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August 4, 2005
GO2-05-136

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397; ENERGY NORTHWEST RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST: CONTROL ROD DROP ACCIDENT ANALYSIS**

References:
1) Letter dated October 12, 2004, GO2-04-177, DK Atkinson (Energy Northwest), to NRC, "License Amendment Request: Control Rod Drop Accident Analysis"
2) Letter dated March 4, 2005, GO2 05-045, WS Oxenford (Energy Northwest) to NRC "Energy Northwest Response to Request for Additional Information Regarding License Amendment Request: Control Rod Drop Accident Analysis"

Dear Sir or Madam:

In the referenced letters, Energy Northwest submitted a request for amendment to the Operating License NPF-21 for the Columbia Generating Station (Columbia) and a response to a request for additional information. The proposed amendment requested NRC approval to update the Final Safety Analysis Report (FSAR) to reflect that the reactor core isolation cooling (RCIC) system is not required to mitigate the consequences of the control rod drop accident (CRDA).

The license amendment request is limited to clarifying in the Columbia license and design bases that the methodologies used to calculate the potential fuel damage and the resultant dose consequences of the CRDA do not include a model for RCIC system initiation or injection. Energy Northwest has classified the RCIC system as safety related and, in accordance with the regulations in 10 CFR 50.36, will retain the RCIC system in the technical specifications.

A second NRC staff request for additional information regarding this submittal was provided to Energy Northwest by the NRC Licensing Project Manager for Columbia. The Energy Northwest responses are provided in Attachment 1.

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Energy Northwest has also consulted with General Electric (GE), the vendor for the Columbia nuclear steam supply system and the designer of the RCIC system. General Electric confirmed that the GE analysis of the CRDA did not credit the initiation of the RCIC system. General Electric also stated that the RCIC design functions do not include mitigation of the CRDA. That report is included as Attachment 2.

If you have any questions or require additional information regarding this matter, please contact Mr. GV Cullen, Licensing Supervisor, at (509) 377-6105.

Respectfully,

WS Oxenford
Vice President, Technical Services
Mail Drop PE04

Attachments: 1. Response to the Request for Additional Information
2. GE-NE-0000-0040-1432-00-01, Revision 0

cc: BS Mallett - NRC – RIV
BJ Benney - NRC – NRR
NRC Sr. Resident Inspector - 988C
WA Horin - Winston & Strawn
RN Sherman - BPA/1399

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

NRC Statement: Requests relief from 10 CFR 50.73 reporting requirements.

Response
Energy Northwest is not requesting relief from reporting requirements. The license amendment request (LAR) is limited to a clarification of the license and design bases that the reactor core isolation cooling (RCIC) system is not credited in the control rod drop accident (CRDA) analysis. A secondary effect of this correction will be the elimination of reporting the inoperability of the RCIC system as a condition that could prevent the fulfillment of a safety function.

NRC Statement: Licensee claims that credit is not taken in the CRDA Analysis.

Response
In the analyses of record for the CRDA, the injection of water into the reactor pressure vessel is not modeled. The details of the codes used to perform the analyses are included in the References, Section 15.4.10, in the Columbia Final Safety Analysis Report (FSAR) and are repeated below:

- Siemens Power Corporation, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2," EMF-2158(P)(A), Revision 0, October 1999.
- Exxon Nuclear Company, "Application of the ENC Methodology to BWR Reloads," XN-NF-80-19(P)(A) Volume 4, Revision 1, June 1986.
- Framatome ANP, "Columbia Generating Station Cycle 17 Reload Analysis," EMF-2863, Revision 1, September 2003.
- Careway, H. A., V. D. Nguyen, P. P. Stancavage, "Radiological Accident Evaluation - The CONAC03 Code," (NEDO-21143-1).

NRC Statement: NEDO-10527, March 1972, the original licensing basis TR indicates that credit was taken for RCIC in the CRDA analysis.

Response
The current design bases topical report by the fuel vendor is "Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis," XN-NF-80-10(P)(A). The analysis for the CRDA explains and the NRC safety evaluation (SE) reiterates that the transient event time is about 6 seconds. In Section 2.2(b) of the SE, the NRC also says that "...the accident may be terminated assuming a scram." The proposed change will align the FSAR with the approved licensing analyses of record.

Two General Electric (GE) documents, NEDO-10527and NEDO-20360, were part of the original design bases. These GE topical reports discuss computer codes and other analytical methodologies used by GE to determine that the limits were met following design bases accidents.

In Section 2 of GE-NE-0000-0040-1432-00-01, Revision 0 (Attachment 2), GE confirms that NEDO-10527 did not take credit for the RCIC system in the mitigation of the CRDA.

> "...NEDO-10527 (Reference 2), as a licensing topical report, should not be interpreted as crediting RCIC for mitigating the consequences of a CRDA."

NRC Statement: Scram function alone is not sufficient for safe shutdown, RCIC is critical to satisfy the single failure criteria to maintain reactor water level after the scrams.

Response

Energy Northwest agrees that a scram does not assure reaching or maintaining safe shutdown. The Columbia design provides several pathways that can be taken to reach and maintain safe shutdown following a scram. The cause of the scram does not dictate which pathway is taken by the operators, although the problem that caused the scram may impact which systems are available. Only those systems categorized as engineered safety features (ESF) are credited as pathways used in accident scenarios. However, operators are free to use other available systems even if they are not ESF systems.

The RCIC system at Columbia is not an emergency core cooling system (ECCS) or an ESF system. In addition, the use of the RCIC system to maintain safe shutdown is limited because of the need for steam as the motive force. The HPCS system is an ECCS designed to respond to decreasing reactor water level, over the range of anticipated vessel pressures or temperatures. The HPCS system meets single failure criteria because the back-up inventory source (diverse as opposed to redundant) is provided by the automatic depressurization system (ADS) in conjunction with an operating low pressure ECCS. Accordingly, the RCIC system operation is not necessary following a reduction of reactor water level.

