Chapter 9D—Nuclear/Radiological Events

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Chapter 9D

Nuclear/Radiological

Details on management of nuclear and radiation events and incidents can be found in the Florida Comprehensive Emergency Management Plan (CEMP), and in Florida Department of Health's Standard Operating Procedures and other guidance.

UNITS OF RADIOLOGICAL MEASUREMENT

U.S./English System

a. Rem: an English System unit of measure of exposed radiation dose equivalent for people – Roentgen Equivalent Man
   - Abbreviated: rem
   - Commonly measured at the micro (μ) and milli (m) levels
   - Corresponds to sievert in International System
     - 1rem = 10mSv

b. Ras: an English System unit of measure of absorbed radiation dose in any material
   - Abbreviated: rad
   - Corresponds to gray in International System
     - 1rad = 10mGy

c. Curie: an English System unit of measure of activity (the intensity of radiation being released by an isotope)
   - Abbreviated: Ci
   - Corresponds to becquerel in the International System
   - Equal to $3.7x10^{10}$ disintegrations per second
     - 1Ci = 37GBq

International System

a. **Sievert**: an International System unit of measure of exposed radiation dose equivalent for people
   - Abbreviated: Sv
     - 1 Sv = 100 rem

b. **Gray**: an International System unit of measure of absorbed radiation dose in any material
   - Abbreviated: Gy
     - 1 Gy = 100 rad

c. **Becquerel**: an International System unit of measure of activity (the intensity of radiation being released by an isotope)
   - Abbreviated: Bq
     - 1 Bq = 27 pCi

A Radiological Units Conversion Table can be found at the following link:

http://orise.orau.gov/reacts/guide/measure.htm#Conversions

Fundamental Principles of Radiation

a. The principles of radiation are based on the electromagnetic properties and the sub-atomic or nuclear structure of atom/element.

b. There are 118 elements with 98 elements naturally occurring.

c. The sub-atomic structure of all elements except for hydrogen 1 includes the following particles
   - A nucleus comprised of positively charged protons (p+) and neutrons (N), which have no charge. Hydrogen does not have a neutron in its nucleus.
   - An orbiting cloud or shell of negatively charged electrons (e-).

d. These particles are in constant motion (spinning, vibrating, and rotating).
e. The number of protons, neutrons, and electrons in the atoms of an element determines the physical, chemical, and electromagnetic properties of that element. The ratio is 1 p+ / 1n / 1 e- which enables the atom/element to be stable or balanced.
f. All atomic systems and elements tend towards states of minimum energy and maximum stability and balance.
g. If an atom has too many or too few of any sub-atomic structure (protons, neutrons, and electrons) it is unstable and unbalanced.
h. In an effort to achieve stability and balance, different isotopes emit different sub-atomic particles such as protons, neutrons or electrons, or combinations thereof (see #9). This process of emitting sub-atomic particles is called radiation. These particles are classified as follows:
    - Alpha radiation (α), a proton and a neutron, positively charged (+)
    - Beta radiation (β), an electron, negatively charged (-)
    - Neutron radiation (n), a neutron, no charge
i. Isotopes may also emit photons of energy in order to achieve stability and balance. This invisible energy is called gamma (y) or x-ray radiation and is not comprised of any particles.
j. Alpha, beta, neutron, gamma, and x-ray radiation is of sufficient energy to alter the sub-atomic or nuclear structure of an atom/element. They are forms of ionizing radiation, which is different from other types of electromagnetic energy.
k. Naturally Occurring Radioactive Materials (NORM) are in all aspects of our lives and add to our natural background radiation levels.

l. Microwaves, radio waves, electromagnetic fields from power lines, ultra-violet, infrared, and visible light are all considered non-ionizing radiation; they are non-ionizing radiation because they cannot alter the sub-atomic or nuclear structure of an atom/element.

