Radiological Information for Farmers, Growers and Food Producers

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Introduction

This information is intended to help farmers better understand the effects of radioactive contamination on plants, soil, water and animals, and the basic needs and care of animals should a radiological accident that occur at Peach Bottom Atomic Power Station. The Ingestion Exposure Zone is approximately a 50-mile radius around the nuclear plant. When radioactive material is released as a result of an accident or incident, it may contaminate food and water. The information contained within this pamphlet applies to Howard County because it falls within the 50-mile ingestion pathway zone of Peach Bottom Atomic Power Station.

In the event of an emergency, your first concern should be ensuring the safety of you and your family. State and local officials using Emergency Alert and Warning Systems will notify the public of necessary protective steps. If the accident is of such severity that it will also affect farming in your area, instructions for farmers will be issued through effective notification channels. This information will provide you with an explanation of the actions that you may be advised to take to protect farm animals and farm products.

Comprehensive emergency plans have been prepared cooperatively by local government and state emergency management officials to advise you on protective measures should the need arise. For the agricultural industry, plans have been made to include a 50-mile zone from the plant, with the emphasis on protecting dairy products and crops. Teams of trained personnel have been organized to implement emergency procedures and assist all residents during an emergency. See Appendix 2 for a listing of local governments within 50 miles of Peach Bottom Atomic Power Station.

In an Emergency, Who Will Provide Advice?

This information provides general advice as to precautions, preparations and actions you can take. However, in a radiological ingestion exposure emergency, the Howard County Health Department in cooperation with the County's Public Information Office and other state agencies will monitor and broadcast radiation levels, dangers and recommended actions based on information gathered by radiation monitoring teams. Federal and State agencies will conduct damage assessments in potentially affected areas and will inform farmers, growers and producers of any actions, which should be undertaken. The general public will receive this information through Emergency Alert and Warning Systems.

Protecting Your Farm

You may be asked to shelter your farm animals and give them protected feed and water. This will help prevent contamination from harming your animals, and from later entering the human food supply.

Checking for contamination at home gardens and small-scale farms may not begin for weeks after the emergency. Homegrown produce should be tested for radioactive contamination before it is consumed. Home gardeners and small-scale farmers should wait for a field monitoring team to help them, or for

further instructions from local and state agriculture and health agencies.

Sheltering Animals

If you are advised to shelter animals, remove them from pasture and house them in a farm building. You may not have enough shelter available for all of your animals, so priority should be given to your most valuable livestock. State and local emergency response agencies will provide advice for decontaminating farm animals.

Possible livestock shelters:

- Barns
- Milking parlors
- Machine sheds
- Garages
- Corncribs
- Poultry buildings
- Swine buildings

Giving Animals Protected Feed

You may be advised to place animals on protected feed and water that have not been stored in the open or exposed to radioactive contamination. Types of protected feed include:

- Grain stored in protective bins
- Hay stored in a barn or covered shed
- Ensilage stored in a covered silo
- Hay bales covered by a tarp or barrier plastic or bales with the outer layers discarded

Giving Animals Protected Water

Even if you have no protected feed during a radiological emergency, animals can live for several days on water alone. Water from enclosed wells or other covered or underground sources will normally be safe for livestock. It is unlikely these water supplies will be affected.

Water from a covered well, tank, cistern or from a freely running spring is best. To prevent contamination from radioactive particles, do not add water to covered tanks unless the water is from a protected well or spring. Use all the water originally present in the tanks first.

Open water troughs should be drained, rinsed and refilled after notification that radioactive materials have settled to the ground. The same procedure should be followed after windy weather spreads dust in the area.

Protecting Water Sources

Open sources of water, such as rain barrels and tanks should be covered to prevent contamination. State and local health experts will check open sources of water and tell you whether they are safe.

Filler pipes should be disconnected from storage containers supplied by runoff from roofs or other surface drain fields. This will help prevent contamination from entering the storage containers.

Intake valves on water systems should be closed when you suspect the water source may be contaminated. This will prevent distribution or irrigation until the water source is tested and found to

be safe.

