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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 5, 2012

Mr. Mark E. Reddemann  
Chief Executive Officer  
Energy Northwest  
P.O. Box 968 (Mail Drop 1023)  
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – REQUEST FOR ADDITIONAL  
INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO  
IMPLEMENT PRNM/ARTS/MELLLA (TAC NO. ME7905)

Dear Mr. Reddemann:

By letter dated January 31, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML120400144), Energy Northwest (the licensee), submitted a license amendment request for Columbia Generating Station that would allow the licensee to expand the operating domain by the implementation of Average Power Range Monitor/Rod Block Monitor/Technical Specifications/Power Range Neutron Monitoring/Maximum Extended Load Line Limit Analysis (ARTS/PRNM/MELLLA). The Neutron Monitoring System would be modified by replacing the analog Average Power Range Monitor subsystem with the Nuclear Measurement Analysis and Control (NUMAC) Power Range Neutron Monitoring System. The licensee would expand the operating domain to Maximum Extended Load Line Limit Analysis (MELLLA) and make changes to certain allowable values and limits and to technical specifications. The changes to the technical specifications include the adoption of Technical Specification Task Force Traveler (TSTF) 493 Option A surveillance notes. Furthermore, the amendment would allow a change in the licensing basis to support Anticipated Transient without Scram (ATWS) accident mitigation with one Standby Liquid Control (SLC) pump instead of two.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by the licensee and determined that additional information identified in the enclosure(s) to this letter is needed in order for the NRC staff to complete its review. The draft copy of the request for additional information (RAI) was provided to Mr. Zachary Dunham of your staff via e-mail on Thursday, July 26, 2012. A teleconference was held on August 24, 2012, with members of your staff. During the call, Mr. Huiatt agreed to respond within 30 days of the date of this letter, with the exception of RAI #10, to which Columbia will respond within 45 days.

The NRC staff's proprietary version of the RAIs is provided in Enclosure 1 and a non-proprietary version is provided in Enclosure 2. Proprietary information in Enclosure 1 is identified by text enclosed within double brackets.

NOTE: Enclosure 1 to this letter contains Proprietary Information. Upon separation from Enclosure 1, this letter is DECONTROLLED.

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M. Reddeman

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If you have any questions regarding this matter, I may be reached at (301) 415-1056 or via e-mail at [lauren.gibson@nrc.gov](mailto:lauren.gibson@nrc.gov).

Sincerely,

*Lauren Kate Gibson*

Lauren K. Gibson, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:

1. Proprietary RAIs
2. Non-proprietary RAIs

cc w/Encl 2: Distribution via Listserv

ENCLOSURE 2

REQUEST FOR ADDITIONAL INFORMATION  
(NON-PROPRIETARY)

Proprietary information pursuant to Section 2.390 of Title 10 of the  
*Code of Federal Regulations* has been redacted from this document.

**Redacted information is identified by blank space enclosed within double brackets.**

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST

TO IMPLEMENT PRNM/ARTS/MELLLA

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NUMBER 50-397

By a letter dated January 9, 2012, Energy Northwest (the licensee) submitted a license amendment request (LAR) for Columbia Generating Station (CGS). The proposed amendment would allow the licensee to expand the operating domain by the implementation of Average Power Range Monitor/Rod Block Monitor/Technical Specifications/Power Range Neutron Monitoring/Maximum Extended Load Line Limit Analysis (ARTS/PRNM/MELLLA). The Neutron Monitoring System would be modified by replacing the analog Average Power Range Monitor subsystem with the Nuclear Measurement Analysis and Control (NUMAC) Power Range Neutron Monitoring System (PRNMS). The licensee would expand the operating domain to Maximum Extended Load Line Limit Analysis (MELLLA) and make changes to certain allowable values and limits and to technical specifications. The changes to the technical specifications include the adoption of Technical Specifications Task Force Traveler (TSTF) 493 Option A surveillance notes. Furthermore, the amendment would allow a change in the licensing basis to support Anticipated Transient without Scram (ATWS) accident mitigation with one Standby Liquid Control (SLC) pump instead of two.

The NRC staff has reviewed the submitted information and determined that the information below is needed for the staff to complete its evaluation.

1. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A074)," paragraph 1.4.4, "Communication Modules."

Are all the fiber-optic communications that are used in the Power Range Neutron Monitoring System (PRNMS) for digital data communication permanently constrained to the unidirectional mode or do any of them support reconfiguration to be bidirectional? If a fiber-optic communication supports reconfiguration to be bidirectional, then can this feature be reconfigured remotely (i.e., from outside a safety channel's boundary)?

Please confirm that each fiber-optic interface used is fixed unidirectional and cannot be reconfigured or could identify any that are reconfigurable to be bidirectional. If single-mode simplex fiber connection is used throughout to achieve each point-to-point connection and/or distinct fiber-optic transmitters and receivers are used rather than a configurable transceiver, then please state this and provide associated vendor part numbers. If any fiber-optic interface is reconfigurable, please provide an explanation of what detects and reports this reconfiguration as an equipment failure/error.

2. This request relates to Enclosure 2, Attachment 2, "NEDC-33685P, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A082)," paragraph 1.4.13, "Communications."

With regard to the communication of gain adjustments from []

[], please clarify what type of switch is used within each PRNMS channel's instrument chassis to perform or accept instrumentation gain and calorimetric gain adjustments. Is it a physical hardware switch with electrical contacts or something else? Please describe the characteristics as well as the vendor's name and model number.

3. This request relates to Enclosure 2, Attachment 2, "NEDC-33685P, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A082)," paragraph 1.4.4, "Communication Modules."

With regard to communication among the PRNMS components and its interfacing systems, please provide the communication diagrams for the different types of communication used (e.g., the communication diagrams should clearly indicate whether the communication is one-way or two-way). The communication diagrams should clearly identify whether the communication is relied upon to perform a safety function, and should clearly identify the isolation boundary for redundant safety-related components (interdivisional or safety with non-safety) that provides electrical and data independence. Please also describe the communication protocols for each of the communication systems used. It is the staff's understanding that []

[] Please confirm if this is true or describe any other []

4. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A074)."

Paragraph 4.4.3.3, Software Design Specification DI&C ISG-06 D.4.4.3.3, refers to References 68 and 69 as specifications for functional software design specifications and data sheets for the Average Power Range Monitor (APRM) software functional design. Please identify and submit the document that describes the MELLA functional software design specifications/data sheets.

5. This request relates to Enclosure 2, Attachment 2, "NEDC-33685P, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A082)."

Paragraph 4.4.5.2.7, Design Verification states, in part, that

*All design verifications, including verification by an individual within the same organization, must abide by the following independence requirements for the RV [Responsible Verifier]. Reference 29, Section 7.1.3, states that the following independence criteria shall be met.*

[[

]]

The use of words, [[                    ]] in the above three sentences implies that the RV could have a role in the design process. Please note that the NUMAC SVVP (Software Verification and Validation Plan), Section 2.2, in Appendix A to the document states in part that [[

]]

References 34 and 42 specify various requirements for independent design verification. The GEH (General Electric-Hitachi) design process requires independent design verification at various stages of the design. The words [[                    ]] have been used while describing the role of the RVs in the design verification process which is not in compliance with the concept of independent design verification. Please justify the use of words [[                    ]] as stated and used above. This clarification is required to ensure that RV is independent of the design process.

6. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A074)."

Paragraph 5.2, Equipment qualification, states, in part, that:

*New PRNM equipment being installed in the main control room must meet the environmental design conditions for the main control room. The CGS specific analyses and testing performed to support qualification of the CGS PRNM equipment as installed in CGS is documented (Reference T3).*

Please submit an EQ (equipment qualification) summary report that provides sufficient information for staff review to ensure the adequacy of the tests and test results.

7. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A074)."

Paragraph 9.3.8, Clause 6.8 Setpoints states, in part, the following:

*The margin between the AL [analytic limit] and the final NTSP [nominal trip setpoint] is at least equal to, and generally greater than that needed to meet the 95% probability requirement of RG [Regulatory Guide] 1.105.*

*GEH's setpoint methodology for operating plants uses single-sided distributions in the development of AVs [allowable values] and NTSPs for instrument channels that provide trips when the process variable being measured approaches the setpoint in one direction, as described in ISA [Instrument Society of America] standard 67.04 part II.*

Please be advised that NRC has not endorsed ISA Standard 67.04 part II. RG 1.105, Rev. 3 (issued in December 1999) states, in part, "That is, there is a 95% probability that the constructed limits contain 95% of the population of interest for the surveillance interval selected." The licensee statement addresses the part regarding the 95% of the population only. Please explain specifically how you ensure the constructed limits contain 95% of the population with a confidence/probability of 95%.

8. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A074)."

Paragraph 11.5 addresses the secure development and environmental controls. In part, this paragraph states that "only GEH personnel would have access to the digital safety system under development." Please confirm that the development network was not connected to any other network during the software design and development phase and that the access to the development area was limited to the personnel involved with the design and development phase. Also, please describe how access to the development system computers was controlled (e.g., physical access, adequacy of password protections and user privileges, etc.).

9. This request relates to Enclosure 2, Attachment 9, "NEDC-33685, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function,' (ML12040A074)."

Table 11-1 addresses regulatory positions 2.1 through 2.5 of RG 1.152. Under subsection 2.4 it addresses code review. Was the code reviewed for unwanted and undocumented functions? If so, what were the results? If not, please provide the justification to assure that no unwanted or undocumented code was present.

10. This request relates to Enclosure 2, Attachment 10, "NEDC-33690, Revision 0, 'Columbia Generating Station Power Range Neutron Monitoring System Response Time Analysis Report' (ML12040A075)."

The following paragraph has been extracted from the bottom of page 4 of Enclosure 2, Attachment 3:

*With respect to system response time, the CGS FSAR [Final Safety Analysis Report] (Reference 5) Chapter 15 requirements use the timing*

*requirements from the Licensee Controlled Specification Manual (Reference 4) Table 1.3.1.1-1. This meets the IEEE-603-1991 Clause 4.10 (Reference 7) requirement for the safety system design basis.*

Please provide the elements of this program as they apply to the four subsections (subsections 4.10.1 through 4.10.4) under section 4.10 of IEEE 603-1991.

11. This request relates to Enclosure 2, Attachment 3, "NEDC-33690P, Revision 0, 'Columbia Generating Station Power Range Neutron Monitoring System Response Time Analysis Report' (ML12040A083)."

D&IC ISG-04, Staff Position 1.20 discusses data error rates. Part of the response to these items states on the bottom of page 12,

*II*

*II*

*The data error rate for each safety-related communication link was established and used to determine the effect of data errors on safety system response time. The established data error rates will be supported by testing a similar PRNM system for GGNS during integration testing. Therefore, the criteria of Staff Position 1.20 are met.*

Will the same number, structure, and length of messages be sent on each data link on CGS as was tested for GGNS? Please confirm. In addition, please confirm that the CGS and/or GGNS test results will be available within the CGS documentation for audit by NRC Staff.

Will the data error rates be tested for CGS or the data error rates tested for GGNS be utilized to take credit for CGS? If credit is to be taken for the GGNS data, then a justification for use of GGNS data for CGS must be provided. Please clarify.

12. This request relates to Enclosure 2, Attachment 6, "NEDC-33697P, Revision 1, 'Columbia Generating Station Power Range Neutron Monitoring System Design Analysis Report' (ML12040A086)."

Enclosure 1 to this attachment provides D&IC-ISG-04 Compliance Matrix. Staff position for item 55 of the compliance matrix is as follows:

*Staff Position 1.12 (Implementation details). Messages may occur at a high rate that degrades or causes the system to fail (i.e., broadcast storm).*

The licensee response discusses how messages, if lost, could not affect any safety function. In particular the response states,

*||*

*||*

Equipment failure or software malfunction can cause broadcast data storms. Please explain how data storms are prevented and, if they do happen, how they affect plant operation and safety.

13. This request relates to Enclosure 2, Attachment 6, "NEDC-33697P, Revision 1, 'Columbia Generating Station Power Range Neutron Monitoring System Design Analysis Report' (ML12040A086)."

