CP&L
Carolina Power & Light Company

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SERIAL: NLS-86-156

Director of Nuclear Reactor Regulation
Attention: Mr. Lester S. Rubenstein, Director
PWR Project Directorate #2
Division of PWR Licensing - A
United States Nuclear Regulatory Commission
Washington, DC 20555

COMMENTS ON PRA INSIGHTS REPORTS

Dear Mr. Rubenstein:

Carolina Power & Light Company appreciates the opportunity to review and comment on the draft reports, "Probabilistic Risk Assessment Insights" (NUREG/CR 4405) and "Insights Gained From Probabilistic Risk Assessments," which you transmitted by letter dated March 21, 1986.

The former report contains valuable information that utilities can use to make comparisons with their own PRAs; the latter contains a useful "checklist" which utilities can use to increase their awareness of previously identified problems. Both reports contain significant limitations in sample size and scope; therefore, general conclusions drawn from these reports may not be appropriate.

Our general and specific comments on these draft reports are attached.

If you have any questions or would like to discuss our comments, please call Ms. Carol G. Love at (919) 836-8166.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

CGL/ccj (3835CGL)

Attachments

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ATTACHMENTS 1

COMMENTS ON DRAFT NUREG/CR-4405
"PROBABILISTIC RISK ASSESSMENT INSIGHTS"

General Comments

The report contains very valuable information that can be used by utilities to make comparisons with their own PRAs. However, the users of this document must be very cautious about drawing any general conclusions that may degrade the objectivity of individual plant specific analyses.

The "database" from which these conclusions are drawn is small (four plants - only one BWR). General impressions of leading risk contributors based on this small sample and applied to all plants would be ill advised. We believe that an insight equally important to those discussed in this draft NUREG is that each PRA has shown unique features, strengths, and weaknesses for that plant. This tool (PRA) can be used effectively at the plant specific level, but generic conclusions about a class of plants should be treated cautiously.

Specific Comments

We have confined our specific comments to the "Executive Summary" section of the report; however, our review did require referral to the supporting data in the body of the report. Thus, our comments are applicable to both sections.

Executive Summary, Paragraph 3

"The core melt probability and public risk associated with the interfacing systems LOCA (Event V) as demonstrated in the Oconee PRA can be substantially reduced by appropriate selection of operating configuration and testing procedures and prohibition of testing of the interfacing valves with the reactor at power/pressure."

CP&L Comment

The numerical results provided in this report support the comment that the interfacing systems LOCA contribution to core melt probability and public risk is lower for the Oconee PRA than it is for the other PRAs reviewed. However, the reasons for these differences are not sufficiently discussed in the body of the report (Section 4) to support the balance of the comment associated with administrative and procedural controls of interfacing system components.

This insight is not a new finding in that the WASH-1400/Surry PRA (10/75) showed similar sensitivity to interfacing LOCA's. Surry 1 has since placed administrative and procedural controls on interfacing system components as a result of WASH-1400 study.

Executive Summary, Paragraph 4, Item 4

"The dominant risk sequences represent only a small fraction (typically less than 1 percent) of the total contribution to core melt probability (CMP) and are characterized by a loss of the containment function due to direct bypass or overpressurization."

CP&L Comment

The following dominant risk sequences (in percentage contribution) were extracted from the draft report:

PLANT	DOMINANT RISK SEQUENCE	% CONTRIBUTION TO CORE MELT
Millstone 3	Interfacing LOCA	4.2
Seabrook	Interfacing LOCA	.8

Oconee PRA did not explicitly define leading sequences for risk. The highest risk category represents .01 percent of total CMP.

Shoreham PRA did not explicitly define leading sequences for risk. The three most severe categories represents 0.33 percent of total CMP.

Further review of Section 3 (Shoreham Insights) and Section 4 (Oconee Insights) did not reveal any additional insights as to whether the dominate risk sequences are characterized by loss of containment function due to direct bypass or overpressurization. With regard to the Shoreham PRA, the 0.33 percent of total CMP for the three most severe categories (alluded to in the draft report) was apparently arrived at by summing the release frequencies provided in Table 3.12, dividing the result by the total CMP (5.5E-05), and multiplying by a factor of 100 to obtain a percentage. The problem with this is that the values in Table 3.12 are release frequencies and not core melt probabilities. The release frequencies are derived on a different basis from core melt probabilities. A review of Table 3.4 indicates that a LOCA has a core damage classification of III and has a core melt contribution of 1.8 percent. Table 3.12 indicates that a LOCA is only one of the contributors to severe release Category 7. This result is not consistent with the 0.33 percent stated in the draft report.

