

August 28, 2001

MEMORANDUM TO: Cynthia A. Carpenter, Chief
Generic Issues, Environmental, Financial
and Rulemaking Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

FROM: Timothy A. Reed, Senior Project Manager/**RA**/
Generic Issues, Environmental, Financial
and Rulemaking Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

SUBJECT: TRIP REPORT - OBSERVATION OF RIP50 OPTION 2 PILOT
ACTIVITIES (IDP DEMONSTRATION) AT QUAD CITIES NUCLEAR
POWER PLANT

On August 15, 2001, the BWROG RIP50 Option 2 Integrated Decision-making Panel (IDP) met at Quad Cities Nuclear Station. Quad Cities is the lead plant for the BWROG pilot activity supporting RIP50 Option 2. The RIP50 Option 2 pilot activity is piloting the draft implementation guidance for Option 2 contained in NEI 00-04. The NRC staff attended the IDP, observed the IDP deliberations, and provided preliminary feedback to industry on August 16, 2001. In attendance from the NRC were M. Cheek, G. Kelly, and T. Reed.

Attached is the trip report documenting the staff's observations.

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Trip Report
RIP50 Option 2 Pilot Activity
Observation of IDP at Quad Cities (BWROG Pilot)

Introduction

On August 15, 2001, the BWROG RIP50 Option 2 Integrated Decision-making Panel (IDP) met at Quad Cities Nuclear Station. Quad Cities is the lead plant for the BWROG pilot activity supporting RIP50 Option 2. The purpose of this IDP session was to pilot the draft implementation guidance for Option 2 contained in NEI 00-04. The NRC staff who observed the IDP deliberations were M. Cheok, G. Kelly, and T. Reed. On August 16, preliminary observations and lessons-learned from the IDP session were discussed among the representatives from Quad Cities, the BWROG, the WOG pilot plant representatives, and the NRC staff. Where applicable, these lessons-learned are to be applied in future BWROG activities, upcoming WOG pilot activities, in the updates of the NEI guidance documents, and in the staff's RIP50 Option 2 rulemaking efforts.

As part of this BWROG pilot activity, the IDP deliberated on three systems: Core Spray, Standby Gas Treatment, and Feedwater. The IDP activity focused on the categorization of SSCs into the risk-informed safety classes (i.e., RISC-1, RISC-2, RISC-3, and RISC-4). Treatment requirements for the re-categorized SSCs were not within the scope of this IDP session.

Prior to this IDP meeting, the BWROG had assembled a draft report: NEDC 33036, "Option 2 Pilot Program For Quad Cities, Boiling Water Reactor Owners' Group." The report provided a substantial portion of the information on which the IDP deliberated. Based on guidance from the draft revision A2 of NEI 00-04, this report utilized plant-specific risk insights, defense-in-depth arguments, and traditional engineering calculations to identify potentially high and low safety significant SSCs for the three systems identified above at Quad Cities.

The following plant-specific models and tools were utilized to support categorization of SSCs for the Quad Cities Option 2 pilot effort: internal events PRA (CDF and LERF model at full power operation), internal fires PRA, seismic margin assessment, IPEEE screening assessment for external hazards, and the SENTINEL/ORAM outage management model for low power and shutdown modes of operation.

IDP Approach

The IDP's review of the three systems piloted was intended to judge the acceptability of the proposed categorization of the SSCs. The IDP decision was to either: 1) accept the categorization results, 2) accept the categorization results with qualifications, or 3) reject the categorization results, based on a consensus of the panel.

Prior to review of the first system, the issue of the acceptability of the Quad Cities PRA for SSCs for the Option 2 process was presented to the IDP. It was stated that the PRA complies with the guidelines proposed in NEI 00-04 (including a peer review as described in NEI 00-02).

The IDP first reviewed the proposed system boundaries and identified system functions. System functions were identified using information sources such as maintenance rule, UFSAR, and the PRA. Although not done for the pilot demonstration, the Quad Cities representative indicated that for an actual IDP process, the system engineer would be required to sign off on whether all functions had been correctly identified prior to the package going to the IDP. Once the IDP reviewed the system functions, IDP members had to agree that the functions had been completely identified.

