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January 20, 2011
GO2-11-017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397 RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LICENSE RENEWAL APPLICATION**

References:
1) Letter, GO2-10-11, dated January 19, 2010, WS Oxenford (Energy Northwest) to NRC, "License Renewal Application"

2) Letter dated November 19, 2010, NRC to SK Gambhir (Energy Northwest), "Request for Additional Information for the Review of the Columbia Generating Station, License Renewal Application," (ADAMS Accession No. ML103130548)

Dear Sir or Madam:

By Reference 1, Energy Northwest requested the renewal of the Columbia Generating Station (Columbia) operating license. Via Reference 2, the Nuclear Regulatory Commission (NRC) requested additional information related to the Energy Northwest submittal.

Transmitted herewith in the Attachment is the Energy Northwest response to the Request for Additional Information (RAI) contained in Reference 2. Enclosure 1 contains Amendment 22 to the Columbia License Renewal Application. Two new commitments and one revised commitment are included in this response. These commitments are reflected in the changes to Table A-1 in this amendment.

If you have any questions or require additional information, please contact Abbas Mostala at (509) 377-4197.

A143
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on the date of this letter.

Respectfully,

SK Gambhir
Vice President, Engineering

Attachment: Response to Request for Additional Information

Enclosure: License Renewal Application Amendment 22

cc: NRC Region IV Administrator
NRC NRR Project Manager
NRC Senior Resident Inspector/988C
EFSEC Manager
RN Sherman – BPA/1399
WA Horin – Winston & Strawn
EH Gettys - NRC NRR (w/a)
AD Cunanan - NRC NRR (w/a)
BE Holian - NRC NRR
RR Cowley – WDOH

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

"Request for Additional Information for the Review of the Columbia Generating Station, License Renewal Application,"
(ADAMS Accession No. ML103130548)

Follow-up RAI B.2.34-1

Background:

In response to the RAI B.2.34-1, the applicant stated:

a. "Additionally, the sand pocket drains are checked monthly (28 day frequency) for presence of water."
b. "Based on plant specific corrosion rates for carbon steel exposed to raw water (i.e., SW piping) the maximum average corrosion rate is 1.5 mils per year (mpy). Therefore, a corrosion of 1.5 mpy will be assumed for containment steel plate in the sand pocket region."
c. "The 1.9% margin when applied to the thickness of the plate in the sand bed region will result in a corrosion allowance of 27.5 mils."
d. "The construction of the containment at Columbia utilized a polyurethane foam material in the annulus between the biological shield wall and primary containment vessel. Energy Northwest agrees this method of construction would inhibit, if not prevent, the free flow of moisture to the sand pocket regions and drain lines from the refueling bellows area."

Issue:

It is not clear to staff:

a. How the sand pocket drains are inspected for presence of water.
b. How the plant specific corrosion rate of 1.5 mpy was established.
c. How the corrosion rate in the sand bed region can be linearly proportional to the drywell thickness.

In addition, presence of moisture in the polyurethane material can lead to corrosion and localized pitting of the steel containment. The localized corrosion rate due to pitting can be higher than 1.5 mpy over the long term.

Request:

a. Provide details on how the sand pocket drains are inspected. In addition, does the plant procedures require vacuum of all of the eight sand pockets during inspection.
b. Provide the basis for the plant specific corrosion rate of 1.5 mils per year (mpy).
c. Justification for assuming that corrosion rate in sand bed region is linearly proportional to the drywell thickness.

d. Plans (if any) for UT examination of a representative portion of the steel containment and sand pocket region to detect degradation of steel and confirm that corrosion rate is less than 1.5 mils per year (mpy).

Energy Northwest Response:

a. The sand pocket drains are checked on a 28 day frequency under a preventative maintenance (PM) task. The task has an equipment operator (EO) open the valve at each of the eight drain lines (one at a time) and check for the presence of water. The EO notes 'Yes/No' for the presence of water and then signs and dates the appropriate step. There is a note following these sign-offs that if water is observed notify the Control Room Supervisor (CRS). To date no water has been found. The EO does not vacuum the drain lines for this task, but these lines are vacuum checked under another PM task performed on a two year frequency. The humidity level is checked in the sand pocket drain region prior to and after each refueling outage under a PM task and for this evolution a vacuum pump is attached to each drain line to draw an air sample. Successful completion of this task has served to confirm and reaffirm that the drain lines are not clogged. As stated in the Energy Northwest response to NRC Generic Letter 87-05, dated February 8, 1988 (GO2-88-035), these drain lines were confirmed to be free of sand or cleaned out. However, to further confirm the absence of clogged drain lines and that a flow path exists for identification of any potential leakage into the sand pocket region a boroscope examination of each drain line will be performed prior to the end of 2015. LRA Table A-1 is amended to add the commitment for the sand pocket drain line boroscope inspection in Amendment 22 of the LRA included in the enclosure.

