Wolf Creek
Nuclear Operating Corporation

Radiological Emergency Information for:

Farmers

Food Processors

Distributors

PLEASE READ THIS BOOKLET THOROUGHLY

Revised 2019

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Introduction

This booklet has been prepared by Wolf Creek Generating Station, in cooperation with Kansas Division of Emergency Management (KDEM), Kansas Department of Health and Environment (KDHE), and the Kansas Department of Agriculture (KDA). Information in this booklet provides guidance to members of the agricultural community with farms, food processors and distributors within 50 miles of Wolf Creek Generating Station in Kansas. It contains information concerning actions you may be advised to take to protect your livestock and crops if there is a radiological emergency at the plant. It is intended to help farmers; food processors and distributors better understand the effects of radioactive contamination on plants, soil, water and animals, and the basic needs and care of animals if a radiological emergency occurs in Kansas. Please read and become familiar with the information in this booklet. Keep it in a convenient place for future reference.

Wolf Creek is a commercial nuclear power station for the generation of electricity. The plant is located in Coffey County, Kans., about four miles northeast of Burlington; 55 miles south of Topeka; 90 miles southwest of Kansas City; and 120 miles northeast of Wichita.

There are two types of emergency planning zones (EPZs) around nuclear power plants:

- *Plume Exposure Pathway* is a 10-mile radius around Wolf Creek where plans are in place for dealing with direct exposure to radioactive material during an emergency. This area includes most of Coffey County.

- *Ingestion Exposure Pathway* is a 50-mile radius around Wolf Creek where emergency plans are in place to deal with the potential for indirect exposure to radiation caused by eating food or drinking water or milk, or other liquids that are contaminated by radioactive material released during an emergency.

Coffey County, the State of Kansas and Wolf Creek have comprehensive emergency plans in place to protect the health and safety of the public. This booklet is part of those plans. It provides information to farmers, livestock owners, fruit and vegetable growers, food processors, and food distributors about actions to take if a radiological emergency occurs. If an emergency is declared, and radioactive material is released to the environment, your first concern should be to ensure you and your family is safe. Additionally, you may be advised to take actions to protect your family, farm animals and agriculture products. This information will help you minimize the effects of radiological contamination on food and agriculture.

Be Prepared

Here are some things you can do now to prepare for an emergency:

- Read this brochure and keep it in a convenient place.
- Plan where you would shelter your animals. Decide which animals would require immediate shelter. If you do not have enough shelter for all, determine priorities.
- Decide how to provide livestock and poultry with stored feed and water.
- Plan for storing or processing milk if marketing must be delayed for a few days.

What to do in a radiological emergency

While it is unlikely that a radiological emergency will occur at a nuclear power plant in this country, it is important to be prepared for such an event. Information in this booklet may help you respond more effectively to an emergency. It provides general advice on precautions, preparations and protective actions you may be asked to take. In a radiological emergency, KDEM, KDHE, Coffey County and WCNOC personnel will monitor radiation and contamination levels and recommend protective actions based on information gathered by joint radiological monitoring teams.

The public will be notified of an emergency by local officials, police, sheriff, or emergency management. These officials may use a variety of means, including Wireless Emergency Alerts (WEAs), Public Notification System, Emergency Alert System messages through AM/FM radios and TV, social media, NOAA Weather/All-Hazard radios, outdoor warning sirens, tone alert radios, PA systems from vehicles or simply door-to-door contact. Coffey County uses the Integrated Public Alert and Warning System (IPAWS). IPAWS is a system used to alert the public which may use, but is not limited to, analog, digital and satellite radio and television via the Emergency Alert System (EAS); cell phones and mobile devices via WEA; NOAA All-Hazards National Weather Radio via the IPAWS-NOAA gateway; internet applications and websites that direct you to listen to EAS broadcasts. Be sure your phone is set to receive alert notifications.

Emergency Alert System Stations

FM radio	AM radio	TV
KSNP 97.7	WIBW 580	WIBW-TV (CH. 13)
KMXN 92.9	KOFO 1220	KOAM-TV (CH. 7)
WIBW 94.5*	KVOE 1400	
KFFX 104.9		

*Primary EAS Station—broadcasts 24-hours a day.

Emergency information concerning an event that affects farmers, food processors, and distributors within 50 miles of Wolf Creek Generating Station will be disseminated through County Extension Offices, local radio, or news media. Follow the information on the radio broadcast.

You may be advised to take actions to protect your farm and livestock. Some possible protective actions are:

- Protect feed and water. Cover outside feed supplies with a tarp or other appropriate material.
- Cover open water sources. Remove dairy animals from pasture, shelter if possible, and provide them with protected feed and water.
- Shelter other livestock and poultry if possible, and provide them with protected feed and water.

