ENERGY NORTHWEST
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P.O. Box 968 • Richland, WA • 99352-0968

September 23, 2004
GO2-04-164

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397; LICENSE AMENDMENT REQUEST TO REVISE THE REACTOR PRESSURE VESSEL MATERIAL SURVEILLANCE PROGRAM**

References:
(1) Letter GO2-04-032 dated March 5, 2004, from DK Atkinson (Energy Northwest) to U.S. Nuclear Regulatory Commission, "Schedule for Requesting Revision of Technical Specification P/T Curves and Adoption of the BWRVIP Integrated Surveillance Program"
(2) Letter dated February 1, 2002, from Mr. William Bateman (NRC) to Mr. Carl Terry (BWRVIP Chairman), "Safety Evaluation Regarding EPRI Proprietary Reports "BWR Vessels and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)" and "BWRVIP-86: BWR Vessels and Internals Project, BWR Integrated Surveillance Program Implementation Plan"
(3) NRC Regulatory Issue Summary 2002-05, "NRC Approval of Boiling Water Reactor Pressure Vessel Integrity Surveillance Program," dated April 8, 2002.
(4) Letter GO2-04-107 dated June 9, 2004, from DK Atkinson (Energy Northwest) to NRC, "License Amendment Request to Revise Technical Specification 3.4.11, Reactor Coolant System (RCS) Pressure/Temperature (P/T) Limits"

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Energy Northwest hereby requests an amendment to the Columbia Generating Station (Columbia) Operating License NPF-21. The proposed amendment would revise Columbia's licensing basis by replacing the current plant-specific Reactor Pressure Vessel (RPV) material surveillance program with the Boiling Water Reactor Vessels and Internals Project (BWRVIP) Integrated Surveillance Program (ISP). Specifically, the proposed amendment would revise Columbia's Final Safety Analysis Report (FSAR) to include participation in the ISP as described in the program document BWRVIP-86-A, "BWR Vessel and Internals Project Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," dated October 2002.

A001

A condition for participating in the ISP program set forth in the NRC Safety Evaluation approving the BWRVIP ISP (Reference 2) is that each licensee is to provide information, with their license amendment request, regarding the specific neutron fluence methodology to be implemented for their facility. The information submitted must be sufficient to determine that the methodology is NRC approved and that neutron fluence methodology compatibility is addressed as it applies to the comparison of neutron fluences calculated for the RPV versus the neutron fluences calculated for surveillance capsules in the ISP, which are designated to represent the RPV. A license amendment request (Reference 4) was previously submitted to the NRC for review and approval that will implement a neutron fluence methodology that satisfies this condition. Compatibility of the fluence methodology being implemented by Energy Northwest is addressed in paragraph 4.2 of Attachment 1 to this letter.

The NRC has issued a Safety Evaluation (SE) (Reference 2) approving the BWRVIP ISP as an acceptable alternative to all existing BWR plant-specific RPV surveillance programs for the purpose of maintaining compliance with 10 CFR 50 Appendix H, "Reactor Vessel Material Surveillance Program Requirements," through the end of current facility 40-year operating licenses. On April 8, 2002 the NRC issued Regulatory Issue Summary (RIS) 2002-05, "NRC Approval of Boiling Water Reactor Pressure Vessel Integrated Surveillance Program," (Reference 3). RIS 2005-05 states that licensees who elect to participate in the ISP shall submit a license amendment request to incorporate this program into their licensing basis. This license amendment request is submitted in accordance with the guidance contained in References 2 and 3.

Similar requests have been approved for the AmerGen Energy Company's Clinton Power Station, Unit 1, by NRC letter dated August 12, 2003 (TAC No. MB6998), and for Exelon Generation Company's Quad Cities Nuclear Power Station, Units 1 and 2, by NRC letter dated August 28, 2003 (TAC Nos. MB7008 and MB7009).

Energy Northwest has evaluated the proposed amendment pursuant to the criteria of 10 CFR 50.92(c) and has determined the proposed amendment warrants a no significant hazards consideration.

Energy Northwest requests approval of the proposed amendment by October 2005. Energy Northwest also requests a 60-day implementation period upon approval of this request. There are no new commitments associated with this submittal.

If you have any questions or require additional information regarding this matter, please contact Mr. DW Coleman, Regulatory Programs Manager, at (509) 377-4342.

