



## FREQUENTLY ASKED QUESTIONS (FAQS)

### Frequently Asked Questions About a Nuclear Blast

With the recent threats of terrorism, many people have expressed concern about the likelihood and effects of a nuclear blast. The Centers for Disease Control and Prevention (CDC) has developed this fact sheet to describe what happens when a nuclear blast occurs, the possible health effects, and what you can do to protect yourself in this type of emergency.

#### What is a nuclear blast?

A nuclear blast, produced by explosion of a nuclear bomb (sometimes called a nuclear detonation), involves the joining or splitting of atoms (called fusion and fission) to produce an intense pulse or wave of heat, light, air pressure, and radiation. The bombs dropped on Hiroshima and Nagasaki, Japan, at the end of World War II produced nuclear blasts.

When a nuclear device is exploded, a large fireball is created. Everything inside of this fireball vaporizes, including soil and water, and is carried upwards. This creates the mushroom cloud that we associate with a nuclear blast, detonation, or explosion. Radioactive material from the nuclear device mixes with the vaporized material in the mushroom cloud. As this vaporized radioactive material cools, it becomes condensed and forms particles, such as dust. The condensed radioactive material then falls back to the earth; this is what is known as fallout. Because fallout is in the form of particles, it can be carried long distances on wind currents and end up miles from the site of the explosion. Fallout is radioactive and can cause contamination of anything on which it lands, including food and water supplies.

#### What are the effects of a nuclear blast?

The effects on a person from a nuclear blast will depend on the size of the bomb and the distance the person is from the explosion. However, a nuclear blast would likely cause great destruction, death, and injury, and have a wide area of impact.

In a nuclear blast, injury or death may occur as a result of the blast itself or as a result of debris thrown from the blast. People may experience moderate to severe skin burns, depending on their distance from the blast site. Those who look directly at the blast could experience eye damage ranging from temporary blindness to severe burns on the retina. Individuals near the blast site would be exposed to high levels of radiation and could develop symptoms of radiation sickness (called acute radiation syndrome, or ARS [[www.bt.cdc.gov/radiation/ars.asp](http://www.bt.cdc.gov/radiation/ars.asp)]). While severe burns would appear in minutes, other health effects might take days or weeks to appear. These effects range from mild, such as skin reddening, to severe effects such as cancer and death, depending on the amount of radiation absorbed by the body (the dose), the type of radiation, the route of exposure, and the length of time of the exposure.

People may experience two types of exposure from radioactive materials from a nuclear blast: external exposure and internal exposure. External exposure would occur when people were exposed to radiation outside of their bodies from the blast or its fallout. Internal exposure would occur when people ate food or breathed air that was contaminated with radioactive fallout. Both internal and external exposure from fallout could occur miles away from the blast site. Exposure to very large doses of external radiation may cause death within a few days or months. External exposure to lower doses of radiation and internal exposure from breathing or eating food contaminated with radioactive fallout may lead to an increased risk of developing cancer and other health effects.

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### How can I protect my family and myself during a nuclear blast?

In the event of a nuclear blast, a national emergency response plan would be activated and would include federal, state, and local agencies. Following are some steps recommended by the World Health Organization if a nuclear blast occurs:

#### ***If you are near the blast when it occurs:***

- Turn away and close and cover your eyes to prevent damage to your sight.
- Drop to the ground face down and place your hands under your body.
- Remain flat until the heat and two shock waves have passed.

#### ***If you are outside when the blast occurs:***

- Find something to cover your mouth and nose, such as a scarf, handkerchief, or other cloth.
- Remove any dust from your clothes by brushing, shaking, and wiping in a ventilated area—however, cover your mouth and nose while you do this.
- Move to a shelter, basement, or other underground area, preferably located away from the direction that the wind is blowing.
- Remove clothing since it may be contaminated; if possible, take a shower, wash your hair, and change clothes before you enter the shelter.

#### ***If you are already in a shelter or basement:***

- Cover your mouth and nose with a face mask or other material (such as a scarf or handkerchief) until the fallout cloud has passed.
- Shut off ventilation systems and seal doors or windows until the fallout cloud has passed. However, after the fallout cloud has passed, unseal the doors and windows to allow some air circulation.
- Stay inside until authorities say it is safe to come out.
- Listen to the local radio or television for information and advice. Authorities may direct you to stay in your shelter or evacuate to a safer place away from the area.
- If you must go out, cover your mouth and nose with a damp towel.
- Use stored food and drinking water. Do not eat local fresh food or drink water from open water supplies.
- Clean and cover any open wounds on your body.

