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Agriculture and Nuclear Power In South Carolina

Emergency Information
For Farmers

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STATE DOCUMENTS

Developed by

**S.C. Emergency Preparedness Division
Office of the Adjutant General**

and

**Clemson University
College of Agricultural Sciences
Cooperative Extension Service**

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Introduction

Nuclear reactor operations began early in South Carolina with the Savannah River Site in 1953.

Since that time, Carolina Power & Light Company, Duke Power Company and South Carolina Electric & Gas Company have built nuclear power generating plants in the state. These are the H.B. Robinson Plant near Hartsville, the Oconee Plant near Seneca, the Catawba Plant near Rock Hill and the V.C. Summer Plant near Jenkinsville. Also considering Charleston's Nuclear Submarine Base, the nearby Vogtle Plant in Georgia and the nearby Brunswick and McGuire plants in North Carolina, it becomes obvious that South Carolina is very much involved in the nuclear power age.

The nuclear industry in the United States, both commercial and military, has proven to be a safe industry.

Other than the accident at Three Mile Island in Pennsylvania in 1979, the record in the United States shows no occurrence that would have affected the public's safety. Many worthwhile lessons were learned from Three Mile Island. This brochure is a by-product of the lessons learned. The information provided is directed to both the farm and the agricultural communities in the event of a nuclear emergency.

Agriculture and Nuclear Power

This brochure provides general information for farmers and livestock owners about protective action for farm animals and commodities, and what should be done if a nuclear emergency occurs. This information supplements other emergency procedures and details provided to South Carolina citizens living near nuclear plants. The public will be informed by state and local officials through the Emergency Broadcast System and local news stations about actions necessary to ensure protection.

In the event of an emergency that may affect farming, instructions specific to farmers' needs will be issued. This brochure provides an explanation of the actions you may be advised to take to protect the quality and marketability of your farm's production. Detailed, specific information for protection of farm animals and commodities is available at the Clemson University Extension office located in your county.

Nuclear reactors are integral in the United States as part of the process for production of electricity. Major contamination of the agricultural community downwind from a nuclear plant appears to be unlikely. Although unlikely, an accident may occur which requires individuals to take some or all of the actions described in this brochure.

General Considerations

In the event a nuclear emergency should occur, advance planning will help you to take effective protective action quickly. The following information is important:

- Protective actions taken after a warning but prior to the arrival of radioactive contamination will be extremely important.
- The greatest potential source of radioactive contamination will be airborne. Therefore, the greatest hazards will be from breathing radioactive particles and consuming them.
- Protective care relating to the shelter and feeding of livestock will provide the greatest potential for reducing injury or contamination.
- Little protection can be given to an unharvested crop in the field.
- Most harvested crops probably will not be contaminated if they are stored in enclosed facilities.
- Emergency procedures exist to provide warnings of approaching radioactive contamination. Prior to its arrival, officials will call for protective actions. Should contamination occur, procedures also exist to monitor contaminated animals or commodities, to provide for safe re-entry into contaminated areas, and to remove contamination from affected food products.

Specific Procedures

To prepare for a specific action, you should inventory facilities and needs. If you are warned that a nuclear emergency exists, do the following:

1. Follow instructions given over the Emergency Broadcast System.
2. Shelter all farm animals, especially dairy cattle and valuable breeding stock, and use stored feed and protected water. Protected self-feeders and automatic livestock waterers are the most effective.
3. Take feed into the buildings or cover it if outdoors. Feed stored in buildings will be protected from contamination. Keep radioactive particles out of other feed by covering the feed with plastic or canvas.
4. Shelter as much livestock as possible. Cover wells and open water tanks.

Supporting Information

Livestock Shelter

In the event of radioactive fallout, farm buildings can be adapted for use as shelters for livestock. Some buildings offer greater protection than others, depending on their construction and shielding mass. Placing earth, hay, sacked feed or fertilizer, concrete blocks, or other materials over and around exposed walls of shelters will increase their shielding effectiveness.

A primary limiting factor in sheltering animals is ventilation. Avoid using fans for ventilation; if you must use fans, set them on low speed. It is better to give adequate space to the best animals than to try to provide shelter for all animals and lose some from overcrowding.