Respectfully,

D.K. Atkinson

DK Atkinson
Vice President, Technical Services
Mail Drop PE08

Attachments:

1. Evaluation of the Proposed Amendment
2. Marked-up Affected Pages from the Columbia Generating Station Final Safety Analysis Report
3. List of Regulatory Commitments

cc: BS Mallet - NRC - RIV
WA Macon - NRC - NRR
NRC Sr. Resident Inspector - 988C
RR Cowley - WDOH
RN Sherman - BPA/1399
TC Poindexter - Winston & Strawn
JO Luce - EFSEC

STATE OF WASHINGTON)
)
COUNTY OF BENTON)

Subject: Request for Amendment, Final Safety Analysis Report Methodology Change

I, DK Atkinson, being duly sworn, subscribe to and say that I am the Vice President, Technical Services, for ENERGY NORTHWEST, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief that the statements made in it are true.

DATE September 23, 2004

DK Atkinson
Vice President, Technical Services

On this date personally appeared before me DK Atkinson, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

GIVEN under my hand and seal this 23rd day of September, 2004

LORI A. WALLI
COMMISSION EXPIRES 3-29-05
NOTARY PUBLIC
STATE OF WASHINGTON

Lori A. Walli
Notary Public in and for the
STATE OF WASHINGTON

Residing at Richland WA

My Commission expires 3-29-05

EVALUATION OF THE PROPOSED AMENDMENT

1.0 DESCRIPTION

This submittal is a request to amend Operating License NPF-21 for Columbia Generating Station (Columbia). The proposed amendment would revise Columbia's licensing basis by replacing the current plant-specific Reactor Pressure Vessel (RPV) material surveillance program with the Boiling Water Reactor Vessels and Internals (BWRVIP) Integrated Surveillance Program (ISP). Specifically, the proposed amendment would revise Columbia's Final Safety Analysis Report (FSAR) to include participation in the ISP as described in the program document BWRVIP-86-A, "BWR Vessel and Internals Project Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," dated October 2002.

A condition for participating in the ISP program set forth in the NRC Safety Evaluation approving the BWRVIP ISP (Reference 2) is that each licensee is to provide information, with their license amendment request regarding the specific neutron fluence methodology to be implemented for their facility. The information submitted must be sufficient to determine that the methodology is NRC approved and that neutron fluence methodology compatibility is addressed as it applies to the comparison of neutron fluences calculated for the RPV versus the neutron fluences calculated for surveillance capsules in the ISP, which are designated to represent the RPV. A license amendment request (Reference 3) was previously submitted to the NRC for review and approval that will implement a neutron fluence methodology consistent with Regulatory Guide (RG) 1.190 (Reference 5). Use of this methodology satisfies this condition. Compatibility of the fluence methodology being implemented by Energy Northwest is addressed in paragraph 4.2 of Attachment 1 to this letter.

2.0 PROPOSED CHANGE

The Columbia Generating Station FSAR, Section 5.3.1.6, "Material Surveillance," describes the current plant-specific RPV material surveillance program. A proposed revision to this section is provided in Attachment 2 to document Columbia's adoption of the BWRVIP ISP and to incorporate BWRVIP-86-A. Excerpts from other sections of Columbia's FSAR related to the methodology for determination of RPV neutron fluence that are being revised are also provided in Attachment 2. Following NRC approval of this license amendment request, the FSAR will be updated to incorporate the changes associated with implementation of the ISP program identified in Attachment 2 in accordance with 10 CFR 50.71(e).

3.0 BACKGROUND

10 CFR 50, Appendix H requires monitoring the beltline regions of RPVs with a material surveillance program that complies with the American Society for Testing and Materials (ASTM) E 185, except as modified by Appendix H. The ASTM protocol provides guidelines for designing a minimum surveillance program, selecting materials, and evaluating test results for light-water cooled nuclear power reactors. It also provides recommendations for the minimum number of surveillance capsules and their withdrawal schedule. 10 CFR 50, Appendix H requires that the proposed surveillance capsule withdrawal schedule be submitted to and approved by the NRC prior to implementation.

Energy Northwest's RPV material surveillance program for Columbia was developed in accordance with 10 CFR 50, Appendix H. The program is described in Columbia's FSAR Section 5.3.1.6, "Material Surveillance." The current Columbia RPV surveillance capsule withdrawal schedule is contained in FSAR Table 5.3-8.

The BWRVIP ISP was developed in response to an issue regarding the potential lack of adequate unirradiated baseline Charpy V-notch (CVN) data for one or more materials in plant-specific RPV surveillance programs at several Boiling Water Reactors (BWRs). This lack of baseline properties would inhibit licensees ability to effectively monitor changes in fracture toughness properties of RPV materials in accordance with 10 CFR 50, Appendix H. The BWRVIP ISP, as approved by the NRC in Reference 1, resolves this issue.

