Tornado

Definition *A small radius cyclonic windsform*

National Frequency The yearly national average of incidents (taken from 1959-1988 data) is 783. The average annual frequency per State is 16 with a high for Texas of 132 and less than 3 in 14 States.

Regions at Risk Tornadoes are a risk in all States but are more frequent in the Midwest, Southeast and Southwest. The States of Mississippi, Kansas, Arkansas, **Oklahoma,** Illinois, Indiana, Iowa, Missouri, Nebraska, Texas, Louisiana, Florida, Georgia, Alabama and South Dakota are at greatest risk. (See *Figure 14* for a national summary of the 1959-1988 tornado occurrences and *Figure 15* for the 1991 tornado activity.)

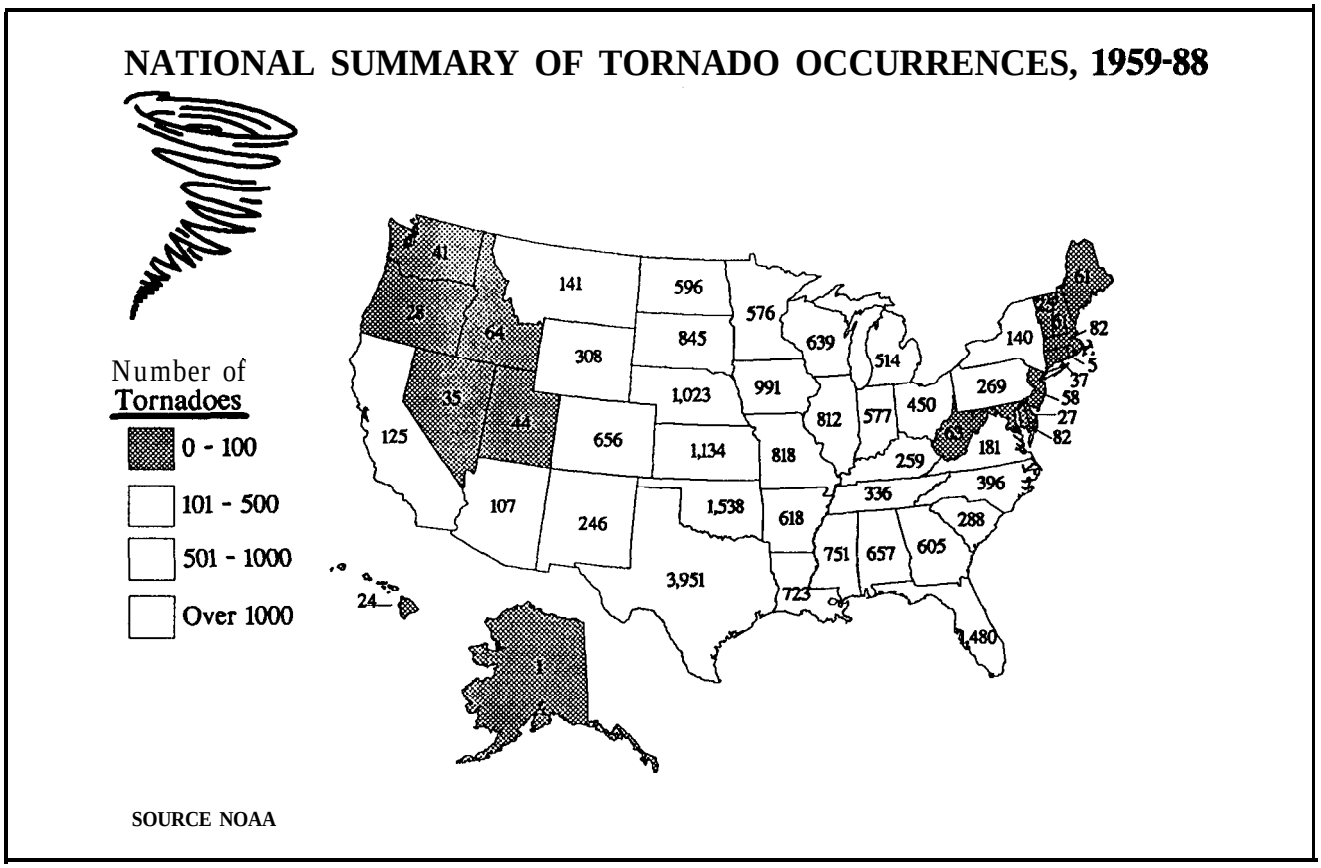

Figure 14

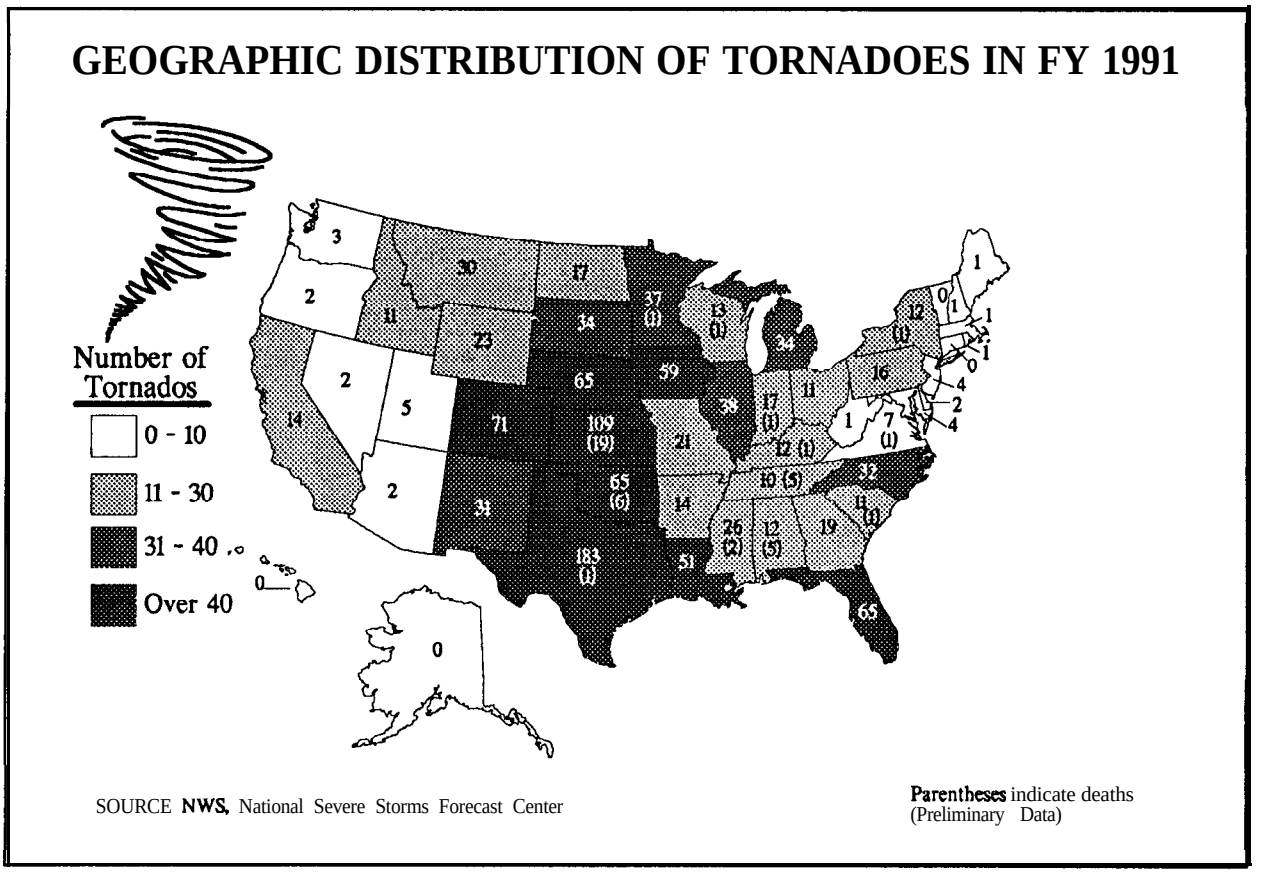

Figure 15

Season(s)

Tornadoes can occur year-around. While the normal tornado season extends from March to August, the peak months are from April through June.

Effects