Protection from Contaminated Soil
If state officials find that the soil is contaminated above established safety levels, proper soil management procedures can reduce contamination to safe levels. Idling – the non-use of land for a specific period of time – may be necessary. In situations involving highly contaminated soil, removal and disposal of the soil may be more appropriate.

Growing alternative non-food crops may also be recommended in some situations.

Deep-plowing the soil can move radioactive substances below the plant root level, prevent plants from taking up contaminated nutrients, and allow the level of radioactivity to decrease with the passage of time.

Protecting Your Crops

The following specific actions may be advised to reduce the danger of ingesting adulterated food products.

Milk
Remove all dairy animals from pasture and shelter them if possible, and provide them with protected food and water. Sampling teams from the State may come to your farm to take milk, and possibly feed and water samples, for laboratory analysis to determine whether any of these products are adulterated.

If dairy products are contaminated, it will be recommended that milk and milk products be withheld from the market. It is possible, however, for milk products contaminated with very low levels of radioactive materials to be safe for human consumption.

The State will advise as to which protective actions are appropriate.

Vegetables and Fruits, Including Grapes
Wash, scrub, peel, or shell locally grown fruits and vegetables, including roots, tubers and grapes to remove surface contamination.

Meat and Meat Products
If there is a release of radioactive materials into the environment, you may be advised to place meat animals on protected feed and water, and, if possible, provide them with shelter. If livestock consume feed and water contaminated with radioactive materials, some of the contamination will be absorbed into their bodies and could then enter the human food supply through meat and meat products.

Poultry and Poultry Products
Poultry raised outdoors, especially those kept for egg production, should be monitored by taking samples and performing lab tests to determine the presence of radioactive contamination. Poultry raised indoors and given protected food and water are not likely to be contaminated. If adulteration is verified, the State may advise that poultry and eggs not be eaten.

Grains
If grains are permitted to grow to maturity, most contamination will probably be removed by the wind and rain. Milling or polishing will probably remove any remaining contamination. Sampling and laboratory analysis will determine if the grain is safe to use. When harvested, adulterated and unadulterated grains should be stored separately.

Bees
Honey and beehives will need to be sampled and analyzed by the State if radioactive contamination is detected in the area. You will be instructed by the State on how to handle the hives and honey if needed.

Fish
Fish may continue to be harvested unless the State determine through laboratory analysis of samples that they are adulterated. Dilution of the radioactive material in large bodies of water should make adulteration of fish highly unlikely. Samples of fish from fish processing facilities may be analyzed to ensure they are safe.

Protecting Food Products

Food and Milk Processors, Warehouses and Commodity Terminals
Windows and vents to the outdoors should be closed. Vacuum systems should be shut down, as should compressed air systems. Any system that draws air from the outdoors to the inside should be shut down. Your facility will be notified directly by the State, if the food products in your facility are affected. If samples are collected, the State officials will notify you which products can be released for sale.

Protection of Packaged Food Products
Food in finished packaging should not be harmful to eat as long as the outer wrappings are discarded. Radioactivity will travel as fine particles that may coat the outside of the food product container.

Economics

Under the worst conditions, radioactive contamination could reduce the economic productivity of your farm. As previously mentioned, you may suffer the loss of some farm and dairy items due to contamination or spoilage during the period of time that a radiological emergency is in progress. However, following an accident, radioactive contamination might reduce the competitive economic value of your farm products. This would be due to public reluctance to purchase farm products that are suspected of having been grown in an area that has been affected by a radioactive release from a nuclear power plant or other source. State authorities will advise you on the contamination level that your farm experienced and the marketability of your farm products.

Radiation and Our Environment

Radiation is energy released in the form of small particles or rays that are emitted from a radiation source, and is a natural part of our environment. Radiation is in the air we breathe, the food we eat, the soil, our homes, sunshine, and even our bodies. The radiation naturally occurring or existing in our environment is called background radiation. The amount of background radiation varies from one location to another.

People are also exposed to radiation through medical and dental x-rays, and appliances such as color television sets. Commercial nuclear power stations and other facilities such as hospitals and universities are permitted to release controlled non-harmful amounts of radioactivity to the environment during routine operations.

