

# Monroe County Emergency Management



## Nuclear Power Plant Emergency Media Outreach

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## ***Nuclear Power Plant Emergency Media Outreach***

### **Contents**

Purpose.....	4
Plan Overview.....	4
Plume Exposure Pathway.....	4
Ingestion Exposure Pathway.....	5
Emergency Classifications.....	5
Emergency Facilities.....	6
Public Education and Information.....	6
Sirens .....	7
Marine Notifications .....	7
Protective Actions.....	8
Radiological Sampling.....	8
Radiation Health Effects.....	9
Appendix 1. 10-Mile Emergency Planning Zone Map .....	13



## **Purpose**

Emergencies at Turkey Point can range from minor incidents, which would have little or no impact on the local community to major accidents resulting in the release of radioactive materials and contaminants into the atmosphere and the surrounding environment.

The purpose of Media Outreach is to acquaint news media with the emergency plans, information concerning radiation, and points of contact for release of public information in an emergency.

## **Plan Overview**

The Turkey Point Nuclear Plant is owned and operated by Florida Power and Light, a subsidiary of NextEra Energy. The Plant, located in southern Miami-Dade, and has two Westinghouse pressurized water reactors (Unit 3 & Unit 4) which came on line in 1972 & 1973. FPL also operates fossil plants at the same site.

To facilitate a planned strategy for protective actions during an emergency, two Emergency Planning Zones (EPZs) have been established around Turkey Point: the Plume Exposure Pathway and the Ingestion Exposure Pathway. These zones extend ten (10) and fifty (50) miles around the facility, respectively.

## **Plume Exposure Pathway**

The Plume Exposure Pathway Emergency Planning Zone (EPZ) has a radius of approximately 10 miles from Turkey Point and is sub-divided into ten (10) geographically identifiable areas. Areas one (1) through nine (9) are located within Miami-Dade County. Area ten (10) consists of Ocean Reef and Key Largo Anglers Club, private communities in upper Key Largo in Monroe County. A map of the Plume Exposure Pathway is included as Appendix 1.

Protective actions for the Plume Exposure Pathway are designed to avoid or reduce the radiation dose from exposure to radioactive materials and may include sheltering, evacuation, and the use of Potassium Iodide (KI) where appropriate. Factors such as wind speed, wind direction, and projected doses affect the area(s) that could require protective actions.

During the early phase of an incident, there are three main exposure pathways from airborne releases:

- **Direct exposure** to radioactive materials in an aerial plume. The plume may contain radioactive noble gases, radioiodines, and radioactive particles. Many of these materials emit gamma radiation that people in the vicinity of the passing plume can be exposed to.



## **Nuclear Power Plant Emergency Media Outreach**

- **Inhalation** of radionuclides can occur from immersion in a radioactive aerial plume and inhalation of ground-deposited radionuclides that may be re-suspended. Inhaled radioactive particulates, depending on their solubility in body fluids, may remain in the lungs or move via the bloodstream to other organs, prior to elimination from the body. Some radionuclides become concentrated in a single body organ, with only small amounts going to other organs. For example, a significant fraction of inhaled radioiodines will move through the bloodstream to the thyroid gland.
- **Deposition** of radioiodine and particulates from a radioactive plume. Deposited materials can continue to emit beta and gamma radiation as groundshine after the plume has passed causing continued exposure to skin and internal body organs. Similarly, skin and clothes may become contaminated.

While the main focus of emergency planning concerns mainland Miami-Dade and Monroe Counties, coastal bay areas and barrier islands may also be affected. These include Biscayne Bay, Biscayne National Park, and a portion of John Pennekamp Coral Reef State Park.

### **Ingestion Exposure Pathway**

The Ingestion Exposure Pathway EPZ extends a radius of about 50 miles from Turkey Point. Protective actions for the Ingestion Exposure Pathway are primarily designed to avoid or reduce radiation doses from potential ingestion of radioactive materials deposited in water and food sources, including milk, fresh vegetables and other crops, tropical and fresh water fish, and seafood. These actions may include but are not limited to a ban of contaminated food and water. Additional protective measures may be implemented in areas of the Ingestion Exposure Pathway EPZ to prevent accumulated exposures over time.