The National Weather Service recorded 39 death due to tornadoes, with a 20 year average annual rate of 74 deaths. In their annual flood damage report, the U.S. Army Corps of Engineers estimated that the costs of tornado-related damage reached $651 million in Fiscal Year 1991.The annual rate of economic damage for the eight fiscal years 1983-1990 is around $590 million. Tornadoes cause secondary events such as power failure and fires. (See *Figure* 16 for a summary of tornado deaths during the period 1959-1988.)

Worst Event

The worst event in this century occurred on March 18, 1925, when eight tornadoes in Missouri, Illinois, Indiana, Kentucky, Tennessee and Alabama caused 689 deaths. The worst November on record was in 1988 when 121 tornadoes, mainly concentrated in

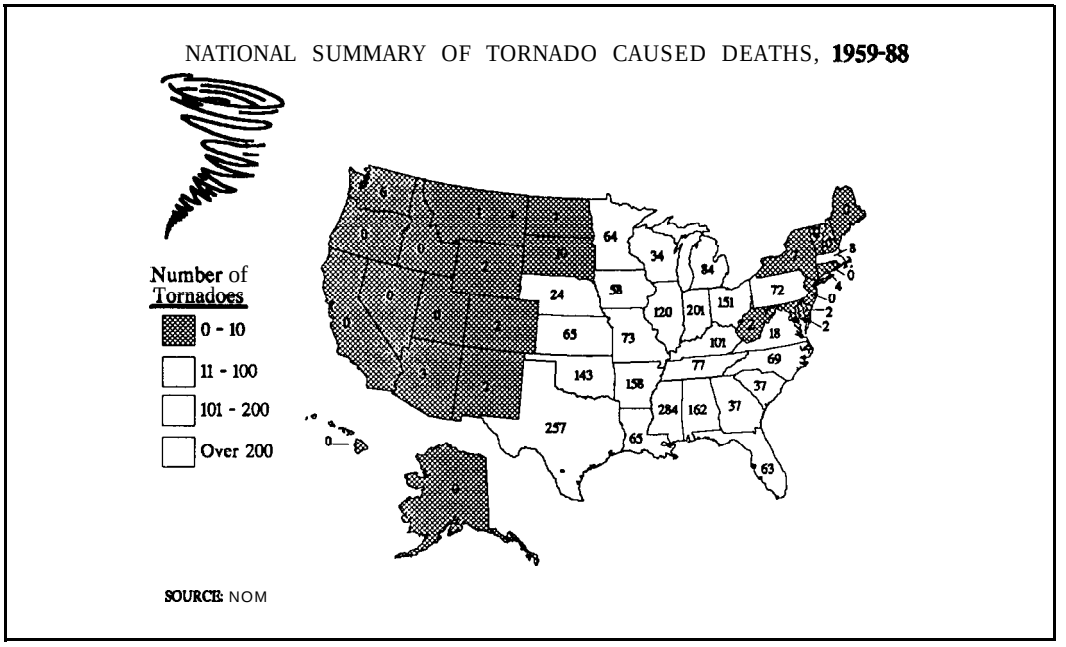

Figure 16

four major outbreaks, struck 15 south-central States. (The annual tornado average for November is 23.) A total of 14 lives were lost and damages were in excess of $108 million.