#### ***If you are advised to evacuate:***

- Listen to the radio or television for information about evacuation routes, temporary shelters, and procedures to follow.
- Before you leave, close and lock windows and doors and turn off air conditioning, vents, fans, and furnace. Close fireplace dampers.
- Take disaster supplies with you (such as a flashlight and extra batteries, battery-operated radio, first aid kit and manual, emergency food and water, nonelectric can opener, essential medicines, cash and credit cards, and sturdy shoes).
- Remember your neighbors may require special assistance, especially infants, elderly people, and people with disabilities.

### Is a nuclear bomb the same as a suitcase bomb?

The “suitcase” bombs that have been described in new stories in recent years are small nuclear bombs. A suitcase bomb would produce a nuclear blast that is very destructive, but not as great as a nuclear weapon developed for strategic military purposes.

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### Is a nuclear bomb the same as a dirty bomb?

A nuclear blast is different than a dirty bomb. A dirty bomb, or radiological dispersion device, is a bomb that uses conventional explosives such as dynamite to spread radioactive materials in the form of powder or pellets. It does not involve the splitting of atoms to produce the tremendous force and destruction of a nuclear blast, but rather spreads smaller amounts of radioactive material into the surrounding area. The main purpose of a dirty bomb is to frighten people and contaminate buildings or land with radioactive material.

### Would an airplane crash in a nuclear power plant have the same effect as a nuclear blast?

While a serious event such as a plane crash into a nuclear power plant could result in a release of radioactive material into the air, a nuclear power plant would not explode like a nuclear weapon. There may be a radiation danger in the surrounding areas, depending on the type of incident, the amount of radiation released, and the current weather patterns. However, radiation would be monitored to determine the potential danger, and people in the local area would be evacuated or advised on how to protect themselves.

### Do I need to take potassium iodide (KI) if there is a nuclear blast?

Local emergency management officials will tell people when to take KI. If a nuclear incident occurs, officials will have to find out which radioactive substances are present before recommending that people take KI. If radioactive iodine is not present, then taking KI will not protect people. If radioactive iodine is present, then taking KI will help protect a person's thyroid gland from the radioactive iodine. Taking KI will not protect people from other radioactive substances that may be present along with the radioactive iodine.

### Where can I get more information?

For more information about radiation and emergency response, see the Centers for Disease Control and Prevention's website at [www.bt.cdc.gov](http://www.bt.cdc.gov) or contact the following organizations:

- **CDC** at 800-CDC-INFO
- **World Health Organization**, Radiation and Environmental Health Unit at [www.who.int/ionizing\\_radiation/en](http://www.who.int/ionizing_radiation/en)
- **Conference of Radiation Control Program Directors** at [www.crcpd.org](http://www.crcpd.org) or 502-227-4543
- **Environmental Protection Agency (EPA)** at [www.epa.gov/radiation/rert](http://www.epa.gov/radiation/rert)
- **Nuclear Regulatory Commission** at [www.nrc.gov](http://www.nrc.gov) or 301-415-8200
- **Federal Emergency Management Agency (FEMA)** at [www.fema.gov](http://www.fema.gov) or 202-646-4600
- **Radiation Emergency Assistance Center/Training Site** at [www.orau.gov/reacts](http://www.orau.gov/reacts) or 865-576-3131
- **U.S. National Response Team** at [www.nrt.org](http://www.nrt.org)
- **U.S. Department of Energy (DOE)** at [www.energy.gov](http://www.energy.gov) or 1-800-DIAL-DOE

For more information, visit [www.bt.cdc.gov/radiation](http://www.bt.cdc.gov/radiation), or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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## FAQs

## Frequently Asked Questions about a Radiation Emergency

### What Is Radiation?

- Radiation is a form of energy that is present all around us.
- Different types of radiation exist, some of which have more energy than others.
- Amounts of radiation released into the environment are measured in units called **curies**. However, the dose of radiation that a person receives is measured in units called **rem**.

