

FOR: The Commissioners

FROM: William D. Travers  
Executive Director for Operations

SUBJECT: IMPROVING DECOMMISSIONING REGULATIONS FOR NUCLEAR POWER PLANTS

PURPOSE:

To provide the Commission with the results of the staff's recent spent fuel pool risk assessment and recommendations for using this information to improve decommissioning regulations for nuclear power plant. The staff also recommends a new approach to achieving overall improves in decommissioning regulations.

BACKGROUND:

Decommissioning nuclear plants pose a reduced risk to public health and safety when compared to operating nuclear plants but, in many regulatory areas, continue to be subject to the same requirements as operating nuclear plants. Because some of these operating nuclear plant based regulations are burdensome or unnecessary and lack commensurate safety importance for decommissioning nuclear plants, exemptions are typically requested by licensees after permanently shutting down. To increase the efficiency, effectiveness, and predictability of decommissioning regulations, the staff has been engaged in rulemaking activities which would significantly reduce the need to routinely process exemptions. Based on previously established priorities for decommissioning, the staff has been concentrating its rulemaking efforts in areas of emergency planning (EP) and financial protection (insurance). Recent issues with decommissioning safeguards requirements have resulted in rulemaking plans in this area as well. A key consideration in each of these rulemakings is the risk associated with storing irradiated fuel in a spent fuel pool. Reviews of previous exemption requests for decommissioning plant EP programs have been inconsistent in evaluating spent fuel pool risks and lacking a uniform technical basis. Development of rulemakings in the areas of EP and insurance has also revealed the staff's incomplete understanding of a drained spent fuel pool's heatup phenomena and the associated risks. During a Commission meeting on March 17, 1999, the staff was asked to reexamine the risk associated with storage of irradiated fuel in a spent fuel pool at permanently shutdown nuclear plants and develop a risk-informed technical basis for reducing decommissioning regulatory burdens. The staff was also requested during the meeting to determine whether decommissioning rulemaking activities in the areas of EP, insurance, safeguards (and possibly other areas) could be consolidated into a single, integrated, risk-informed rule which, to the extent possible, incorporates the staff's finding from its spent fuel pool risk assessment. As a consequence of this effort, the staff has re-examined its plan for future decommissioning rulemaking and has considered other ways to achieve and overall improvement of decommissioning regulations.

DISCUSSION:

**Spent Fuel Pool Risks**

After a nuclear power plant has permanently shutdown and defueled, the traditional accident sequences that dominate the operating plant risk are no longer applicable. The predominant source of risk remaining at permanently shutdown plants involves accidents associated with irradiated fuel stored in the spent fuel pool. Previous NRC sponsored studies have evaluated

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very unlikely severe accident scenarios that involve drainage of the spent fuel pool cooling water below the level of the irradiated fuel. Given certain combinations of spent fuel storage configurations and decay times, the discharged fuel assemblies will heat up to a temperature where a self-sustaining oxidation of the zirconium fuel cladding (zirc fire) might occur and result in cladding failure and a large offsite release of radioactive materials from the irradiated fuel. When evaluating the acceptability of licensee exemption requests from regulations in the areas of EP and insurance for permanently shutdown plants, the staff typically assesses the susceptibility of the spent fuel to a zirc fire accident. In some cases, the staff has requested heatup evaluations of the spent fuel in air. However, differences in licensee and NRC evaluations of spent fuel heat up phenomena have resulted in questions from industry stakeholders regarding the NRC's technical and regulatory basis for imposing severe spent fuel pool accidents scenarios on decommissioning licensees. Recently, one licensee asserted that the staff's request to perform a heat up analysis of a drained spent fuel pool constituted a backfit since such a concern was not considered in the original licensing basis of the plant and that NRC's resolution of Generic Issue 82 on beyond design basis accidents in spent fuel pools determined that additional actions were unwarranted because no cost effective design options were found that reduced the risk of these accidents. Although the backfit claim was resolved in favor of the staff, the NRC has not issued any further guidance on the basis for assessing spent fuel pool risks at decommissioning nuclear power plants. It should also be noted that there is no standard analytical methodology for performing spent fuel heat up calculations in a drained spent fuel pool nor does an NRC sanctioned computer code exist for conducting the evaluation. Consequently, processing of EP and insurance exemptions has become unpredictable for licensees and is resource intensive for both the licensee and the NRC staff.

Based on a commitment to the Commission, the staff has reassessed the risks from spent fuel pools at permanently shutdown nuclear power plants. As a result of this effort, criteria have been developed, which, when satisfied by a licensee, establish that significant risk reductions milestones associated with storage or irradiated fuel in spent fuel pools have been reached.

**\*\*\*\*\*RISK CRITERIA\*\*\*\*\***  
(UNDER DEVELOPED)

Summary discussion of criteria and implications to be provided here  
Detailed justifications of these criteria will be provided in Attachment 1 to this SECY paper  
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In reaching its conclusions, the staff kept the public informed and solicited comments and inputs throughout the process. A total of three public meetings were held to discuss these issues and receive recommendations from external stakeholders.

These spent fuel pool risk criteria provide a risk-informed technical basis for exemption requests and rulemakings. Subject to the Commission's approval, the staff will expect licensees to address the above criteria in support of any future decommissioning related exemption requests for EP or insurance (and others when applicable). As discussed below, the staff will take the necessary actions through the rulemaking process to incorporate these criteria into the applicable regulations for decommissioning nuclear power plants.