From: Glenn Kelly NRR
To: George Hubbard, Mark Rubin NRR
Date: Fri, Apr 21, 2000 11:03 AM
Subject:

Q1/21

Response by SPSB to fax by P. J. Atherton
on the Draft Final Decommissioning Risk Assessment
4/18/2000

Comments on Policy - #4 -

(Paraphrase) Your calculations from PRAs for the expected frequency of events such as TMI-2 and Chernobyl that actually occurred should be the starting point for developing acceptance criteria for acceptable risk for decommissioning spent fuel pools, not Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" (RG 1.174).

Answer: We believe that the thought process that went into the approach for using PRAs in risk-informed decision making for plant-specific licensing basis changes provides an excellent starting point for determining a risk-informed process for spent fuel pool risk at decommissioning sites. The technical analyses in our Draft Study indicate that the consequences of a zirconium fire at a decommissioning spent fuel pool are comparable, but not identical, to the consequences of large releases from operating reactors as evaluated in Level-3 PRAs. Besides working with the numerical guidance developed in RG 1.174, we have sought to assure that the principles of risk-informed integrated decision making outlined in the RG are addressed in our decommissioning analysis too. These principles include assuring sufficient defense-in-depth and safety margins are maintained while assuring that licensees monitor the industry commitments, staff assumptions, and the seismic checklist included in our report.

Comments on Failure Rates

(Paraphrase) The decommissioning spent fuel pool risk assessment should be redone using improved failure rate data based on non safety-related equipment failure rates.

Answer: The risk assessment we performed turned out not to be sensitive to failure rates of spent fuel pool cooling equipment. Among risk contributors, seismic dominated risk by an order of magnitude even though the return frequency of seismic events three or more times greater than the SSE is very low. For such seismic events, the contribution from fuel handler error was minimal on non-existent. For the next largest contributor, we assumed that no recovery was possible by fuel handlers after dropping a loaded cask (that approaches or exceeds 100 tons) into the spent fuel pool or near its edge. The next largest contributor is loss of offsite power due to extreme weather conditions, which is driven by the inability to restore power to the site and bring in emergency equipment, not by random equipment failure rates. In the next class of initiators, loss of cooling and loss of inventory sequences, which are dominated by the probability of continued fuel handler error over many days and shift turnovers, equipment failure rates are not an important link. In summary, the dominant initiators with respect to risk were seismic and heavy load drop that are effectively independent of fuel handler error. Failure rates of pumps, valves, and heat exchangers for spent fuel pool cooling systems are near the bottom of the list of ranked contributors to risk. So, changing the random failure rates of equipment would neither alter the bottom line numbers of the risk assessment significantly nor affect risk insights.

(Paraphrase) At the July 1999 workshop, Mr. Meisner, representing NEI, committed the nuclear industry to installing single failure proof crane systems at decommissioning plants. The crane systems were to use safety grade electrical equipment. What happened to this commitment?

Answer: Mr. Meisner did make a commitment at the July 1999 workshop that utilities would upgrade their crane systems at future decommissioning sites, if needed. He committed the industry to performing Phase II of NUREG-0612. In particular the industry committed to having a single failure proof crane or performing a consequence analysis. The technical bases for rulemaking and for exemption requests will reflect these commitments. There was no commitment made by the industry at the July 1999 workshop that called for the electrical portions of the crane systems to be safety grade beyond any guidelines in NUREG-0612.

Comments on Operator Action

(#1 - Paraphrase) NRC should specify how many operators should be at a decommissioning unit and should assure that those operators are protected in the event of a severe accident.

Answer: [SHOULD BE GIVEN BY DICK DUDLEY]

(#2 - What is the NRC doing to help assure that the fuel handlers standing watch over a SFP "graveyard" maintain their vigilance?

Answer: By letter dated November 12, 1999, NEI committed the nuclear industry to having procedures and training in place to prepare fuel handlers to respond to accidents at decommissioning spent fuel pools. In addition, the staff has identified assumptions it made in its analysis (e.g., walkdowns of SFP systems will be performed at least once per shift by the fuel handlers) that must be incorporated into the industry's practices if they are to gain exemptions in the area of EP. Together, the staff finds that these steps are sufficient to minimize the chances of operator errors that might occur during the long period needed for draining of the spent fuel pool to occur from loss of heat removal events.

General Comments

(#1 - Paraphrase) The NRC's own analyses show that the results of a zirconium fire at a decommissioning SFP would be as bad as a large release at an operating reactor (from a reactor core damage accident). The NRC should reconsider whether or not spent fuel pools need a containment.

Answer: Our report provides technical results and discusses the implications of these results with respect to the issues of reduced EP, indemnification, and security at decommissioning SFPs. Our technical analysis showed that the consequences of a decommissioning spent fuel pool zirconium fire are comparable, but not identical, to the consequences of a large release from a severe core damage accident at an operating reactor. Our analysis found the frequencies of these large releases to be similar. The Commission has determined that it finds the risks from operating reactors to be

acceptable, based in part on the numerical results from PRAs, including the expected frequencies of large releases. Your request to have containments put around spent fuel pools at decommissioning sites is a policy decision and would require rulemaking. As such, if you believe that SFPs need a containment, we suggest you petition the Commission for a rulemaking on the matter.

(#2 - Paraphrase) The draft Final Technical Study did not address experimental validation of the risk assessment.

Answer: Your desire for a discussion of experimental validation of risk results from the draft study is possibly a misunderstanding of how PRAs are performed. The models used in the risk assessment were based on NRC staff visits to actual decommissioning sites. The data for failure rates of equipment were taken from large databases of equipment failure rates. Initiating event frequencies were taken from the latest literature and were modified, as needed, to take into account the unique configurations found at decommissioning spent fuel pools. Our seismic analysis was based on work from a world renowned expert. The deterministic input to our risk assessment was carefully documented, and the deterministic analyses listed areas where data were lacking. We have attempted to address areas of uncertainty in the thermal hydraulics and fission product release areas. No areas have been identified that are both essential to decision-making for reduced EP and require additional research efforts .[PLEASE CONFIRM THIS REMAINS TRUE]