m. Different types/forms of ionizing radiation have different properties:
   - Alpha radiation is characterized as a slow moving, relatively high-energy particle that is mainly an internal body contamination hazard. It is shielded by paper, skin, and common closing with an approximate range of 1-3 inches from the source. Beta radiation (β), an electron is Characterized as a low to high-energy faster moving particle that is both an internal and an external body contamination hazard. It can be shielded by dense materials such as sand/bricks, plastics and partially by turnout gear with an approximate range of: 10-30 feet from the source.
   - Neutron radiation (n) is characterized as high energy, fast moving particles that is an external whole body exposure hazard. It can be shielded by substances with high concentrations of hydrogen such as water, plastics, and concrete with an approximate range of 100-300 feet from the source.
   - Gamma radiation (y) and x-rays (operationally identical) are characterized as an external whole body exposure hazard. They move at the speed of light and are shielded by dense materials such as lead, sand, and water with an approximate range of 100-300 feet from the source.

n. Ionizing radiation cannot be detected by human or animal senses.

o. Equipment must be used to detect ionizing radiation.

p. Detection equipment must be calibrated and checked prior to use.
q. The appropriate equipment must be used for the type of radiation believed to be present. Not all equipment is designed to detect all types of radiation.
r. Emergency response radiation detection equipment (e.g., CDV yellow gear) is designed to detect radiation – It DOES NOT identify the isotope producing the radiation.
s. Radioactive isotopes aka radionuclides may emit two or more different types of radiation simultaneously.
t. The most common type/form of ionizing radiation are gamma and beta.

Figure 16 – Radiation Exposure Guidelines For First Responders & Emergency Workers

5-25 µrad/hr	Normal FL Background [1]
2X Background	Contaminated; Check with Local Policy
2 mrad/hr	Hot Zone Boundary
500 mrad/hr	Turn Back Now (Turn back Daily Dose Limit)
5 rem per hour	Turn Back Now (Turn back Dose Rate Limit)
5 rem	Max Dose annual dose – radiation worker and maximum dose for duration of emergency under most circumstances
10 rem	Max Dose – Property Preservation
25 rem	Max Life Safety Dose W/ Informed Consent
50 rem	Onset Of Biological Effects To Blood Cells
100 rem	Onset Of Acute Radiation Poisoning Symptoms

Refer to US EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (400 R 92 001) & subsequent revisions for

[1] This is an official FL Department of Health Bureau of Radiation Control Value

full and complete guidance on radiological exposure during emergency response operations AND follow the instructions of the Radiation Safety Officer.

Exposure Control

a. Emergency workers and first responders must follow all established field safety guidelines particular to their agency's guidance. Generally, these guidelines will include the ALARA principle.
   - ALARA means As Low as Reasonably Achievable.
   - Because of naturally occurring radioactive material in the earth and modern society, the ALARA principle recognizes that exposure to radiation cannot be absolutely eliminated.
   - Emergency response to a radiological incident may include some exposure to radiation for the first responder/emergency worker.
   - The following methods of practice the ALARA principle so as to minimize your exposure to radiation:
     - Do not smoke, eat, and drink in the hot & warm zones. Minimize contamination by avoiding contact between your hands and your head & face area.
   - Use TIME–DISTANCE–SHIELDING as a general protective action guideline.
   - Minimize TIME spent near the radioactive source.
   - Maximize DISTANCE between you and the radioactive source.
   - Use SHIELDING between you and the radioactive source.

b. Measure your personal cumulative dose with a dosimeter.

c. Report dose measurements to Radiological Safety Officer – RSO, at least every 30 minutes or as directed.

d. Record your permanent cumulative dose with a thermo luminescent dosimeter–TLD or optically stimulated luminescent dosimeter – OSLD. Do not swap dosimeters.
e. Do not delay in performing a life safety action because of a radiological hazard.

EMERGENCY PLANNING ZONES (EPZ) for Nuclear Power Plants

Plume Exposure Pathway

The plume exposure pathway EPZ has a radius of about 10 miles from the reactor site. Predetermined protective action plans are in place for this EPZ and are designed to avoid or reduce dose from potential exposure to radioactive materials. These actions include sheltering, evacuation, and the use of potassium iodide where appropriate.