For more information on radiation measurement, see the CDC fact sheet "Radiation Measurement" at [www.bt.cdc.gov/radiation/measurement.asp](http://www.bt.cdc.gov/radiation/measurement.asp).

For more information about radiation check the following Web sites:

- U.S. Environmental Protection Agency: "Radiation" ([www.epa.gov/radiation](http://www.epa.gov/radiation))
- Radiation Emergency Assistance Center/Training Site of Oak Ridge Associated Universities: "Radiation Accident Management" ([www.ornl.gov/reacts/injury.htm](http://www.ornl.gov/reacts/injury.htm))

### How Can Exposure Occur?

- People are exposed to small amounts of radiation every day, both from naturally occurring sources (such as elements in the soil or cosmic rays from the sun), and man-made sources. Man-made sources include some electronic equipment (such as microwave ovens and television sets), medical sources (such as x-rays, certain diagnostic tests, and treatments), and from nuclear weapons testing.
- The amount of radiation from natural or man-made sources to which people are exposed is usually small; a radiation emergency (such as a nuclear power plant accident or a terrorist event) could expose people to small or large doses of radiation, depending on the situation.
- Scientists estimate that the average person in the United States receives a dose of about one-third of a rem per year. About 80% of human exposure comes from natural sources and the remaining 20% comes from man-made radiation sources – mainly medical x-rays.
- Contamination refers to particles of radioactive material that are deposited anywhere that they are not supposed to be, such as on an object or on a person's skin.
- Internal contamination refers to radioactive material that is taken into the body through breathing, eating, or drinking.
- Exposure occurs when radiation energy penetrates the body. For example, when a person has an x-ray, he or she is exposed to radiation.

For more information on contamination and exposure, see the CDC fact sheet "Radioactive Contamination and Radiation Exposure" at [www.bt.cdc.gov/radiation/contamination.asp](http://www.bt.cdc.gov/radiation/contamination.asp).

### What Happens When People Are Exposed to Radiation?

- Radiation can affect the body in a number of ways, and the adverse health effects of exposure may not be apparent for many years.

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- These adverse health effects can range from mild effects, such as skin reddening, to serious effects such as cancer and death, depending on the amount of radiation absorbed by the body (the dose), the type of radiation, the route of exposure, and the length of time a person was exposed.
- Exposure to very large doses of radiation may cause death within a few days or months.
- Exposure to lower doses of radiation may lead to an increased risk of developing cancer or other adverse health effects later in life.

For more information about health effects from radiation exposure, check the following Web sites:

- U.S. Environmental Protection Agency: "Radiation" ([www.epa.gov/radiation](http://www.epa.gov/radiation))
- Radiation Emergency Assistance Center/Training Site of Oak Ridge Associated Universities: "Radiation Accident Management" ([www.ornl.gov/reacts/injury.htm](http://www.ornl.gov/reacts/injury.htm))

## What Types of Terrorist Events Might Involve Radiation?

- Possible terrorist events could involve introducing radioactive material into the food or water supply, using explosives (like dynamite) to scatter radioactive materials (called a "dirty bomb" [see [www.bt.cdc.gov/radiation/dirtybombs.asp](http://www.bt.cdc.gov/radiation/dirtybombs.asp)]), bombing or destroying a nuclear facility, or exploding a small nuclear device.
- Although introducing radioactive material into the food or water supply most likely would cause great concern or fear, it probably would not cause much contamination or increase the danger of adverse health effects.
- Although a dirty bomb could cause serious injuries from the explosion, it most likely would not have enough radioactive material in a form that would cause serious radiation sickness among large numbers of people. However, people who were exposed to radiation scattered by the bomb could have a greater risk of developing cancer later in life, depending on their dose.
- A meltdown or explosion at a nuclear facility could cause a large amount of radioactive material to be released. People at the facility would probably be contaminated with radioactive material and possibly be injured if there was an explosion. Those people who received a large dose might develop acute radiation syndrome (see [www.bt.cdc.gov/radiation/ars.asp](http://www.bt.cdc.gov/radiation/ars.asp)). People in the surrounding area could be exposed or contaminated.
- Clearly, an exploded nuclear device could result in a lot of property damage. People would be killed or injured from the blast and might be contaminated by radioactive material. Many people could have symptoms of acute radiation syndrome. After a nuclear explosion, radioactive fallout would extend over a large region far from the point of impact, potentially increasing people's risk of developing cancer over time.

