

Nuclear Failure

General

Through a Memorandum of Understanding (MOU), the Nuclear Regulatory Commission (NRC) and FEMA share federal oversight for radiological emergency response planning matters for licensed nuclear power plants. Their mutual efforts are directed toward more effective plans and related preparedness measures at and in the vicinity of nuclear reactors and fuel cycle facilities. The Memorandum of Understanding between the agencies was signed on January 14, 1980, in response to President Carter's decision of December 7, 1979, directing FEMA to: coordinate all federal planning for the off-site impact of radiological emergencies; take the lead for assessing off-site radiological emergency response plans and preparedness; make findings and determinations as to the adequacy and capability of implementing off-site plans; and communicate those findings and determinations to the NRC. The NRC reviews FEMA findings and determinations in conjunction with the NRC on-site findings to determine the overall state of emergency preparedness.

A separate MOU, dated October 22, 1980, addresses NRC and FEMA cooperation and responsibilities in response to an actual or potential radiological emergency. Operations response procedures have been developed that implement the provisions of the incident Response MOU. These documents are intended to be consistent with the Federal Radiological Emergency Response Plan, which describes the relationships, roles, and responsibilities of federal agencies for responding to accidents involving peacetime nuclear emergencies.

Following the 1979 accident at Three Mile Island, the NRC reexamined the role of emergency planning for protection of the public in the vicinity of nuclear power plants. The NRC issued regulations requiring that, before a plant can be licensed to operate, the NRC must have "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." The regulations set forth 16 emergency planning standards and define the responsibilities of the licensee, and state and local organizations involved in emergency response. The added feature of emergency planning to the NRC's "defense-in-depth" philosophy provides that even in the unlikely event of a release of radioactive materials to the environment, there is reasonable assurance actions can be taken to protect the population around nuclear power plants.

Regulations

For planning purposes, FEMA and the NRC have defined the plume exposure pathway emergency planning zone (EPZ) — also known as an "at risk area" — as an area about 10 miles in radius, and an ingestion pathway EPZ about 50 miles in radius around each nuclear power plant. EPZ size and configuration may vary in relation to local emergency response needs and capabilities, as affected by such conditions as demography, topography, land characteristics, access routes, evacuation routes, and jurisdictional boundaries. Counties within the ingestion exposure pathway are considered "support counties." FEMA and the NRC's

requirements for emergency planning are contained in Title 10 of the Code of Federal Regulations, Part 50.47 and cover the following topics:

- Assignment of responsibility
- Emergency response support and resources
- Notification methods and procedures
- Public education and information
- Accident assessment
- Radiological exposure control
- Recovery and reentry planning and post-accident operations
- Responsibility for the planning effort
- Development, periodic review and distribution of emergency plans
- Onsite emergency organization
- Emergency classification system
- Emergency communications
- Emergency facility and equipment
- Protective response
- Medical and public health support
- Exercises and drills
- Radiological emergency response training

The Pennsylvania Emergency Management Agency (PEMA), in conjunction with the Commonwealth’s risk counties — which does not include Huntingdon — has identified the specific EPZ around each of the five nuclear power plants in Pennsylvania. As such, there are on-site and off-site Radiological Emergency Response Plans for each power plant. Each plant owner is required to exercise its emergency plan with off-site authorities at least once every two years to ensure state and local officials remain proficient in implementing the plan.

History

Pennsylvania is home to the worst nuclear facility accident in the history of the nation. Although it did not occur in Huntingdon County, the effects of it were felt nationwide. After the accident at Three Mile Island, state, county, and municipal entities designed plans for handling future accidents, so safety could be assured for all residents. However, many “unusual events” and “alerts” occur every year at the 100+ nuclear facilities across the nation.



Three Mile Island

These are events that require the notification of local emergency managers. For example, in 1997 alone, there were 40 notifications of unusual events, and three alert-level notifications nationwide.

Vulnerability

In the wake of an accident, the primary nuclear exposure for the immediate area around a nuclear power plant can last from hours to months. The health of the citizens in the surrounding area is the primary immediate concern, followed by the long-term impact on the environment. Livestock, livestock by-products, and crops can be contaminated for many years after a nuclear incident. The health effects reported from the psychological stress of individuals living in the immediate area will strain stress management and disaster psychology resources to the limit.

Huntingdon County is not located within the plume exposure pathway EPZ or ingestion pathway EPZ for any of the five nuclear facilities in the Commonwealth.

As seen below, there are three different types of nuclear accidents.

Nuclear Accident Categories	
Criticality	Accidents that involve a loss of control of nuclear assemblies or power reactors
Loss-of-Coolant	Accidents that involve a reactor coolant system experiencing a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating makeup system
Loss-of-Containment	Accidents that involves the release of radioactivity and have involved materials such as tritium, fission products, plutonium, and natural, depleted, or enriched uranium

Source: U.S. Nuclear Regulatory Commission (NRC)

Probability

Pennsylvania is home to the only nuclear power plant in the United States to have reached the emergency classification level of “General Emergency.” Since the 1979 accident at the Three Mile Island nuclear power plant, nuclear power has become one of the safest and most heavily regulated industries in the nation. The frequency of nuclear accidents in the United States is extremely low. Likewise, the likelihood of another incident at Three Mile Island is low.

Maximum Threat

The effects and impacts of a nuclear threat depend on the type of radiation released, the duration of the release, the volume of the release, and the existing weather conditions, such as wind speed and direction. Since Huntingdon County is located well outside the 10-mile “at-risk area” for the Three Mile Island facility, the risk associated with a Three Mile Island incident is dramatically lessened. Should a nuclear incident occur, the greatest threat and highest impact would be to the health and safety of the citizens. Additionally, the potential exists for catastrophic impacts on property, facilities, infrastructure, essential services, the environment, and the County’s economy. Dense population areas and outlying residential areas could experience the greatest impact as a result of radiation ingestion.

Secondary Effects

Power failure is the most common secondary effect of a nuclear incident. More serious secondary effects would include public health emergencies resulting from widespread radionuclide ingestion and/or radiation fallout.

Radionuclide contamination could have lasting impacts on structures, facilities, and infrastructure in the affected areas, primarily in urban and residential areas. Radionuclide ingestion by domesticated and farm animals could force agricultural product embargos, placing severe strain on the economy. Radiological particulate contamination of the environment may impact natural resources, disrupt service delivery, and cause work cessation and evacuations. Other response measures that result from the event could damage the local economy.