Ingestion Exposure Pathway

The ingestion exposure pathway EPZ has a radius of about 50 miles from the reactor site. Predetermined protective action plans are in place for this EPZ and are designed to avoid or reduce dose from potential ingestion of radioactive materials. These actions include a ban on contaminated food and water.

Emergency Classification Levels

If a nuclear plant declares an emergency, it does not necessarily mean there is an immediate condition at the plant that requires a response by Offsite Response Organizations (ORO). The emergency classification system is intended to bring offsite agencies to a higher state of readiness proportionate to the nature of conditions at the

nuclear power plant. The emergency classification system is based on four levels of classification beginning with the least severe (UE) and ending in the most severe (GE). The level of emergency class is called an Emergency Classification Level (ECL).

- Unusual Event
- Alert
- Site Area Emergency
- General Emergency

Nuclear power plant emergency classification system is standardized nationwide. All nuclear power plants in Florida use this emergency classification system.

Figure 17 – Emergency Classification Levels

ECL	SIMPLE PLAIN ENGLISH EXPLANATION
Unusual Event	Minor plant incident that does not affect safety
Alert	Plant incident that affects plant safety
Site Area Emergency	Major plant safety failure that affects the plant site
General Emergency	Major plant safety failure that affects areas beyond the plant site

For more information on Emergency Classification Levels, please refer to the Field Operations Guide for Nuclear Power Plant Response in Florida. This can be obtained by emailing

dem_rep@em.myflorida.com.

Emergency Action Levels

a. An Emergency Action Level (EAL) is a pre-determined, site-specific, observable threshold, trigger, or plant condition that places the plant in a particular emergency class ECL (UE, ALERT, SAE, GE).
b. Emergency Action Levels (plant operating conditions) determine Emergency Classification Levels (emergency classifications).
c. EALs are standardized and are based on whether the plant's reactor is operating (HOT) or shut down (COLD).
d. EAL categories:
    - R—Abnormal Radiation Levels/Radiological Effluent
    - C—Cold Shutdown/Refueling System Malfunction
    - E—Events Related to Independent Spent Fuel Storage
    - F—Fission Product Barrier Degradation
    - H—Hazards and Other Conditions Affecting Plant Safety
    - S—System Malfunction

State Management Team

In most cases, the first responders to a nuclear/radiological event/incident will be county or municipal emergency personnel. Leaders of these emergency response units will implement command and control of both the crisis and consequence management operations through a unified command structure established at or near the scene. If needed, State and/or Federal assistance will be mobilized to support the local command structure.

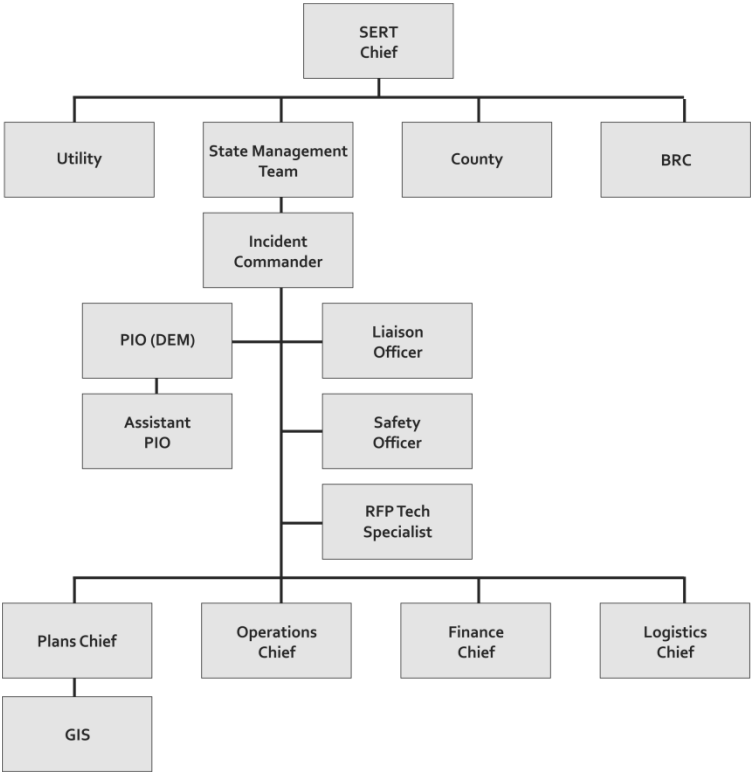
When an emergency at a commercial nuclear power plant escalates to an Alert status, the State Coordinating Officer may deploy a State Management Team (SMT) to the affected Florida nuclear

