



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

February 21, 2001

MEMORANDUM TO: Larry Garner, Senior Project Engineer
Reactor Projects Branch 6
Division of Reactor Projects

FROM: *Luis A. Reyes*
Luis A. Reyes, Regional Administrator

SUBJECT: FINDINGS OF AD HOC DIFFERING PROFESSIONAL VIEW
REVIEW PANEL

Attached is a memorandum from the Differing Professional View (DPV) panel that reviewed your December 7, 2000 DPV. The panel recommends that additional guidance be provided in the Manual Chapter (MC) and Regional Office Instruction that covers the Phase III reviews. I agree with the recommendation of the panel. We are currently reviewing the Regional Office Instruction for appropriate changes. A feedback form has been submitted to the Office of Nuclear Reactor Regulation to address the suggested changes to MC 0609.

Per Management Directive 10.159, if you desire to have the DPV made available to the public, please provide your desire in writing. If you are not satisfied with the resolution of your issues, you may submit a Differing Professional Opinion to the Executive Director for Operations.

Attachment: As stated

cc w/att: C. Evans

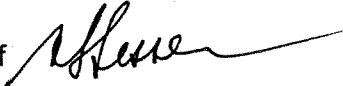


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FEBRUARY 12, 2001

MEMORANDUM TO: Luis A. Reyes, Regional Administrator

FROM: Mark S. Lesser, Chief 
Maintenance Branch
Division of Reactor Safety

SUBJECT: FINDINGS OF AD HOC REVIEW PANEL TO REVIEW A DIFFERING
PROFESSIONAL VIEW

In a memorandum dated December 12, 2000, you appointed me to serve as Chairperson of an Ad Hoc Review Panel to review a Differing Professional View (DPV) pertaining to the significance characterization of a finding at the V.C. Summer station. The DPV was dated December 7, 2000, by an individual who participated in the Significance Determination and Enforcement Review Panel (SERP) regarding the significance of the inoperability of the turbine driven emergency feedwater (TDEFW) train at Summer. In addition to myself, membership on the panel consisted of Michael Cheok, Terrence Reis, and Larry Mellen. We reviewed the DPV in accordance with Management Directive 10.159 and Regional Office Instruction No. 2304. This memo summarizes the assessment and findings of the Review Panel.

The panel met three times by telephone on January 3, January 10, and January 24, 2001. The panel interviewed Anne Boland, RII Enforcement Officer; Walt Rogers, Senior Reactor Analyst (SRA); and the submitter. Outside of the arranged meetings, interviews by single panel members were conducted with Robert Haag, Division of Reactor Projects (DRP) Branch Chief, Victor McCree, Deputy Director, DRP, and NRR PRA specialists Gareth Parry and See-Meng Wong. The panel reviewed several documents including the SERP and Re-SERP worksheets, the significance determination Phase 3 analysis, Inspection Report 50-395/00-05, NRC Manual Chapter 0609, Significance Determination Process, a draft Oversight Process/Feedback Form and the DPV itself.

Background

The issue in question involves the NRC's significance determination of the September 21, 2000, event where the TDEFW pump manual discharge isolation valve was found locked closed instead of locked open, as required by procedure. This condition rendered the TDEFW train inoperable for approximately 48 days. In accordance with Manual Chapter 0609, "Significance Determination Process," a Phase 3 analysis was conducted to calculate the Change in Core Damage Frequency (CCDF).

The region held a pre-panel on October 5, 2000, and the issue was brought to a SERP on October 11, 2000. The Phase 3 analysis was developed by a RII SRA, Walt Rogers and concurred in by NRR PRA experts See-Meng Wong and Gareth Parry. In evaluating the significance of this condition the NRC analysts used the Simplified Plant Analysis Review (SPAR) model. The SPAR model uses Accident Sequence Precursor (ASP) worksheets for

Human Reliability Analysis (HRA). These worksheets require the analyst to assign levels/multipliers to seven performance shaping factors (PSF) as inputs to an equation that estimates the probability of operator recovery of a failed system. Two of the PSFs relate to the plant procedures and ergonomics (interaction of the operators with the equipment to carry out tasks). To determine the multiplier for the procedures PSF, the Emergency Operating Procedures (EOP) were reviewed for guidance to restore flow given initial failure of the EFW system. Since steps are provided for control room operation but not for local checks, a level of "poor" was assigned to the procedural PSF. The level assigned to the ergonomic PSF was "between nominal and poor" and was based upon assessment of the manual valve location, lighting, and labeling. Based in part on these judgements, the probability of recovery was calculated to be 0.5. The Phase 3 analysis determined the issue to be preliminarily Yellow, but only marginally, at $1.16E-5$. This was documented in Inspection Report 50-395/00-05 dated October 20, 2000.

