Radiological Accidents

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Radiation is energy in the form of waves or particles and is part of our everyday lives. Our planet receives radiation from outer space and from the sun. Other naturally occurring radioactive materials are present in the soil, in the structures where we live, and in the food and water we consume. These natural forms of radiation are referred to as "background radiation."

Radioactive materials also are a source of fuel for nuclear power plants. While the history of such plants in the United States has been generally safe, residents living near power plants should know what preparations and responses are appropriate to take in the event of a radiological accident. In addition to the information in this section, also refer to the General Family Preparedness section.

Radiation Types

The three basic forms of radiation are:

1. Alpha particles can be stopped by a single sheet of paper or a few layers of dead skin. Therefore, alpha radiation is not an external hazard. However, if the source of radiation is within the body, it is the most serious hazard, because of alpha radiation's greater biological effects on live tissue.

2. Beta particles can be stopped by a few layers of clothing, 10 feet of air or a half-inch of tissue. If beta particles are retained in the skin, they can damage living cells by causing severe skin or eye burns. They also can damage cells in the digestive tract if particles are ingested with food or water.

3. Gamma rays are similar to x-rays and are the major radiation of concern in radiological environments. Gamma rays are deeply penetrating and can damage body cells. Although all cells are subject to damage, bone marrow cells and cells in the intestinal lining seem to be particularly sensitive. Gamma rays can be shielded to acceptable levels by sufficient amounts of materials.

Radioactive materials can be released in the form of particles or gases. Both are spread by the wind. The farther the particles travel, the lower the concentration of radioactive material. Contamination is an undesired presence of radioactive materials. In an accident that releases radiation into the environment, people, farm equipment, animals, crops and the soil can become contaminated. In addition to the following procedures, homeowners and agricultural producers also should refer to the section on General Family Preparedness.

Preparing for a Nuclear Power Plant Accident

1. If you live near a power plant, familiarize yourself with the terms used to describe a nuclear emergency.

   Notification of unusual event means a small problem has occurred at the plant. No radiation leak is expected. No action is necessary on your part.

   Alert means a small problem has occurred and small amounts of radiation could leak inside the plant. You should not have to do anything.

   A site area emergency is a more serious problem. Small amounts of radiation could leak from the plant. Area sirens may be sounded. Listen to your radio or television for safety information. A general emergency is the most serious problem. Radiation could leak outside the plant and off the plant site. The sirens will sound. Tune to your local radio or television station. Be prepared to follow state and county officials instructions.

2. Learn your community's warning system. Nuclear power plants are required to install sirens and other warning systems to cover a ten-mile area around the plant.

3. Obtain public emergency information materials from the company that operates your local nuclear power plant or from your local emergency services office.

What to Do in a Nuclear Power Plant Emergency

1. Keep calm. Not all incidents result in the release of radiation.

2. Stay tuned to local radio or television. Specific instructions will be given by authorities. Local instructions should take precedence over any advice given in this handbook.

3. Evacuate if you are advised to do so. See the section on Evacuation Procedures in the General Family Preparedness section. Keep car windows and vents closed; use recirculated air.

4. If you are not advised to evacuate, remain indoors.

   Close doors and windows.

   Turn off the air conditioner, ventilation fans, furnace and other air intakes.

   Go to a basement or other underground area if possible. If you must go outdoors, cover your nose and mouth with a handkerchief.

5. Do not use the telephone unless absolutely necessary. All lines will be needed for emergency calls.

6. If you have just been outdoors, take a thorough shower.

   Change your clothes and shoes.

   Put the items you were wearing in a plastic bag.

   Seal the bag and store it out of the way.

   Clothes can later be washed as you normally would in the washing machine. Any contamination would remain in the water and not contaminate the washing machine.

7. Put food in covered containers or in the refrigerator. Food not previously in covered containers should be washed first.

Safety of Home Gardens After a Nuclear Accident

1. Test homegrown produce for radioactive contamination before it is consumed.

2. If you work outside make sure you:

   Wash hands thoroughly before eating.

   Wear protective clothing that covers all portions of your body while outside. Remove outer clothing before you go inside.

   Wear a dust mask or a folded, damp cloth over your nose and mouth while you work.

   Avoid dust-producing activities as much as possible.

Recovering Losses and Expenses from a Nuclear Accident

1. Nuclear power station operators are required to have insurance to cover damages suffered by the public. Additional living expenses, loss of farm or business income, and physical or property damage are covered.

2. The Federal Emergency Management Agency also may provide funds for temporary housing and home repair, as well as other types of assistance. See the section on General Family Preparedness for post-disaster assistance information.