The primary means of protection from radiation are (1) sheltering, (2) increasing distance and, (3) reducing exposure time.

Contamination

Contamination is the presence of radioactive particles in unwanted locations. Anything can become contaminated: people, animals, water, food, plants, soil, farming equipment, etc. Contamination is caused by radioactive particles lying on the surface of an object. In the case of people and animals, internal contamination can result from breathing radioactive particles in the air, drinking radioactive water or eating radioactive food.

Therefore, it is necessary to take special precautions with farm animals to prevent or minimize contamination.

Outer skin surfaces can be decontaminated through washing, but radioactive material collected inside the body may result in a long-term exposure and is, therefore, of greater concern.

Care should be taken to prevent or minimize the radioactive particles that are taken into the body or allowed to collect on your skin or clothing.

Radiation Exposure and Health

The principal means by which the public may be exposed to radiation following an accident are:

- Externally from radioactive materials that are released into the air;
- Internally from breathing airborne radioactive particles or eating food contaminated by radioactive elements.

The health effects of radiation exposure to people are measured in units called millirems. The federal government has set guidelines for radiation exposure to the public for nuclear power plant accidents and incidents at test and research reactors, fuel processing plants and other facilities using or producing large quantities of radioactive material. These guidelines recommend actions when (1) the total projected dose to the whole body from external radiation exceeds 500 millirem or, (2) the total projected dose to the thyroid from internal radiation exceeds 1,500 millirem. These Precautionary measures may be recommended at radiation levels below the limits mentioned above or even before any radioactivity is released from an accident site.

Potential Sources of Radiological Emergencies

This fact sheet applies to peacetime emergencies resulting from fixed nuclear facility incidents (including commercial and military nuclear power reactors); transportation incidents; and other incidents, e.g., nuclear powered satellite reentry. Sabotage and terrorism are not treated as separate types of incidents; rather, they are considered a complicating dimension of the incident types noted.

Specifically, the following fixed nuclear facilities are potential sources of radiological emergencies in Maryland:

- Calvert Cliffs Nuclear Power Plant, Lusby, Maryland
- Hope Creek Nuclear Generating Station, Lower Alloways Creek, New Jersey
- Limerick Generating Station, Pottstown, Pennsylvania
- Peach Bottom Atomic Power Station, Delta, Pennsylvania
- North Anna Power Station, near the town of Mineral, Virginia
- Three Mile Island Nuclear Generating Station, Harrisburg, Pennsylvania

However, only a portion of Howard County falls within the 50-mile ingestion pathway zone of Peach Bottom Atomic Power Station.

Summary

The information contained in this fact sheet applies to only a portion of Howard County that is within the 50-mile radius of Peach Bottom Atomic Power Station (see Appendix 2 Figure-1). Be familiar with the probable effect and potential effects of radiation contamination on your farming operation. If it should occur, listen for EAS messages on your local radio and television stations.

If you are warned that a radiological emergency exists, do the following:

- Arrange for the safety of you and your family.
- Shelter all farm animals, especially dairy cattle, and feed and water livestock from stored feed and protected water.
- Bring feed into building, or cover it if outdoors.
- Store as much water as possible for livestock. Cover wells, rain barrels and tanks.
- Delay grazing of animals on contaminated pasture.
- Place food or water in a closed area inside a house where it cannot be contaminated. Uncovered food brought in from a contaminated area should be cleaned. Eggs, potatoes, melons and root crops that are clean can be eaten. Green vegetables should be carefully washed and their outer layers removed if they were exposed to radiation. Peas and beans require normal cleaning.

You should protect yourself against radioactive contamination by:

- Washing hands thoroughly before you eat;
- Wear clothing such as coveralls, gloves and hats while working outside. The clothing should cover all portions of your body. Remove outer clothing before going inside.
- As much as possible, avoid activities that can re-suspend contamination, such as plowing, digging, burning, or mowing. Wear a dust mask or a folded, dampened cloth over your nose and mouth to reduce the quantity of radioactive materials inhaled when such activities cannot be avoided.
- Shower after completing outdoor activities
- Wash outer clothing

Governmental agencies will conduct assessments of land and crop damages and will advise you on how farm activities should be continued following a radiological accident.