Discussion

While they are relatively short-lived in duration, tornadoes are intensely focused, making them one of the most destructive natural hazards. With winds of 150 miles per hour or more at their centers, tornadoes can destroy almost everything in paths that can range from 200 yards to one mile wide. Although tornadoes normally travel for up to 10 miles, tornado tracks of 200 miles have been reported.

More tornadoes occur in the United States than anywhere else in the world. They generally develop from thunderstorms and sometimes as the result of hurricanes. The weather conditions which tend to generate this phenomenon are unseasonably warm and humid earth surface air, cold air at middle atmospheric levels and strong upper-level jet stream winds. The instability of weather patterns during the "transitional" Spring and Fall seasons, when warm- and cold-air systems often converge violently, make these times of the year particularly dangerous for tornado activity.

In the first half of this century, the number of tornadoes recorded per year was less than 200. Since 1953, the numbers have ranged from 421 to 1,102 per year. The increase results from a number of

factors not necessarily related to weather changes. Increased population density means that there are more people to detect and report tornadoes which touch down in areas that were formerly isolated. In addition, significant improvements in technology, communications and military and weather service tracking have improved both the detection and reporting of tornadoes.

Tsunami

Definition *A water wave or a series of waves generated by an impulsive vertical displacement of the ocean or other body of water usually due to earthquakes, volcanoes or landslides*

National Frequency Between 1900 and 1990, coasts in the United States have been struck by 151 confirmed tsunamis, for an average frequency of 1.67 per year. During this time, a damaging tsunami occurred every 3.6 years on the average.

Regions at Risk Hawaii, the highest risk area, averages one tsunami every year with a damaging occurrence every 7 years. Alaska, also at high risk, averages a tsunami every 1.75 years and a damaging event every 7 years. The West Coast and American Samoa experience a damaging tsunami every 18 years on the average. Although Guam, the Commonwealth of the Northern Marianas (Saipan) and the other Western Pacific Insular entities record a tsunami every 3 years, they are at low risk because the waves cause almost no damage. Also at low risk are Puerto Rico, the Virgin Islands and the East Coast where tsunamis are recorded every 13 to 18 years. Historically, however, at least one tsunami has caused damage and deaths in Puerto Rico and the Virgin Islands. The tsunami risk table (developed by the National Geophysical Data Center) in *Figure* 17 lists the 1900-1990 frequency rate.

Season(s) Year round

TSUNAMI RISK AREAS
Frequency Per Year 1900 - 1990

AREA	TOTAL	DAMAGING	RISK
Hawaii	1.00	a14	High
Alaska	0.57	0.14	High
West Coast	0.5	0.06	Moderate
American Samoa	0.67	0.06	Moderate
Pacific Islands	0.33	0.01	Low
Puerto Rico/ Virgin Islands	0.06	0.01	Low
East Coast	0.08	0.01	Low

Figure 17

Effects

History records at least 470 fatalities and several hundred million dollars in property damage in the United States and its territories. Tsunamis can trigger the secondary effects of flooding and landslides.

Worst Event(s)

On April 1, 1946, a tsunami with wave heights of 55 feet above sea level struck Hawaii, killing 159 people and causing property damage estimated at $26 million. Generated by an earthquake near the Aleutian Islands in Alaska, the tsunami had a wave length of about 100 miles and traveled at about 490 miles per hour. Deaths from this tsunami were also recorded in Alaska and the West Coast.

A tsunami following the Prince Rupert Sound (Alaska) earthquake in 1964 directly impacted the three West Coast States and Alaska, resulting in 123 deaths and damage totaling $98 million. (Hawaii was also affected, but damages were significantly lower.) Tsunami-generated waves of 20 feet crashed ashore at Crescent City, California, and waves ranging from 10-16 feet swept along parts of other coastal areas of California, Oregon and Washington.

Figure 18 summarizes the damage from the five major tsunamis that have occurred within the past 50 years.

DAMAGE FROM MAJOR TSUNAMIS
(1940 - 1990)

Date/Source	Hawaii	Alaska	West Coast	Samoa
April 1, 1946 Aleutian Islands	$26,000,000 159 deaths	Some 5 deaths	Moderate 1 death	
November 4 1952 Kamchatka, USSR	$1,000,000	Slight		Minor
March 9, 1957 Aleutian Islands	$5,000,000	Severe	Minor	Minor
May 22, 1960 S. Chile	$24,000,000	Minor	$1,000,000	Minor
March 28, 1964 Gulf of Alaska	$15,000	$86,000,000 107 deaths	$12,000,000 16 deaths	

Figure 18

Discussion

The term "tsunami," a Japanese word meaning 'harbor wave," has become the accepted name for this phenomenon. Although tsunamis are often called tidal waves, the latter term is incorrect because tsunamis are not caused by the tidal action of the moon and the sun.