NRC Statement: Use of SRVs, low pressure ECCS as back-up to HPCS is approved only for Appendix R scenarios.

Response
As discussed in the safety evaluation report for Columbia, NUREG-0892, and the Columbia FSAR (specifically in Chapter 6), the ECCS include the HPCS system, ADS, the low pressure core spray (LPCS) system, and the low pressure coolant injection (LPCI) system. From NUREG-0892 Section 6.3.1:

> "The ADS is provided to depressurize the reactor coolant system in the event a small pipe break occurs and the HPCS system cannot maintain reactor vessel water level or fails to start."

The approval of the use of ADS was not limited to Appendix R scenarios. The ADS has been designed to reduce reactor pressure to allow the injection by a low pressure ECCS as a back-up to the high pressure ECCS. Although NUREG-0892 Section 6.3 discusses the use of ECCS in response to the spectrum of pipe breaks, the ECCS, including the ADS, are used for any accident that causes reactor water level to drop to the established initiation levels. For example, in NUREG-0892, Section 15.1.2, regarding anticipated transients with a single failure, the studies indicate, and the NRC accepted, that automatic depressurization and low pressure inventory make-up will keep the core covered following a feedwater failure with a HPCS failure.

Therefore, the NRC approved licensing basis for Columbia establishes use of the SRVs (ADS) with the low pressure ECCS as a back-up to HPCS for more than Appendix R scenarios.

NRC Statement: RCIC is used as a back-up to HPCS for LOFW event.

Response
Energy Northwest agrees that either the RCIC or the HPCS system is capable of responding to transient events that cause reactor water level to drop, such as the loss of feedwater. The GE design specifications for the RCIC system discuss that the system design bases is to respond to a loss of feedwater. If RCIC can not maintain water level, the HPCS system or other ECCS may be manually initiated or will automatically initiate. As discussed above, ADS in conjunction with an operating low pressure ECCS is the back-up for HPCS during accidents.

NRC Statement: TS allow continued plant operations with RCIC when HPCS is inoperable.

Response
Energy Northwest agrees.

From the Columbia technical specification bases for LCO 3.5.1:

> "If the HPCS System is inoperable, and the RCIC System is immediately verified to be OPERABLE (when RCIC is required to be OPERABLE), the HPCS System must be restored to OPERABLE status within 14 days. In this condition, adequate core cooling is ensured by the OPERABILITY of the redundant and diverse low pressure ECCS injection/spray subsystems in conjunction with the ADS. Also, the RCIC System will automatically provide make-up water at most reactor operating pressures. Immediate verification of RCIC OPERABILITY is therefore required when HPCS is inoperable and RCIC is required to be OPERABLE."

The Columbia technical specifications and bases were developed based on the generic BWR standard technical specifications and bases. The Columbia plant specific bases and the generic bases explain that adequate core cooling is ensured by the operability of redundant and diverse ECCS.

NRC Statement: In 1985, staff denied the request to remove certain requirements from the RCIC TS.

Response
Energy Northwest agrees. In 1983, Energy Northwest requested that the RCIC system LCO be removed from technical specifications. This request was supported by the NRC-required modifications made to the ADS. As modified, ADS could provide an automatically initiated back-up to the HPCS system during events that did not have a high drywell pressure signal. In the denial of the request to remove RCIC from technical specifications, the staff did not discuss the modification made to the ADS systems. However, the staff did include their evaluation of the modification to the ADS in NUREG-0892, Supplement 4, Section 6.3.6, TMI Actions, II.K.3.18.

Generically, the NRC addressed the RCIC system during the project revising the standard technical specifications. The fourth criterion in 10 CFR 50.36 was created because some important systems did not meet any one of the other three criteria. In the Federal Register, Volume 60, Number 138, published July 19, 1995, the NRC identified four systems that would meet criterion four and that should remain in the standard technical specifications even though they were not related to the prevention of accidents or the mitigation of the consequences of accidents (criteria 1, 2, and 3). Those systems were RCIC/isolation condenser, residual heat removal, standby liquid control, and recirculation pump trip. The studies that initiated the four criteria were in

development at the time Energy Northwest requested that RCIC be removed from the Columbia technical specifications. Based on this, Energy Northwest believes that the decision to retain the RCIC system in the technical specifications was based on the importance of the system rather than a deterministic reliance on the system to mitigate the consequences of any design basis accident. Energy Northwest agrees that the RCIC system is, as shown by probabilistic risk assessment and operating experience, significant to public health and safety. Therefore, Energy Northwest also believes that the RCIC system should remain in the Columbia technical specifications in accordance with 10 CFR 50.36, criterion 4.

NRC Statement: Operating experience and PRA show that RCIC system is important to safety.

Response
Energy Northwest agrees.

NRC CONCLUSION: Relaxation of reporting requirements for RCIC is not recommended.

Response
As discussed above, Energy Northwest is not requesting a relaxation of reporting requirements. Energy Northwest is requesting that the NRC approve a request to revise the FSAR to agree with the approved analyses of record for the CRDA. The change to the FSAR would align the licensing and design bases for Columbia.

Energy Northwest has requested NRC approval to clarify that the RCIC system is not credited in the accident analyses for mitigating the consequences of the CRDA. The RCIC system is an important system for restoring reactor water level regardless of the reason for the decreasing level. The RCIC system is used and will continue to be used at Columbia to reach safe shutdown conditions when adequate steam flow is available. The HPCS system is an ECCS credited for restoring reactor water level. The NRC approved back-up for the HPCS system is ADS in conjunction with an operating low pressure ECCS.