

December 24, 2003

Dr. Mario V. Bonaca, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REGULATORY EFFECTIVENESS OF UNRESOLVED SAFETY ISSUE A-45,
"SHUTDOWN DECAY HEAT REMOVAL REQUIREMENTS"

Dear Dr. Bonaca:

Thank you for your November 18, 2003, letter and comments on our effectiveness assessment of the resolution of Unresolved Safety Issue (USI) A-45. We agree with the Advisory Committee on Reactor Safeguards (ACRS) conclusion and recommendation that assessment of the effectiveness of Nuclear Regulatory Commission (NRC) regulations is important and should be continued. Within this context, we plan to perform additional studies on licensee performance in the area of shutdown operations. Events initiated from shutdown and refueling conditions were outside the final scope of the resolution process for USI A-45. Nevertheless, shutdown Probabilistic Risk Assessments (PRAs) have indicated that the decay heat removal (DHR) function during shutdown can be an important component of risk. We, therefore, plan to review operating experience of licensee performance in the area of shutdown operations with a focus on selected plant states, to understand if any areas deserve further regulatory or licensee attention, consistent with our goal of ensuring safety. We will continue to keep the ACRS informed of this and other regulatory effectiveness studies, and any follow-on actions that evolve from them.

With respect to the regulatory effectiveness assessment of the resolution of USI A-45, the ACRS concurred with the staff's conclusion that in most cases the associated risk from DHR is consistent with the NRC safety goals and defense-in-depth principles. Nevertheless, and as noted in the ACRS letter (Conclusion and Recommendation 1), the study found 11 individual plant examinations (IPEs) involving 17 pressurized-water reactor (PWR) units in Category 2, i.e., a category higher than what would be expected for plants having an acceptably small core damage frequency (CDF) or one reducible by simple improvements. Although no plants had a DHR induced CDF that required prompt action to reduce the probability of core damage, the plants with the highest CDFs did raise ACRS questions on the need for follow-on action. Our response to this and related ACRS questions is as follows:

- Are additional plant-specific actions appropriate for these [higher CDF] plants?

The effectiveness study found that all plants generally met USI A-45 resolution expectations without the imposition of generic hardware fixes to improve DHR reliability. The overall conclusion of the study indicated that the approach to resolve USI A-45 had been reasonable and effective, and that additional follow-on action for plants including those with the highest

estimated CDF, is not necessary. The findings and conclusions from the study, however, can be valuable in supporting plant reviews, and for identifying risk-significant areas at the plant-specific level.

- Would more sophisticated analyses show that the estimates based on IPEs are overly conservative?

It is likely that more sophisticated analyses would find a number of IPEs with overly conservative estimates. Conservative or bounding assessments are generally used to reduce time and resources necessary to complete probabilistic studies, including those that supported the IPE. In this context, additional defense-in-depth would have been provided in response to the identification and implementation of low-cost DHR improvements that may have resulted from the conservative assessments.

- Is it possible to make independent assessments of these plants with standardized plant analysis risk (SPAR) models?

It is possible to perform independent assessments using the SPAR model. For example, SPAR models were used to assess the impact of certain features such as feed and bleed in our assessment of USI A-45. However, since the SPAR models are not generally as detailed as the probabilistic safety assessment models that underlie licensees' IPEs, and since one of the stated objectives of the IPE was to analyze DHR vulnerabilities on a plant-specific basis, it is not expected that the use of SPAR models will lead to significantly different insights into the need to enhance the DHR function for the selected plants.

We agree with the ACRS that the upgrading of SPAR models to the level of those currently used in the pilot studies for the Mitigating Systems Performance Index will give the staff independent capability to assess (from a probabilistic perspective) the effectiveness of current and proposed regulations and additionally improve the accident sequence precursor program. Supplementing insights obtained from analyses with SPAR models with operating experience reviews and in-depth technical assessments will when taken together, provide NRC with a sound technical basis for regulatory decision making. Deterministic regulatory criteria and initiatives, including the application of the maintenance rule, are also key in assessing regulatory effectiveness.

In response to ACRS "Conclusion and Recommendation 2," the staff also agrees with the ACRS that IPEs alone are not to be relied upon to assess the effectiveness of the of NRC regulations. Many other data sources and information enter into regulatory effectiveness reviews, including operating experience assessments, inspection reports, independent equipment reliability studies, insights from NRC and licensee probabilistic risk assessments, and information contained in responses to various regulatory requests and bulletins. In addition, SPAR models are being upgraded as discussed above to enhance NRC's ability to perform independent analyses, and the staff continues to gain access to the latest licensee risk information. The ACRS letter also expressed concerns regarding the problem of ensuring that licensees' IPE and associated DHR evaluations have been realistic. Further analyses to identify limiting conditions to reduce uncertainties associated with credit taken for enhancing the DHR is under consideration. The thermal-hydraulic analyses that were used to support the IPE's success criteria can have an impact on the realism and associated insights. We will

continue to consider further analyses in this area to identify the limiting thermal-hydraulic conditions to reduce uncertainties associated with the credit taken for enhancing the DHR function under accident conditions.

Once again, we agree with the ACRS (Conclusion and Recommendation 3) that assessment of the effectiveness of NRC regulations is important, and they will continue. We will keep the ACRS informed of any new findings or other initiatives in this areas.

Sincerely,

/RA/

William D. Travers
Executive Director
for Operations

cc: Chairman Diaz
Commissioner McGaffigan
Commissioner Merrifield
SECY

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