The IDP next reviewed the available risk insights for each identified function. The importance of SSCs with respect to the system functions (for applicable initiating events and plant operating modes) were discussed. Results of PRA importance measures and other qualitative risk insights (initiating event prevention, reliability of passive systems, systems supporting operator actions, etc.) were presented. Defense-in-depth arguments were discussed. Finally, supplementary information such as radiation protection, ALARA, and personnel safety were considered. This effort comprised the majority of the IDP's review for each system. Following this review, the IDP voted as to whether the panel agreed with each item in the presentation.

NRC Observations

1. The staff believes that since the issues of categorization and treatment are somewhat dependent, it is very difficult to separate these issues during an IDP session. Therefore, potential changes in treatment should be discussed by the panel as part of their deliberations to determine safety significance. For example, for SSCs being categorized as RISC-3, such a discussion would enable the panel to better understand the potential effects of the re-categorization which may influence the panel decision to re-categorize the SSC or to remove a specific special treatment from the SSC. For SSCs being categorized as RISC-2, it is important to understand what treatment is currently being applied and whether this treatment adequately addresses the safety significant attribute(s) identified for the SSC. It is therefore suggested that future IDPs discuss the concept of treatment as part of the deliberation of SSC categorization. Note that this discussion could be at a higher level and specific details of the requirements may not be necessary at the categorization phase.
2. It is important to document the bases for the IDP decision. This helps future deliberations for other systems, particularly for systems that have similar functions, and for situations such as selective or phased implementation. Documentation enables both the IDP and third parties to determine what was done and what credit is being taken for a system (e.g., from a support system or a redundant system), what credit is taken for operator actions (if any), or what risk increase is involved.
3. The report, handed out prior to the IDP session contains a lot of useful information. It was not clear how familiar the IDP members were with the contents of the report. Discussion of the findings of the report would provide a good starting point for the IDP deliberations and a good start to the basis for their decisions. This may make the IDP deliberations more focused and efficient.
4. There was very little discussion of margin of safety. The staff believes that NEI 00-04 should contain more detailed guidance on how margins should be treated in terms of Option 2 applications to help support IDP discussions. For example, for the Quad Cities pilot demonstration, this may have been helpful during the discussion of the core spray sparger.

5. The Quad Cities IDP illustrated the need for more guidance in NEI 00-04 regarding the categorization of SSCs that do not affect CDF and LERF. For example, the IDP discussion regarding the standby gas treatment system would have been more focused, and the basis for decision-making would have been clearer, if such guidance existed in NEI 00-04. This would also apply to other systems such as post accident sampling system, containment systems, etc.

6. There should be a distinction between the use of quantitative risk approaches versus the use of qualitative risk approaches when both approaches are available to support categorization for Option 2. For example, Quad Cities has a PRA for shutdown operations but chose not to use it since it was not a verified model and it was judged to be tedious to use. Instead, a more simplified model which is used for outage management was also used in the Option 2 categorization. When models such as these are used (this also applies to the use of screening methodologies for fires, seismic and other external events) it should be argued that the results of the categorization are more conservative (i.e., tend to categorize more SSCs as safety significant) when compared to when a PRA is used. One way to accomplish this could be to apply more conservative guidance during the deliberations for defense-in-depth and/or safety margins.

7. In the Option 2 process, the role of importance measures is to identify “candidates” for RISC-3 and RISC-2. However, it is the calculated change in risk that helps determine the acceptability of the proposed changes in treatment requirements. Understanding this concept may help in the “borderline” cases where an SSC’s importance is very close to a RAW or FV criteria. This will also help resolve the concern that importance measures deal only with single SSCs and not groups of SSCs (since the calculation of CDF and LERF considers the whole population of SSCs). For Option 2, current staff guidance states that the change in CDF and LERF from the re-categorization of SSCs should be small and be consistent with the guidelines provided in Reg Guide 1.174. This places more importance on managing risk changes such that there will not be a systematic increase in risk beyond the Reg Guide 1.174 guidelines for each system added to a phased or selective implementation process.