b. The plant specific corrosion rate of 1.5 mils per year (mpy) is based on plant specific data from 180 day corrosion coupons exposed to Service Water system (raw water) environment. The subject 180 day coupons are bare carbon steel and are removed every 180 days and the material loss determined. These coupons are replaced with new coupons (also bare carbon steel) and the process repeated.

c. Based on review of the final stress report provided by the primary containment vessel (PCV) vendor the stresses seen by the PCV can be both membrane and bending stresses based on the load combinations. The resultant stress intensities related to membrane stresses are linearly proportional to the thickness and the resultant stress intensities related to bending stresses are exponentially proportional to the thickness (thickness squared). However, the allowable stress intensity for stress intensities associated with bending stress is also higher (1.5 times) than that for stress intensity related to purely membrane stresses. Thus, to address this concern Energy Northwest (EN) performed an evaluation of the entire PCV and adjusted the stress intensities identified in the final stress report as appropriate for the anticipated reduction in thickness of 90 mils thru the period of extended operation. This evaluation addressed the PCV from the sand pocket region up to the location of the refueling bellows or the entire height of the PCV.

The results of this evaluation are that the PCV will maintain its structural integrity and pressure boundary for all load cases with the postulated corrosion loss of 90 mils through the period of extended operation.

d. EN does not plan on performing any UT examinations of the PCV to confirm that the potential corrosion rate is less than the postulated rate of 1.5 mils per year. This rate was based on new (bare) carbon steel in raw water as noted in response b) above and while the exterior side of the PCV is also bare carbon steel EN feels that exposure of this material to water has been minimal based on response a) above. However, per response to RAI 3.5.2.2.1.4-1 EN has committed to removal of all eight inspection ports equally spaced in the upper region of the PCV to visually inspect this exterior side of the PCV. These inspection ports are located approximately 12 feet below the refueling bellows which would be the most likely source of any potential leak into the annulus area between the PCV and the concrete shield wall at Columbia. These inspections will be performed during the fourth ISI inspection interval prior to the period of extended operation (PEO) and the fifth ISI inspection interval after entering the PEO to verify leakage is not entering. This commitment is documented in LRA Amendment 17.

Follow-up RAI B.2.34-3

Background:

In response to RAI B.2.34-3, the applicant stated that the VT-3 examinations are performed in accordance with the plant procedures by certified VT -3 examiners. The procedures and certification are in accordance with ASME Section XI.

Issue:

10CFR 50.55a which is referenced in GALL XI.S1 states that VT-1 and VT-3 examinations must be conducted in accordance with IWA-2200. Personnel conducting examinations in accordance with the VT-1 or VT-3 examination method shall be qualified in accordance with IWA-2300. The "owner-defined" personnel qualification provisions in IWE-2330(a) for personnel that conduct VT-1 and VT-3 examinations are not approved for use. It is not clear to the staff whether the persons performing the VT-3 examination at the Columbia Generating Station are qualified in accordance with the IWA-2300 requirements.

Request:

Provide the qualification requirements for the VT-3 examiners at the Columbia Generating Station. Specifically, the staff needs to know if the VT-3 examiners are qualified in accordance with ASME IWA-2300.

Energy Northwest Response:

Columbia Generating Station qualifies and certifies VT-3 visual examination personnel to a procedure which complies with 1) ASME Section XI 2001 Edition through the 2003 Addenda, 2) 10 CFR 50.55a, and 3) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel CP-189, as modified by ASME section XI 2001 Edition 2003 Addenda. Since the procedure complies with the requirements of ASME Section XI, the personnel are qualified in accordance with IWA-2300 of ASME Section XI 2001 Edition, 2003 Addenda.

