

January 12, 2005

Mr. Kenneth S. Putnam, Chairman  
BWR Owners Group  
Nuclear Management Company  
Duane Arnold Energy Center  
3277 DAEC Road  
Palo, IA 52324

SUBJECT: COMMENTS ON INDUSTRY ACTIVITIES TO RESOLVE POTENTIAL  
ADVERSE FLOW EFFECTS FROM POWER UPRATE OPERATION

Dear Mr. Putnam:

In a letter from Mr. Brian W. Sheron, Associate Director for Project Licensing and Technical Analysis, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission (NRC), dated November 8, 2004, the NRC requested that the Boiling Water Reactor Owners' Group (BWROG) provide, for NRC staff review, documents being prepared that are part of industry's effort to resolve concerns surrounding potential adverse flow effects from power uprate operation. In response, the BWROG forwarded NEDO-33159, Revision 0, "Extended Power Update (EPU) Lessons Learned and Recommendations," in a letter to the NRC dated November 23, 2004 (Accession No. ML043340238). The BWROG also forwarded General Electric (GE) Nuclear Energy Services Information Letter (SIL) No. 644, Revision 1 dated November 9, 2004, "BWR Steam Dryer Integrity," by e-mail on November 30, 2004 (Accession No. ML050120032).

The NRC staff has reviewed BWROG Report NEDO-33159, Revision 0 and GE Nuclear Energy SIL No. 644, Revision 1. Enclosures 1 and 2 contain our comments on these documents, respectively. At the next opportunity for us to meet and discuss the status of industry's activities regarding concerns for the potential of adverse flow effects during power uprate operation, we request to further discuss these documents and our associated comments.

We appreciate your efforts to keep us informed of the industry's activities to resolve this issue and look forward to meeting with you in the near future on this matter. Please contact Mr. Bo Pham at 301-415-8450 regarding any additional questions and to make meeting arrangements.

Sincerely,

**/RA/**

Robert A. Gramm, Chief, Section 2  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Project No. 691

Enclosures: As stated

cc w/encls: See next page

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COMMENTS BY THE OFFICE OF NUCLEAR REACTOR REGULATION

BOILING WATER REACTOR OWNERS' GROUP (BWROG)

NEDO-33159, REVISION 0

"EXTENDED POWER UPRATE (EPU) LESSONS LEARNED AND RECOMMENDATIONS"

DATED NOVEMBER 2004

1. NEDO-33159, Revision 0, "Extended Power Uprate (EPU) Lessons Learned and Recommendations" applies to boiling water reactor (BWR) licensees that are in the evaluation or implementation phase of EPU operation. In addition to addressing potential adverse flow effects from EPU operation, the recommendations in the report would be useful for BWR licensees considering uprates to power levels less than full EPU conditions. In addition, this document would be helpful to the Westinghouse Owners' Group in developing recommendations for pressurized water reactor (PWR) plants planning to request, or currently implementing, power uprates.
2. The overall tone of the BWROG report appears to be that the occurrence of adverse flow effects under EPU conditions is an anomaly associated with Quad Cities. The recommendations in the report would be beneficial to all BWR licensees planning to request, or currently implementing, power uprates to provide assurance that adverse flow effects will not occur at their plants during power uprate operation.
3. The BWROG report appears to focus on acoustic loads as the only significant loads acting on the steam dryer. At this time, the specific load definition on the steam dryer and the source of the loads have not been established. An update to the report might be appropriate when the ongoing effort to define the loads on the steam dryer is completed.
4. The BWROG report does not provide specific recommendations regarding power ascension and maintaining a sound basis for power uprate operation. For example, it would be beneficial for the BWROG to provide recommendations on procedures for avoiding adverse flow effects during power escalation and after achieving power uprate conditions, including specific hold points and their duration, inspections, plant walkdowns, vibration data collection methods and locations, and planned data evaluation.
5. Section 2.3 indicates several adverse flow effects that occurred at Quad Cities as a result of EPU operation. The report states that the degradation of the limit switch of a Limitorque actuator for a motor-operated valve at Quad Cities Unit 1 would not have

ENCLOSURE 1

impacted the valve function. The report does not specify the basis for this determination.

