November 06, 2001

MEMORANDUM TO: Cynthia A. Carpenter, Chief
Risk Informed Initiatives, Environmental, Decommissioning and Rulemaking Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

FROM: Eileen M. McKenna, Senior Reactor Engineer**/RA/**
Risk Informed Initiatives, Environmental, Decommissioning and Rulemaking Branch
Division of Regulatory Improvement Programs
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SUBJECT: TRIP REPORT - OBSERVATION OF "RIP50 OPTION 2" PILOT ACTIVITIES (IDP DEMONSTRATION) AT WOLF CREEK NUCLEAR STATION

On October 24-25, 2001, a pilot activity for the rulemaking on risk-informing special treatment requirements in 10 CFR Part 50 (RIP50 Option 2) was conducted. Specifically, a session of the Integrated Decision-making Panel (IDP) met at Wolf Creek Nuclear Station to categorize structures, systems and components in two systems. Wolf Creek is the lead plant for the Westinghouse Owners Group (WOG) pilot activity supporting RIP50 Option 2. This 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 October 25, 2001. In attendance from the NRC were G. Kelly, and E. McKenna.

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

Attachment: As stated

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Package Accession#ML01
Attachment 1 Acc#ml013
Attachment 2 Acc#ML13060457
NRR-106
DOCUMENT NAME: G:\RGEB\EMM\WC TRIP REPORT.WPD

OFFICE	RGEB:DRIP	SPSB:DSSA	RGEB:DRIP
NAME	E. McKenna	G. Kelly	S. West
DATE	11/02/01	11/05/01	11/06/01

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Trip Report
RIP50 Option 2 Pilot Activity
Observation of IDP at Wolf Creek (WOG Pilot)

Introduction

On October 24-25, 2001, a session of an Integrated Decision-making Panel (IDP) met at Wolf Creek Nuclear Station to categorize structures, systems and components in two systems. Wolf Creek is the lead plant for the Westinghouse Owners Group (WOG) 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 G. Kelly, and E. McKenna (refer to attachment 1 for a complete list of meeting participants). On October 25, 2001, preliminary observations and lessons-learned from the IDP session were discussed among the representatives from Wolf Creek, the WOG, NEI, a representative from the other WOG pilot, and the NRC staff. It was noted that some of the issues from the first pilot IDP at Quad Cities had been addressed during the Wolf Creek IDP. Where applicable, these lessons-learned are to be applied in future pilot activities, in the updates of the NEI guidance documents, and in the staff's RIP50 Option 2 rulemaking efforts.

As part of this pilot activity, the IDP deliberated on two systems: Containment Spray and Normal Service Water (as distinguished from the Emergency Service Water System that is a safety-related system at Wolf Creek). 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 discussed during this IDP session.

Preparation for the IDP

Prior to this IDP meeting, Westinghouse, under contract to the WOG, had prepared data sheets that summarized recommended categorizations for groups of equipment, organized by function. These data sheets, and supporting background material provided a substantial portion of the information on which the IDP deliberated. Based on guidance from the draft revision B of NEI 00-04, the contractor preparing the preliminary materials utilized plant-specific risk insights, defense-in-depth arguments, and traditional engineering calculations to identify potentially high and low safety significant SSCs for the two systems identified above at Wolf Creek. The data sheets covered both the "active" components for particular functions and "passive" pressure boundary components (this latter information was based upon the process outlined in draft ASME Code Case "Risk-Informed Safety Classification for Use in Risk-Informed Repair/Replacement Activities). In part because of scheduling and resource reasons associated with the pilot effort, these materials were not reviewed by Wolf Creek plant staff before the IDP.

A guidance document was prepared by the WOG for the panel's use, which discussed the purpose, the risk categories, categorization guidance drawn from NEI 00–04, and the expectations for the panel. Training for the panel was conducted on the overall process. The IDP panel members did not review the filled-out data sheets and other information in advance of the meeting.

IDP Approach

The IDP's review of the two 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, or 2) return the categorization results to the working group (in this case, Westinghouse) to resolve open issues, based on a consensus of the panel. A formal process, involving motions, seconds, voting, and documentation of decisions was employed. Voting members on the IDP represented various disciplines, and there was a (non-voting) panel chair to conduct the process. The system engineer and the working group were also present for the discussion.

The following plant-specific models and tools were utilized to support categorization of SSCs for the Wolf Creek Option 2 pilot effort: internal events PRA (CDF and LERF model at full power operation), and qualitative insights from the IPEEE for external events, including fires, and for low power and shutdown modes of operation. This included review of emergency operating procedures.

Prior to review of the first system, the issue of the acceptability of the Wolf Creek PRA for SSCs for the Option 2 process was presented to the IDP. It was noted that the PRA had been subjected to a peer review as described in NEI 00-02, conducted in August 2000. It was noted that all grades were "3" (with a few contingent). The facts and observations were also screened and reviewed.

