

## Emergency Planning and Preparedness for Nuclear Fuel Facilities

### Background

Following the accident at the Three Mile Island Unit 2 nuclear power plant in 1979, the Nuclear Regulatory Commission (NRC) reexamined the role of emergency planning for protection of the public in the vicinity of nuclear power plants and fuel fabrication facilities. The Commission issued regulations requiring that before such facilities could 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."

After a large, toxic release of uranium hexafluoride (UF<sub>6</sub>) at the Sequoyah Fuels Corporation conversion facility in 1986, the agency reevaluated the emergency preparedness for fuel facilities. The significant potential accidents at uranium conversion, fuel fabrication, and enrichment facilities and enrichment facilities are UF<sub>6</sub> releases, fires, and criticality accidents – the latter being an unintended, self-sustaining nuclear chain reaction. In general, there is likely to be little or no warning time before these accidents start. However, they are likely to be controlled within roughly half an hour in a majority of cases. Thus, quick decisions and prompt actions are necessary.

### Emergency Planning and Preparedness

Emergency planning has been adopted as an added conservatism to the NRC's "defense-in-depth" safety philosophy. Briefly stated, this philosophy:

- Requires high quality in the design, construction and operation of nuclear facilities and equipment to reduce the likelihood of malfunctions in the first instance;
- Recognizes that equipment can fail and operators can make errors, therefore requiring safety systems to reduce the chances that malfunctions will lead to accidents that release fission products or other radioactive and hazardous materials; and
- Recognizes that, in spite of these precautions, accidents can happen, therefore requiring high efficiency particulate air (HEPA) filters and other "trap" devices to prevent the release of fission products or other radioactive and hazardous materials offsite.

The added feature of emergency planning to the defense-in-depth philosophy provides that, even in the unlikely event of a release of radioactive and hazardous materials to the environment, there is reasonable assurance that actions can be taken to protect the population around nuclear facilities.

## Regulations

Fuel facility operators, licensed by NRC, have the responsibility to prevent serious accidents. Should that fail, the responsibility for protecting the public near the facility is considered to belong to offsite public safety authorities, such as local fire and police departments. The regulations require licensees to immediately notify those authorities of serious accidents. It is expected that the authorities would then notify the public in a manner similar to handling an industrial accident.

The licensee is required to develop and submit its emergency plan to the NRC, after offsite emergency response organizations review the plan. Each licensee is required to invite offsite response organizations to participate in its exercises.

The regulatory requirements for an emergency plan are contained in the NRC's regulations in Title 10 of the Code of Federal Regulations under Parts 40.31, 70.22, and 76.91. An emergency plan must include the following:

<ul style="list-style-type: none"><li>• Facility description</li><li>• Classification of accidents</li><li>• Mitigation of consequences</li><li>• Responsibilities</li><li>• Information to be communicated</li></ul>	<ul style="list-style-type: none"><li>• Safe shutdown</li><li>• Hazardous chemicals</li><li>• Types of potential accidents</li><li>• Detection of accidents</li></ul>	<ul style="list-style-type: none"><li>• Assessment of releases</li><li>• Notification and coordination</li><li>• Training</li><li>• Exercise</li></ul>
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Detailed guidance on emergency planning and preparedness is contained in NRC's Regulatory Guide 3.67, entitled "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities."

## Discussion

Currently, there are six operating fuel manufacturing facilities in the country that are involved in making nuclear reactor fuel from uranium. These are: AREVA NP, Inc., in Lynchburg, Virginia; B&W Nuclear Operations Group in Lynchburg, Virginia; Global Nuclear Fuels in Wilmington, North Carolina; Nuclear Fuel Services in Erwin, Tennessee; AREVA NP, Inc. in Richland, Washington; and Westinghouse Electric Company in Columbia, South Carolina. There is also the Honeywell International, Inc. uranium hexafluoride conversion facility in Metropolis, Ill., and the Shaw AREVA MOX Services, LLC mixed oxide fuel fabrication facility in Aiken, South Carolina.

For each facility, there is an emergency plan to assure that adequate protective measures would be taken to protect the public in the event of a radiological emergency. Biennial exercises of emergency plans are required at each facility. The NRC Incident Response Plan, which governs NRC's response to incidents, identifies specific individual and group responsibilities for responding to fuel facility emergencies. The NRC works closely with its licensees and with local, State, other Federal, and international organizations during an incident. As spelled out in the National Response Framework, the NRC, as the Lead Federal Agency, is responsible for Federal oversight of activities onsite and coordination of Federal assistance in conducting radiological monitoring and assessment, and development of protective action recommendations.

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