Implementation of the BWRVIP ISP will provide additional benefits. When the original surveillance materials were selected for plant-specific surveillance programs, the state of knowledge concerning RPV material response to irradiation, post-irradiation and subsequent effects on fracture toughness was different than it is today. As a result, many utilities did not include what would be identified today as the plant's limiting RPV materials in their surveillance programs. The BWRVIP effort to identify and evaluate materials from other BWRs, which may better represent a facility's limiting materials, should improve the overall evaluation of BWR RPV embrittlement. Also, the inclusion of testing of Boiling Water Reactor Owners Group (BWROG) Supplemental Surveillance Program (SSP) capsules will improve the overall quality of the data being used to evaluate BWR RPV embrittlement.

The benefits of implementing the ISP also include the following:

- Costs, occupational radiation exposure and outage times of the BWR fleet will be reduced due to elimination of the need for some units (including Columbia) to remove surveillance material specimens, and;

- Implementation of the ISP is expected to reduce the cost of surveillance testing and analysis because materials that are of little or no value will no longer be tested.

4.0 TECHNICAL ANALYSIS

BWRVIP-86-A (Reference 2) describes the implementation plan for an ISP to support operation of all domestic BWR RPVs through the completion of each facility's current 40-year operating license that complies with 10 CFR 50, Appendix H. In a Safety Evaluation (SE) dated February 1, 2002 (Reference 1), the NRC concluded that the ISP proposed by the BWRVIP, if implemented in accordance with specific conditions, is an acceptable alternative to existing BWR plant-specific RPV surveillance programs. The NRC SE requires that each licensee electing to participate in the ISP provide the following:

1. Information regarding what specific neutron fluence methodology will be implemented as part of participation in the ISP, and;

2. Address neutron fluence methodology compatibility as it applies to the comparison of neutron fluences calculated for its RPV versus the neutron fluences calculated for surveillance capsules in the ISP which are designated to represent its RPV.

4.1 Fluence Methodology

Energy Northwest has used the NRC-approved General Electric NEDC 32983P-A, "General Electric Methodology for Reactor Pressure Fast Neutron Flux Evaluations," to calculate the most recent fluence values for Columbia. The methodology is in accordance with the recommendations of Regulatory Guide 1.190 (Reference 5) and was approved by the NRC in a letter dated October 27, 2003 (Reference 4). This methodology was utilized to support a proposed revision to Columbia's RPV pressure-temperature limit curves that was submitted to the NRC for review and approval by letter dated June 9, 2004 (Reference 3). Columbia's FSAR is being revised, as shown in Attachment 2, to reflect that an NRC approved fluence methodology will be used which conforms with RG 1.190. Use of an NRC approved fluence methodology satisfies the first condition contained within the NRC SE (Reference 1).

4.2 Fluence Methodology Compatibility

At an August 29, 2002 workshop regarding the establishment and implementation of the BWRVIP RPV Integrated Surveillance Program, the NRC staff stated that neutron fluence methodology compatibility is satisfied if the surveillance capsules and the RPVs are evaluated with an NRC approved methodology that complies with RG 1.190. BWRVIP-86-A requires the evaluation of ISP capsule fluences to be performed using a methodology that is consistent with the guidance of RG 1.190. Columbia's FSAR is being revised, as shown in Attachment 2, to include the requirement to use an NRC-approved fluence methodology that is consistent with RG 1.190. This satisfies the second condition contained within the NRC SE (Reference 1).

In accordance with the current plant-specific RPV material surveillance program, Columbia's first surveillance capsule has been withdrawn and tested. Under the BWRVIP ISP, Columbia is not identified as a host plant. The representative materials for Columbia's limiting RPV plate and weld materials, and their associated withdrawal schedules, are identified in Reference 2. Thus, in accordance with the ISP, future withdrawal and testing of Columbia's surveillance capsules will be permanently deferred.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration Determination

Energy Northwest is proposing to revise the licensing basis for Columbia Generating Station by replacing the current plant-specific RPV material surveillance program with the BWRVIP ISP. This change is acceptable because implementation of the proposed ISP at Columbia meets the criteria specified in 10 CFR 50, Appendix H, Paragraph III.C, "Requirements for an Integrated Surveillance Program."

In accordance with 10 CFR 50.92(c), a proposed change to the operating license involves a no significant hazards consideration if operation of the facility in accordance with the proposed change would not: 1) involve a significant increase in the probability or consequences of any accident previously evaluated; 2) create the possibility of a new or different kind of accident from any accident previously evaluated; or 3) involve a significant reduction in a margin of safety. Energy Northwest has evaluated the proposed changes to the Columbia Generating Station FSAR using the three criteria set forth in 10 CFR 50.92(c) and has determined that they warrant a no significant hazards consideration as described below:

1. **Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No

   The proposed change implements an ISP program that meets the requirements of 10 CFR 50, Appendix H, Paragraph III.C, "Requirements for an Integrated Surveillance Program." The proposed ISP program ensures the same level of RPV integrity as Columbia's current material surveillance program. Implementation of the proposed ISP is not a precursor or initiator of any previously evaluated accident. No physical changes to Columbia Generating Station are involved with the proposed change. The proposed change will not cause the RPV or interfacing systems to be operated outside of any design limit or testing limit, and will not alter any assumptions or initial conditions previously used in evaluating the radiological consequences of an accident.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No

