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November 28, 2005

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U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: **Westinghouse Owners Group Comments on Draft NUREG-1829, "Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Expert Elicitation Process" (MUHP-3062)**

The WOG appreciates the opportunity to provide comments to the NRC regarding the June 2005 draft of NUREG-1829. The work presented in this NUREG is very significant since it provides the basis for establishing the "transition break size" for the proposed risk informed changes to 10CFR Part 50.

We welcome the NRC's efforts supporting the risk informing of 50.46, and offer the attached comments to draft NUREG-1829.

If you have any questions concerning these comments, please feel free to call Bob Jaquith at 860-731-6447.

Sincerely yours,

Thomas [signature] for,

Frederick P. "Ted" Schiffley, II, Chairman
Westinghouse Owners Group

mjl

Attachment: Comments on NUREG-1829 Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Elicitation Process (Draft Report for Comment, June 2005)

SISP Review Complete

E-RIDS = ADM-01

Add = C. Greene (CA52)

Template = ADM-013

cc: Licensing Subcommittee
Risk Management Subcommittee
LBLOCA Working Group
Steering Committee
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Charles Greene, NRC
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Comments on NUREG-1829 Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Elicitation Process (Draft Report for Comment, June 2005)

The subject draft report was reviewed by the Westinghouse Owners Group, including a member of the Expert Panel. The reviewers believe that this report provides a reasonable representation of both the NRC elicitation process and the expert panel's current state of knowledge regarding LOCA frequencies. Therefore, the quantitative mean LOCA frequency as a function of leak and effective break size, such as that in given in Table 1 and Figure 1 of NUREG-1829, is believed to provide a solid technical basis for defining a transition break size for pressurized water reactor (PWR) plants. This transition break size is a key parameter in the NRC's proposed use of risk information to refine the emergency reactor cooling requirements in 10CFR50.46.

Specific comments are provided below on three topics addressed in the draft report.

1. <u>Method of Aggregating Individual Frequency Responses into a Group Response</u>

For this study the geometric mean aggregation method was used instead of the arithmetic mean method or mixture distribution methods, which could give higher mean values of LOCA frequency. The reviewers concur that the geometric mean is most representative of the consensus of the group (expert panel). As an example, consider possible individual responses and the different group means for the distribution of factors on a base-line frequency in the following table:

Number of Responses	Value of Factor
1	0.01
2	0.1
3	1.0
2	10
1	100

For this example, the arithmetic mean value for the 9 responses is 13.69 while the geometric mean value (average of the logarithms) is 1.0, which seems to be much more representative of the group's opinions. Part of the reason for this is that the probabilities and frequencies of failures of structural components, such as piping, are normally expressed as orders of magnitudes much less than one. Uncertainties on these values are also expressed as factors instead of differences because the physical contributors to structural failures (leaks and breaks), such as flaw sizes and crack growth rates, are also known to be log-normally distributed. Use of logarithmic distributions and geometric means is also consistent with NRC Guidance on Risk-Informed Inservice Inspection for Piping (Draft Report NUREG-1661, January 1991). Figures 3.3 and 3.4 of this guidance show the range of frequency estimates from expert elicitation, plotted on a logarithmic scale, for failure of auxiliary feedwater system components and the reactor pressure

vessel, respectively. Figure 4.6 of this same report shows the uncertainty in the best-estimate (median value) of piping failure probability, calculated using probabilistic fracture mechanics methods, to also be logarithmically distributed. Scanned copies of these figures are provided in Appendix A.