For more information about radiation terrorist events, see the CDC Radiation Emergencies website at [www.bt.cdc.gov/radiation](http://www.bt.cdc.gov/radiation) or check with the following organizations:

- Oak Ridge Radiation Emergency Assistance/Training Site ([www.ornl.gov/reacts](http://www.ornl.gov/reacts))
- U.S. National Response Team ([www.nrt.org](http://www.nrt.org))
- U.S. Department of Energy ([www.energy.gov](http://www.energy.gov))
- Nuclear Regulatory Commission ([www.nrc.gov](http://www.nrc.gov))
- U.S. Environmental Protection Agency ([www.epa.gov](http://www.epa.gov))

## What Preparations Can I Make for a Radiation Emergency?

- Your community should have a plan in place in case of a radiation emergency. Check with community leaders to learn more about the plan and possible evacuation routes.
- Check with your child's school, the nursing home of a family member, and your employer to see what their plans are for dealing with a radiation emergency.
- Develop your own family emergency plan so that every family member knows what to do.

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- At home, put together an emergency kit that would be appropriate for any emergency. The kit should include the following items:
  - A flashlight with extra batteries
  - A portable radio with extra batteries
  - Bottled water
  - Canned and packaged food
  - A hand-operated can opener
  - A first-aid kit and essential prescription medications
  - Personal items such as paper towels, garbage bags, and toilet paper

For more information about preparing for a radiation emergency event, check the following Web sites:

- Federal Emergency Management Agency ([www.fema.gov](http://www.fema.gov))
- American Red Cross: "Terrorism – Preparing for the Unexpected" ([www.redcross.org/services/disaster/0,1082,0\\_589\\_,00.html](http://www.redcross.org/services/disaster/0,1082,0_589_,00.html))
- U.S. Environmental Protection Agency's Office of Emergency Management ([www.epa.gov/swercepp](http://www.epa.gov/swercepp))

### How Can I Protect Myself During a Radiation Emergency?

- After a release of radioactive materials, local authorities will monitor the levels of radiation and determine what protective actions to take.
- The most appropriate action will depend on the situation. Tune to the local emergency response network or news station for information and instructions during any emergency.
- If a radiation emergency involves the release of large amounts of radioactive materials, you may be advised to "shelter in place," which means to stay in your home or office; or you may be advised to move to another location.
- If you are advised to shelter in place, you should do the following:
  - Close and lock all doors and windows.
  - Turn off fans, air conditioners, and forced-air heating units that bring in fresh air from the outside. Only use units to recirculate air that is already in the building.
  - Close fireplace dampers.
  - If possible, bring pets inside.
  - Move to an inner room or basement.
  - Keep your radio tuned to the emergency response network or local news to find out what else you need to do.
- If you are advised to evacuate, follow the directions that your local officials provide. Leave the area as quickly and orderly as possible. In addition –
  - Take a flashlight, portable radio, batteries, first-aid kit, supply of sealed food and water, hand-operated can opener, essential medicines, and cash and credit cards.
  - Take pets only if you are using your own vehicle and going to a place you know will accept animals. Emergency vehicles and shelters usually will not accept animals.

For more information about evacuation, see the CDC fact sheet "Facts About Evacuation During a Radiation Emergency" at [www.bt.cdc.gov/radiation/evacuation.asp](http://www.bt.cdc.gov/radiation/evacuation.asp).

For more information about sheltering, see the CDC fact sheet "Sheltering in Place During a Radiation Emergency" at [www.bt.cdc.gov/radiation/shelter.asp](http://www.bt.cdc.gov/radiation/shelter.asp) or the American Red Cross fact sheet "Shelter-in-Place" at [www.redcross.org/services/disaster/beprepared/shelterinplace.pdf](http://www.redcross.org/services/disaster/beprepared/shelterinplace.pdf).