The data sheets were organized by functions. The summary page characterized the function and provided the proposed categorization results arising from the various parts of the process (see example sheet - attachment 2); associated with each summary page was the list of components that support that function. Because of the two different processes, separate sheets for active and passive components were prepared. The data sheets as presented tried to list each SSC under only one function. In was recognized that many SSCs contribute to multiple functions (and the data base does capture this), but the summary pages tried to present the "limiting" case. This was an area identified for enhancement in presentation to better capture the multiple functions for each component.

In preparing the lists of components, the working group had used piping and instrument drawings, equipment lists, maintenance rule scoping documents and other information. The IDP first reviewed the identified system functions and also the proposed lists of SSCs. System functions were identified using information sources such as maintenance rule, UFSAR, and the PRA. Although not done for the pilot demonstration, for an actual IDP process, the system engineer would review whether all functions had been correctly identified and if the set of SSCs was complete 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. (As noted, the material was not reviewed in advance by the panel, but the members were quite familiar with system functions and the majority of components, but some questions did arise about whether particular SSCs were associated with the correct functions. Resolution in some cases involved consulting the drawings and agreeing upon how the system or functional boundaries should be divided).

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. 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 the categorization, as well as what information should be recorded in the documentation about that function.

For simplicity during the pressure boundary categorization, large sections of piping were considered together; this effort was conducted primarily to exercise the latest revision of the ASME code case, rather than to specifically recategorize individual pipe segments at Wolf Creek. Thus, the most limiting result was applied to the set. In a plant-specific application, a finer definition of segments and functions would be done to permit a gradation of significance. As shown on the summary sheet, this process considers quantitative results (from the risk-informed ISI program), as well as several qualitative factors, which were assessed by the staff in its review of the South Texas exemption relating to pressure boundary components. (On the summary sheet, a "FALSE" answer means that the rank is not "high" for that factor; so in the example, the safety function area was ranked "high" for the reason listed in the comment field).

As noted in the observations below, the draft code case process generated a number of questions and areas for possible improvement in application. Certain areas of the NEI guidance were also noted for improvement.

Certain component types, such as pipe supports and cables were not categorized in this pilot effort. It was noted that pipe supports and snubbers could be associated with the piping sections that they support, and derive their risk significance from the rating of the piping, but this was not done as the data were not available to the contractors.

A critique of the IDP meeting (and process) was conducted by the panel after the session. The comments offered by various participants during the critique and summary discussions are presented below.

Wolf Creek IDP Summary Observations

<u>NRC</u>

1. Understanding of system boundaries and functions is crucial to the process. Using the maintenance rule information as a "benchmark" of function significance (and also to explore reasons when differences were seen) was helpful.

2. Consideration of both "active" and "passive" was challenging, with differences in the guidance and consistency issues (e.g., high/low categories for active and high/medium/low for passive, use of different risk metrics (CDF/LERF) vs. focus upon consequences). Considerable discussion arose during the meeting about whether certain components were "active" as well as about functions (active or pressure boundary). A good example was the issue of the sump screens, as they related to the function of "provide collecting reservoirs from which the containment spray pumps can take suction after contents of the RWST have been expended." (Also arose with respect to snubbers and cable).

3. It was important to keep clear in the discussions the distinction between “safety” functions that arise from the design basis (with the corollary that only treatment would be changed, and there is a need to “maintain function” consistent with licensing assumptions and safety analyses) and the risk-significant functions (deriving from realistic analyses like PRA). These can lead to different characterizations about what the function is, and what SSC are necessary to achieve them. It was observed that the summary sheets should be clearer on this point, and that this could have reduced some of the time spent by the panel in working through what was being presented and reconciling that with their respective frames of reference.

4. The staff noted that there was a conscientious effort by the panel members to deliberate on issues as appropriate and not just jump to a decision. (In the case of the information about the effect of containment spray (being available or not) for LERF, staff was surprised there was not more challenge to the presentation that there was little effect - it was later said that the magnitude of release in either case (with or without spray) was viewed as LERF - so sensitivity studies were not done to determine the difference).

5. There was little discussion about large late release, which NRC has identified as a concern about the categorization process.

6. The staff stated that it was important for the IDP members to understand the PRA results as they consider the SSC functions and categories, to keep in mind the dominant sequences, minimal cutsets, and role of support systems. Perhaps having a wall chart (or other summary information) available would be beneficial.

7. The panel did not discuss potential changes in treatment - this might have been helpful in the discussion about safety margins, from the perspective of what is important to preserve and what might be changed.

8. Documentation is an important part of the process, and the recording that was being done of decisions and rationale will help later.

9. There were efforts to discuss safety margins, but panel members felt there was a need for more guidance on how this is to be done. 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.