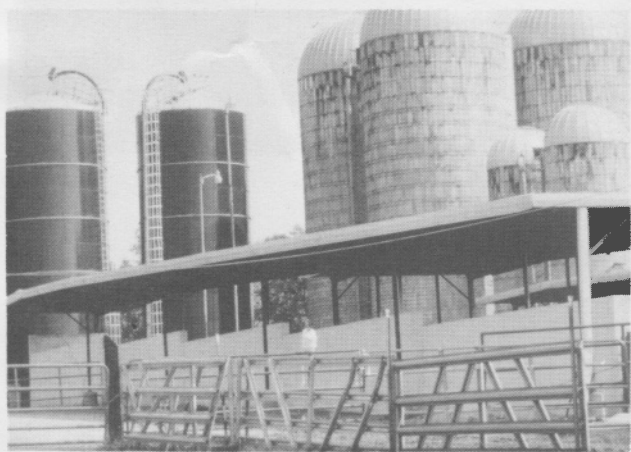
Livestock Feed and Water

Feed and water should be protected from contamination. Animals that ingest fallout particles will be exposed to internal radiation.

Safe water will be the animals' most crucial need -- even more important than feed. Because you may be advised not to return and care for livestock during a period of heavy contamination, provide an emergency water supply in protected areas. Other water supplies should be protected from contamination. Standing, open water will receive the most contamination.

Feed stored in buildings will be protected from contaminant particles. Other feed can be protected before contamination arrives by covering it with plastic sheeting or canvas.

Most livestock can survive for extended periods on limited rations. To conserve protected feed supplies, animals may be kept in shelters for a few days with reduced feed. If sheltered space is unavailable for all animals, feed from uncontaminated sources will reduce their consumption of contaminated pasture feed.



Minimum Rations

Animals can survive on these minimum rations for several months:

| Animal | Water/Day | Feed/Day | Space/Animal (sq. ft.) | |
|--------------------------|--------------------------------|-------------------------|---------------------------|-----------------|
| | | | 24-36 Hrs. | Ext. Periods |
| Pregnant beef cow | 7 gal summer 6 gal winter | 10-15 lbs legume hay | 20 | 35 |
| Beef cow with calf | 9 gal summer 8 gal winter | 12-18 lbs legume hay | 40 | 70 |
| Beef calf, 400 lbs | 6 gal summer 4 gal winter | 8-12 lbs legume hay | 15 | 25 |
| Brood sow with litter | 4 gal summer 3 gal winter | 8 lbs grain | 30 | 35 |
| Pregnant brood sow | 1-2 gal summer 1 gal winter | 2 lbs grain | 14 | 18 |
| 150 lb gilt or boar | 1 gal | 3 lbs grain | 5 | 8 |
| Ewe | 2-3 gal | 3 lbs hay | 8 | 12 |
| Dairy cow | 9 gal summer 7.5 gal winter | 10-18 lbs hay | 20 | 35 |
| Laying hens | 5 gal/100 birds | 17 lbs/100birds | 0.5 | 0.6 |
| Broilers | 5 gal/100 birds | 10 lbs/100 birds | 0.3 | 0.4 |
| Turkeys | 12 gal/100 birds | 40 lbs/100 birds | 2 | 4 |

Dairy Cattle

Radioactive materials can be transferred to milk, which will be the food product needing most control following an emergency. Milking cows should be given preferred shelter and clean feed and water. The milk and milk products from dairy animals will be an acceptable source of human food if cows are adequately sheltered and fed stored rations during a period of radioactive contamination.

Remember that any shelter is better than none and that animals need adequate space and ventilation. Plan to give the most valuable animals the best shelter and care.

Beef Cattle

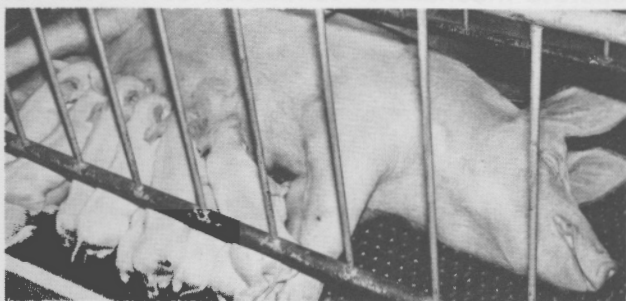
Although it is difficult to protect animals in open pastures from radioactive exposure, several procedures may help reduce contamination.

Natural shelters afford some protection. Caves, ravines, forests, and wood lots also offer some protection. You may have access to cattle underpasses or bridges where cattle could be penned. Cattle confined in pens shield each other to a limited extent.

Cattle should be restrained from grazing on contaminated pastures. If possible, feed them protected stacked hay, silage from a silo or trench, or stored grain. Where grazing cannot be avoided, supplementing with protected feed will limit the amount of contaminated forage cattle will ingest from pastures.

To the extent possible, prevent cattle from drinking from ponds, lakes, rivers, and streams. Water from covered sources such as springs and wells will be essentially free of contamination.