power plant's Emergency Operations Facility (EOF) or Alabama's Forward Emergency Operations Center. The State Coordinating Officer and the SMT Incident Commander will determine the size and composition of the SMT.

For events at Florida utilities, the State Management Team will consist of, at a minimum:

- Incident Commander
- Operations Chief
- Plans Chief
- Logistics Chief
- Finance Chief
- Radiological Emergency Preparedness Planning Technical Specialist
- Public Information Officer
- State Liaisons for the county Emergency Operations Centers

Figure 18 – Minimum Staffing Plan from Radiological Emergency Preparedness Program Manual (RPM)



The responsibilities below are common to all SMT members. An emergency at a nuclear power plant may begin at any of the four emergency classification levels.

Notification of an Unusual Event

- Monitor the situation

Notification of an Alert

- Monitor the situation
- Make preparations to deploy (SMT may deploy based on emergency conditions)

Notification of a Site Area Emergency or a General Emergency

- Monitor the situation
- Make preparations to deploy (SMT will deploy at these emergency classifications)

Upon Arrival at Emergency Operations Facility

- Receive team briefing from the utility (with counties and BRC, if available)
- Locate work area and conduct operational checks (such as computer/phone/EM Constellation)
- Advise SMT Leader/Incident Commander when operational

Concept of Operations (CONOPS) of Response to Nuclear Power Plant Emergencies in Florida

a. The CONOPS to nuclear power plant emergency response in Florida is DIFFERENT from that of other states. (see #6 of this section)
b. The Florida State Statute pertaining to Radiological Emergency Preparedness & response is 252.60. This statute recognizes the federal codes that pertain to nuclear power plant emergencies so that State and local officials have a basis in Florida statute by which they can implement the federal codes.
c. The federal codes that pertain to nuclear power plant emergencies are NUREG 0654–FEMA REP 1. These

regulations between the US Nuclear Regulatory Commission and the Federal Emergency Management Agency jointly govern operations both "inside the fence" of all nuclear power plants and among all the OROs (first responders) nationwide.

d. Florida is a home rule State. Effectively, this means that each county has the ability to change and overrule those decisions made by State government.

e. However, protective action decisions are implemented unanimously because of the high degree of cooperation among members of each nuclear power plant's task force. The task force of each nuclear power plant is comprised of risk and host county emergency management officials, State Emergency Management officials, State Department of Health–Bureau of Radiation Control officials and representatives of the nuclear power plant. This coherence allows for unity of purpose, which facilitates more efficient field operations.

f. During a nuclear power plant emergency, the OROs of the nuclear power plant's task force execute the protective action decision-making process jointly as one body AND in person. This process takes place at the Emergency Operating Facility (EOF). Each county and state agency are represented in person during the decision making process. This is the distinguishing feature of Florida nuclear power plant emergency CONOPS.

g. The general sequence of events for a nuclear power plant emergency in Florida is as follows:
   - Plant declares an Alert, Site Area, or General Emergency.
   - Risk, Host and State Emergency Operations Centers are activated, either fully or partially.