If you are directed to evacuate or shelter in your home, do not delay taking those actions. Other recommendations in this booklet should only be followed by those not directed to evacuate or shelter. If you have begun taking protective actions for animals or crops, and are then directed to evacuate or shelter—STOP the earlier actions and evacuate or take shelter.

Safety of the food supply within the 50-mile radius of the power plant could be a concern to members of the agricultural community if a radiological release to the atmosphere occurs. During such a release water and soil could become contaminated. If a release of radioactive materials is confirmed, State officials will verify contamination of agricultural products. The following are examples of protective actions that may be recommended for the public:

- After finishing work outside, remove clothing carefully and placed it in plastic trash bags until it can be washed. Such clothing should be washed as a separate load or with other potentially contaminated clothing.
- Wash hands carefully before preparing or eating food, drinking, or smoking.
- Wash, scrub, peel or shell fresh fruits, vegetables, and nuts before eating them.
- If practical, remove livestock from pasture, confine them in uncontaminated areas, if possible, and provide them with uncontaminated feed and water.
- Do not slaughter, transport, or market any livestock or poultry.
- Do not use fresh milk from dairy animals, vegetables from gardens, fruit or nuts from orchards, or eggs from poultry.
- Do not conduct any farming activities such as harvesting, haying, or tilling.
- Protect already harvested crops that have not been contaminated.
- Do not fish or hunt in restricted areas.

Specific instructions depend on the distance from the nuclear power plant and prevailing wind conditions during the release of radioactive materials.

When the State of Kansas and Coffey County are notified of a radiological emergency, they will dispatch radiological monitoring team members to work with Wolf Creek personnel. Joint Radiological Monitoring Teams will perform sampling during and after a release of radiation to determine areas that may be contaminated and appropriate actions to take.

Coffey County and state of Kansas emergency response organizations are prepared to quickly notify and advise the agricultural community on actions to take in the event of a radiological emergency. The decision to recommend protective actions will be based on conditions at the power plant, available information on the amount of radiation that has been or may be released to the environment, and consideration of health, economic, and social impacts of the proposed actions.

When it appears a release of radioactive materials will occur officials will issue an advisory so that certain protective actions can be implemented in advance (such as removing dairy animals from pasture). Once an evacuation is advised, there may not be sufficient time to perform such preventative actions.

Radiation information

Radiation is energy in motion. It is tasteless, odorless and invisible. Contamination is radioactive material where we do not want it. We can be exposed to radiation and not be contaminated.

Radiation and radioactive materials are a natural part of our environment. They are in the air we breathe, in the food we eat, in the soil, in our homes, and even in our bodies. The level of radiation naturally existing in our environment is called "background radiation." It may vary greatly from one location to another depending on related factors such as solar radiation, geographic elevation, soil composition, and the presence of radon gases from the soil and building materials.

Health effects of radiation exposure are measured in units called "millirem."

- In the U.S., average background radiation dose received per person is about 310 millirems per year.
- People also receive about 298 millirems a year from medical sources.
- About 12 millirems is received from consumer products, occupational and other environmental sources.
- Total average annual dose per person in the U.S. is about 620 millirems, excluding exposure from tobacco use.
- We are also exposed to sources of man-made radiation such as X-rays. One chest x-ray is about 10 millirems of radiation.

- Nuclear power plants may release small amounts of radioactive materials to the environment under controlled conditions and during routine operations. People living near a commercial nuclear power plant station receive less than one additional millirem per year from normal plant operation.

Effects of radiation on people depend on the amount and length of time of exposure, how much of the body is exposed, how much radioactive material stays in the body, and the general health and age of the exposed person. Reducing the time a person is exposed and increasing the distance from the source of radiation can decrease radiation effects.

Anything can become contaminated: people, animals, water, food, plants, soil, farming equipment, etc. Contamination is caused by radioactive particles lying on (or becoming affixed to) the surface of an object. People and animals can be internally contaminated by breathing radioactive gases and particles in the air, by eating contaminated food, or by drinking contaminated water or milk. Therefore, it is necessary to take special precautions with farm animals to prevent contamination from entering the food chain.
Plants can become contaminated through direct exposure and internally by absorbing radioactive particles contained in the soil or water.

If radioactive material is deposited on a person's skin, or if radioactive materials have been ingested or inhaled, the person is then considered to be contaminated. Outer surfaces can be washed or decontaminated. Radioactive material collected inside the body may result in a long-tem exposure which may be a more significant health concern.