A review of the Millstone 3 PRA indicates that a dominant risk sequence is 4.2 percent of the core melt probability. Our assessment is that it would be very difficult to draw any general conclusions about the relationship of risk dominant sequences to CMP based on the data presented in the draft report.

Executive Summary, Paragraph 4, Item 5

"In the two PRAs (Millstone and Seabrook) which specifically documented risk contribution by sequence, interfacing systems LOCA represents over 98 percent of the total contribution to early fatalities. Although not specifically quantified, the Shoreham PRA appears to identify large LOCA with early suppression pool failure as its leading contributor to early fatalities."

CP&L Comment

It is unfortunate that only the consequence component of risk, i.e., "fatalities" is given in this item. The other component, i.e., "probability" is required to make an accurate and complete statement about public risk. To the PRA practitioner, this component is understood to be extremely low. However, as stated here, the layman may assume erroneously that the probability of early fatalities is 1.

Executive Summary, Paragraph 4, Item 9

"The main insight drawn from these results is that the usual percentage breakdown of the contribution of internal versus external initiators of about 80/20 was fully reversed in the Oconee study."

CP&L Comment

Because of the plant specific nature of external events, it would be very difficult to conclude that 80/20 is a "usual" percentage breakdown. There does not appear to be sufficient data in the draft report to make such a general statement about this.

ATTACHMENT 2

COMMENTS ON RELIABILITY AND RISK ASSESSMENT BRANCH DRAFT REPORT, "INSIGHTS GAINED FROM PROBABILISTIC RISK ASSESSMENT"

General Comments

The report appears to be an excellent compilation of PRA results for the time period studied. The synopses given for each PRA in Appendix A should be very useful for the purpose identified in the second paragraph in Page 2, i.e., use ". . . as a checklist for the conduct of future PRAs to increase awareness of problems that have already been identified and to systematically check the applicability to a specific plant."

It should be emphasized to potential users, particularly within the NRC, that the majority of the PRAs reviewed in this study had significant limitations. The RSS was, as stated, a pioneering program with limitations noted in the Lewis Committee Report. The RSSMAP PRAs were truncated applications of the RSS and the IREP PRAs were concerned with core melt only. Use of general conclusions drawn from results of these studies would be ill advised. Contrary to Page 3, Paragraph 2, the identification of generic safety issues using this report is not recommended as it could be counter-productive to safety in some plants by diverting resources from specific plant weaknesses.

Specific Comments

Pages 18-19, Item 8(a)

The concern for establishment of high pressure cooling following failure of the Emergency Feedwater System is well taken. However, automation of the systems involved in this cooling mode is extremely undesirable. The current emergency response guidelines and operator training covers this situation very well and provide for EFS recovery efforts before going to the "feed-and-bleed" mode. Since this mode involves opening of the reactor coolant system PORVs, any automation feature would increase the likelihood of spurious openings which could lead to the equivalent of small break LOCAs.

Page 25, Item 3

It does not appear that the conclusion came from a study of these PRAs, but rather is an observation of the authors based on other sources not documented in this report.

Page 29, Paragraph 2

This paragraph is somewhat confusing as it begins by lumping system hardwired dependencies and AC power systems and ends with a reference to component cooling. Perhaps several paragraphs each making a point about the necessary considerations would communicate the findings better.

Page 34, Paragraph 1, Beginning with the Second Sentence

The point of this paragraph is well stated and very important. We strongly agree that attempts to increase reliability for a highly reliable system may not be the most effective allocation of resources.

(3835CGL/ccj)

Appendix A

We have no specific comments on each plant specific importance ranking results. As previously stated, the synopses will be extremely valuable for a utility that is performing or reviewing PRA results for their specific plant.

Appendix B

Page 83, Last Sentence

As previously stated in the first specific comment, automation of the high pressure recirculation system is not desirable. The particular reactor design which generated this "insight" responds very quickly to a complete loss of feedwater event. This is not the case for other PWR designs which require a much longer time for recovery of feedwater (hours versus minutes). Improving knowledge about plant behavior and operator training are much better ways to minimize the probability of human error in dominant sequences.

Pages 85-93, DC Power Systems

The discussions of this system and the degree of modeling, failure modes, etc., in various PRAs is useful and provides information for utilities to consider during performance of plant specific PRAs. However, it is not clear that DC power systems should be singled out to the degree discussed in this report (over 8 pages). Other support systems, such as those briefly mentioned on Page 94, are potentially just as important.

(3835CGL/ccj)