



September 26, 1996  
LD-96-042

Docket No. 52-002

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

Attention: S. K. Shaukat

Subject: Misleading Statement by BNL on CE's Reactor Coolant Pump Seals

References: 1) Brookhaven National Laboratory letter to NRC, dated October 5, 1995  
2) "A Combustion Engineering Review of NUREG-1032, Evaluation of Station Blackout Accidents at Nuclear Power Plants," ABB-CE Report NPSD-340, performed for the CE Owners Group, March 1986

Dear Mr. Shaukat:

The Reference 1 letter was recently placed in the Public Document Room and our review shows that it includes an erroneous statement related to the reliability of our reactor coolant pump seals. Item six on page two of that letter (attached) identifies "CE's use of nearly zero seal failure probabilities" as an example of a "quite non-conservative" seal model used in industry IPEs.

ABB-CE uses a low seal failure probability because the reactor coolant pump seal on ABB-CE designed NSSSs has unique design features which have resulted in demonstrated high reliability through both normal operation and tests.

A high reliability (and consequent low-failure probability) does not equate to being non-conservative. Rather, the three-stage mechanical seal design, the last one of which is capable of retaining full reactor coolant system operation pressure, leads to a failure probability that is both low and conservative. This is true for all ABB-CE NSSS designs (see Reference 2), but especially so for the System 80+™ Standard Plant Design for which there are two independent seal cooling systems (Component Cooling Water and Seal Injection) with a dedicated backup system for seal injection that may be used during station blackout events.

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ABB-CE requests that BNL's statement not be repeated or referenced in future documents. If you wish to discuss this further, please call me or Stanley Ritterbusch at (860) 285-5206.

Sincerely,

COMBUSTION ENGINEERING, INC



C. B. Brinkman  
Director  
Nuclear Licensing

ser/lw

cc: C. Serpan (NRC/RES)  
J. N. Wilson (NRC/NRR)  
C. Ruger (BNL)



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October 5, 1995

S. Khalid Shaukat  
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Rockville, MD 29852-2738

Dear Khalid:

This letter provides the latest information on our activities related to the issue of a Reactor Coolant Pump (RCP) seal model for use in probabilistic risk assessments (PRAs). Information is included here based upon work performed at BNL and by our subcontractor, Robert Bertucio of NUS. This material is by way of follow up to the July 25, 1995 technical meeting at BNL, in which you participated.

During the July 25, 1995 meeting, Bob Bertucio was asked to apply the corrected seal LOCA model developed by BNL to the Sequoyah NUREG-1150 PRA and to estimate the significance of the prior NUREG-1150 errors both on this plant and on a generic basis for any PWR. He was also requested to estimate the level of effort required to correct the errors.

Attached is a letter report from Bob Bertucio of NUS, dated September 1, 1995, which responds to these requests. On page 2 of his letter, item 7 discusses the corrected seal LOCA model, developed by BNL. This indicates that the seal LOCA paths and probabilities are already developed. This is true for the four pump model (Sequoyah), but the three pump seal model (Surry) has not been completed to date.

This cover letter provides our review and suggestions for future actions concerning the RCP seal model and related PRA models.

1. The NUS letter report confirms that the seal model in Volume 2 of NUREG/CR-4550 was not used by Bertucio in Volumes 3 (Surry) and 5 (Sequoyah) and that the final calculations for CDF in the NUREG-1150 program erroneously did not include the probability of seal failures which start at time zero, after a loss of seal cooling (LOSC). A few other errors (unrelated to seal leakage probabilities) were also discovered in the 1150 model during the current review by NUS.

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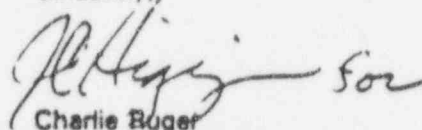
October 5, 1995

2. The correction of the error in RCP seal modeling alone resulted in about a 20% increase in the conditional core damage probability (CCDP) for station blackout (SBO) seal LOCA sequences. The CCDP was noted to be very sensitive to the assumptions and probabilities associated with the non-recovery of AC power (NRAC).
3. While loss of service water (LOSW) sequences were not important in these two NUREG-1150 plants, they are important in some other plants. For those plants BNL had previously estimated that the seal model correction will result in an increase in CCDP for LOSW sequences of 250% (2.5 times). These results will also be very sensitive to NRAC probabilities.
4. The final effect of the seal modeling errors on the total CDF will be very plant specific and depends heavily on the importance of the SBO and LOSW sequences relative to other sequences.
5. There are a number of other issues currently being evaluated (e.g., fire protection, GI-106, GI-57) or requiring evaluation in the future which may have important contributions from RCP seal failures. Proper quantification of these issues requires an accepted, reasonably accurate seal model.
6. Industry IPE's have used widely different seal models which vary from very conservative (failure probability of 1.0 on LOSC) to quite non-conservative (e.g., CE's use of nearly zero seal failure probabilities). Some IPE's may be using the incorrect NUREG-1150 seal model. MB

Based on these conclusions and concerns there appears to be a need by both industry and the NRC for a consistent and reasonably accurate RCP seal failure model under LOSC conditions. Therefore, we believe that industry should be notified of the error in the current NUREG-1150 seal model. Further, a relatively quick way to address the need for an accurate model would be to complete and publish the combined BNL/NUS corrected model so that future analysis can be based on a standard, accurate model.

If you have any questions or wish to discuss any of these issues further, please contact me.

Sincerely,



Charlie Ruger  
Engineering Assessment & Technical Training

CJR:af  
Attachment

cc: R. Bari  
R. Bertucio, NUS  
J. Cadwell  
M. Cunningham, NRC, w/att.  
R. Hall  
J. Higgins  
P. Kohut  
G. Martinez  
W. Pratt  
C. Serpan, NRC, w/att.