For more information about emergency response, check the following Web sites:

- Federal Emergency Management Agency ([www.fema.gov](http://www.fema.gov))

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- American Red Cross: "Disaster Services"  
([www.redcross.org/services/disaster/0,1082,0\\_500\\_00.html](http://www.redcross.org/services/disaster/0,1082,0_500_00.html))
- U.S. Environmental Protection Agency's Office of Emergency Management  
([www.epa.gov/swercepp](http://www.epa.gov/swercepp))

### Should I Take Potassium Iodide During a Radiation Emergency?

- Potassium iodide (KI) should only be taken in a radiation emergency that involves the release of radioactive iodine, such as an accident at a nuclear power plant or the explosion of a nuclear bomb. A "dirty bomb" most likely will not contain radioactive iodine.
- A person who is internally contaminated with radioactive iodine may experience thyroid disease later in life. The thyroid gland will absorb radioactive iodine and may develop cancer or abnormal growths later on. KI will saturate the thyroid gland with iodine, decreasing the amount of harmful radioactive iodine that can be absorbed.
- KI only protects the thyroid gland and does not provide protection from any other radiation exposure.
- Some people are allergic to iodine and should not take KI. Check with your doctor about any concerns you have about potassium iodide.

For more information about KI, see the CDC fact sheet "Potassium Iodide (KI)" at [www.bt.cdc.gov/radiation/ki.asp](http://www.bt.cdc.gov/radiation/ki.asp) or check the following Web sites:

- U.S. Food and Drug Administration: "Frequently Asked Questions on Potassium Iodide (KI)"  
([www.fda.gov/cder/drugprepare/KI\\_Q&A.htm](http://www.fda.gov/cder/drugprepare/KI_Q&A.htm))
- U.S. Food and Drug Administration: "Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies" ([www.fda.gov/cder/guidance/4825fnl.htm](http://www.fda.gov/cder/guidance/4825fnl.htm))

For more information, visit [www.bt.cdc.gov/radiation](http://www.bt.cdc.gov/radiation),  
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).



## FREQUENTLY ASKED QUESTIONS (FAQS)

### Dirty Bombs

People have expressed concern about dirty bombs and what they should do to protect themselves if a dirty bomb incident occurs. Because your health and safety are our highest priorities, the health experts at the Centers for Disease Control and Prevention (CDC) have prepared the following list of frequently asked questions and answers about dirty bombs.

#### What is a dirty bomb?

A dirty bomb is a mix of explosives, such as dynamite, with radioactive powder or pellets. When the dynamite or other explosives are set off, the blast carries radioactive material into the surrounding area.

#### **A dirty bomb is *not* the same as an atomic bomb**

An atomic bomb, like those bombs dropped on Hiroshima and Nagasaki, involves the splitting of atoms and a huge release of energy that produces the atomic mushroom cloud.

A dirty bomb works completely differently and *cannot create an atomic blast*. Instead, a dirty bomb uses dynamite or other explosives to scatter radioactive dust, smoke, or other material in order to cause radioactive contamination.

#### What are the main dangers of a dirty bomb?

The main danger from a dirty bomb is from the explosion, which can cause serious injuries and property damage. The radioactive materials used in a dirty bomb would probably not create enough radiation exposure to cause immediate serious illness, except to those people who are very close to the blast site. However, the radioactive dust and smoke spread farther away could be dangerous to health if it is inhaled. Because people cannot see, smell, feel, or taste radiation, you should take immediate steps to protect yourself and your loved ones.

#### What immediate actions should I take to protect myself?

These simple steps—recommended by doctors and radiation experts—will help protect you and your loved ones. The steps you should take depend on where you are located when the incident occurs: outside, inside, or in a vehicle.

#### **If you are outside and close to the incident**

- Cover your nose and mouth with a cloth to reduce the risk of breathing in radioactive dust or smoke.
- Don't touch objects thrown off by an explosion—they might be radioactive.
- Quickly go into a building where the walls and windows have not been broken. This area will shield you from radiation that might be outside.
- Once you are inside, take off your outer layer of clothing and seal it in a plastic bag if available. Put the cloth you used to cover your mouth in the bag, too. Removing outer clothes may get rid of up to 90% of radioactive dust.
- Put the plastic bag where others will not touch it and keep it until authorities tell you what to do with it.



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- Shower or wash with soap and water. Be sure to wash your hair. Washing will remove any remaining dust.
- Tune to the local radio or television news for more instructions.