   The proposed change revises the licensing basis for Columbia Generating Station to reflect participation in the BWRVIP ISP. The NRC has approved the ISP as an acceptable material surveillance program pursuant to 10 CFR 50, Appendix H, paragraph III.C. No physical changes to the plant are associated with the proposed change. No changes in design or operation of any system, structure, or component will be made as a result of the proposed change. The ISP is an alternative monitoring program and cannot create a new failure mode or a new or different kind of accident from any previously evaluated.

   Therefore, the proposed change does create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed amendment involve a significant reduction in the margin of safety?**

   Response: No

   Compliance with RPV material surveillance program requirements specified in 10 CFR 50, Appendix H and the fracture toughness requirements contained in 10 CFR 50, Appendix G ensures an adequate margin of safety exists in the fracture toughness of RPV beltline ferritic materials during any condition of normal operation, anticipated operational occurrence, and system hydrostatic tests. Implementation of the proposed ISP has been evaluated to meet the requirements of 10 CFR 50, Appendix H and this margin of safety is not impacted. Compliance with the requirements of 10 CFR 50, Appendix G will not be affected by this proposed change.

   Therefore, the proposed change does not involve a significant reduction in a margin of safety.

In conclusion, based on the considerations discussed above; (1) there is a reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations, and; (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.2 Applicable Regulatory Requirements

10 CFR 50.60, "Acceptance criteria for fracture prevention measures for light water nuclear power reactors for normal operation," requires that all light water power reactors, with certain exceptions, must meet the fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary set forth in 10 CFR 50 Appendices G and H. 10 CFR 50 Appendix G, "Fracture Toughness Requirements," specifies fracture toughness requirements for ferritic materials of pressure-retaining components of the reactor coolant pressure boundary, including RPVs. 10 CFR 50 Appendix H, "Reactor Vessel Material Surveillance Program Requirements," requires licensees to implement an RPV material surveillance program in order to monitor changes in the fracture toughness properties in the reactor beltline region which result from exposure of these materials to neutron irradiation and the thermal environment.

10 CFR 50 Appendix H, Paragraph III.C, "Requirements for an Integrated Surveillance Program," provides specific criteria upon which approval of an ISP shall be based. An ISP is an alternative method to a plant specific material surveillance program. Appendix H Paragraph III.C states that in an ISP, "the representative materials chosen for surveillance for a reactor are irradiated in one or more other reactors that have similar design and operating features." In Reference 1 the NRC documented that the BWRVIP ISP met the criteria specified in Appendix H, Paragraph III.C provided that all licensees use one or more compatible neutron fluence methodologies acceptable to the NRC staff to determine capsule and RPV neutron fluences. In addition, the NRC required a plant-specific license amendment to be submitted by each licensee wishing to adopt the ISP confirming their incorporation of the ISP into their licensing basis.

Conformance with the NRC General Design Criteria (GDC) for Nuclear Power Plants, Appendix A, to 10 CFR 50, is described in Section 3.1 of Columbia's FSAR. In particular, GDC 31, "Fracture Prevention of Reactor Coolant Pressure Boundary," requires, in part, that the reactor coolant pressure boundary be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions, the boundary will behave in a non-brittle manner and the probability of a rapidly propagating fracture is minimized. Adoption of the ISP as described herein does not conflict with Columbia's FSAR statement of conformance with GDC 31.

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and, (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve; (i) a significant hazards consideration; (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite; or, (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. Letter from Mr. William Bateman, (NRC), to Mr. Carl Terry (BWRVIP Chairman), "Safety Evaluation Regarding EPRI Proprietary Reports "BWR Vessels and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)" and "BWRVIP-86: BWR Vessels and Internals Project, BWR Integrated Surveillance Program Implementation Plan," dated February 1, 2002.

2. BWRVIP-86-A, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," Final Report, October 2002.

3. Letter (GO2-04-107) from DK Atkinson (Energy Northwest) to NRC, "License Amendment Request to Revise Technical Specification 3.4.11 Reactor Coolant System (RCS) Pressure/Temperature (P/T) Limits," dated June 9, 2004.

4. Letter from SA Richards (USNRC) to JF Klapproth, "Safety Evaluation for NEDC-32983P, General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluation (TAC No. MA9891)," MFN 01-050, dated September 14, 2001.

5. Regulatory Guide 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," March 2001.

6. NRC Regulatory Issue Summary 2002-005, "NRC Approval of Boiling Water Reactor Pressure Vessel Integrated Surveillance Program," dated April 8, 2002.