Effects of radioactive deposits on human food and water

Depending on the amount of radioactive material released into the atmosphere and prevailing weather conditions, people, animals, crops, land, and water near the site of the emergency could be affected.

Of initial concern is the condition of fresh milk from dairy animals grazing on pasture and drinking from open sources of water. Sampling for contamination could occur at the farm, transfer station or processing plant. If contamination of fresh milk and processed milk products is verified, State officials will determine whether to dispose of these products or to hold them until safe for consumption.

A later concern is possible contamination of vegetables, grains, fruits and nuts. The severity of the impact of the contamination depends on the time of the year the emergency occurred. The time immediately prior to or during harvest is the most critical period. Government officials will sample and analyze crops to ensure crops are safe to eat.

An additional concern is the possible impact of contamination on livestock and poultry. Pasture, feed, and water sources, as well as meat and poultry products, will be sampled and analyzed to ensure the meat and poultry are safe to consume.

Contamination of drinking water supplies is not likely to be significant. If it occurs, it will probably affect only surface water supplies and not ground wells or underground water sources. Water safety will be determined by sampling public and private sources.

Radioactive materials decay away at specific rates. Exposure from radiation is greatest during the first few hours and days following a release and deposition of radioactive materials. Those materials that remain in the air for longer periods of time lose much of their radioactivity before they settle to earth. The intensity of radiation decreases with the passage of time as radioactive materials decay.

Potassium Iodide (KI)

KI is used in certain situations to protect the thyroid gland from absorbing radioactive iodine. If taken before or within an hour of exposure to radioactive iodine, KI can block about 90 percent of the radioactive iodine from being absorbed by the thyroid gland.

The State of Kansas determined that potassium iodide provides no significant enhancement to public protection beyond that which can be effectively achieved through the implementation of the existing and modified protective actions defined within the emergency plan. While the State does not intend to recommend the use of KI by the general public, it acknowledges that individual members of the public may elect to obtain and use the drug voluntarily if they so desire.

For more KI information, visit the Federal Drug Administration Web page: http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/ucm080542.pdf or call (301) 827-4573.

Two types of protective actions help prevent or lessen the possibility of people eating or drinking contaminated food or water.

Preventive Protective Actions

These are actions to prevent or minimize contamination of milk and food products. Examples are washing, scrubbing, peeling or shelling fruits, nuts, and vegetables to remove surface contamination.

Emergency Protective Actions

These are actions to isolate or contain food, prevent its introduction into commerce and determine whether condemnation or other action is appropriate. An example is to restrict or withhold (embargo) agricultural and dairy products from the marketplace by prohibiting transportation from the affected areas.

Protective Actions for Animals

Sheltering animals

If 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 give priority to your most valuable livestock. Possible livestock shelters:

- Barns
- Garages
- Milking parlors
- Poultry buildings
- Machine sheds
- 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 possibly 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 possible contamination, do not add water to covered tanks unless it 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 potential contamination has settled on the ground. The same procedure should be followed after windy weather spreads dust in the area.

Protecting water sources

Open water sources, such as rain barrels and tanks should be covered to prevent contamination. State health experts will check open sources of water and determine if 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 contamination is suspected. This will prevent distribution or irrigation until the water source is tested and found to be safe.

Protective actions for the food supply

Here are examples of protective actions and related information that may be recommended. Location-specific protective action recommendations will be issued by State officials in the event of an actual emergency.

Milk

Remove dairy animals from pasture, shelter if possible, and provide protected feed and water. State officials may come to your farm to take samples of milk, feed, and water for laboratory analysis to determine whether these products are contaminated.

If dairy products are contaminated, it may be recommended that milk and milk products be withheld from the market. It is possible, however, for milk products contaminated with certain radioactive materials to be safe for human consumption after proper storage over a period of time. This will allow for decay of the radioactive materials.

To allow time for decay to occur, freeze or store fresh milk, concentrated milk, or concentrated milk products. Storage of milk for prolonged periods at a reduced temperature is also possible provided ultrahigh temperature pasteurization techniques are used during processing. Using fluid milk for the production of butter, cheese, dry milk, or evaporated milk may also be possible.

Fruits and vegetables

To remove contamination, wash, scrub, peel or shell locally grown fruits, nuts, and vegetables, including roots and tubers. If contaminated by certain radioactive material, preserving by canning, freezing, or dehydration and store to allow time for decay of the radioactive material. If contamination is excessive, you may be directed to not use food from restricted or contaminated areas.

Meat and meat products

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 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. Samples should be taken and laboratory tests performed to determine the presence of radioactive contamination. Poultry raised indoors, and given protected feed and water, are not likely to be contaminated. If contamination is verified, State officials may advise that poultry and eggs should not be eaten.