To the extent that farm buildings are available, these will provide the greatest protection. The most valuable breeding stock should receive priority care and shelter.



Swine

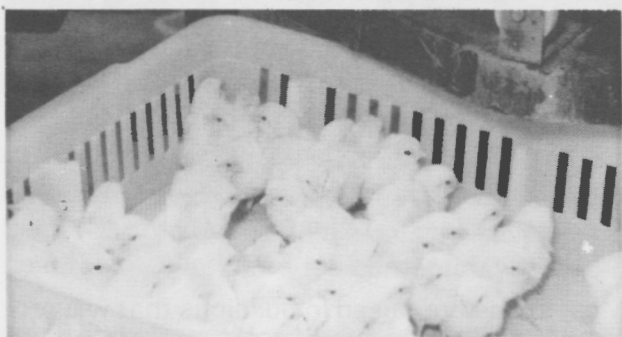
Most swine are raised in buildings that will provide some protection from radioactive contamination. Generally, the larger, heavier constructed buildings will provide the best protection. Foundation breeding stock and/or the most productive breeding stock should be given the best shelter and care.

Adequate space is important. Water is vital to hogs. Make sure it comes from sources which have been protected. Stored feed will usually have adequate shielding from contamination. Swine feed is customarily stored in the complete ration form. This supply should be exhausted before switching to grain only. Grain rations are indicated in the minimum requirements table on page 9.

Use fresh water for flushing. Use lagoon water only in emergency for flushing under slats.

Poultry

Poultry products, particularly eggs, are important food sources needing protection. Although poultry can endure higher doses of radiation than most other animals, the feed and water they consume must be protected from radiation. Confinement housing will provide protection for birds, feed and water. If possible, avoid using natural ventilation. Close curtains and operate mechanical ventilation at the lowest level possible.



Land and Crops

Contaminated soil will not be of immediate concern, but proper management procedures could do a great deal to reduce potential problems. Farm workers may be unable to manage and cultivate land for a time. It is anticipated that most land could be returned to normal use within several weeks after having been contaminated, depending upon the amount and type of radiation deposited in an area.

For contaminated grains, protective action probably never will be needed. If protective action is required, it should include milling and polishing. Time from harvest to consumption also will be an important factor. In many cases, this takes several months.

Fruits and Vegetables

When growing fruits and vegetables are exposed to concentrations of radioactive particles, they can become externally contaminated. Leaves, pods and fruits can be cleaned before being eaten. Washing is probably the most effective measure, just as it is the best way to clean garden foods that get dirty from other causes. Cleaning operations should be performed away from the kitchen and food storage areas. Protective gloves should be used during washing.



Roots and tubers can absorb a small amount of contamination. The normal cleaning or peeling of underground vegetables such as potatoes or carrots will be adequate for removing contamination.

Fruits and vegetables which are grown on heavily contaminated soil could absorb radioactive elements. However, the level of contamination from a nuclear reactor emergency is not likely to cause this to occur.

Fruits ripe at the time of a nuclear emergency may be lost because of the personal hazard caused by contamination involved in harvesting them. Fruits that do not have to be picked immediately can be saved and picked after the contamination has decayed to a safe level.



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Honey Bees

In the event of a nuclear emergency, honey bees will be provided some protection from radioactive contamination because they are kept in hive boxes. Foraging bees will be lost to radioactive contamination



if a disaster occurs during sunlight hours. At night, bees are concentrated in the hive.

Beekeepers should prevent bees from foraging nectar and pollen on contaminated plants following a nuclear emergency. Continued foraging would likely contaminate all bees in the hive and the honey being produced. Feed uncontaminated sugar water or honey and pollen to maintain bees.

If advanced warning is given, beekeepers should provide additional shelter for honey bees to reduce exposure to radioactive contamination. Accomplish this by placing hives in dense vegetation, barns or garages. During winter, bee hives may be stored underground or in caves for several days without harm to the bees. A limiting factor in storing bees underground in spring, summer and fall is excess waste build-up inside the hive, which is detrimental to a colony.

Radioactive contaminated honey should be disposed of carefully. This is necessary to keep contaminated honey from being utilized for human consumption and also as food for bees.



Summary

- Upon warning, take protective action.
- Monitor the Emergency Broadcast System.
- Shelter livestock to protect it.
- Use protected sources of water.
- Cover feeds stored outside with plastic before contamination arrives.
- Remember that enclosed storage provides protection for harvested crops and feeds.
- Wash contaminated fruits and vegetables before eating or shipping them.
- Keep in mind that unharvested crops usually cannot be protected.
- Contact your Clemson Cooperative Extension Service agent for more information.

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