Marked-up Affected Pages from the Columbia Final Safety Analysis Report

1.) LDCN-FSAR-04-033; Marked-up FSAR pages

FSAR Page	FSAR Section/Table	Title
5.3-6	5.3.1.6	Materials Surveillance
5.3-7	5.3.1.6	Materials Surveillance (con't)
	5.3.1.6.1	Positioning of Surveillance Capsules
5.3-17	5.3.3.7	Inservice Surveillance
	5.3.4	References
5.3-21	Table 5.3-1	10 CFR 50 Appendix G Matrix (con't)
5.3-31	Table 5.3-8	Capsule Withdrawal Schedule
5.3-32	Table 5.3-8	10 CFR 50 Appendix H Matrix
5.3-33	Table 5.3-8	10 CFR 50 Appendix H Matrix (con't)

2.) LDCN-FSAR-04-005; Excerpts of FSAR Changes

FSAR Section/Table	Title
4.3.2.8	Vessel Irradiations
4.3.4	References
1.6	Material Incorporated by Reference Table 1.6-1 Topical Reports
1.8	Conformance to NRC Regulatory Guides

curve A shown in Figure 5.3-1. The predicted shift in the RT_{NDT} temperature was determined using the methodology outlined in Regulatory Guide 1.99, Revision 2.

Technical Specification 3.10.1 allows inservice leak and hydrostatic testing to be performed in Mode 4 when the metallurgical characteristics of the reactor pressure vessel require testing at temperatures greater than 200°F, given specified Mode 3 Limiting Conditions for Operations are met. This exemption is only applicable provided reactor coolant temperature does not exceed 275°F.

5.3.1.5.2.5 Operating Limits During Heatup, Cooldown, and Core Operation. The fracture toughness analysis was done for the normal heatup or cooldown rate of 100°F/hr. The temperature gradients and thermal stress effects corresponding to this rate were included. The results of the analysis are operating limits defined by Figure 5.3-1. Curves A, B, and C give the limits for hydrotest, nonnuclear heating, and nuclear heating. The minimum boltup temperature of 80°F is based on an RT_{NDT} at 20°F for a shell plate which connects to the lower flange (Heat and Slab No. C-1307-2); above 80°F the core beltline plate (Heat and Slab No. C-1272-1), which has an initial RT_{NDT} of 28°F, is most limiting for inservice ~~hydrostatic~~ or leak pressure tests (curve A). The feedwater nozzles, which have an RT_{NDT} ~~of -14°F,~~ 0°F are more restrictive than the core beltline at lower pressures during nonnuclear and ~~nuclear heating~~ (curves B and C).

APPROVAL PENDING; REFERENCE LDCN-FSAR-04-005 & 02-04-107

5.3.1.5.2.6 Reactor Vessel Annealing. Inplace annealing of the reactor vessel to counteract radiation embrittlement is unnecessary because beltline material adjusted reference temperature of the NDT is well within the 10 CFR 50 Appendix G 200°F screening limit.

5.3.1.6 Material Surveillance

The materials surveillance program monitors changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region resulting from exposure to neutron ~~irradiation and thermal environment.~~

5.3-01

5.3-01 INSERT

Materials for ~~the program are selected to represent materials used in the~~ PLANT-SPECIFIC MATERIALS SURVEILLANCE reactor beltline region. The specimens ~~are~~ WERE manufactured from a plate actually used in the beltline region and a weld typical of those in the ~~beltline~~ WERE region and thus represent base metal, weld metal, and the transition zone between base metal and weld. The plate and weld ~~are heat~~ WERE treated in a manner which simulates the ~~actual heat treatment performed on the core region shell~~ plates of the completed vessel. WPPSS-ENT-089 (REFERENCE 5.3.4-1) PROVIDES ADDITIONAL DETAIL AND SUPPORTING INFORMATION FOR THE MATERIALS SURVEILLANCE PROGRAM.

~~Each of three in-reactor surveillance capsule contains CVN and tensile specimens. A set of out-of-reactor baseline CVN and tensile specimens is provided with the surveillance test specimens. The WNP-2 RPV Surveillance Program (WPPSS-ENT-089) presents the details of the surveillance program and compliances with the respective codes. The program includes~~

Insert for LDCN-FSAR-04-033 Mark-ups (for paragraph 5.3.1.6):

5.3-01 Insert:
The CGS plant-specific RPV materials surveillance program is replaced by the NRC approved BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), as described in BWRVIP-86-A (Reference 5.3.4-2). The NRC approved the ISP for the industry in their safety evaluation dated February 1, 2002 (Reference 5.3.4-3). The ISP meets the requirements of 10 CFR 50, Appendix H.