- The nuclear power plant's offsite Emergency Operating Facility is activated and the task force members convene in person.
- Based on the nature and severity of the emergency and their approved protocols, the nuclear power plant's representative issues a Protective Action Recommendation (PAR) to the local & State officials / members of the task force (OROs).
- The local & State officials/members of the task force, excluding nuclear power plant's representatives, review the utility's PAR and consider the issuance of a Protective Action Decision (PAD) for the general public.
- Local State(s) of Emergency (LSE) for the risk and host counties are considered and issued in accordance with each county's CEMP and the PAD. The timing of the issuance of the LSE may fluctuate between counties.
- Governor's declaration of emergency is considered and issued in accordance with the CEMP. The timing of the issuance of the Governor's Declaration may fluctuate.

h. PADs may include sheltering in place, evacuation, restrictions on travel in certain areas, curfew, agricultural restrictions on crops or animals care.

i. During the PAD making process, particular consideration is given to managed populations, which include hospitals, schools, jails, adult living, and childcare facilities.

j. Once a PAD is issued, the alert & notification process begins. This includes the use of audible tone alert & messaging (sirens/loud speakers), Emergency Alert System, NOAA All-Hazards Radio messaging, route alert messaging, and emergency broadcasting.

k. IF the PAD includes evacuation, citizens from the designated areas of the Risk Counties will be directed to

the appropriate Host County. Evacuation is not mandatory unless ordered by the Governor.

l. Evacuees will be directed to Radiological Emergency Reception Centers, which may or may not be in Host Counties. However, the evacuees are NOT REQUIRED to participate in reception center activities or receive services offered at these reception centers.

m. First responders, emergency workers (and their equipment) who become contaminated while performing operations in Risk Counties are decontaminated at pre-designated wash-down stations in the Risk Counties.

n. The PAD may include restrictions on agricultural activities, which may be implemented independently from other PADs.

Fundamentals of Alert & Notification For Nuclear Power Plant Emergencies in Florida

a. Primary alert & notification of a nuclear power plant emergency begins at the control room of the nuclear power plant.

b. The control room communicates the initial notification of an emergency with the OROs, both verbally and electronically via the use of the "Florida Nuclear Power Plant Emergency Notification Form". This form is designed to address all relevant information regarding the status of the plant, the reactor, PARs, atmospheric conditions, and projected operations that OROs need in order to ensure public safety.

c. The OROs at the County Warning Point(s) and State Watch Office receive and acknowledge the plant's emergency notification and follow established plans & protocols for the appropriate response.

d. Subsequent updates regarding the emergency are communicated using the same process.

e. Once a PAD is reached by the OROs, the general public is officially alerted by means of audible tone alert & messaging (sirens/loud speakers), Emergency Alert System, NOAA All-Hazards Radio messaging, route alert messaging, and emergency broadcasting. This is a NRC requirement; however, there are several exception areas throughout the country.
   - The Ocean Reef Community north of Key Largo in Monroe County is one such exception. This community is within the 10 mile EPZ of the Turkey Point Plant and uses an emergency telephone calling system instead of sirens/audible tone alert.

f. As of February 2011, there are no official means of using social media for the alert & notification process.

g. Unified messaging is decided upon at the EOF by the OROs. Pre-scripted messages are used in order to match plant scenarios with the appropriate protective action without the need to draft and approve language during emergency circumstances.

Implementation of Protective Actions

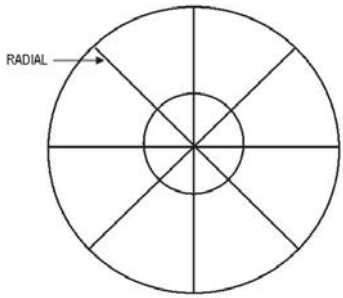
For people and household pets and service animals (HPSA):

a. Protective actions primarily include sheltering in place or evacuation.

b. In Florida, sheltering in place presents the secondary risk of overheating due to the lack of outside ventilation and air conditioning. Unless mitigated in some way, outside ventilation and air conditioning may deposit contamination inside structures. Not using ventilation and air conditioning in hot & humid weather is not only hazardous but also immediately dangerous to life & health for vulnerable individuals. Do not delay in performing a life safety action because of a radiological hazard.

c. Both protective actions present significant challenges and pose potentially life-threatening consequences for managed populations, which include hospitals, schools, jails, adult living, and childcare facilities.
   - Managed populations have emergency response plans for such circumstances, however additional resources may be required to assist such facilities achieve their objectives.

d. All nuclear power plants in Florida use a radial grid method of identifying locations in the community and distances from the plant.
   - The plant is located at the center.