DPV Summary

The panel reviewed the DPV, interviewed the submitter, and summarized the concerns as follows: 1) the inspection report did not adequately justify a preliminary Yellow finding in that documentation and explanation for particular values used in the assessment of the probability of recovering the TDEFW train were insufficient; 2) the recovery factor is determined within the specialized arena of the risk analyst without adequately considering inspector experience input and the SERP did not perform an adequate independent review of the recovery factor determination; 3) characterizing an Emergency Operating Procedure in an inspection report with a procedural PSF as "poor" sends the wrong message to the licensee and industry and could result in licensees cluttering up EOPs with unnecessary details; and 4) regional management did not address the submitter's concerns.

Panel Assessment

Concern 1: The preliminary Yellow finding was documented in paragraph 4OA3 of Inspection Report 50-395/00-05. The report provided the facts surrounding the event. An initial scoping calculation without operator recovery was performed to assess the risk. The dominant accident sequences associated with an inoperable TDEFW pump were evaluated. The Phase 3 analysis includes operator recovery and the report provided an extensive discussion this. The PSFs were itemized and the information that was assessed to select the multipliers for each PSF was documented to an adequate level of detail. The report contained an explanation of how the recovery factor and the CCDF were calculated. The panel found that the report adequately provided the basis for the preliminary Yellow finding.

Concern 2: The submitter took issue with the outcome of the assigned PSF ratings for procedures and ergonomics. The submitter was concerned that there was no challenge of the values or discussion of how they were arrived at the SERP. Given that the issue was borderline White/Yellow, the submitter felt the SERP should have done more to validate this subjective area of human recovery. The submitter considered that unlike the old enforcement process, where there was a healthy exchange of thoughts on such matters, that the SERP essentially endorsed without challenge the findings of the risk analysts.

Currently there are several models available to the PRA analyst for the estimation of human reliability, however, there is no consensus on "the most appropriate methodology." Even for a selected model, the estimated human error probability is dependent to a certain degree on analyst subjectivity and judgement. Therefore, for the case of Summer, depending on how the various plant procedures, plant and system configurations, operator training, etc. were interpreted, the probability of recovery of EFW could have been different which could have resulted in a White finding for the SDP. For example, in the ASP/SPAR methodology, if plant procedures were nonexistent for a particular task, a multiplier of 50 would be assigned (i.e., the base human error probability will be increased by a factor of 50). If available, but judged to be poor, a value of 5 is assigned, if recovery is addressed in procedures a value of 1 is assigned and if the procedure provides diagnostic recovery actions a value of 0.5 is assigned. In the Summer analysis, the analyst chose a multiplier of 5 for the procedures PSF, based primarily on the lack of specific procedural direction which would identify the incorrectly closed valve. In similar fashion the analyst chose a multiplier of 5 for ergonomics PSF. Based in part on these multipliers, the probability of recovery of the TDEFW train is estimated to be 0.5. To illustrate how sensitive the probability of recovery is to the assignment of ratings to these shaping factors, if values of 4 for both procedures and ergonomics had been assigned, the probability of recovery would have increased to 0.7, and as a result, the Summer issue would have dropped out of the Yellow significance band. The panel recognizes that subjectivity is an inherent characteristic of human reliability analyses and that variances will result. The panel does not believe that additional inspection was warranted in order to refine the ratings. The SERP ensured that sufficient information from the resident inspectors was provided to the SRA for use in selecting the PSFs and the ASP methodology was correctly applied. The SERP ensured that the SRA's results had been reviewed by two PRA experts in headquarters. The panel found that the analysis was correctly done, the SERP process was followed, and the SERP provided adequate oversight to ensure this. However, the panel recommends that if the CCDF results in a borderline color, the most sensitive factors should be pointed out to the SERP for appropriate discussion.

At the time of the SERP, a Phase 3 analysis was procedurally required by Manual Chapter (MC) 0609; however the guidance lacked structure. The MC provided for the Phase 3 analysis to be done, but actual methodology selection was left to the expertise and discretion of the qualified risk analysts. Any of a number of techniques might be used. The SRA could have chosen other methodologies to calculate the recovery factor. This ASP model was chosen because it was user friendly, relatively simplified, and bounding. At the regulatory conference, the licensee presented results from several different HRA models. The non-recovery probabilities from these models ranged between 0.5 and 0.15. The SRA indicated that following the Summer issue, it became clear to him that a consistent approach for a Phase 3 analysis did not exist. The SRA submitted an Oversight Process Feedback/Comment Form documenting this problem. The Form states "there are numerous human error probability techniques that can be used for the same recovery situation that are valid but produce different numerical results". The Form recommended a solution to "use HEP methodology consistent with the PSA model being used to quantify the risk change." The panel determined that a revision to Appendix A of MC 0609 was issued on December 28, 2000. Attachment 1 to Appendix A, step 3.1 states that "the HRA method used in a licensee's PRA model may be considered a reasonable basis for the significance determination of the inspection finding." The panel concludes that this would reduce the variability due to the choice of models, however, variability due to analyst judgement would still exist to a certain degree.