The current surveillance capsule withdrawal schedule for the representative materials for the CGS vessel is based on the latest approved version of BWRVIP-86-A (Reference 5.3.4-2). No capsules from the CGS vessel are included in the ISP. The withdrawal of capsules for the CGS plant-specific surveillance program is permanently deferred by participation in the ISP. Capsules from other plants will be removed and tested in accordance with the ISP implementation plan. The results from these tests will provide the necessary data to monitor embrittlement for the CGS vessel.

5.3.1.6

5.3-01 (CONT)

three sets of specimens in the reactor. The withdrawal schedule of the three sets of specimens in the reactor is planned as follows:

a. The first set will be withdrawn when its exposure corresponds to the calculated exposure of the reactor vessel wall at 25% of the reactor design life,

b. The second set will be withdrawn when its exposure corresponds to the calculated exposure of the reactor vessel wall at 75% of the reactor design life, and

c. The third set will be a spare to be withdrawn based on previously developed data.

Calculated lead factors have been prepared for the CGS reactor. The lead factor is the ratio of the fluence at the surveillance sample to the fluence at the peak location in the vessel. The lead factors are located at asymmetrical positions with respect to the core. Because of symmetry each surveillance sample is expected to have the same lead factor.

1/4 T lead factor = 1.42
Vessel surface lead factor = 0.95

5.3.1.6-01
APPROVAL PENDING;
REFERENCE LDCN-FSAR-04-005 &
G02-04-107

(See Tables 5.3-8 for capsule withdrawal schedule)

For the extent of compliance to 10 CFR 50 Appendix H, see Table ~~5.3-9~~ 5.3-8. NEDO-21708 also addressed the requirements of Appendix H to 10 CFR 50 and supports the current application of Regulatory Guide 1.99.

5.3-02

5.3-03

5.3.1.6.1 Positioning of Surveillance Capsules and Method of Attachment FOR PLANT-SPECIFIC SURVEILLANCE PROGRAM

Surveillance specimen capsules are located at three azimuths at a common elevation in the core beltline region. The sealed capsules are not attached to the vessel but are in welded capsule holders. The capsule holders are mechanically restrained by capsule holder brackets as shown in Figure 5.3-4. The capsule holder brackets allow the capsule holder to be removed at any desired time in the life of the plant for specimen testing. A positive spring-loaded locking device is provided to retain the capsules in position throughout any anticipated event during the lifetime of the vessel.

The capsule holder brackets are designed, fabricated, and analyzed to the requirements of the ASME B&PV Code Section III. The surveillance brackets are welded to the clad material which surfaces the pressure vessel walls. As attached, the brackets do not have to comply with specifications of the ASME Code.

5.3.3.7 Inservice Surveillance

Inservice inspection of the reactor pressure vessel is in accordance with the requirements as discussed in Section 5.2.4. The vessel was examined once prior to startup to satisfy the preoperational requirements of IS-232 or the ASME Code, Section XI. Subsequent inservice inspection will be scheduled and performed in accordance with the requirements of 10 CFR 50.55a subparagraph (g). SEE SECTION 5.3.1.6 FOR DESCRIPTION OF THE MATERIALS SURVEILLANCE PROGRAM. 5.3-06

The materials surveillance program monitors changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region resulting from their exposure to neutron irradiation and thermal environment. ~~Specimens of actual reactor beltline material are exposed in the reactor vessel and periodically withdrawn for impact testing.~~ Operating procedures will be modified in accordance with test results to ensure adequate brittle fracture control.

Material surveillance programs and inservice inspection programs are in accordance with applicable ASME Code requirements and provide assurance that brittle fracture control and pressure vessel integrity will be maintained throughout the service lifetime of the reactor pressure vessel.

5.3-07

5.3.4 REFERENCES
SEE INSERT FOR 5.3-07

Insert for LDCN-FSAR-04-033 Mark-ups:

5.3-07 Insert (new paragraph):

5.3.4 REFERENCES

5.3.4-1 WPPSS-ENT-089, "WNP-2 RPV Surveillance Program", Current Revision.

5.3.4-2 BWRVIP-86-A, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," Final Report, October 2002.

5.3.4-3 Letter from U.S. NRC to C. Terry (BWRVIP), "Safety Evaluation Regarding EPRI Proprietary Reports 'BWR Vessel and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)' and 'BWRVIP-86: BWR Vessel and Internals Project, BWR Integrated Surveillance Program Implementation Plan,'" dated February 1, 2002.