Follow-up RAI B.2.35-2

Background:

In its response to RAI B.2.35-2, dated September 3, 2010, the applicant stated that no inspection frequency is specified when applying supplemental examinations per IWF-3200. The applicant also stated that when visual examinations detect conditions in the structural steel supports of the service water pond spray ring header requiring evaluation, these examinations may be supplemented with other examination methods to determine the characteristic of the flaw. Supplement examinations, if needed, are performed by either or both the surface and volumetric methods. The applicant further stated that the structural steel supports of the spray ring header are protected from corrosion by coating the structure and a sacrificial anode protective system. The effectiveness of the corrosion protection system is assessed periodically by performing above-water and below-water visual inspections of the structural supports. Additionally, the operation of the anode protective system is verified periodically. The criterion to initiate the corrective action process is, in accordance with plant procedures, "Identify any issue or condition that doesn't look as if it is right using the AR-CR process."

Issue:

The staff reviewed the applicant's response to RAI B.2.35-2 and was concerned that the applicant did not provide the frequency of the periodic inspection of the service water pond spray ring header supports and the anode protective systems. In addition, the criterion used to initiate the corrective action process was very subjective.

Request:

The applicant is requested to provide the inspection frequency for the above and below water inspection of service water pond spray header supports, and anode protection system. In addition, the applicant to identify quantitative criteria used to initiate the corrective action process. The staff needs this information to confirm that the effects of aging on the intended function of the spray pond header will be adequately managed for the period extended operations in accordance with 10 CFR 54.21(c)(iii).

Energy Northwest Response:

Inspection of the above water portion of the Service Water (SW) spray header supports is performed under the current Structures Monitoring Program at Columbia on a four year frequency. This is a visual inspection of the structural items as performed from the catwalk which provides access to the ring header. The inspection is performed in accordance with the applicable plant procedure. The guidance of this procedure is general in nature and relies on the skill of the qualified engineer(s) selected to perform adequate inspections and document undesired conditions under the site corrective action process. RAI Response B.2.50-2 from Letter GO2-10-128 Amendment 4 committed Energy Northwest to specify additional direction for quantifying, monitoring and trending of inspection results and to provide better alignment with referenced Industry codes, standards and guidelines for the Structures Monitoring Program. This enhancement meets NUREG-1801 Rev. 1 XI.S6 acceptance criteria element. Details of the implementation timeline of the required program enhancement are provided in response to follow-up RAIs B.2.50-1, B.2.50-2, and B.2.50-3.

Inspection of the below water portion of the SW spray header supports is performed under Columbia's Inservice Inspection (ISI) program by VT-3 qualified divers. The frequency of the inspection is every five (5) refueling outages or every ten (10) years. Plant specific instructions provide requirements for visual examination of component supports including personnel qualifications, data recording, and data evaluation. Conditions to be recorded include, but are not limited to structural degradations of support items, missing, detached or loosened support items and general corrosion on sliding surfaces or general corrosion which might reduce the load bearing capacity of the support. All data recorded by the VT-3 qualified diver is reviewed by a level II or III inspector. Any component supports containing unsatisfactory items are then further evaluated for entry into the site corrective action program.

Inspection of the anode protection system for the SW spray header supports is performed by divers on a three (3) year frequency. Divers clean (wire brush) and inspect the anodes and provide the as-found condition to the system engineer for trending and monitoring. Parameters collected during the dive inspection are each anode's average depth, average gap, and percent volume remaining. The system engineer will use this quantitative measurement of material left to determine if and when anode(s) require replacement.

Indications or relevant conditions of degradation are reported and submitted for further evaluation as part of the corrective action program. These evaluations are performed by engineers qualified by virtue of training and experience to evaluate evidence of potential aging effects. They ensure the components are maintained within all Current Licensing Basis (CLB) design conditions or component will continue function as originally designed.

Follow-up RAIs B.2.50-1, B2.50-2, B.2.50-3

Background:

In response to RAIs B.2.50-1, B2.50-2, B.2.50-3, the applicant stated that the required enhancements to AMPs will be implemented prior to the period of extended operation. In addition, it is not clear from the response which of the recommended enhancements will be adopted for the AMPs.

Issue:

The staff is concerned that the required enhancements to the AMPs will not be implemented until the period of extended operation which begins December 2023. Early implementation of the enhancements is needed to establish a baseline for monitoring and trending the aging of the structures during the period of extended operation. In addition, the applicant has not clearly identified the recommended enhancements that will be incorporated in the AMPs.