Adjacent States and Jurisdictions within 50-Mile Ingestion Pathway

1. The Maryland State Emergency Operations Center (SEOC) will provide notification to affected or potentially affected jurisdictions within the ingestion pathway and adjacent states in the event of a radiological emergency occurring at the Peach Bottom Atomic Power Station. The State will transmit to each local organization recommended protective measures based upon protective action guides and other criteria. This shall be consistent with the recommendations of the Maryland Department of the Environment (MDE) and U.S. Environmental Protection Agency (EPA) regarding exposure resulting from passage of radiological airborne plumes and with other Federal recommendations regarding radioactive contamination of human foods and animal feeds.

2. The primary means for notifying adjacent states and local jurisdictions within the ingestion pathway will be by commercial telephone. Adjacent states and local governments within the ingestion pathway are listed in Table 1.

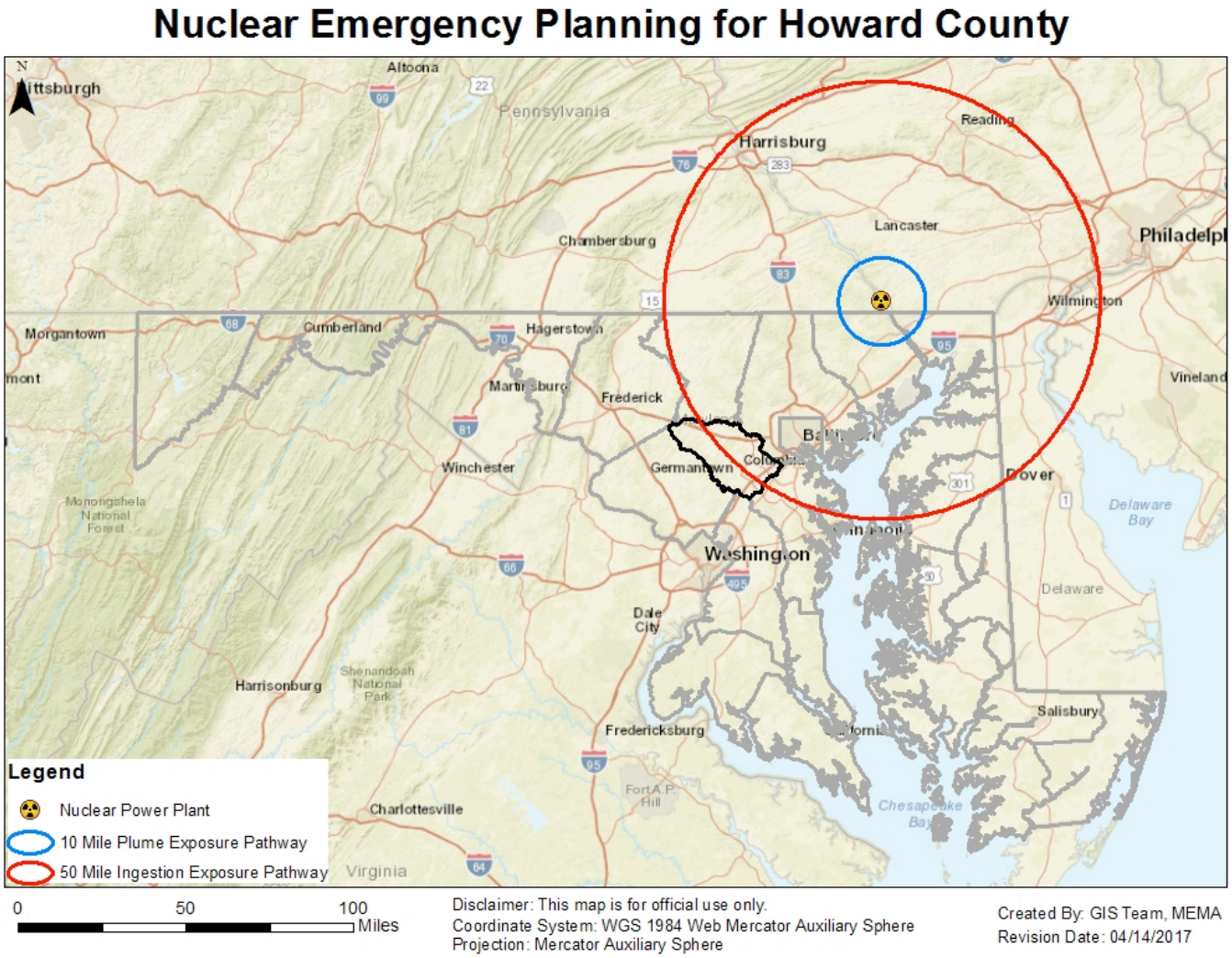
3. The Maryland SEOC will provide notification to affected or potentially affected local jurisdictions within the 50-mile ingestion pathway zone in the event of a radiological emergency occurring at the Peach Bottom Atomic Power Station. See Table 1 for jurisdictions to be notified within the 50-mile ingestion pathway zone.