2. Effect of Service Level D Seismic Loading on LOCA Frequencies

In Chapter 8, Ongoing Work, it is noted that the LOCA elicitation results were for normal operating conditions only. The effects of Service Level D transients, of which seismic was found by NRC to be the most prominent, were not considered in the elicitation efforts. The reason seismic loading was not explicitly considered was that most of the expert panel did not believe that it would significantly change the LOCA frequencies for normal operation. Experience from probabilistic fracture mechanics calculations indicates that severe seismic loading, such as that from a design-basis safe shutdown earthquake, could increase the conditional probability of failure in flawed piping by one to two orders of magnitude. However, the probability of having the severe seismic loading during the worst time in life, such as the 40th or 60th year of operation, would be a maximum of 0.001 and would likely be much less. Thus, the maximum effect of this severe seismic loading would be to increase the LOCA frequency during normal operating conditions by 10 percent. This increase was deemed to be insignificant relative to the other uncertainties that were considered by the expert panel in the elicitation process for LOCA frequencies.

3. Usefulness of NUREG-1829 beyond 50.46a

It would be useful to the PRA community, and help facilitate plant to plant consistency if, for the smaller break sizes, more information or guidance were provided to help separate out the frequencies of SGTR from small break LOCA, and CRDM nozzle breaks from medium LOCAs, as well as any other contributors other than primary system piping. Although there is no current intention to use the results of the expert elicitation to update the various LOCA frequencies assumed in individual plant PRAs, as plants go forward with peer reviews of PRAs, it is likely that LOCA frequencies for small, medium and large LOCAs will be compared with NUREG-1829 results. The NUREG-1829 frequencies for the smaller LOCA sizes are several times higher than the values presented in NUREG-5750. The NUREG-1829 values listed for the small break frequency (>100gpm) are so high that one would expect to have seen an event in the US every three or four years, whereas to date we have seen none. It would be helpful if the conservatism in the estimates for the smaller break sizes was discussed and some caveat provided so that plant PRAs don't end up with excessive conservatism in their small LOCA risk estimates.