The waves triggered by an earthquake or volcano travel outward in all directions from the generating area, traveling at speeds of 300 to 600 miles per hour in the deep and open ocean. The distance between successive crests can be as much as 300 to 400 miles. In deep water, the height of the waves may be no more than 1-2 feet and may pass a surface vessel unnoticed. However, upon reaching shallower waters around islands or on a continental shelf, the speed of the advancing wave diminishes, its length decreases and its height increases greatly (possibly to more than 60 feet) as the water piles up along the shoreline. The advancing turbulent wave front of a tsunami may crash inland, sweeping all before it, sometimes beaching boats and ships thousands of feet inland. *(A tsunami triggered by the Krakatoa volcano in the Sunda Strait between Java and Sumatra on August 26, 1883, generated a tsunami estimated at 100 feet in height that caused tremendous loss of life on fhe islands.)*

A tsunami wave may break on the beach, appear as flooding or form a "bore" tide (a violent rush of water with an abrupt front) as it moves up a river or stream. When the trough of the wave arrives first, the water level drops rapidly, draining the harbor or offshore area and exposing sea life and ocean bottom. This phenomenon may be the only warning to residents that a large tsunami is approaching. Fatalities have occurred when people tried to gather fish or explore the strange landscape. The wave returns to cover the exposed coastline faster than the people can run. Although there may be an interval of minutes-or perhaps an hour-between waves, the second, third or later waves can be more destructive than the first. Residents returning to the waterfront after the first wave have been drowned in later waves. Successive wave crests may continue to pound the coast for several hours. Several days may pass before the sea returns to its normal state.

Most tsunamis are generated in the Pacific. Hawaii and the west coast of the United States have been struck repeatedly by tsunamis generated by earthquakes in South America and the Aleutian-Alaska region. Tsunamis of significant destructive force are

relatively infrequent. During the last 60 years, 165 incidents have been recorded in the United States and the Western Pacific Islands.

While tsunamis are generally associated with the Pacific Ocean, they are rare, but not unknown, along the Atlantic coastline. A severe earthquake on November 18, 1929, in the Grand Banks of Newfoundland generated a tsunami that caused considerable damage and loss of life at Placentia Bay, Newfoundland. Small sea waves were recorded along the east coast of the United States as far south as Charleston, South Carolina. In the Caribbean, a large earthquake on November 18, 1867, centered between St. Thomas and St. Croix, caused sea waves more than 20 feet high that swept inland in the Virgin Islands and Puerto Rico. A local tsunami accompanying an offshore earthquake with a magnitude of 7.5 drowned many persons and destroyed numerous dwellings in northwestern Puerto Rico on October 11, 1918.

Although research into the history of tsunami experience is an important step for assessing risk, accurate assessment of future tsunami risk is complicated by changing demographics and modem developments. Population growth in coastal areas will increase the risk. Modifications to harbors and other mitigation efforts may have substantially reduced the risk in other areas. While modeling and study of historical data have contributed to the understanding of the effects of these waves, they remain an enigma and a threat to the United States coastal areas. (Sources: ***United States Tsunamis 1690-1988,*** *by Lander, J.F., and Lockridge, P.A., National Oceanic and Atmospheric Administration, National Geophysical Data Center, 1989;* ***Earthquakes, Volcanoes, and Tsunamis—An Anatomy of Hazards,*** *by Steinbrugge, Karl V., Skandia America Group, 1982. pp.* ***234-246; Earthquakes: A National Problem,*** *[FEMA], including sources of information from Schnell, M. L., and Herd, D.G. [eds.];* ***National Earthquake Hazards Reduction Program: Report to the United States Congress,*** *U.S. Geological Survey Circular 918, 1984; and* ***The Severity of an Earthquake,*** *U.S. Geological Survey Popular Publication, 1979.)*

Volcano

Definition *An eruption from the earth's interior producing lava flows or violent explosions issuing rock, gases and debris*

National Frequency Among the known risk areas, volcanic eruptions occur more frequently in Hawaii.

Regions at Risk The primary areas affected include the Pacific Rim States of Hawaii, Alaska, Washington, Oregon and California and the Commonwealth of Northern Marianas in the Western Pacific. Montana and Wyoming are also at risk, but to a much lesser extent.

Season(s) Year round

Effects Violent volcanic outbursts are characterized by clouds of poisonous gasses, rivers of lava and volcanic ash that can spread over wide areas. Major eruptions can result in heavy layers of ash covering widespread land areas, as witnessed following the eruption of Mt. St. Helens. Volcanic activity can also trigger tsunamis, landslides, floods (from the damming effects of slides or lava) and fires.

Worst Event The eruption of Mount St. Helens in southwestern Washington on May 18, 1980, caused 60 deaths and approximately $1.5 billion in damage.

Discussion All of the areas in the United States where volcanic action has occurred in the last 10,000 years are located west of the Rocky Mountains and thus could pose potential future hazards (see *Figure 19).*

In addition to the Mount St. Helens event, other recent eruptions have occurred in Alaska's Mount Augustine in 1976 and 1986 and Mount Redoubt in 1989 and 1990. Hawaii's Kilauea and Mauna Loa have been relatively active in recent years. For the past seven years, Kilauea has posed a continuous threat to the surrounding population. Mauna Loa, on the same island, has been less active with a major eruption in 1950 and ones of smaller magnitude in 1975 and 1984. The Commonwealth of Northern Marianas has three active volcanos. Mt. Pagan erupted in 1981.