Table 5.3-1

10 CFR 50 Appendix G Matrix (Continued)

APPROVAL PENDING;
REFERENCE LDCN-FSAR-04-005
& G02-04-107

5.3-1-01

Appendix G Paragraph	Topic	Comply Yes/No or N/A	Alternative Actions or Comments
IV.B (continued)			Beltline plates were tested with ~~longitudinal~~ CVNs at +10°F only. The minimum values are for Heat C1272-1 (0.15% Cu; 34, 26, 30, 31, 34, 30 ft-lb; 10 and 40% shear at +10°F) and Heat C1273-1 (0.14% Cu; 33, 33, 30, 30, 34, 35 ft-lb; 10% shear at +10°F). Beltline welds were tested with CVNs at 10°F or -20°F ~~only~~. Lowest weld values are found for Heat 04P046/Lot D217A27A (0.06% Cu; 34, 32, 32, 39, 40 ft-lb; 20 and 30% shear at -20°F). Heat C3L46C/Lot J020A27A (~~0.02% Cu;~~ 36 35, 39, 40 ft-lb; 60% shear at +10°F) and Heat ~~05P018/Lot~~ D211A27A (0.09% Cu; 29, 30, 31, 36, 38 ft-lb; 30 and 40% shear at -20°F). Because of the preceding relatively low test temperatures and Cu contents, it is anticipated that end-of-life upper shelf CVN values would be in excess of 50 ft-lb.
IV.C	Requirements for Annealing when RT_{ndt} >200	N/A	5.3-08
V.A	Requirements for Material Surveillance Program	See Table 5.3-~~9~~8	5.3-09
V.B	Conditions for Continued Operation	Yes	Requirements for continued operations are covered in Technical Specifications and the Reactor ~~Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ (REFERENCE 5.3.4-1). SEE SECTION 5.3.1.6 FOR DESCRIPTION OF THE MATERIALS SURVEILLANCE PROGRAM. The Surveillance Program demonstrates compliance with Appendix G, Section IV. ~~Should the conditions prevail, Surveillance Program has provided for a standby set of surveillance samples for additional testing.~~ SEE SECTION 5.3.1.6 FOR DESCRIPTION OF THE MATERIALS SURVEILLANCE PROGRAM. ~~THE PLANT SPECIFIC~~
V.C	Alternative if V.B Cannot be Satisfied	N/A	

5.3-10

Table 5.3-8

Capsule Withdrawal Schedule

Capsule	Vessel Azimuth Location	Lead Factor	Withdrawal Time[a] (EFPY)
1[c]	300°	Due to symmetry, all capsules are expected to have the same lead factors.	8
3[b]	30°		24
2[b]	120°		Standby

[a] Changes to this schedule for withdrawal of surveillance specimens cannot be made without prior NRC approval as required by 10 CFR 50 Appendix H. Section II.B.3, and Generic Letter 91-01 and the Safety Evaluation Report (SER) for License Amendment 107, dated June 15, 1992. In accordance with the SER, once this approval has been obtained this table must be updated. This particular schedule was approved by an NRC to Energy Northwest letter dated July 21, 1993.

[b] Capsule two located at 120° azimuth had fallen off prior to the May 27, 1989, in-vessel examinations. The 120° capsule was last seen in position during the ASME Section XI Preservice Examination (PSI). This capsule was subsequently reinstalled during the 1991 outage. Since this capsule missed some early in life exposure, the 120° capsule was placed in the standby mode rather than being pulled at 24 EFPY.

[c] Capsule 1 located at 300° azimuth was withdrawn for testing in April of 1996. The specimens were tested and reconstituted, then the capsule was reinstalled in May of 1997. This capsule is now considered to be in standby.

5.3-11

Table 5.3-~~9~~ 8

10 CFR 50 Appendix H Matrix

Appendix H Paragraph	Topic	Comply Yes/No or N/A	Alternative Actions or Comments
I	Introduction	N/A	
II.A	Fluence 10^{17}n/cm^2	Yes	PLANT-SPECIFIC CGS ~~has a comprehensive~~ RPV Surveillance Program IS REPLACED BY THE BWRVIP ISP. ~~as described in Program document (WPPSS-ENT-089)~~. SEE SECTION 5.3.1.6.
II.B	Standards Requirements (ASTM) for Surveillance	No	PLANT-SPECIFIC SURVEILLANCE PROGRAM: Noncompliance with ASTM E185-73 in that the surveillance specimens are not necessarily from the limiting beltline material. Specimens are from actual beltline material, however, and can be used to predict behavior of the limiting material. Heat and heat/low numbers for surveillance specimens were supplied. SEE SECTION 5.3.1.6.
II.C.1	Surveillance Specimen Shall be Taken for Locations Alongside the Fracture Test Specimens (Section III.B of Appendix G)	No	PLANT-SPECIFIC SURVEILLANCE PROGRAM: Noncompliance in that specimens may not have necessarily been taken from alongside specimens required by Section III of Appendix G and transverse CVNs may not be employed. However, representative materials have been used, and RT_{NDT} shift appears to be independent of specimen orientation. SEE SECTION 5.3.1.6.
II.C.2	Locations of Surveillance Capsules in RP~~B~~V	Yes	Code basis is used for attachment of brackets to vessel cladding.
II.C.3.a	Withdrawal Schedule of Capsules, RT_{NDT} <100°F	N/A	SEE SECTION 5.3.1.6. ~~Three capsules planned.~~ Starting RT_{NDT} of limiting material is based on alternative action (see paragraph III.A of Appendix G). ~~See Table 5.3-8.~~
II.C.3.b	Withdrawal Schedule of Capsules, RT_{NDT} <200°F	N/A	
II.C.3.c	Withdrawal Schedule of Capsules, RT_{NDT} >200°F	N/A	