Concern 3: The submitter was concerned that assigning and documenting the procedural PSF as "poor" could lead to unintended consequences. The public may perceive that the NRC is concluding that procedures are poor, in this case Emergency Operating Procedures. Clearly this is not the intent of the writeup. Additionally, licensees might be motivated to modify EOPs to include such local actions as checking the positions of manual isolation valves. This would be inconsistent with NRC requirements for EOPs, which have gone through extensive review, validation, inspection, and acceptance. The panel recommends that appropriate guidance be provided in either MC 0610* or MC 0609 as to how the Phase 3 evaluation should be documented.

Concern 4: The submitter started questioning the preliminary Yellow finding during the pre-panel and SERP process. The submitter perceived that the analyst's calculation of probability of recovery was overly conservative and not adequately justified. The submitter believed that the probability of operator recovery should be higher and therefore the significance of the condition was White rather than Yellow. The submitter expected the SERP would engage in discussions of the subjective areas, however this did not happen. The SERP discussed what was written in the report and whether NRR supported the analyst's findings. That question was answered affirmatively. The SERP directed that the inspection report describe the assumptions used to calculate the recovery factors. The submitter thought that the recovery actions should be walked down or simulated to validate the calculated recovery factor. During the SERP, the submitter stated that he was not chilled, but did not voice strong objection to the outcome at that point. It was clear; however, to some members of the SERP that the submitter did not agree with the outcome. There were varied opinions as to whether or not consensus had been achieved. EICS staff notes of the meetings did not document dissension. The panel noted that neither MC 0609, nor Regional Office Instruction (ROI) 0925, Significance Determination Process and Enforcement Review Panels for Reactor Licensees, provide direction regarding obtaining consensus during the SERP. Direction is provided in similar ROIs for Maintenance Rule and 50.59 violation panels. The panel recommends that guidance be provided in these directives regarding consensus.

The submitter continued to voice concerns during the report concurrence phase to divisional management and was given direction to submit his concerns in writing. Managers on the SERP believed that they had provided sufficient opportunity for the submitter to voice opinion and that they had adequately considered the submitter's concerns. They believed that sufficient inspection of the procedures and ergonomics involved had been performed by the resident inspectors and there was little to be gained by more inspection or simulation. They believed that they were following the process and that the most knowledgeable experts were actively engaged in the issue. The submitter was not required to concur on this section of the report. Furthermore, the managers recognized that the SERP's outcome was preliminary and the licensee would have opportunity to provide additional information.

At the regulatory conference on December 7, 2000, the licensee challenged the NRC's assessment of Human Error Probability and presented three acceptable risk methodologies that led to the conclusion that the CCDF was more appropriately characterized as being of White significance rather than Yellow. It is clear that the NRC process provides steps to take when differences in significance determination are apparent. ROI 0925 provides guidance that a subsequent SERP may be required following a regulatory conference if the licensee's analysis

does not agree with the NRC analysis. This is in fact what happened. An additional SERP was held on December 20, 2000 to evaluate the licensee's position and it was determined that the issue was more appropriately characterized as being of White significance. A Final Significance Determination for a White finding and Notice of Violation was transmitted to the licensee on December 28, 2000.

Panel Findings

In general, the panel found that this significance determination was handled appropriately in accordance with Manual Chapter 0609 and Regional Office Instruction 0925. Specifically, the SRA used the guidance in Manual Chapter 0609 and had his work reviewed and concurred in by two other risk analysts. Additionally, the SERP process was followed and there was opportunity to voice opposing views. The inspection report adequately documented the analysis. When the licensee's analysis differed from the NRC preliminary finding, a Re-SERP was held to consider the information.

At the time of the SERP, there were no governing documents on preparing a Phase 3 analysis. It was up to the skill and expertise of the SRA. With multiple modeling techniques available, this would lead to human error probabilities that could be dependent on the model chosen. This concern was recognized at about the time of the regulatory conference and an Oversight Process Feedback/Comment Form was initiated December 21, 2000 by the SRA. MC 0609 has since been revised to add guidance for the Phase 3 analysis.

The panel recognizes that subjectivity is an inherent characteristic of human reliability analyses and that variances will result. The SERP process calls for additional review if the licensee's analysis differs from the NRC analysis. The panel recommends that if the CCDF results in a borderline color, the most sensitive factors should be pointed out to the SERP for appropriate discussion.

The panel believes that it was not clear to those involved that the Phase 3 process was inadequately defined at that time. Differences of opinion were unable to be resolved because while the submitter sensed excessive reliance on the SRA's skill of the craft in developing the analysis, management believed that the process had been fully followed. The panel noted that directives for the SERP do not discuss obtaining consensus and recommends that appropriate guidance be added.

The panel recommends that guidance be provided in either MC 0610* or MC 0609 on how the Phase 3 evaluation should be documented to ensure that PSF characterizations are not taken out of context.

cc: R.W. Borchardt, Director OE