Request:

a. Clearly identify the enhancements that will be incorporated into the AMPs.

b. Provide a firm schedule for implementation of the required enhancements, in order to establish a baseline prior to the period of extended operation. If no plans exist to implement the enhancements prior to the period of extended operation explain why early implementation is unnecessary and how an appropriate baseline will be established prior to entering the period of extended operation.

Energy Northwest Response:

a. The enhancements that will be incorporated into the Structures Monitoring Program are shown in LRA Table A-1 item number 50 and response to RAIs B.2.50-2 and B.2.50-3 from Energy Northwest Letter GO2-10-128 (Amendment 4) dated September 3, 2010.

b. Energy Northwest will implement the required enhancements into the Structures Monitoring Program as indicated in LRA Table A-1 and will conduct a baseline inspection of the structures within the scope of license renewal plus a minimum of one additional inspection prior to entering the period of extended operation.

LRA Table A-1 is amended to add the commitment from the part b response in Amendment 22 to the LRA included in the enclosure.

Follow-up RAI B.2.50-5

Background:

In response to RAI B.2.50-5, the applicant stated that tell tale drains are checked once per shift, during 12 hours shift, in accordance with plant procedures. The acceptance criterion is no flow through the drains. Should the operator find flow in the tell tale drains, the event would be entered into CAP. As of August 2010, no instances of leakage through tell tale drains have been entered into CAP.

Issue:

The staff is concerned that tell tale drains may be blocked and prevent any leakage to be collected or observed at the drain valves.

Request:

Provide additional information that will demonstrate that tell tale drains are not blocked. This could be boroscope inspection of the drains.

Energy Northwest Response:

The spent fuel pool (SFP) is located above grade within the Reactor building. The tell tale drains are located below the bottom of the SFP and are accessible from the plant floor slab (el. 548') below the bottom of the SFP. The tell tale drains are open to the atmosphere (i.e., no valves) and drain into a floor drain scupper. They are checked at this location each shift (twice daily) by a station Equipment Operator (EO). The acceptance criterion, as noted on the record of operator rounds, is no water in these drains. The discovery of water at the tell tale drains is one of the items the EO is directed to initiate a condition report during these rounds. Additionally, portions of the bottom of the SFP and lower portions of the north and south concrete walls of the SFP are visible from this same floor slab (el. 548') and any evidence of water coming thru the walls could be noted. There is no plant specific OE regarding water leaking thru these drain lines or the visible walls and bottom slab of the SFP.

As stated in Final Safety Analysis Report 9.1.3.2.1.2, SFP water purity and clarity is maintained by filtering and demineralizing the pool water through the Fuel Pool Cooling (FPC) system filter demineralizers. The SFP at Columbia, being a boiling water reactor, utilizes demineralized water and the liner drain lines are not prone to industry experience of boric acid residual clogging SFP liner drains in pressurized water reactors.

Although boric acid residual clogging the tell tale drains at Columbia is not plausible, Energy Northwest will commit to a one-time internal inspection of the tell-tale drain lines prior to the period of extended operation to confirm the drain lines are free of obstruction. Unexpected inspection result of clogged lines will require a condition report be documented and further engineering evaluation of adverse impacts to the SFP structure and to identify the periodicity of drain cleaning and maintenance process.

LRA Table A-1 is amended to add the commitment of spent fuel pool drain lines internal inspection in Amendment 22 to the LRA included in the enclosure.

License Renewal Application
Amendment 22

LRA Section Number	Page Number	RAI Number
Table A-1 Line Item 50	A-63	B.2.50-1, B.2.50-2, B.2.50-3
Table A-1 Line Item 50 insert	A-63a*	B.2.50-1, B.2.50-2, B.2.50-3
Table A-1 Insert A	A-68b	B.2.34-1
Table A-1 Insert A	A-68b	B.2.50-5
Table A-1 Line Item 66	A-68c	B.2.34-1
Table A-1 Line Item 65	A-68c	B.2.50-5

* Page 63a format has changed, from Amendment 4, for presentation.