5.3-12

5.3-11

Table 5.3-~~9~~ 8

10 CFR 50 Appendix H Matrix (Continued)

5.3-12

Appendix H Paragraph	Topic	Comply Yes/No or N/A	Alternative Actions or Comments
III.A	Fracture Toughness Testing Requirements of Specimens	Yes	Requirements for postirradiation testing of surveillance material are ~~discussed in the Reactor Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ ADDRESSED IN BWRVIP-86-A (REFERENCE 5.3.4-2).
III.B	Method of Determining Adjusted Reference Temperature for Base Metal, HAZ, and Weld Metal	Yes	Method of determining adjusted reference temperatures found in ~~the Reactor Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ BWRVIP-86-A (REFERENCE 5.3.4-2)
IV.A	Reporting Requirements of Test Results	Yes	Reporting requirements are discussed in ~~the Reactor Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ BWRVIP-86-A (REFERENCE 5.3.4-2).
IV.B	Requirement for Dosimetry Measurement	Yes	Dosimetry requirements are discussed in ~~the Reactor Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ BWRVIP-86-A (REFERENCE 5.3.4-2).
IV.C	Reporting Requirements of Pressure/Temperature Limits	Yes	A discussion of the pressure/temperature limits and reporting requirements is found in ~~the Reactor Pressure Vessel Surveillance Program document (WPPSS-ENT-089)~~ BWRVIP-86-A (REFERENCE 5.3.4-2).

Attachment 2
2.) LDCN-FSAR-04-005; Excerpts of Changes

Excerpts of changes pertaining to RPV fluence calculation methodology. Note: These changes are on hold pending approval of a proposed revision to Columbia's RPV pressure-temperature limit curves that was submitted to the NRC by letter dated June 9, 2004 (Reference 3 on Attachment 1).

Changes to Section 4.3.2.8 Vessel Irradiations

Replace Section:
(First paragraph of replaced section provided below)

The reactor pressure vessel (RPV) irradiation calculation provides a best-estimate prediction of the fluence rather than a conservative prediction as was the case with earlier methods. The methodology for neutron flux calculation conforms to Licensing Topical Report (LTR) NEDC-32983P-A (Reference 4.3-13). In general, the methodology described in the LTR adheres to the guidance in Regulatory Guide 1.190 for neutron flux evaluation and was approved by the U.S. NRC in the Safety Evaluation Report (SER) for referencing in licensing actions.

Changes to 4.3.4 REFERENCES:

Add:
4.3-13 GE Nuclear Energy, "Licensing Topical Report, General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluations", NEDC-32983P-A, December 2001.

Changes to Section 1.6 Material Incorporated by Reference
Table 1.6-1 Topical Reports

Add:

NEDC-32983P-A	General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluations (December 2001)

Changes to Section 1.8 CONFORMANCE TO NRC REGULATORY GUIDES
1.8.2 NUCLEAR STEAM SUPPLY SYSTEM SCOPE OF SUPPLY EVALUATION

Add:
Regulatory Guide 1.190, Revision 0, March 2001
Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence

Regulatory Guide Intent:
This regulatory guide has been developed to provide state-of-the-art calculations and measurement procedures that are acceptable to the NRC staff for determining pressure vessel fluence.

Application Assessment:
Assessed capability in design.

Compliance or Alternative Approach Statement:
The methodology for neutron flux calculation for the CGS reactor vessel conforms to Licensing Topical Report (LTR) NEDC-32983P-A. In general, the methodology described in the LTR adheres to the guidance in Regulatory Guide 1.190 for neutron flux evaluation and was approved by the U.S. NRC in the Safety Evaluation Report (SER) for referencing in licensing actions.

General Compliance or Alternate Assessment:
Reference compliance assessment for Regulatory Guide 1.99.

Specific Evaluation Reference:
See 4.3.2.8.

Similar Application Reference:
Similar application is used for Browns Ferry Nuclear Plant, Units 2 and 3, reactor vessels.

List of Regulatory Commitments

Regulatory Commitment	Due Date
None	N/A