8. It was noted that, although a “flood prevention” function was identified as an item of discussion for the IDP, a fire prevention function was not identified. SSCs that could limit fire initiation, fire growth, or the spread of fire to other fire areas may in some cases be as important as SSCs identified as being important in the prevention of flood initiation and/or mitigation.

9. This pilot illustrates the importance of the involvement of the system engineer in the process. The system engineer would be key to determining systems boundaries, systems functions, and more complex situations like physical interactions, or flooding etc. The system engineer should also be available to support the IDP panel discussion and to answer questions that arise.

10. The maintenance rule (MR) expert panel delphi assessment of SSCs and functions appears to be a good source of information to consider for Option 2 categorization determinations. It is important to be able to understand the basis for the MR panel decisions. For example, for Quad Cities the SGTS scored less than 300 in the MR categorization process; however, the MR panel still categorized SGTS as high safety significant to be conservative (from a licensing/inspection/enforcement perspective) .

11. The Quad Cities IDP illustrated the importance of going through all functions for RISC-2 SSCs to assure all important attributes are identified. This enables the IDP to understand all the important attributes such that any additional treatment on these RISC-2 SSCs can be focused accordingly. For example, if just one attribute/function causes a SSC/train/function to be RISC-2 and there are disincentives to re-categorizing such as cost or increased dose, then the IDP may be able to address the key attribute only (as opposed to a whole train or system) and avoid unnecessary costs and dose while still addressing the safety aspects.

Observations Provided By Industry Participants and Observers

Industry participants and observers provided the following additional observations regarding the pilot IDP process, NEI guidance, and the categorization report (NEDC-33036):

Lessons Learned (Process)

1. Conducting the IDP and the training for the IDP took longer (80-200 man-hours) than expected. There is a mind set that the IDP is similar to the Maintenance Rule Panel, but there are some major differences. It was estimated at 6-8 hours per system, and it was closer to 2-4 times longer including preparation time.
2. The check sheets were helpful for IDP deliberations. Even with the guidelines and the checklists, there was considerable confusion on how the Panel was to be conducted. The check sheets need to be completed to the component level and distributed to the IDP prior to the panel meeting. It may be helpful to have this defined in the guidelines, but this will increase the resources needed for the process.
3. The Wolf Creek IDP should be video taped and edited to show critical elements, e.g., introductory information, deliberations, approvals, and open items.
4. For a utility to pursue Option 2, a program manager (like Maintenance Rule) would be needed.
5. The quality of the documentation (report and checklists) needs to be defined. If the proposal is rejected, does that go into the plant's corrective action program?
6. There is more detailed guidance to support categorization of SSCs to RISC-3. More guidance (perhaps in the form of supplementary questions) may be helpful to support IDP deliberations for categorizing SSCs as RISC-2.
7. The process will need to be proceduralized and supported with training, if it is to be pursued by a utility.
8. The material provided to the IDP should be a reviewed, verified, and approved document(s).
9. Consideration should be given whether to model the IDP to operate more like plant review committees or more like Maintenance Rule expert panels.
10. The report may have been too much to digest prior to the IDP meeting. Possibly a summary should be prepared.

11. There should be a critique of the IDP meeting by the panel.

NEI Guideline Feedback

1. System boundaries need to be clearly defined and the P&IDs need to be used. The concept of one SSC being safety significant for one risk, and how this may or may not extend to other SSCs (in terms of safety significance) in the same system needs additional consideration particularly for systems where there are a large number of SSCs such as feedwater.

2. There is a need to determine what authority the IDP has for making a determination that an SSC is low safety significant when the PRA indicates the SSC is safety significant.

3. The margin between the importance measure value determined for an SSC and the criteria that are to screen the SSC as safety significant (Fussell Vesely= .005, RAW = 2) should be addressed.

Changes To The Report

1. The check sheets utilized for the IDP should be part of the report.