### **Emergency Classifications**

Emergency classifications, common to nuclear plants throughout the United States, are used to categorize the severity of an emergency at a nuclear plant.

*Unusual Event* – The least significant of the four emergency classifications. It may involve severe weather or a minor mechanical or security event. No public action is needed.

*Alert* – An equipment or security event of significance that may affect plant safety. There is no impact to the public but public safety officials may take some preparatory activities or share information with the public, as needed. Residents should monitor communications from their County Safety Officials.

*Site Area Emergency* – A serious equipment or security event affecting plant safety. Sirens would sound to alert the public to listen to local radio and television stations for information. Radiation levels outside the plant property should not exceed federal



guidelines but public safety officials may take some precautionary actions and share information or instructions with the public. Residents should monitor communications and prepare to take action as directed by their Public Safety Officials.

*General Emergency* – A very serious equipment or security event affecting plant safety. Sirens would sound. Public safety officials would act to protect the public. Instructions for people in the affected areas would be provided by local radio or television stations. Radiation levels outside the Plant may exceed federal guidelines.

## **Emergency Facilities**

### *Emergency Operations Center*

This is a facility set up at the Tavernier Fire Station from which Monroe County Emergency Management coordinates overall county implementation of public protective measures and coordination of emergency response operations.

### *Emergency Reception Center*

This is a facility set up at Key Largo School for members of the public evacuating the 10-mile EPZ. At this site, members of the public can receive radiological monitoring and decontamination services and can access other emergency services from the Florida Department of Health in Monroe County, the American Red Cross, and others.

### *Marine Reception Center*

This is a facility set up at Murray Nelson Government Center in Key Largo for members of the boating public evacuating the 10-mile EPZ. At this site, boaters receive radiological monitoring and decontamination services and transportation to the Emergency Reception Center.

### *Emergency Operations Facility*

This is the FPL facility from which FPL leaders and technical experts advise local, state and federal decision makers on the conditions of the Plant and efforts to mitigate the problems affecting safe reactor operation.

### *Joint Information Center / Emergency News Center*

Collocated with the Emergency Operations Facility, this is the site from which representatives of the media receive press briefings and engage local, state, utility and federal Public Information Officers for purposes of communicating information to the public. Monroe County's PIO would be located at the Joint Information Center to coordinate the release of public information during an emergency.

## **Public Education and Information**

To inform the population of the 10-mile EPZ about the Turkey Point Nuclear Plant and emergency planning measures, FPL, Miami-Dade County, and Monroe County annually



## ***Nuclear Power Plant Emergency Media Outreach***

update and mail a postcard that includes a map of the 10-mile EPZ and a URL to the FPL webpage where residents can find more details about safety planning.

### **Sirens**

The 10-mile EPZ contains an extensive warning siren system. The system is comprised of 48 sirens capable of delivering a wailing sound within its coverage area. The sirens can be activated and controlled from the Miami-Dade County Fire Alarm Office as well as from the primary or backup Public Safety Access Points. Two sirens are located in Monroe County. Route alerting would be used for notification in Key Largo Anglers Club and Ocean Reef in addition to text messages pushed to all cell phones.

### **Marine Notifications**

Boaters in the waters within the 10-mile EPZ would be notified of emergencies by loudspeakers from boats and aircraft operated by the following Emergency Support Function (ESF) 16 support agencies:

- U.S. National Park Service, Biscayne National Park
- Miami-Dade Police Department Marine Patrol
- United States Coast Guard
- Florida Fish & Wildlife Conservation Commission



## **Protective Actions<sup>1</sup>**

Early phase protective actions can include sheltering in place or evacuation. Additional protective actions including the distribution of stable potassium iodide (KI) to block radioactive iodine's effects upon the thyroid can also be taken.

### **Basis for EPA Protective Action Guides (PAG)**

1. Acute effects on health (those that would be observable within a short period of time and which have a dose threshold below which they are not likely to occur) should be avoided
2. The risk of delayed effects on health (primarily cancer and genetic effects) should not exceed upper bounds that are judged to be adequately protective of public health, under emergency conditions, and are reasonable achievable.
3. PAGS should set to produce achievable reduction of risk to public health at acceptable cost.
4. The risk to health from a protective action should not exceed the risk to health from the avoided dose.