   - Concentric rings are drawn in whole mile intervals from the center, i.e. the nuclear power plant.
   - Radials from the center are used to divide the concentric rings in sectors, areas, or zones. The terms sector, area, and zone are specific to each plant and are not necessarily interchangeable.
   - Locations within the concentric circles and divided by the radials are identified with letters or numbers.
   - The locations in the community where protective actions may be warranted are determined by downwind proximity from the plant based on wind speed and direction.

- The phrase "0-2 & downwind to 5" refers to sectors or zones or areas identified for protective action that encompass a 2 mile radius from the plant and sectors or zones or areas downwind from the plant up to 5 miles.

e. Evacuation is an emergency protective measure designed as an immediate action to guard against a clear and present danger. It is not intended to be a migration that involves preparation and relocation of household/commercial goods, valuables and other such commodities. First responders need to communicate this concept effectively in order to mitigate against radiological exposure and contamination.

f. Traffic control measures will include roadblocks, which are designed to force motorists away from the hazard and towards safety.

g. Risk counties use wash-down locations to decontaminate their emergency response equipment. These temporary facilities are not indented for use by the general public.

For Livestock, Show, and Domesticated Animals:

h. Protective actions primarily include sheltering in place or evacuation.

i. The use of stored feed and covered water may be required.

j. Special agricultural quarantines and restrictions may be put into effect as necessary.

k. Overall operations in the host counties included the following main components:
   - Emergency reception center operations
   - Issuance of potassium iodide (KI)
   - Sheltering & mass care operations

l. The emergency for Host Counties is not the nuclear power plant incident itself, but the influx and care of a large

number of potentially contaminated evacuees and their HPSAs.

m. Host counties that are also in the IPZ, may have additional operational priorities based on the spread of contamination. Such priorities will be typically but not exclusively agriculturally based.

n. Risk county evacuees will be directed to Radiological Emergency Reception Centers in the host counties. However, the evacuees are NOT REQUIRED to participate in the activities or receive services that are offered at these reception centers.

o. Receipt of services, i.e. emergency sheltering, is contingent on participation at the emergency reception centers.

p. **IF** Risk county evacuees need or want access to the sheltering services in the host counties, **THEN** they **ARE REQUIRED** to participate in the activities or receive services that are offered at reception centers. However, participation in host county reception center operations is strictly voluntary.

q. Risk county evacuees may voluntarily elect to make private arrangements for lodging at their own expense. These expenses may be reimbursable by the nuclear power plant. Private lodging owner/operators may refuse evacuees service based on fear of contamination.

r. Risk county evacuees are likely to bring their HPSAs to host county emergency reception centers. By federal law, service animals are allowed at the reception centers and shelters.
   - Pets are NOT service animals.
   - Distinctions and decisions must be made.

s. Radiological emergency (community) reception centers are temporary operations that exist because of the response to a nuclear power plant emergency.

t. Unless officially designated otherwise, all personnel providing services to evacuees at the emergency reception centers are designated as first responders or emergency workers.

u. Operations conducted at the emergency reception centers are NIMS compliant.
   - Unified Command should include members of Fire Rescue / EMS, Law Enforcement, Public Health and Emergency Management.

v. The primary objective of the community reception center(s) is to monitor, decontaminate as necessary, and register risk county evacuees so that the host county sheltering system does not become contaminated.

w. Operations at the community reception centers will be conducted in accordance with fundamentals of mass casualty, triage, decontamination, evidence/property collection practices that are modified for a nuclear power plant emergency.

x. Exigent circumstances may necessitate the utilization of reduced standards of care, i.e. a mass casualty incident.

y. Routine medical screening for common, non-life-threatening, non-acute, non-contagious public health maladies should not be undertaken at the community reception centers; as such, efforts will only delay the processing of Risk County evacuees and potentially jeopardize or endanger the evacuation.