Appendix A

Referenced Figures

From

Draft NUREG-1661

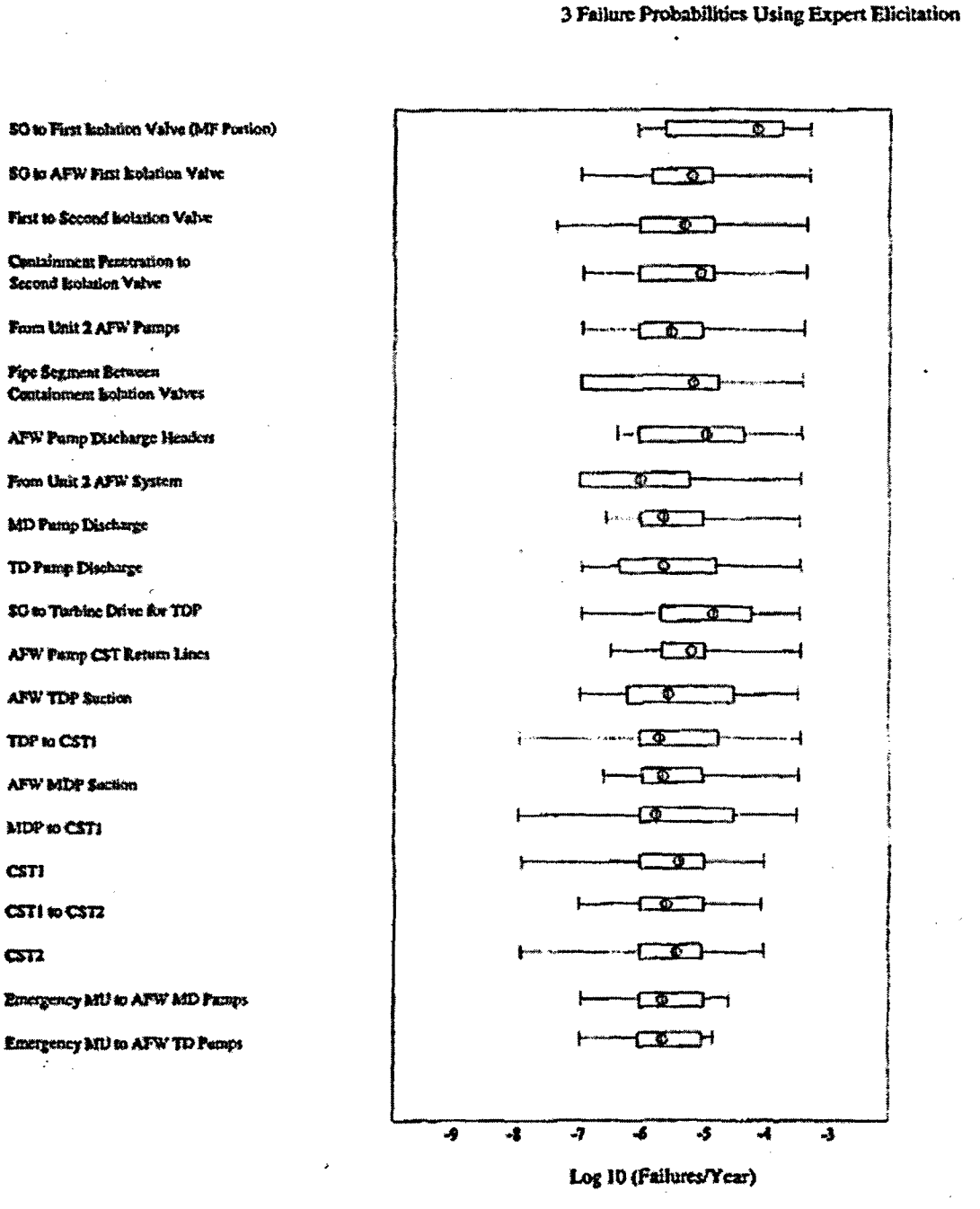

Figure 3.3 Failure Frequency estimates for the auxiliary feedwater (AFW) system components.