Areas of Potential Volcanic Activity

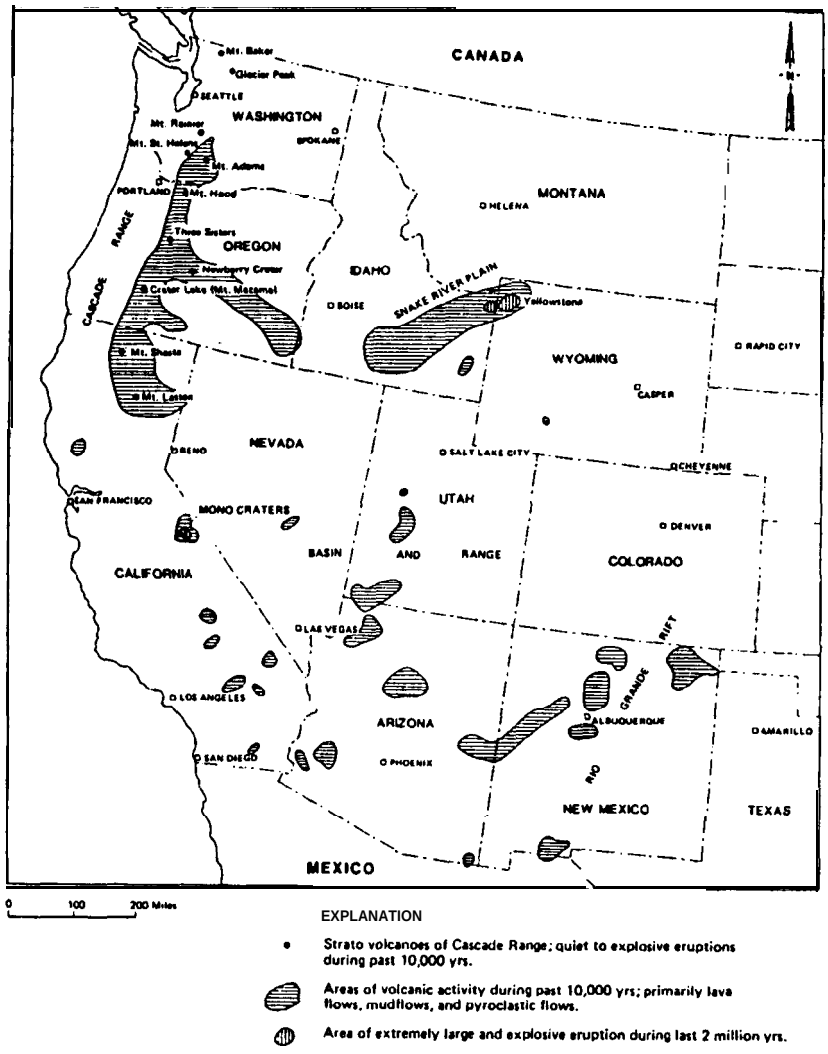

Figure 19

About 500 volcanoes have had recorded eruptions within historical times. Most volcanoes occur at the boundaries of the earth's crustal plates, such as the famous "Ring of Fire" that surrounds the Pacific Ocean Plate. Of the world's active volcanoes, about 60 percent are along the perimeter of the Pacific. (Source: ***Earthquakes, Volcanoes, and Tsunamis-An Ana tomy*** of ***Hazards,*** *by Karl V. Steinbrugge. Skandia America Group, 1982. pp. 259-274.)*

Wildfire

Definition

Any instance of uncontrolled burning in grasslands, brush or woodlands

National Frequency

According to U.S. Forest Service figures for the years 1986-1988, the national average was 140,341. The State average was 2,794 with Georgia having the highest average of 12,478. In 1989, a total of 94,369 fires burned 2,039,363 acres. The State averages for fires and involved acreage was 1,887 and 40,787, respectively. Georgia again had the highest number of fires-7,325; however, the 37,783 acres burned was below average. Florida had the highest amount of land involved with 645,331 acres burned by 7,291 fires.

Regions at Risk

All wooded, brush and grassy areas-especially those in Kansas, Mississippi, Louisiana, Georgia, Florida, the Carolinas, Tennessee, California, Massachusetts and the National forests in the western States. *Figure* 20 shows the distribution of wildfires in the States in 1989.

Season(s)

Wildfires occur most often in the Spring, Summer and Fall.

Effects

The annual death and economic damage rates have not been determined. Secondary events of wildfires would be soil erosion and subsequent landslides following heavy rains.

Worst Event

The worst single event in terms of deaths was the 1871 wildfire in Wisconsin where 1,182 people died. The worst single wildfire season in six decades occurred in 1988 with Federal expenditures of $538 million for combating fires in widespread areas of the West where 6,000 soldiers and marines and nearly 4,000 temporary workers assisted the 20,000 professional firefighters on the line.

Discussion

The Summer and Fall of 1991, wildfires were common in the Western states, including California, Montana, Colorado, Oregon and Washington. Perhaps the most dramatic were the October wildfires that swept through an area of over 1,800 acres in the hills of Oakland and Berkeley, California. Fires killed 24 people, injured 148 and left 5,000 people homeless. The destruction of almost 2,000 homes and apartments resulted in property damage of