z. Hospital emergency rooms will not be used for the non-life-threatening processing risk county evacuees as described in this guide.

aa. Community emergency reception centers will need to make provisions for the emergency medical care of risk county evacuees, i.e., the use of a separate paramedic strike teams for emergency response within the emergency reception center.

bb. "Through-put" or the rate, at which evacuees are processed, is dependent upon the resources available at each reception center.
    - The Crystal River Plant has relatively few residents (approximately 20,000) in the 10mile EPZ as compared to the St Lucie Plant which has the most (approximately 260,000 among the most populous in the country).
    - A limiting factor in reception center processing is the number of radiation portal monitors deployed at each reception center and the decontamination process.
    - Emergency resource requests for additional equipment and/or personnel should be directed to FDEM via the EM Constellation system.

cc. The community reception centers will be required to operate over multiple operational periods, at all times of day/night, and in all weather conditions.

dd. The community reception centers operate using the principles of control zones in order to prevent cross contamination.

ee. The objective of the reception center(s) is to process risk county evacuees. Persons who do not fit this definition should be excluded in order to maximize efforts for those truly in need. Persons excluded include the "worried well" from host counties and other areas of the region.

ff. The care of domesticated animals, livestock, and exotic pets will be coordinated by the Florida Department of Agriculture and Consumer Affairs – State Agriculture Response Team. This care will not be part of the community emergency reception center process.

Potassium Iodide – KI

Excerpted from FDOH-BRC SOPs & CDC fact sheets

a. General Considerations:
   - KI may be used to saturate the normal human thyroid gland with stable iodine. Saturation with non-radioactive iodine limits the uptake of radioactive iodine by the thyroid when ingested or inhaled. KI does not limit the uptake of the radioactive iodine by other body organs. KI offers no protection against exposure of the body (including the thyroid) to radiation originating outside the body.
   - KI is NOT an antidote to radiation sickness, exposure, or contamination.

b. Issuance of KI During a Nuclear Power Plant Emergency
   - The use of KI has been pre-approved by the State Surgeon General for State and county radiation workers and the general public. Based on actual releases of radioactive iodine, the Bureau of Radiation Control (BRC) Operations officer will direct that KI be taken.
   - During a rapidly escalation incident, where releases are imminent or have occurred, the county health officers may recommend county emergency workers take KI before consultation with the BRC Operations Officer. First responders & emergency workers should check with their supervisors and verify the order to take KI – Do NOT take KI based on rumor or assumption.

For more information on the use and issuance of KI please refer to the Field Operations Guide for Nuclear Power Plant Response in Florida. This can be obtained by emailing dem_rep@em.myflorida.com.

Figure 19 – Radiological Emergency Management Contact Information

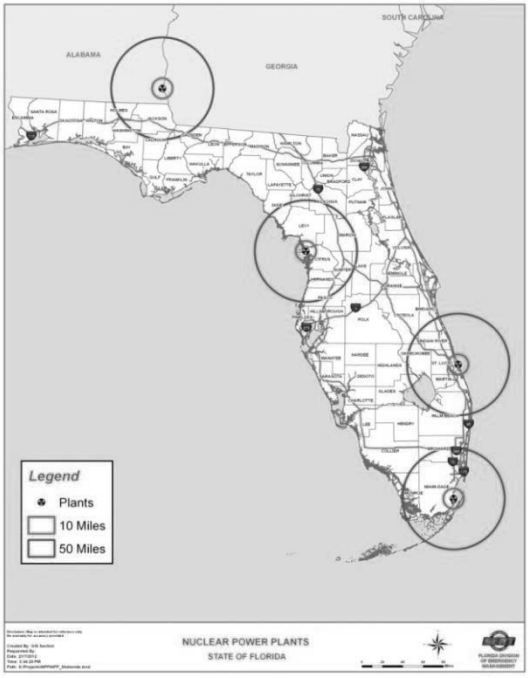
ORGANIZATION	CONTACT NUMBER
FL Division of Emergency Management	State Watch Office 850-413-9911
FL Bureau of Radiation Control	Duty Officer 407-297-2095

