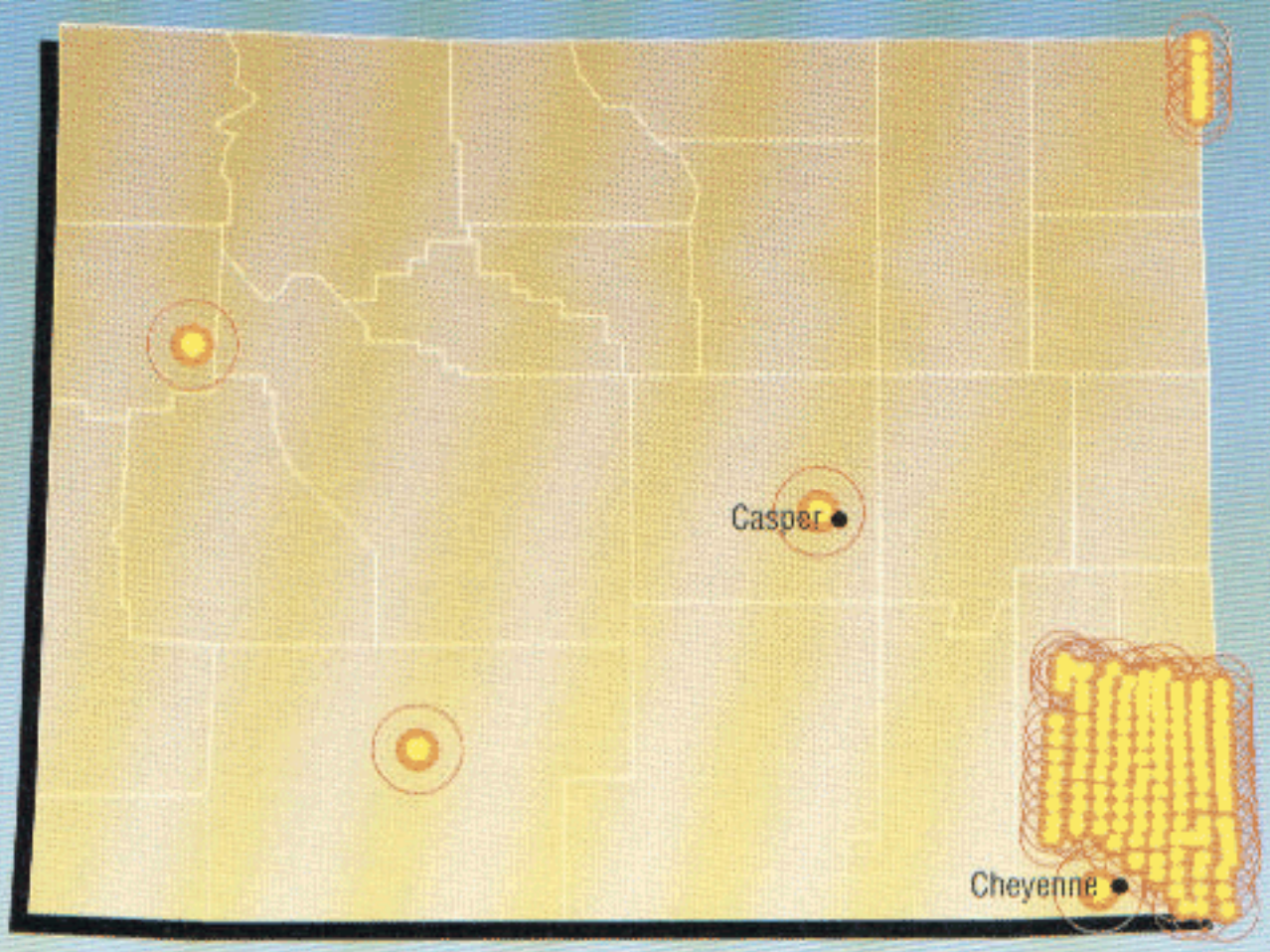
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing

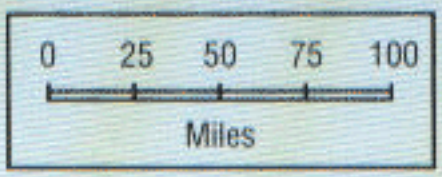
Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

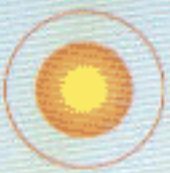
*per 10,000 square miles over a 28-year period

Floods Flooding is a potential hazard in areas throughout the state.





Nuclear Attack



Red Ring (0.5 to 2 psi): Up to 25 percent casualties. Light damage to commercial-type buildings, severe damage to small residences.

Orange Area (2 to 5 psi): 50 percent casualties. Moderate damage to commercial-type buildings, severe damage to small residences.

Yellow Area (5 psi or more): Few survivors. Severe damage to total destruction of buildings.

Fallout

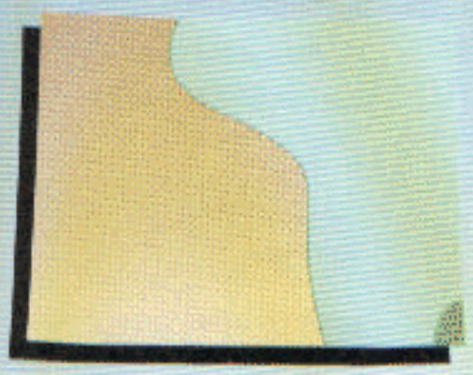
Fallout radiation is a potential hazard for all localities.
See page 123 for more information.

Earthquakes

- Low hazard
- Moderate hazard
- High hazard

Snow and Extreme Cold

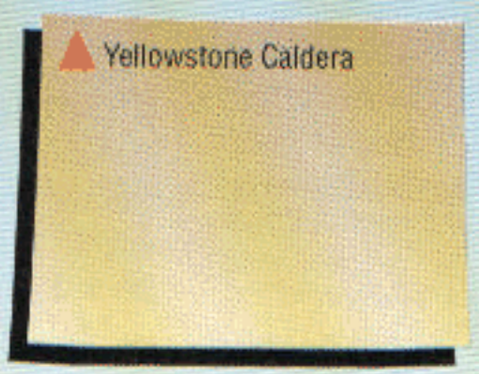
- Moderate snowfall
- Heavy snowfall
- Extreme cold and freezing



Tornadoes

- 1-3 per year*
- 4-6 per year
- 7-9 per year

*per 10,000 square miles over a 28-year period



Volcanoes

- 1 eruption per 10,000 yrs.
- 1 eruption per 1000 yrs.
- 1 eruption per 200 yrs.

Floods Flooding is a potential hazard in areas throughout the state.