Table A-1
Columbia License Renewal Commitments

Item Number	Commitment	FSAR Supplement Location (LRA App. A)	Enhancement or Implementation Schedule
50) Structures Monitoring Program (cont'd)	• Specify that the responsible engineer shall review site groundwater and raw water testing results for pH, chlorides, and sulfates prior to inspection to validate that the below-grade or raw water environments remain non-aggressive during the period of extended operation. Chemistry data shall be obtained from Columbia's chemistry and environmental departments. Groundwater chemistry data shall be collected at least once every four years. The time of data collection shall be staggered from year to year (summer-winter-summer) to account for seasonal variations in the environment.		
51) Supplemental Piping/Tank Inspection	The Supplemental Piping/Tank Inspection is a new activity. The Supplemental Piping/Tank Inspection detects and characterizes the material condition of steel, gray cast iron, and stainless steel components exposed to moist air environments. The inspection provides direct evidence as to whether, and to what extent, the relevant effects of aging have occurred.	A.1.2.51	Within the 10-year period prior to the period of extended operation.

Insert A from Page A-63a

Insert B from Page A-63a for Amendment 22

Table A-1
Columbia License Renewal Commitments

Item Number	Commitment	FSAR Supplement Location (LRA App. A)	Enhancement or Implementation Schedule
50) Structures Monitoring Program (cont'd) Insert A to Page A-63	• Specify additional direction for quantifying, monitoring and trending of inspection results. • Provide better alignment with referenced Industry codes, standards and guidelines regarding terminology and evaluation. • Revise to add sufficient acceptance criteria and critical parameters to trigger level of inspection and initiation of corrective action. ACI 349.3R-96 provides an acceptable basis for developing acceptance criteria for concrete structural elements, steel liners, joints, coatings, and waterproofing membranes. Plant specific quantitative degradation limits, similar to the three-tier hierarchy acceptance criteria from Chapter 5 of ACI 349.3R-96, will be developed and added to the inspection procedure.		
50) Structures Monitoring Program (cont'd) Insert B to Page A-63	Conduct a base line inspection of the structures within the scope of license renewal plus a minimum of one additional inspection prior to entering the period of extended operation.		Baseline inspection plus a minimum of one additional inspection prior to the period of extended operation.

Insert A into page A-68a

Item Number	Commitment	FSAR Supplement Location (LRA App. A)	Enhancement or Implementation Schedule
62) Service Level 1 Protective Coatings Program	The Service Level 1 Protective Coatings Program is an existing program that will be continued for the period of extended operation.	A.1.2.55	Ongoing
63) Inservice Inspection (ISI) Program	Ultrasonic Testing (UT) examination of creviced shroud support plate access hole cover weld, top hat configuration, will be performed once a demonstrated acceptable UT technique becomes available.	A.1.2.33	When demonstrated acceptable UT technique is available. Then ongoing.
64) Inservice Inspection (ISI) Program - IWE	Verify leakage is not entering the annular space between the containment vessel and the concrete shield wall from the outer refueling bellows seal. Inspection of the portions of the outer containment vessel shell made accessible by opening all eight inspection ports in the containment vessel at 570 foot elevation will be performed to check for evidence of leakage. These inspections will be performed during a refueling outage while the reactor cavity is flooded.	N/A	During the fourth Inservice Inspection (ISI) interval prior to the period of extended operation (PEO) and again in the fifth ISI interval after entering the PEO.

Insert new row 65 from Page A-68c for Amendment 18

Insert new rows 66 and 67 from Page A-68c for Amendment 22

Insert A into Page A-68b

Item Number	Commitment	FSAR Supplement Location (LRA App. A)	Enhancement or Implementation Schedule
65) ISI	Columbia will prepare and submit the ISI Program Plan for the fourth 10-year interval no later than 2015. (The third 10-year ISI interval extends from December 2005 until December, 2015.) The small bore piping program will be included in the fourth 10-year interval ISI program plan as an augmented inspection. The locations to be inspected, the sample size, the inspection methodology will be included in the program plan.	LRA Appendix B	Upon submittal of the ISI Program Plan for the fourth 10-year interval
66) Structures Monitoring Program	Perform a one-time internal inspection of the spent fuel pool tell tale drain lines prior to the period of extended operation to confirm the drain lines are free of obstructions. Unexpected inspection result of clogged lines will require a condition report be documented and further engineering evaluation of adverse impacts to the spent fuel pool structure and to identify the periodicity of drain cleaning and maintenance process.		Prior to the period of extended operation.
67) Structures Monitoring Program	Perform a one-time boroscope inspection of the containment sand pocket drain lines to confirm the absence of clogged drain lines and that a flow path exists for identification of any potential leakage into the sand pocket region. Unexpected inspection results (clogged drain lines) will be documented under corrective action process.		Prior to 12/31/15