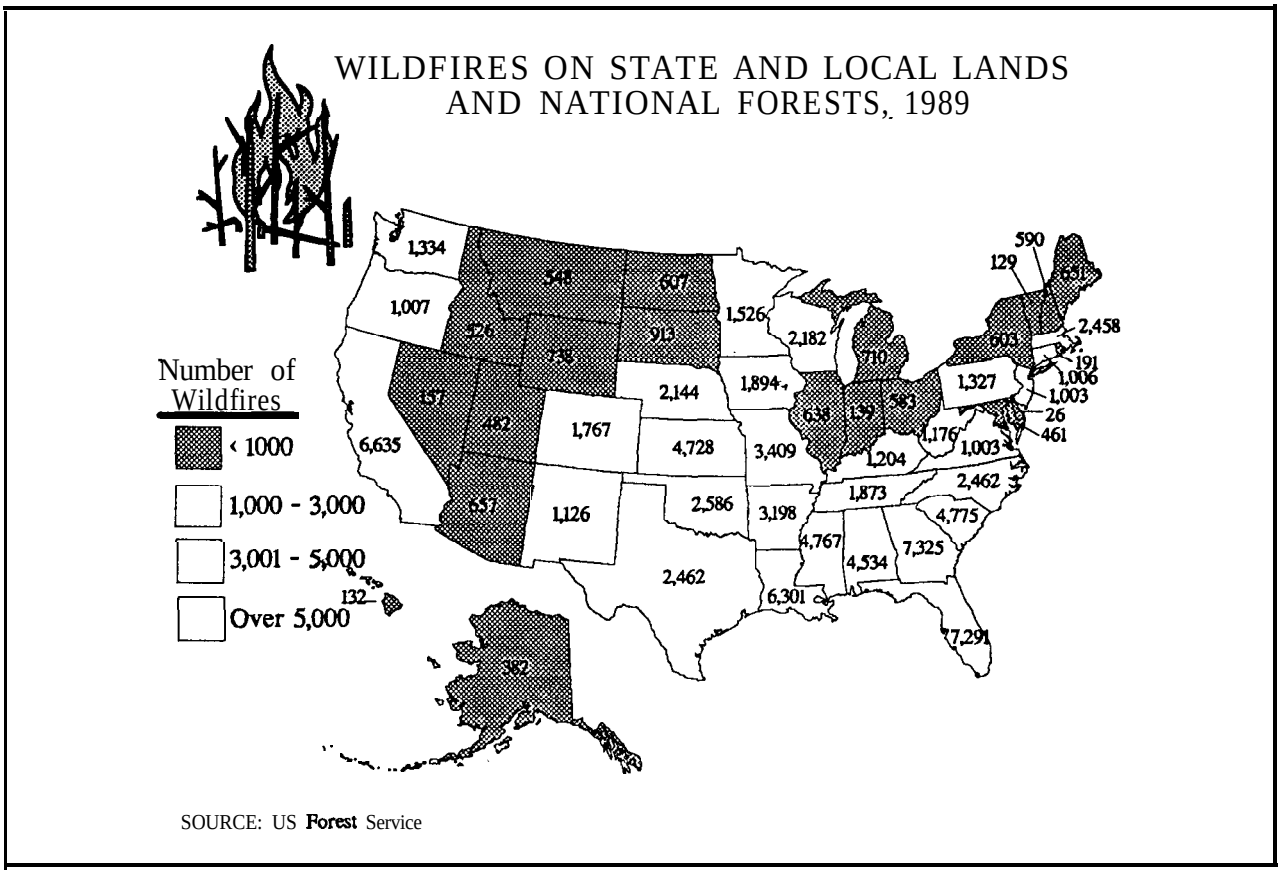

Figure 20

between 1.5 and 2 billion dollars, one of the largest disasters to hit the State. These fires dramatize the threat that wildfires pose to both urban and rural areas.

Winter Storm (Severe)

Definition

Ice storm, blizzard and extreme cold. Vulnerable areas would be subject to heavy snowfall, combined snow and high winds or ice storms.

National Frequency

None has been determined. The winter storm season varies widely depending upon the area's latitude, altitude and proximity to moderating influences.

Regions at Risk

Almost the entire United States except Hawaii and the Territories are at risk. The level of risk depends on the normal severity of local winter weather. Winter storms known as "northeasters" cause extensive coastal flooding, erosion and property loss in the northeastern and middle Atlantic States.

Season(s)

Winter, although some may occur in the late Fall and early Spring.

Effects

Between 1988 and 1991, the National Weather Service recorded a total of 372 deaths that could be attributed to snow, ice storms and extreme cold weather, an average of 93 deaths per year. In 1991, winter snows and blizzards were responsible for the deaths of 37 people, with injuries to 350 nationwide. Ice storms killed 8 and created economic damage estimated at almost a half billion dollars nationwide.

In the aftermath of winter storms, the weight of snow can cause structural failures; for example, in 1978 the roof of the Hartford Civic Center in Connecticut collapsed following back-to-back blizzards. The spring thaw of heavy winter snowfalls and river ice jams can cause floods. The estimated damage from melting ice jams that lead to flooding is in excess of $199 million a year.

Worst Event

The worst event was an 1888 East Coast blizzard when 400 deaths were recorded.

Discussion

Some areas of the country tend to be more susceptible than others to severe winter storms. Generally, the regions where harsh winters are common are more prepared for severe winter weather. Those areas where such weather is rare are more likely to experience disruptions when winter storms impact.

TECHNOLOGICAL/MAN-MADE THREATS

Technological/man-made threats represent a category of events that has expanded dramatically throughout this century with the advancements in modern technology. Like natural threats, they can affect localized or widespread areas, are frequently unpredictable, can cause substantial loss of life (in addition to the potential for damage to property) and can pose a significant threat to the infrastructure of a given area. Technological/man-made threats include hazardous materials incidents at fixed facilities or in-transit accidents, power failures, radiological incidents at fixed facilities or in-transit accidents, structural fires, telecommunications failures and other types of transportation accidents.

Hazardous Materials Incident - Fixed Facility

Definition Uncontrolled release of hazardous materials from a fixed site

National Frequency In 1988, the second year of reporting for the Toxics Release Inventory, 6.2 billion pounds of environmental releases and offsite transfers of chemical wastes were reported by 19,762 manufacturing facilities which submitted 79,343 individual chemical release reports. While more facilities (5 percent) submitted more forms (7 percent), total releases and transfers decreased 11 percent from 1987 to 1988. Facilities in the Gulf Coast, Great Lakes and mid-Atlantic States and California had the largest number of releases. The Rocky Mountain and Great Plains States generated smaller amounts. Ten states accounted for over half of the total releases and transfers. Facilities in Louisiana reported the largest amount of releases (12 percent of the national total) with those in Texas coming in a close second.

Regions at Risk All areas of the U.S. where hazardous materials facilities exist are at risk to this hazard. Jurisdictions with hazardous materials fabrication, processing, storage sites, hazardous waste treatment storage or disposal sites are at risk.