### If you are inside and close to the incident

- If the walls and windows of the building are not broken, stay in the building and do not leave.
  - To keep radioactive dust or powder from getting inside, shut all windows, outside doors, and fireplace dampers. Turn off fans and heating and air-conditioning systems that bring in air from the outside. It is not necessary to put duct tape or plastic around doors or windows.
  - If the walls and windows of the building are broken, go to an interior room and do not leave. If the building has been heavily damaged, quickly go into a building where the walls and windows have not been broken. If you must go outside, be sure to cover your nose and mouth with a cloth. Once you are inside, take off your outer layer of clothing and seal it in a plastic bag if available. Store the bag where others will not touch it.
  - Shower or wash with soap and water, removing any remaining dust. Be sure to wash your hair.
  - Tune to local radio or television news for more instructions.
- **If you are in a car when the incident happens**
    - Close the windows and turn off the air conditioner, heater, and vents.
    - Cover your nose and mouth with a cloth to avoid breathing radioactive dust or smoke.
    - If you are close to your home, office, or a public building, go there immediately and go inside quickly.
    - If you cannot get to your home or another building safely, pull over to the side of the road and stop in the safest place possible. If it is a hot or sunny day, try to stop under a bridge or in a shady spot.
    - Turn off the engine and listen to the radio for instructions.
    - Stay in the car until you are told it is safe to get back on the road.

### What should I do about my children and family?

- If your children or family are with you, stay together. Take the same actions to protect your whole family.
- If your children or family are in another home or building, they should stay there until you are told it is safe to travel.
- Schools have emergency plans and shelters. If your children are at school, they should stay there until it is safe to travel. Do not go to the school until public officials say it is safe to travel.

### How do I protect my pets?

- If you have pets outside, bring them inside if it can be done safely.
- Wash your pets with soap and water to remove any radioactive dust.

### Should I take potassium iodide?

- Potassium iodide, also called KI, only protects a person's thyroid gland from exposure to radioactive iodine. KI will not protect a person from other radioactive materials or protect other parts of the body from exposure to radiation.
- Since there is no way to know at the time of the explosion whether radioactive iodine was used in the explosive device, taking KI would probably not be beneficial. Also, KI can be dangerous to some people.

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### Will food and water supplies be safe?

- Food and water supplies most likely will remain safe. However, any unpackaged food or water that was out in the open and close to the incident may have radioactive dust on it. Therefore, do not consume water or food that was out in the open.
- The food inside of cans and other sealed containers will be safe to eat. Wash the outside of the container before opening it.
- Authorities will monitor food and water quality for safety and keep the public informed.

### How do I know if I've been exposed to radiation or contaminated by radioactive materials?

- People cannot see, smell, feel, or taste radiation; so you may not know whether you have been exposed. Police or firefighters will quickly check for radiation by using special equipment to determine how much radiation is present and whether it poses any danger in your area.
- Low levels of radiation exposure (like those expected from a dirty bomb situation) do not cause any symptoms. Higher levels of radiation exposure may produce symptoms, such as nausea, vomiting, diarrhea, and swelling and redness of the skin.
- If you develop any of these symptoms, you should contact your doctor, hospital, or other sites recommended by authorities.

### Where do I go for more information?

- For more information about dirty bombs, radiation, and health, contact:
  - The Conference of Radiation Control Program Directors (CRCPD) <http://www.crcpd.org> (502) 227-4543
  - The U.S. Environmental Protection Agency (EPA) <http://www.epa.gov/radiation/rert/>
  - The Nuclear Regulatory Commission (NRC) <http://www.nrc.gov/> (301) 415-8200
  - The Federal Emergency Management Agency (FEMA) <http://www.fema.gov/> (202) 646-4600
  - The Radiation Emergency Assistance Center/Training Site (REAC/TS) <http://www.orau.gov/reacts/> (865) 576-3131
  - The U.S. National Response Team (NRT) <http://www.nrt.org/>
  - The U.S. Department of Energy (DOE) <http://www.energy.gov/engine/content.do> 1-800-dial-DOE

For more information, visit [www.bt.cdc.gov/radiation](http://www.bt.cdc.gov/radiation), or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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