EPA PAGs for the early phase of a nuclear incident is evacuation or sheltering at 1-5 Roentgen Equivalent Man (REM) Total Effective Dose. The State of Florida implements this guidance at 1 REM.

The Food and Drug Administration (FDA) guidance for the administration of stable potassium iodide is 5 REM for the most sensitive members of the population (infants, pregnant and lactating women) Florida uses this value for implementation of the PAG.

## **Radiological Sampling**

Monitoring and sampling teams from FPL, the Florida Department of Health Bureau of Radiation Control (BRC), and the Federal Radiological Monitoring and Assessment Center (if requested) will take samples from exposed agriculture and water sites. Maps for recording survey and monitoring data, key land use data, dairies, food processing plants, water sheds, water supply intake and treatment plants and reservoirs are maintained by the Florida Division of Emergency Management.

Procedures can be instituted to protect food items and livestock. These include, but are not limited to:

- Removal of cows or other livestock from pastures and placing them on stored feed
- Quarantine of potentially contaminated milk
- Cut-off of contaminated water supplies

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<sup>1</sup> Source: EPA 400/R-17/001, *PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents*, January 2017; US DHHS CDER, *GUIDANCE Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies*, December 2001; US DHHS FDA, *Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies*, August 13, 1998



- Washing of all harvested produce

Additional guidance from the BRC and the Florida Department of Agriculture and Consumer Services should be obtained prior to the implementation of the above measures to assure their adequacy under actual conditions.

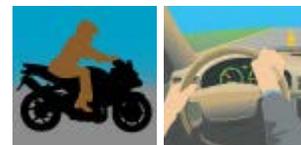
## **Radiation Health Effects<sup>2</sup>**

More than 100 years ago, scientists discovered that many elements commonly found on Earth occur in different configurations at the most basic (atom) level. These various configurations (called isotopes) have identical chemical properties, but different physical properties. In particular, some isotopes (known as radioisotopes) are radioactive, meaning that they emit energy in several different forms. This energy emission is what we call radiation.

Over time, we have come to think of radiation in terms of its biological effect on living cells. For low levels of radiation exposure, these biological effects are so small that they may not even be detectable. In addition, the human body has defense mechanisms against many types of damage induced by radiation. Consequently, radiation may have one of three biological effects, with distinct outcomes for living cells: (1) injured or damaged cells repair themselves, resulting in no residual damage; (2) cells die, much like millions of body cells do every day, being replaced through normal biological processes; or (3) cells incorrectly repair themselves, resulting in a biophysical change.

The exact effect depends on the specific type and intensity of the radiation exposure. In general, however, a 3-millirem exposure imposes the same chance of death — 1 in a million — as each of the following common life experiences:

- Spending 2 days in New York City (because of the air quality)
- Riding 1 mile on a motorcycle or 300 miles in a car (because of the risk of collision)
- Eating 40 tablespoons of peanut butter (because of aflatoxin) or 10 charbroiled steaks
- Smoking 1 cigarette



<sup>2</sup> Source: <https://www.nrc.gov/about-nrc/radiation/rad-health-effects.html>



### **High Radiation Doses<sup>3</sup>**

Because radiation from nuclear material is strictly regulated, humans seldom experience large doses (~50 REM) of radiation. Nonetheless, lower doses can still damage or alter the genetic code (DNA) of irradiated cells. Moreover, high radiation doses (particularly over a short period of time) have a tendency to kill cells. In fact, high doses can sometimes kill so many cells that tissues and organs are damaged immediately. This, in turn, may cause a rapid whole-body response, which is often called "acute radiation syndrome."

In general, the higher the radiation dose, the sooner the effects will appear, and the higher the probability of death. (The time between radiation exposure and cancer occurrence, for example, is known as the "latent period.") This syndrome was observed in many atomic bomb survivors in 1945, as well as emergency workers who responded to the Chernobyl Nuclear Power Plant accident in 1986. Approximately 134 Plant workers and firefighters battling the fire at the Chernobyl Power Plant received high radiation doses of 70,000 to 1,340,000 milli-roentgen (mrem) and suffered acute radiation sickness. Of those 134, 28 died from the radiation injuries that they sustained.