6. Section 2.3 does not discuss the feedwater sample probe failures at Dresden, the cause of those failures, and their resolution.
7. Section 2.4 recommends that the GE/Exelon Extent of Condition Evaluation be reviewed, and that applicable issues be adequately addressed prior to EPU implementation. It is not clear whether the lessons learned from the detailed implementation of the vulnerability assessment conducted by Exelon for EPU operation of Dresden and Quad Cities, and discussed during a public meeting with the NRC staff on September 23 and 24, 2004, have been incorporated into NEDO-33159.
8. Section 3.9 does not specify the collection of data from strain gauges on the main steam lines although such data could be important in predicting steam dryer loads if the acoustic circuit model is validated.
9. The NRC staff requests that all documents listed in Section 5.0 be made available to the NRC staff for referencing.
10. Appendix C specifies recommended actions to address potential adverse flow effects from EPU operation for plant systems and components. However, all potentially affected steam systems and components do not appear to be addressed in the appendix.

COMMENTS BY THE OFFICE OF NUCLEAR REACTOR REGULATION

GE NUCLEAR ENERGY SERVICES INFORMATION LETTER (SIL) NO. 644, REVISION 1

“BWR STEAM DRYER INTEGRITY,” DATED NOVEMBER 9, 2004

1. Recommended Action A specifies that all Boiling Water Reactor (BWR) plants perform a baseline visual inspection of the steam dryer within the next two scheduled refueling outages. SIL No. 644, Supplement 1, issued in September 2003 also allowed a two refueling outage schedule for some initial steam dryer inspections. This recommendation has the potential to allow the steam dryer at some BWRs operating at power uprate conditions to not be inspected for over 5 years from the time of issuance of SIL No. 644, Supplement 1.
2. Recommended Action B specifies that BWR plants planning on increasing the operating power level above the original licensed thermal power or above the current established uprated power level inspect their steam dryer prior to initial increased power operation and each subsequent refueling outage for at least two full operating cycles. The recommended action indicates that such a plant will have operated at the current power level for several cycles with no indication of steam dryer integrity issues. The recommended action is not clear regarding those BWR plants (such as Quad Cities and Dresden) that have experienced past steam dryer issues or are highly susceptible to such issues.
3. The recommended actions do not provide guidance for action to be taken by a licensee if steam dryer cracking occurs during plant operation or is identified during inspections.
4. The inspection guidelines in Appendix C are categorized by the three primary steam dryer designs (square hood, slanted, and curved). SIL No. 644, Revision 1, does not address other factors that could affect the susceptibility of a steam dryer to failure during operation of a BWR plant at power uprate conditions. For example, the extent of the power level change, or the change in the main steam line steam velocity, might also influence the susceptibility of a particular steam dryer to failure or the length of operating time prior to failure.
5. The inspection guidelines in Appendix C indicate that all inspections of slanted and curved steam dryer designs will be on the external surface unless an indication is detected. The focus on external inspection could result in the inability to identify a crack that initiated on an internal surface until the crack grows through the steam dryer wall.
6. The monitoring guidelines in Appendix D focus on measurement of moisture carryover to identify steam dryer failure after it has occurred. The monitoring guidelines do not

ENCLOSURE 2

include proactive means (such as collection and analysis of plant data sufficient to predict steam dryer loads) to avoid steam dryer failure.

7. The monitoring guidelines in Appendix D do not provide specific criteria for licensee action if the monitored parameters indicate the potential for, or the occurrence of, inadequate performance of the steam dryer.
8. Editorial comments are as follows:
  - a. The discussion under Metallurgical Evaluation in Appendix A about the initial steam dryer failure at Quad Cities Unit 2 in 2002 states that the “preliminary” laboratory analysis has been completed although the event occurred over 2 years ago.
  - b. The discussion under Corrective Actions in Appendix A should be changed to past tense because those actions were superceded by later events and actions.
  - c. Appendices A and B describe the steam dryer failures at Quad Cities Unit 2 in 2002 and 2003, respectively, and their causes and resulting corrective action. However, they only briefly discuss the significant steam dryer cracking at Quad Cities Unit 1 in 2003 and Quad Cities Unit 2 in 2004 without describing the resulting corrective actions that have been implemented at the Quad Cities and Dresden units.
  - d. The statement in the first paragraph under BWR Fleet Operating History that local regions near the steam outlet nozzles from the reactor vessel in BWR plants may be continuously exposed to steam flows in excess of 100 feet per second significantly understates the maximum steam velocity at some BWR plants during power uprate operation.
  - e. The basis for the statement in the second sentence under Background in Appendix D that a moisture carryover value of greater than 0.1% may be warranted for a BWR plant with an unmodified square hood dryer is not clear.
  - f. The intent of the second paragraph under Background in Appendix D discussing “less than” values of moisture carryover is not clear.

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