

Why GAO Did This Study

In 1975, a fire at a nuclear power plant damaged critical control cables and hampered operators' ability to monitor the status of the plant's reactor. NRC subsequently issued deterministic fire safety regulations for plants to follow, but differences in plant design, coupled with changes in NRC guidance, made it difficult for most plants to meet the regulations without seeking numerous exemptions. In 2004, NRC issued a regulation permitting plants to voluntarily transition to risk-informed fire protection requirements. This new approach mirrors NRC's efforts to adopt a more risk-informed regulatory approach to nuclear safety in general. In 2008, GAO reported on three key fire safety issues and recommended NRC take action to address them.

GAO was asked to examine (1) NRC's progress in resolving the long-standing fire safety issues raised in GAO's 2008 report at plants remaining under the deterministic approach and at those plants transitioning to the risk-informed approach; (2) the potential benefits of transitioning to a risk-informed approach and the basis for NRC's decision to make adoption of this approach voluntary; and (3) challenges, if any, in efforts to transition to a risk-informed approach in regulating fire safety. GAO reviewed documents; analyzed responses from operators at a nonprobability sample of 12 nuclear plants and from nine consultants or academic experts on fire safety issues and risk-informed regulations; and interviewed NRC, industry, and public interest group representatives.

GAO is not making recommendations in this report. NRC found the report to be accurate and complete.

View [GAO-13-8](#). For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov

NUCLEAR REGULATORY COMMISSION

Oversight and Status of Implementing a Risk-Informed Approach to Fire Safety

What GAO Found

The Nuclear Regulatory Commission (NRC), together with plant operators, has made progress in resolving three fire safety issues raised in GAO's 2008 report by implementing GAO's recommendations or taking other actions. NRC implemented the recommendation on multiple spurious operations (malfunctions caused by fire that could cause safety-related equipment to malfunction) by issuing new guidance or requiring additional modifications at the 36 plants with 57 reactors operating under deterministic regulations. NRC did not implement the recommendations to address the effectiveness of fire wraps or the extended use of interim compensatory measures plants use instead of repairing or replacing damaged safety equipment; however, NRC did take some actions, including (1) evaluating and reporting on corrective actions plants used to mitigate safety concerns associated with fire wraps and (2) developing metrics to gauge the progress of NRC's staff in resolve underlying issues related to the extended use of compensatory measures. According to NRC, plants transitioning to a risk-informed fire safety approach are continuing to resolve these issues through modifications and analyses required as part of the transition process. GAO visited two transitioning plants and observed examples of such modifications.

According to NRC officials, plant operators, and others GAO spoke with, the risk-informed regulatory approach to fire safety offers benefits over the deterministic approach, but NRC made adoption of the risk-informed approach voluntary because it considers plants that meet deterministic requirements to be safe. NRC officials stated that the risk-informed approach (1) will provide plant operators with information to help them quantifiably reduce risk and with flexibility in areas that do not affect risk and (2) allow operators to more easily demonstrate compliance with simplified licensing requirements. According to some of the plant operators, consultants, and experts GAO spoke with, plants will improve their safety using the risk-informed approach. NRC considered mandating the risk-informed approach, but it did not do so because of uncertainties over whether the agency could determine if the approach could improve protection of health and safety enough to impose new regulations. NRC considers plants that meet deterministic requirements to be safe, including plants that do so through approved exceptions to these requirements; thus, it does not plan to further analyze whether the risk-informed approach should be mandatory.

Plant operators, consultants, and experts GAO spoke with identified three challenges that may affect NRC's transition schedule and the number of plants that ultimately transition to the risk-informed approach. First, transition costs have been higher than initially expected, and operators from all of the nontransitioning plants GAO contacted cited this as reason they are remaining under the deterministic approach. Second, according to some operators, consultants, and experts, the absence of fire data may hinder the development of realistic risk assessments and contribute to overly conservative NRC risk assessment guidance, potentially leading to a misallocation of resources. NRC and other stakeholders disagreed with this assessment. Third, few people have expertise in risk analysis and fire modeling, and some operators, consultants, and experts expressed concern that the need for such expertise could compete with other safety-related efforts. However, most consultants and experts GAO spoke with believed that the number of people with expertise will be sufficient to support the transition effort.