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

What to Do in a Nuclear Power Plant Emergency

1. Shelter livestock and give them stored feed if advised to do so by authorities.

   Some farm buildings provide better protection than others because of heavy construction. Placing earth, hay, sacked feed or fertilizer, concrete blocks or other materials around exposed shelter walls will increase shielding effectiveness.

   Make sure that adequate ventilation is provided. If you must use a fan, set it on a low speed to avoid bringing in air from the outside.

Give adequate space to more valuable animals rather than providing shelter for all animals and risking losses from overcrowding.

Natural shelters such as caves, ravines, forests and wood lots offer some protection.

Cattle could be penned in cattle underpasses or bridges if available. Cattle confined in pens shelter each other to a limited extent. Move dairy cattle and goats indoors first because radioactive material easily transfers to milk.

2. Do not add water to covered storage unless it is from a protected source.

3. Protect standing water by covering the surface at the outset of an emergency.

4. Cover feed to protect it from falling particles. Protect haystacks in an open field with tarpaulins, plastic sheets or similar coverings.

5. Poultry are somewhat more resistant to radiation than other farm animals.

Confined shelters and use of stored feed also lower concern of contamination.

The same feed, water and shelter ventilation measures taken for livestock should be followed to reduce the likelihood of contaminated egg and poultry products.

6. Swine care should follow the steps taken with other livestock. Water is a primary necessity for hogs, so make sure the source is protected.

Animal Care After a Nuclear Accident

1. Limit the use of feeds to those under cover or protected from contamination.

Grain in permanent indoor storage, hay in a barn and silage in a covered silo may be considered protected.

Rolled bales of hay should be used only when absolutely necessary, and only if the outer layers are removed and discarded.

Do not let animals graze until you are notified that forage in your area is safe.

If grazing cannot be avoided, supplementing it with protected feed will limit ingested contamination.

If no stored feed is available, animals can survive on water for a period.

Make a special effort to prevent dairy animals from becoming contaminated by providing clean food and water.

If possible, prevent cattle from drinking from ponds, lakes, rivers and streams. Spring and well water should be free of contamination.

2. If you have been evacuated and your absence is longer than the protected feed sources will last, emergency officials may allow you to reenter the area.

You must conform to rules regarding emergency workers, including the use of protective equipment and instrumentation and limitation of stay.

3. It is unlikely that even a worst case event would cause the death of any animals.

Any unexplained illness or death would more likely be the result of changes in routines of livestock feeding and patterns of grazing.

In the event of death or illness of an animal contact your State Department of Agriculture or Extension agent immediately to assist in diagnosis of the problem.

4. Soap and water will remove contamination from animal hides.

5. Wear protective clothing similar to that used in pesticide application.

Recovering Exposed Fruits, Vegetables and Soils

1. Fruit and vegetables may be externally contaminated by radioactive particles.

Normal washing of leaves, pods and fruits that are surface contaminated is effective in removing contamination.

Washing should be done in a place other than the kitchen to prevent contamination of foods and dishes.

2. Underground crops absorb little radiation. Standard washing is sufficient for these foods.

3. Most land should be ready for normal agricultural use several weeks after the incident.

Officials can monitor and sample your land, advising you when it is appropriate to return to it.

If soil is highly contaminated, removal and disposal may be necessary.

Planting alternative crops such as cotton or flax instead of food crops may be recommended in some situations.

Deep plowing will remove radioactive substances below the plant root level and prevent plants from taking up contaminated substances.

Monitoring Fish and Marine Life

1.Fish and marine life in ponds may be harvested unless officials determine they are contaminated.

2.Samples of water, fish and marine life from open bodies of fresh and saltwater should be analyzed for contamination.

Marketing Animals and Products

1. A buffer zone, called a Food Control Area, will be established around land which may be contaminated.

2. State emergency officials will monitor milk on farms and at points on its way to market.

You will be notified if sampled milk contains radioactive materials.

Milk should be safe if it is from dairy animals that have been adequately sheltered and protected. There may be delays in milk pickups which will require holding milk for longer periods of time. Be prepared to provide alternate storage or some milk may have to be discarded.

3. Do not destroy animal foods unless storage has made them inedible.

4. Livestock that have been exposed to external contamination can be used for food if they have been washed well and monitored by authorities prior to slaughter. Meat animals that have internal contamination cannot be slaughtered until officials advise that it is safe to do so.

Information in this document was compiled by the Texas Agricultural Extension Service and Hazard Reduction and Recovery Center