For more Radiological Emergency Management Contact Information

http://www.epa.gov/rpdweboo/rert/contact.html

Overview of Commercial Nuclear Power Plant Sites in or Impacting Florida as of March 2011

Figure 20 – Nuclear Power Plants in Florida



WARNING: Map NOT to Scale – image credit: FDEM GIS

Turkey Point Nuclear Power Plant

a. Location:
   - Homestead, Miami-Dade County

b. Owner/Operator:
   - Florida Power & Light Company

c. Technical Overview
   - Two Westinghouse Pressurized Water Reactors each inside reinforced concrete containment buildings

d. Emergency Operating Facility: The EOF for the Turkey Point Nuclear Power Plant is located on W Flagler St and SW 92nd Ave in Miami.

e. NOTE:
   - Homestead-Miami Speedway, Homestead Air Reserve Base, and Biscayne National Park are located within the 10 mile EPZ Turkey Point Nuclear Power Plant.

Saint Lucie Nuclear Power Plant

a. Location
   - Hutchinson Island , Saint Lucie County

b. Owner/Operator
   - Florida Power & Light Company

c. Technical Overview
   - Two Combustion Engineering Pressurized Water Reactors each inside reinforced concrete containment buildings

d. Emergency Operating Facility: The EOF for the St Lucie Nuclear Power Plant is located on Midway Rd west of I-95 in Ft Pierce.

Crystal River Nuclear Power Plant

a. Location
   - Crystal River, Citrus County

b. Owner/Operator

- Duke Power

c. Technical Overview
   - One Babcock & Wilcox Pressurized Water Reactors inside a reinforced concrete containment building

d. Emergency Operating Facility: The EOF for the Crystal River Nuclear Power Plant is located on W Venable St and US19/98 in Crystal River.

Joseph M Farley Nuclear Power Plant – Alabama

a. Location
   - Columbia AL (near Dothan)

b. Owner/Operator
   - Southern Nuclear Operating

c. Technical Overview
   - Two Westinghouse Pressurized Water Reactors inside reinforced concrete containment buildings

d. Overview of Planned Protective Actions in Florida for an emergency at the Farley Nuclear Power Plant in Alabama:

e. No portion of Florida lies within the 10-mile emergency planning zone, however; seven Florida counties, including Jackson, Calhoun, Liberty, Gadsden, Holmes, Washington, and a small corner of Bay, fall within the 50-mile Ingestion Pathway Zone.

f. A radiological emergency at the Farley Nuclear Power Plant can adversely affect the safety of open water supplies, dairy facilities and the food supply for humans and livestock. Human and animal foods may become contaminated. The health and productivity of farm livestock may be adversely affected through exposure to radioactive contamination.

g. The Departments of Agriculture and Health will monitor and conduct laboratory tests on human and animal foods and provide protective action recommendations to the Division of Emergency Management and to the counties

affected by a radiological release. The Bureau of Radiation Control Mobile Emergency Radiological Laboratory and field monitoring teams will be staged at the fire station at the Marianna Airport in Jackson County. The Department of Environmental Protection will provide assistance in locating public drinking water systems and the collection of samples and restrict consumption of surface water supplies in the event of a release of significant concentrations of radioactive material into those supplies.

NOTE: The specialized instrumentation used for nuclear power plant emergency RESPONSE is DIFFERENT from the specialized instrumentation that is used to interdict/detect illicit radioactive materials in Preventative Radiological Nuclear Detection operations (PRND). PRND is categorized as a PREVENT mission and uses different detection threshold values.

NOTE: For nuclear power plant emergencies, first responders & emergency workers will only use the equipment and detection values authorized by their Incident Commanders if the detection values are in accordance with FL Department of Health–Bureau of Radiation Control standards for monitoring.

For more information on Florida's Nuclear Power Plants please refer to the Field Operations Guide for Nuclear Power Plant Response in Florida. This can be obtained by emailing

dem_rep@em.myflorida.com.

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