Fish and marine life

Fish and other marine life raised in ponds may continue to be harvested unless State officials determine contamination through laboratory analysis of samples. Samples of water, fish, and marine life from open bodies of freshwater should also be analyzed to ensure they are safe.

Soil

If State officials find that soil is contaminated, proper soil management techniques can reduce contamination to safe levels. Idling land for a specific period of time may be necessary in some cases. However, in situations involving highly contaminated soil, removal and disposal of the soil may be more appropriate.

Planting alternative crops may also be recommended in some situations. Crops such as cotton and flax could be substituted for food crops because they contribute little or no radioactive material to the human diet.

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

State officials will let you know what actions are appropriate.

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, contaminated and uncontaminated grains should be stored separately.

Honey

Honey and beehives must be sampled and analyzed by State officials if radioactive contamination is detected in the area. These officials will inform you how to handle the hives and honey.

Food Processors and distributors

Radioactive contamination of milk or food products in an affected area can occur during processing, or transportation. This can result from exposure to radioactive materials on the ground or in the air, and from contact with contaminated products.

Following a radiological emergency, government officials may restrict transportation of food products and withhold them from the marketplace if they are contaminated. These products should not be released until they are considered safe for consumption, or until a decision is made to dispose of them. You will be instructed how to safely handle and dispose of contaminated food products.

Transport vehicles and storage

Vehicles and storage areas that have transported or held contaminated food must be decontaminated prior to use for non-contaminated food. Likewise, any vehicles that were in the contaminated region should be surveyed for contamination prior to leaving the area. Surveys will be performed by trained personnel at access control points set up for this purpose.

Depending upon the levels of contamination, contaminated vehicles may be repeatedly used to move contaminated material to disposal or storage sites.

Decontamination may include washing the contaminated area with soapy water, wiping the area with a damp cloth, or using masking tape to remove the contamination. The affected area will then be surveyed again to ensure contamination has been removed.

Post-emergency actions

The following sections describe post-emergency actions that will occur if contamination is verified.

Re-entry

Re-entry is the temporary entry, under controlled conditions, into a restricted, contaminated area. If you have been evacuated from your area, you may be allowed to return temporarily to your farm when conditions permit. State and County officials will advise you through radio, television or other official means if a decision to permit re-entry is made. You will receive specific instructions on routes to use and safety precautions to take. Re-entry will allow you to perform such vital activities as milking, watering, and feeding farm animals.

Recovery

Recovery is the process of reducing radiation in the environment to acceptable levels for normal daily living. Following the emergency, State officials will identify the types and levels of contamination. They may need to take samples of air, water, soil, crops, and animal products from your farm or business. They will provide instructions and assist in decontaminating animals, food, and property if such actions are necessary. Contaminated food will be isolated to prevent its introduction into the marketplace. State officials will determine whether condemnation and disposal are appropriate.

Where to get more information

If you live within 50-miles of Wolf Creek Generating Station, emergency information about an incident that affects farmers, food processors, and distributors is available through the following county extension offices:

Allen (620) 365-2242	Anderson (785) 448-6826
Bourbon (620) 223-3720	Butler (316) 321-9660
Chase (620) 273-6491	Coffey (620) 364-5313
Douglas (785) 843-7058	Franklin (785) 229-3520
Greenwood (620) 583-7455	Johnson (913) 715-7000
Linn (913) 795-2829	Lyon (620) 341-3220
Miami (913) 294-4306	Morris (620) 767-5136
Neosho (620) 244-3826	Osage (785) 828-4438
Shawnee (785) 232-0062	Wabaunsee (785) 765-3821
Wilson (620) 378-2167	Woodson (620) 625-8620

If you have questions about radiological emergency preparedness in Kansas, contact:

Kansas Division of Emergency Management
Technological Hazards Section
State Defense Building
2800 SW Topeka Boulevard
Topeka, KS 66611-1287
(785) 646-2546
http://www.kansastag.gov/kdem

Kansas Division of Health and Environment
Bureau of Environmental Health
Radiation & Asbestos Control Section
1000 SW Jackson
Topeka, KS 66612-1366
(785) 296-1560
http://www.kdheks.gov/radiation/

Kansas Department of Agriculture
1320 Research Park Drive
Manhattan, KS 66502
(785) 564-6700
http://www.agriculture.ks.gov

Prepared by
Wolf Creek
Generating Station
Emergency Planning Staff

in consultation with

Kansas Department
of Agriculture

Kansas
Department of Agriculture

Adjutant General's Department
Kansas Emergency Management
Technological Hazards Section

Kansas Department of Health and
Environment Bureau of Environmental
Health Radiation and Asbestos
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Management