4. Notifications will be made to local governments within the 50-mile ingestion pathway when a General Emergency is declared or earlier as appropriate.

Table 1 – Peach Bottom Atomic Power Station Delta, Pennsylvania
Jurisdictions within Plume (10-mile radius) and Ingestion Zone (50-mile ingestion pathway)

Plume Jurisdictions (10 Mile)	Ingestion Jurisdictions (50 Mile)
Cecil, Harford	Anne Arundel, Baltimore, Baltimore City, Caroline, Howard, Kent, Queen Anne's

Figure 1-50 Mile Ingestion Pathway Map



Appendix 2

Livestock Requirements

The following charts are extracted from ASABE (American Society of Agricultural and Biological Engineers) Standards 1986.

Water Requirements per Animal per Day*

Ample Supply		
Animal	**Liters**	**Gallons**
Cattle	64.0	17.0
Hogs	9.5	2.5
Sheep	5.8	1.5
Poultry		
-Layers and Broilers-	0.24	0.06
-Turkeys-	1.26	0.30
Limited Supply**		
Animal	**Liters**	**Gallons**
Cattle	26.5	7.0
Hogs	4.8	1.2
Sheep	3.8	1.0
Poultry		
-Layers and Broilers-	0.20	0.05
-Turkeys-	0.50	0.12

* Average requirements at a temperature of 27ºC (80 ºF)
** Water rationing facilities required

Limited Feed Requirements for livestock per day*

Animal	Feed	Amt.of Feed % of body wt.
Cow, lactating	hay	2
Cow, dry	hay	1
Calf, less than 9 mo.of age	hay	1
	40% protein supplement	0.2
Sheep, ewe	alfalfa hay	1
Sheep, lamb 27 kg. (60 lbs)	alfalfa hay	1.5
Sow, pregnant	corn	0.4
	35% protein supplement	0.2

Sow, lactating	corn	1
	35% protein supplement	0.2
Hog, 45kg. (100 lbs.)	corn	1.5
Hog, 91kg. (200 lbs.)	corn	1
Laying hen	mash	2
Turkey, 5 kg (10 lbs.)	mash	1.7
Turkey, 11 kg (25 lbs.)	mash	1.3

Equivalent feeds may be substituted. Hay should be at least one-half legume or equivalent in protein content.

Limited Space for Animals in Fallout Shelters

Animal	Space per Animal	
	Sq. M.	**Sq. Ft.**
Cow	1.9	20
Calf	1.1	12
Sheep, ewe	0.93	10
Sheep, lamb 27 kg. (60 lbs)	0.37	4
Sow, lactating	3.0	32
Hog, 45kg. (100 lbs.)	0.37	4
Hog, 91kg. (200 lbs.)	0.56	6
Chicken	0.06	0.7
Turkey, 5 kg (10 lbs.)	0.14	1.5
Turkey, 11 kg (25 lbs.)	0.19	2

These charts were originally captured from ASAE Standards 1986, and compared to ANSI/ASAE EP282.2 FEB 04. These were approved in 1993, and reaffirmed MAR 2004 by American National Standards Institute

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For more information, please contact the Office of Emergency Management at 410-313-6030.