10. As noted for the QC pilot, the involvement of the system engineer in the process is important. The system engineer would be key to determining systems boundaries, systems functions, and more complex situations like physical interactions, or flooding etc. For Wolf Creek, the system engineer(s) were available to support the IDP panel discussion and to answer questions that arose.

11. The maintenance rule (MR) expert panel assessment of SSCs and functions was used as a source of information for Option 2 categorization determinations. The documentation of results from this IDP was being placed into their maintenance rule data base. In a few instances, a followup item was established for an action concerning the maintenance rule implementation process arising out of the review of this information and how it related to the categorization for Option 2. During the discussions, minutes were taken about the deliberations of the panel.

12. The IDP process as applied to the systems at Wolf Creek highlighted certain areas in both the NEI guidance, as well as in the draft ASME code case that should be clarified:

For NEI 00 -04:
(A) Defense-in-depth matrix for SSC (and applicability for RISC2 and 3).
(B) D-I-D matrix on containment isolation - are the conditions “or” or “and”?
(C) Need for guidance on IDP consideration of common-cause failures
(D) Need for guidance on IDP consideration of safety margins
(E) Need for guidance about the qualitative factors that the IDP is to “consider”and how decisions are to be made on whether a function is risk-significant based on those factors (if the PRA shows low).

For Code Case:
(A)Consistency of qualitative factors compared to 00-04 (and other processes, e.g. maintenance rule) with respect to consideration of Severe Accident Management Guidelines (in addition to EOPs). Also need to clearly understand such ideas as “provides significant mitigating function”, or “essential to important operator actions required to mitigate”, or all pipe segments could be “high.”
(B) If any of the qualitative questions is answered “high,” should this automatically make the overall rating high (as currently drafted), or does this negate the decision-making functioning of the IDP.
(C) Certain wording about the factors was identified for improvement, for instance see wording in brackets: “Failure of the piping segment will result in failure of [other] safety significant piping segments [and what about components?], e.g. through spatial interactions”. And “Failure of the segment will result in unintentional releases of radioactive materials ~~even~~ in the absence of severe accident conditions”.

<u>NEI</u>

1. The use of documents by the IDP (e.g., WOG guidance, NEI 00-04, etc.) was good. It might be helpful to have a checklist of what information to have available at the IDP. For instance, at one point, piping layout drawings were sent out for and a need was identified for some drawings of connected systems (to note locations of isolation valves). Also used were system boundary drawings (quality classes), arrangement drawings (with location of certain equipment), EOPs, PRA information.

2. There was good interaction and discussion among the IDP members

3. Enhancements from last IDP were the involvement of systems engineers and (Wolf Creek) PRA experts (their absence due to illness on second day was felt), as well as in the area of documentation of results.

4. An issue from last time was the use of the corrective action (PIR) process, or other means to track actions. (The IDP either accepted the recommendation or returned the recommendation for resubmittal. In a few instances, issues were identified for followup into processes or information outside of the IDP deliberation. For instance, one equipment list being used (which was not a controlled drawing) had some inconsistent information; a PIR was prepared to resolve the problem with the list).

Wolf Creek IDP members

1. In some ways, the IDP session was a combination of training and demonstration, in terms of discussion about how certain of the guidance materials should be used, or how particular factors should be evaluated.

2. It is helpful to have P&IDs marked, perhaps with color coding, to show the boundaries associated with the different functions. The summary sheet descriptions were in many instances insufficient to understand exactly what was included or not included. Having the drawing on an overhead, such that it could be pointed to and boundaries traced during discussion would have been helpful.

3. The discussions would have been more efficient if more background on the systems and their functions was presented before the specific groupings were discussed.

4. While maintenance rule scoping functions were helpful, also saw a benefit in having FSAR functions identified.

5. The pressure boundary categorization as done for the pilot, which involved some lumping of functions for many pipe sections (done for simplicity and reduction in resource investment), as well as the differences in the criteria and categories, made this part of the process difficult to reach any meaningful judgment.

6. While the prepared materials were viewed as good quality, it was also felt that they would have been improved if the system engineer had greater involvement in the review before the IDP.

7. IDP panels members need to have the leeway to determine the ultimate categorization and not be restricted by one factor, provided there is a supporting rationale that considers the reason for the judgment.

8. The IDP process provides the “conscience” of the categorization supporting the rulemaking, but it is difficult to provide guidance and for NRC to oversee its effectiveness.

9. The next IDP should be video taped and edited to show critical elements, e.g., introductory information, deliberations, approvals, and open items.

Others

1. Having a master list of components with all of its functions identified would be helpful in developing confidence that SSCs are associated with the appropriate functions and that the most limiting category is assigned to each SSC.

2. Reviewing the dominant cutsets (major risk contributors) before the IDP would be useful.

3. The summary sheets should include more information about why the rankings were decided.

4. In revising the code case to deal with comments and get concurrence, some simplifying guidance was added that makes it less useful for the intended purpose of making decisions on relative risk importance of different segments.