Season(s) Year round

Effects The designated chemicals cover a wide range of toxicity and many have minimal or no effects on humans in small doses. Further, release does not necessarily mean there was exposure to humans. In accordance with data maintained by the U.S. Coast Guard's National Response Center, there were 279 reports of hazardous material releases at fixed facilities which injured 537 people and killed 15 in 1990 (as of December 13). The 4-year annual averages are 280 for incidents, 637 for injuries and 24 for deaths.

Worst Event An incident, which included a release of radioactive material, occurred at the Kerr-McGee plant in Oklahoma in 1986, resulting in one death and the hospitalization of 100 people. In addition, 1,000 people were contaminated in Erwin, Tennessee, at a nuclear fuel plant in 1979.

Discussion The principal reporting of these incidents falls under the terms of the Emergency Planning and Right to Know Act of 1986 which requires reporting to the Environmental Protection Agency (EPA) releases of 308 specific chemicals in 20 chemical categories. This input serves as

the basis for the Toxics Release Inventory maintained by the EPA. The different types of releases include:

- emissions of gases or particles to the air;
- wastewater discharges into rivers and other bodies of water;
- solid waste disposal in on-site landfills;
- injection of wastes into underground wells;
- transfers of wastewaters to public sewage plants; and
- transfers of wastes to off-site facilities for treatment or storage.

Hazardous Materials Incident - Transportation

Definition Uncontrolled release of hazardous materials during transport

National Frequency There are an average of 6,646 hazardous materials transportation incidents reported each year in the United States. This has varied from a high of 10,025 in 1981 to a low of 5,758 in 1986. The number of incidents has risen each year since the 1986 low to 7,503 in 1989, the last year of record.

Regions at Risk Areas at risk would be along highways, rail lines, pipe lines, rivers and port areas. Because major highways run through virtually all local jurisdictions, every section of the country is at risk.

Season(s) There is no season for these incidents but, since highway-related incidents account for 83 percent of the total, factors such as weather conditions do influence the patterns of occurrence.

Effects An average of 13 deaths annually are attributed to hazardous materials transportation incidents. Annual economic damage is estimated at $19 million (1981-1989).

Worst Event Definitive data unavailable

Discussion There are a variety of Federal and State mechanisms for reporting incidents involving the transportation of hazardous materials. The major source of data related to interstate transportation incidents is the U.S. Department of Transportation (DOT). Data from this source for the years 1981 through 1989, shown in *Figure* 21, clearly indicate that the great majority of incidents occurred in highway transportation and that such incidents were responsible for the preponderance of resultant deaths and injuries.

(NOTE: DOT maintains hazardous materials transport incident data for IO-year periods; however, incident reporting requirements were changed in 1981 to exclude certain criteria that had been included in prior years. To avoid skewing the annual average rates by mixing reporting data criteria, the numbers cited above were calculated from the totals reported for the years of 1981 through 1989. These averages, based on only 9 years, provide more accurate, consistent risk assessment measurements than could be obtained by using a IO-year data base that includes figures on differing criteria for 1980.)

HAZARDOUS MATERIAL INCIDENTS BY TRANSPORTATION MODE (TOTALS, 1981 THRU 1989)

MODE OF TRANSPORTATION	NUMBER OF INCIDENTS	ASSOCIATED DEATHS	ASSOCIATED INJURIES
	1,177	0	127
	48,907	113	1,762
	8,620	0	611
	92	1	37
	926	0	36
	90	0	18
Totals	59,812	114	2,611

Figure 21

Power Failure

Definition Interruption or loss of electrical service for an extended period of time. An extended period of time would be long enough to require emergency management organization response to needs for food, water, heating, etc., caused by loss of power.

National Frequency Definitive data not available

Effects A summary of potential effects includes loss of power to hospital and medical care facilities which could cause life-threatening situations for patients because necessary medical care equipment would be inoperable (in the absence of working backup generators); massive traffic stoppages due to failures of traffic lights; spoilage of food; lack of heating/air conditioning for many residences/businesses; work interruptions since equipment cannot be used; curtailment of financial and commercial activity from the loss of major databases for security trading and credit checks; lack of potable water and polluted water because of inoperable water and sewage treatment facilities. The cost for repair to power systems and restoration of electricity as well as the economic and societal damage caused by a long-term blackout would be enormous. As an example, the 25-hour black out in New York City in 1977 cost approximately $345 million.

Worst Event On November 9, 1965, a power failure in an Ontario plant blacked out parts of eight northeastern States and two provinces of Canada. More recently, recovery efforts in South Carolina were seriously hampered by widespread loss of electric power following Hurricane Hugo in September 1989.

Discussion There are two classes of power failures: failures internal to the power distribution system such as occurred in New England in 1965 and failures from external causes such as severe storms.

The devastating effect on power systems by major natural disasters can cause widespread outages over a long period of restoration and recovery. Hurricanes affect distribution systems more than generation and transmission equipment with damage to power lines from falling trees, flooding and flying debris. Earthquakes can destroy both distribution systems and generation and transmission equipment. There is also a possible threat from geomagnetic storms arising from solar disturbances. A very strong geomagnetic storm on March 13, 1989

damaged voltage control equipment in Quebec, resulting in the collapse of nearly the entire system for a nine hour blackout. The same storm damaged several transformers in the United States, including a step-up unit at the Salem Nuclear Plant in New Jersey, which forced a six week shut down of the entire plant.