Although radiation affects different people in different ways, it is generally believed that humans exposed to about 500 REM of radiation all at once will likely die without medical treatment. Similarly, a single dose of 100 REM may cause a person to experience nausea or skin reddening (although recovery is likely), and about 25 REM can cause temporary sterility in men. However, if these doses are spread out over time, instead of being delivered all at once, their effects tend to be less severe.

### **Radiation Exposure and Cancer<sup>4</sup>**

The associations between radiation exposure and cancer are mostly based on populations exposed to relatively high levels of ionizing radiation (e.g., Japanese atomic bomb survivors and recipients of selected diagnostic or therapeutic medical procedures). Cancers associated with high dose exposure include leukemia, breast, bladder, colon, liver, lung, esophagus, ovarian, multiple myeloma, and stomach cancers. Literature from the U.S. Department of Health and Human Services also suggests a possible association between ionizing radiation exposure and prostate, nasal cavity/sinus, pharyngeal and laryngeal, and pancreatic cancers.

Those cancers that may develop as a result of radiation exposure are indistinguishable from those that occur naturally or as a result of exposure to other chemical carcinogens. Furthermore, literature from the National Cancer Institute indicates that other chemical and physical hazards and lifestyle factors (e.g., smoking, alcohol consumption, and diet) significantly contribute to many of these same diseases.

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<sup>3</sup> Source: <https://www.nrc.gov/about-nrc/radiation/health-effects/high-rad-doses.html>

<sup>4</sup> Source: <https://www.nrc.gov/about-nrc/radiation/health-effects/rad-exposure-cancer.html>



## ***Nuclear Power Plant Emergency Media Outreach***

Although radiation may cause cancer at high doses and high dose rates, public health data do not absolutely establish the occurrence of cancer following exposure to low doses and dose rates — below about 10,000 mrem. Studies of occupational workers who are chronically exposed to low levels of radiation above normal background have shown no adverse biological effects. Even so, the radiation protection community conservatively assumes that any amount of radiation may pose some risk for causing cancer and hereditary effect, and that the risk is higher for higher radiation exposures.

A linear no-threshold (LNT) dose-response relationship is used to describe the relationship between radiation dose and the occurrence of cancer. This dose-response model suggests that any increase in dose, no matter how small, results in an incremental increase in risk. The U.S. Nuclear Regulatory Commission (NRC) accepts the LNT hypothesis as a conservative model for estimating radiation risk.

### **Implementation of PAGs**

When incidents have the potential for release of radioactive material, state and/or local authorities will decide if protective actions are needed and how they will be implemented.

Protective actions are based upon:

- Potential for releases (plant conditions)
- The projected doses both from the release and the material left behind on the ground
- The dose to be avoided
- The risks associated with the protective actions available

### **Types of PAGs**

**Early Phase** - designed to protect the public from the actual passage (plume) of radioactive material

**Intermediate Phase** - protect the public from long term health effects due to continued presence of radioactive material in the environment. Intermediate phase PAGs would involve relocation of members of the public.

**Ingestion PAGs** - used to prevent the ingestion of radioactive material in harmful quantities. These PAGs are established by the Food and Drug Administration.

**Recovery PAGs** - Decontamination limits for land, buildings, and other material that will be returned to unrestricted use by the public. There is no official guidance for these levels.



## ***Nuclear Power Plant Emergency Media Outreach***

### **Distribution of Potassium Iodide (KI) to the Public**

It is the policy of the Department of Health that the general population will be evacuated prior to exposure, but if conditions warrant, KI will be provided at reception centers by county health departments (CHDs).

Based upon actual releases of radioactive iodine, if the actual or projected dose from radioactive iodine is  $\geq 5$  REM, the BRC operations officer will authorize the distribution of KI at reception centers.



### Appendix 1. 10-Mile Emergency Planning Zone Map