Enclosure 2, page E2-9 states, in part, the following with regard to compliance to regulatory guide 1.152:

*||*

*|| Extensive field experience of NUMAC equipment, including PRNM, demonstrates that the design process applied for the NUMAC equipment, including PRNM, provides a fully adequate digital design for the NUMAC applications.*

The paragraph above does not clarify the steps taken during the design of CGS PRNMS project to implement the guidance of regulatory guide 1.152. Please state the specific measures taken for the CGS PRNM/ARTS/MELLLA upgrade project during software design and development stage.

14. This request relates to Enclosure 2, Attachment 1, "0000-0101-7647-R3, 'Columbia Generating Station Plant-Specific Responses Required by NUMAC PRNM Retrofit Plus Option III Stability Function Topical Report (NEDC-32410P-A) (ML12040A073)" and Attachment 2, "NEDC-33685P, Revision 1, 'Digital I&C-ISG-06 Compliance for Columbia Generating Station NUMAC Power Range Neutron Monitoring Retrofit Plus Option III Stability Trip Function' (ML12040A082)."

Section 4.4.2.2.1.4 of Table in Attachment 1 discusses plant-specific response for temperature and humidity. In part it states:

*The PRNM control room electronics are qualified for continuous operation under the following relative humidity conditions: 10 to 90% (non-condensing).*

In Enclosure 2, Attachment 2, Section 5.4 in Table 5-2 lists the environmental qualifications of the PRNM panel. It lists that the lower humidity qualified value is [ ] humidity. Table 5-3 in the same section lists the CGS plant specific environmental requirement as [ ] humidity. There is an apparent anomaly in the two statements i.e. Enclosure 2, Attachment 1 and Enclosure 2, Attachment 2. In Enclosure 2, Attachment 2, CGS further explained that similar equipment has been tested for [ ] humidity levels.

Please explain this apparent anomaly. Also, please provide the applicable test documentation and address whether the equipment that was tested was the same or substantially similar to the equipment at CGS.

15. This request relates to Enclosure 1, "Description of Proposed Technical Specifications Changes (ML12040A072)."

Section 2.2.4.3, Table 3.3.1.1-1 Note (d) states that, "If the as-found channel setpoint is outside its predicted as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service." CGS is requested to confirm that a corrective action program or an equivalent plant specific program is in place to track and evaluate all such deviations.

16. This request relates to Enclosure 1, "Description of Proposed Technical Specifications Changes (ML12040A072)."

Notes (d) and (e) have been added on page B.3.3.1.1-29 of the TS bases document for SR [Surveillance Requirement] 3.3.1.1.10. These notes address only limiting trip setpoint (LTSP) and do not mention the fact that if the field trip setpoints are more conservative than the LTSP then those setpoints are to be considered for evaluating as-left and as-found settings. These notes should be modified by CGS to appropriately reflect the guidance of TSTF-493, Option A.

17. This request relates to Enclosure 3, Attachment 1, "NEDO-33507, Revision 1, 'Columbia Generating Station APRM/RBM/Technical Specifications/ Maximum Extended Load Line Limit Analysis (ARTS/MELLLA) (ML12020A080)."

Attachment A to the above enclosure lists sigma as "3" on page A-5 and on page A-12, as well as various other places. Please justify the use of 3 sigma for the applications where used.

18. This request relates to Enclosure 3, Attachment 1 "NEDE-33507, Revision 1, 'Columbia Generating Station APRM/RBM/Technical Specifications/ Maximum Extended Load Line Limit Analysis (ARTS/MELLLA) (ML12020A080)."

In order to confirm that the licensee is following the guidance of RG 1.105, Revision 3 and RIS [Regulatory Information Summary] 2006-17, the staff would like to review a sample calculation. As such, CGS is requested to provide the High Power Trip Setpoint (HTSP) calculation along with the supporting documents for staff review. The HTSP setpoint function and the values are noted on page A-13 of Attachment A to Enclosure 3, Attachment 1. Also, please provide the setpoint methodology document, unless it has already been provided as part of the license change request.

M. Reddeman

- 2 -

If you have any questions regarding this matter, I may be reached at (301) 415-1056 or via e-mail at [lauren.gibson@nrc.gov](mailto:lauren.gibson@nrc.gov).

Sincerely,

Lauren K. Gibson, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:

- 1. Proprietary RAIs
- 2. Non-proprietary RAIs

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