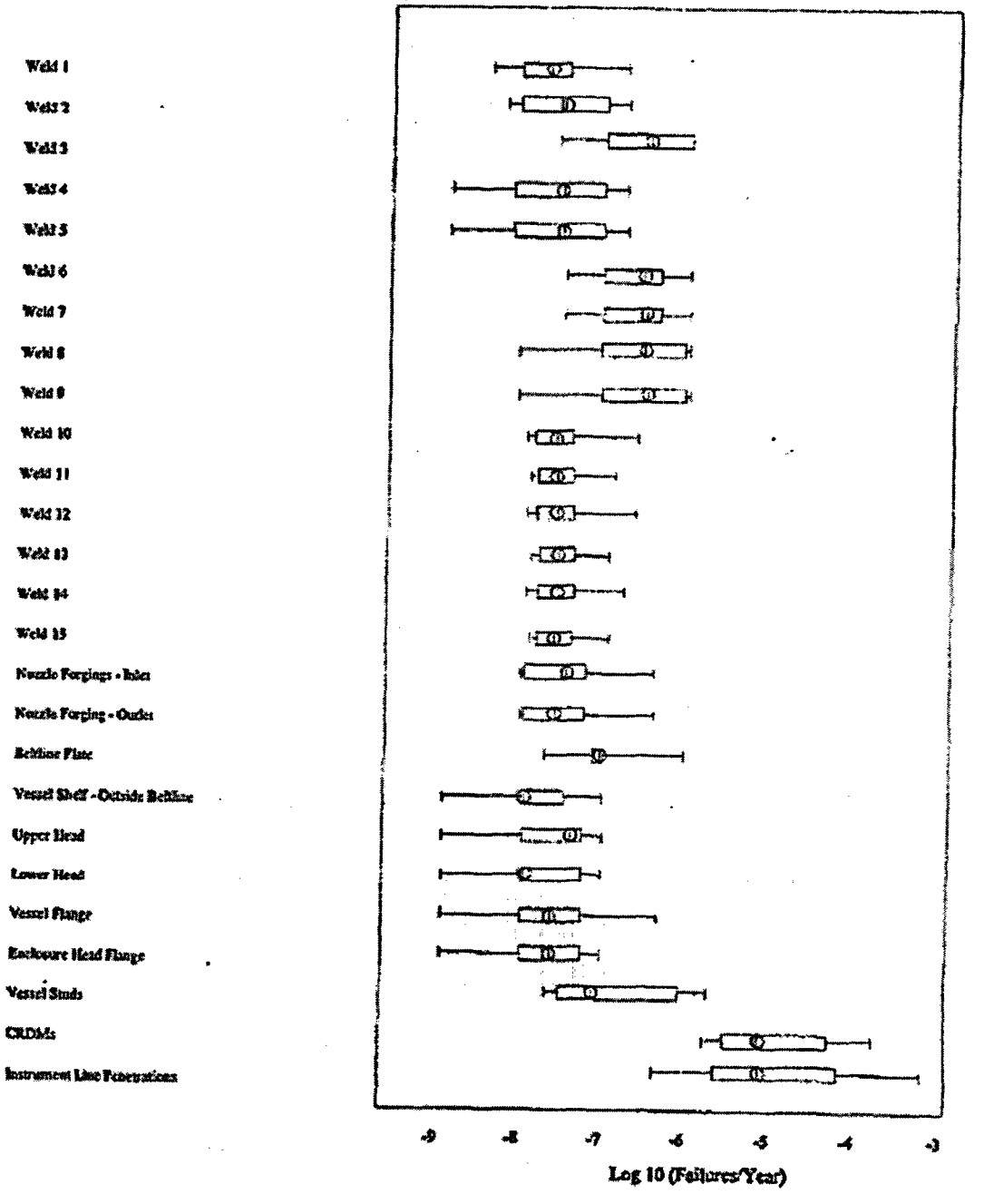

Figure 3.4 Failure frequency estimates for the reactor pressure vessel.

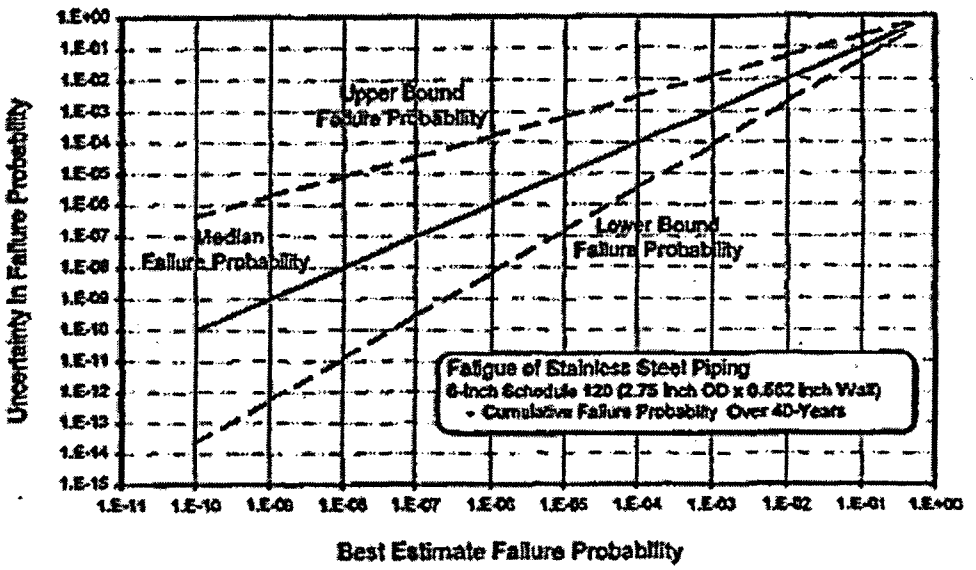

Figure 4.6 Uncertainty Bounds Related to Values of Calculated Failure Probabilites