Besides the natural threats, there is the possibility of power failure from sabotage. In recent years, there have been attacks against electric utilities in West Virginia, Kentucky, Colorado, California, Arizona and Puerto Rico. While most utilities have the ability to recover quickly from isolated acts of vandalism, a sophisticated group, using information found in public sources, could make a coordinated, multi-site attack on community power production with devastating effect. The effort to replace damaged equipment could take months. Some of the largest transformers can take up to a year to manufacture and, weighing up to 500 tons, must rely on a small number of rail cars capable of transporting them to the site of power generation.

Radiological Incident - Fixed Facility

Definition

Uncontrolled release of radioactive material at a commercial nuclear power plant or other reactor facility

Regions at Risk

Areas at risk are normally designated as: (1) within the ***plume emergency planning zone*** of such facilities (jurisdictions located within a lo-mile radius of a nuclear power plant) or (2) within the ***ingestion emergency planning zone*** (jurisdictions within a 50-mile radius of a nuclear power plant). About 38 states are affected, in particular the eastern half of the contiguous 48 States and the West Coast States.

Season(s)

Year round

Effects

An incident could cause the release of radioactive materials into the atmosphere. Three dominant exposure modes to people have been identified: (a) whole body (bone marrow) exposure from external gamma radiation, (b) thyroid exposure from inhalation or ingestion of radioiodines and (c) exposure from ingestion of radioactive materials.

Worst Event

The nuclear power plant accident that occurred at the Three Mile Island Nuclear Power Plant in Pennsylvania on March 28, 1979, was the worst to date in the United States. While this incident caused no deaths, officials considered the possibility of evacuating 650,000 citizens within a 20-mile radius of the plant which is near Hariisburg.

Discussion

As a result of the incident at Three Mile Island, major changes were instituted in the regulation of the nuclear power industry. FEMA was given the responsibility for review and approval of State and local radiological emergency plans and preparedness for jurisdictions located near commercial nuclear power plants. ***Figure*** 22 shows the location of commercial nuclear reactor sites in the United States as of December 1989. ***Figure*** 23 depicts events that occurred at nuclear reactor facilities during the period 1985-1989.

COMMERCIAL NUCLEAR REACTOR SITES IN THE UNITED STATES - DECEMBER 1989

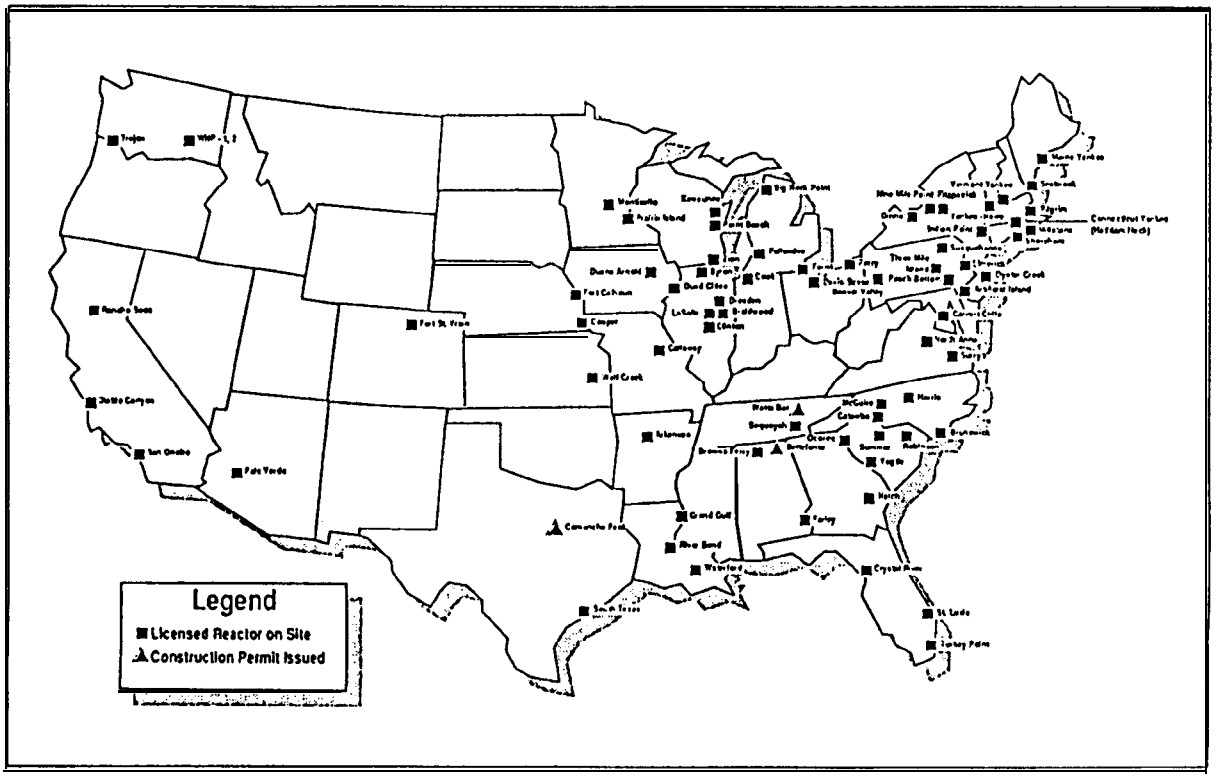

Figure 22

NUCLEAR REACTOR FACILITY EVENTS
1985-1989

Class of Event	Year 1985	1986	1987	1988	1989
Unusual Event	312	209	231	212	197
Alert	11	9	9	6	13
Site Area Emergency	0	0	0	1	0
General Emergency	0	0	0	0	0

Figure 23

Radiological Incident - Transportation

Definition

Any incident involving the shipment of radiological materials

These incidents were subsumed under the general Hazardous Materials -Transportation category previously discussed and are included in the same data base.