From: "PIETRANGELO, Tony" <arp@nei.org>
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Date: 11/30/05 4:19PM
Subject: Comments on Draft NUREG -1829, "Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Elicitation Process," (70 Federal Register 57901, October 4, 2005)

November 30, 2005

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Dr. Charles A. Greene

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U.S. Nuclear Regulatory Commission

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The Nuclear Energy Institute[1] offers the following comments on the subject Federal Register notice, which solicited public comments on draft NUREG-1829. This NUREG was intended to provide technical support for the proposed rulemaking to 10 CFR 50.46 which would establish the option to revise the design basis LOCA break size. Thus, the emphasis of the expert elicitation was on estimating frequencies for large break LOCAs. Our comments are limited to the report's estimation of small break LOCA frequencies, which, unlike large break LOCAs, are important contributors to PRA risk profiles.

...see attached for more...

Tony Pietrangelo

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[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including regulatory aspects of generic operational and technical issues. NEI members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

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NUCLEAR ENERGY INSTITUTE

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November 30, 2005

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PRA standards have been developed by consensus bodies and endorsed by NRC, with the expectation that plants will be expected to conform to these standards to support regulatory applications. ASME PRA standard RA-S-2002 (endorsed through NRG Regulatory Guide 1.200) contains the following requirement relative to initiating event frequency estimation:

> *IE-C1: Calculate the initiating event frequency from plant-specific data, if sufficient data are available. Otherwise, use generic data. Use the most recent applicable data to quantify the initiating event frequencies.....*

As the NUREG-1829 report may be considered to be the "most recent applicable data" upon finalization, it is important that the final report provide an alternative to continue using operational experience data for the determination of small break LOCA frequencies. Most PRAs currently reference NUREG-750, which used such a

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basis (at the time there were 1250 reactor years of operating experience) to estimate small break LOCA frequencies. Since issuance of NUREG-5750, over one thousand additional reactor years of operational experience have confirmed the conclusions of NUREG-5750 relative to small break LOCAs. Draft NUREG-1829 notes that, when steam generator tube rupture data are excluded, there is general correlation on small break frequencies with NUREG-5750. However, our review of the report indicated that draft NUREG-1829 estimates these frequencies over one magnitude higher than the estimate of NUREG-5750. Using the NUREG-1829 small break LOCA frequency estimation, the US reactor fleet should be experiencing one small break LOCA on average every 4 years. However, no such LOCAs have occurred in the operating history of the US plants. Obviously, the incorporation of this frequency estimate into existing PRAs would lead to unwarranted impacts that are out of context with reality.

We offer the following specific comments relative to small break LOCA estimation for purposes of PRA:

1. Draft NUREG-1829 used plant experiences to estimate the steam generator tube rupture (SGTR) frequency which amounts to greater-than 50% of the total small LOCA frequency. Estimate of the remaining 50% of category 1 LOCA was entirely based on expert elicitation. The resulting category 1 frequency estimates from the panel showed a significant divergence of opinions. It is recommend that category 1 LOCA frequency estimate should continue to be related to the large number of years of plant experiences similar to the method used in NUREG-5750. The current lengths of those experiences amount to thousands of reactor-years, and are statistically significant for use in estimating the annual frequency of events at the 1E-2, 1E-3, and 1E-4 levels. Similar estimates are used in PRA models for numerous other important PRA parameters (such as SGTR).

2. The report should provide a discussion on statistical validation of small LOCA frequency. By using the method of Jeffrey's non-informative prior (over the past 2500 reactor years with zero events excluding steam generator tube ruptures), the expected small LOCA frequency is at or below the 1E-04 level. This frequency is over one order of magnitude lower than the frequency reported in the draft NUREG. Plant operational experience of over 2500 reactor-years should be considered as a valid predictor of small LOCAs. That consideration is further strengthened by improved methods and increased requirements for in-service-inspections & leak detections.

3. The report should provide a discussion on probabilistic validation of the small LOCA frequency. Using a Poisson distribution with failure rate of 2.9E-03 (NUREG 1829 category 1 LOCA frequency excluding steam generator tube rupture events), and considering the approximately 2500 reactor-years of

operation experience, the probability of no small LOCA events (actual industry performance) is around 1 percent. This result shows an excessive conservatism in the category 1 LOCA frequency estimation of NUREG-1829.

4. The equivalent break diameters used in various PRA models that form boundaries between various LOCA categories do not necessarily match those used in the draft NUREG. For example, a small LOCA range may extend up to 0.03 square feet equivalent break area (derived through existing capability of high pressure safety injection). The draft NUREG should give a clear guideline on interpolations between the various LOCA frequency values, including advice on arithmetic or geometric preference for interpolation.

5. The draft NUREG combined a variety of LOCA sources into each LOCA category. Piping LOCAs and several non-piping LOCAs were pooled together to form each of the LOCA categories. It would be useful for each of the 6 LOCA categories to add a table of LOCA sources and frequency contributions. This breakdown is particularly important for the small and medium LOCA categories. Some contributors to the small and medium LOCAs are modeled separately in most PRA models (SGTR, RCP seals, inter-system LOCAs and others). If the end user does not subtract the separately-modeled LOCA contributors, then the contribution to CDF from those contributors would be conservatively and redundantly modeled.

6. The various LOCA frequencies are reported in the several tables as cumulative values. In order to isolate the frequency of each LOCA category, one has to subtract the frequency of the next higher ranking category. This reporting format may lead to human errors. Some users may not become aware of the cumulative table format since that description is briefly stated at the later sections of a very large report. Please add a footnote under each LOCA frequency table explain how to obtain the frequency of each LOCA category.

Thank you for your consideration of these comments. Please contact me if you would like to discuss these comments further, or desire additional information.

Sincerely,

Anthony R. Pietrangelo