ENERGY NORTHWEST

Sudesh K. Gambhir
Vice President, Technical Services
P.O. Box 968, Mail Drop PE04
Richland, WA 99352-0968
Ph. 509-377-8313 F. 509-377-2354
sgambhir@energy-northwest.com

September 24, 2010
GO2-10-141

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, GO2-10-011, dated January 19, 2010, WS Oxenford (Energy Northwest) to NRC, "License Renewal Application"

2) Letter dated August 6, 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. ML101960640)

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 and in the Enclosure is Amendment 9 to the License Renewal Application (LRA) that was submitted in Reference 1. No new commitments are included in this response.

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

A043
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, Technical Services

Attachment: Response to Request for Additional Information

Enclosure: License Renewal Application Amendment 9

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

RAI 2.4.2-1

License renewal application (LRA) Table 2.4-2 "Reactor Building" does not list coatings as a component type. If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance. In addition, degraded coatings may have an impact on the functionality of the Emergency Core Cooling Systems (ECCS), therefore the Protective Coatings Monitoring Program should include protective coating monitoring and maintenance. Please clarify if the coatings are credited with managing the effects of aging of the concrete and steel components or may have an impact on the safety function of the ECCS. If it is credited or has an impact on the ECCS, then clarify whether coatings should be included in scope of license renewal and whether there is a subsequent aging management review (AMR) and/or aging management program (AMP) to evaluate this component.

Energy Northwest Response:

As per LRA Tables 3.5.1 (line item 3.5.1-25) and B-1 (XI.S8), Columbia Generating Station (Columbia) does not credit protective coatings inside containment to manage the effects of aging for structures and components or to ensure that the intended function of coated structures and components are maintained. Also, as noted in LRA Table 3.5.1 (line item 3.5.1-25), the effect of coating debris on ECCS pump suction strainers has been evaluated to have no safety impact on strainer operation. Containment coatings are subject to ongoing oversight that addresses their current status and will continue to address their status over the period of extended operation. Therefore, these coatings do not have an intended function as described in 10 CFR 54.4 and do not require aging management for license renewal.

For additional discussion on these coatings at Columbia, see previous response to RAI XI.S8-1 as submitted under Letter, GO2-10-117, dated August 19, 2010, SK Gambhir (Energy Northwest) to NRC, "Columbia Generating Station Docket No. 50-397 Response to Request for Additional Information License Renewal Application."

RAI 2.4.3-1

As stated in LRA Section 2.4.3, page 2.4-17, "the balance of the pump house is supported by reinforced concrete columns and spread footings." However, Tables 2.4-3 and 3.5.2-3 of the LRA does not list the reinforced concrete columns, as included under component type: "Reinforced Concrete: walls, floors and ceilings." Please confirm the inclusion of the reinforced concrete columns in the scope of license renewal and subsequent AMR and provide the location where they are covered. Otherwise, justify the exclusion from scope.

Energy Northwest Response:

The reinforced concrete columns are within the scope of license renewal.

LRA Section 2.4.3 states,

> The Standby Service Water Pump House foundation consists of three types of foundations. The pump inlet bay portion of the pump house is depressed to the same elevation as the pond sump. The concrete walls that form the pump inlet bay and support portions of the buildings are also supported on this mat. The face of the pump house that is adjacent to the Spray Pond is supported by a reinforced concrete retaining wall common to both the pump house and the Spray Pond. The balance of the pump house is supported by reinforced concrete columns and spread footings.

The reinforced concrete columns are described as part of the foundation of the Standby Service Water Pump House. Therefore, they are included in the generic component type "Foundations," which is shown in Tables 2.4-3 and 3.5.2-3 (Row No. 9) in the LRA. The reinforced concrete columns are not included under component type "Reinforced Concrete: walls, floors and ceilings."

Generic component type is used for grouping components that are of similar design and perform the same intended function(s). The components determined to be passive and long-lived for a given component type are addressed with a single aging management review based on similar materials of construction and similar environments and service conditions.

RAI 2.4.5-1

As stated in LRA Section 2.4.5, the Diesel Generator Building is supported on its own foundations consisting of continuous wall footings, isolated spread footing for concrete columns, and isolated equipment foundations. However, Table 2.4-5 of the LRA does not list the reinforced concrete columns, as included under component type: "Reinforced Concrete: walls, floors and ceilings." Please confirm the inclusion of the reinforced concrete columns in the scope of license renewal and subsequent AMR and provide the location where they are covered. Otherwise, justify the exclusion from scope.

Energy Northwest Response:

The reinforced concrete columns are within the scope of license renewal.

LRA Section 2.4.5 states,

> The Diesel Generator Building is a reinforced concrete diaphragm slab and shear wall type structure. It is supported on its own foundations

consisting of continuous wall footings, isolated spread footing for concrete columns, and isolated equipment foundations.

The reinforced concrete columns are described as part of the foundation for the Diesel Generator Building. Therefore, they are included in the generic component type "Foundations", which is shown in Tables 2.4-5 and 3.5.2-5 (Row No. 8) in the LRA. The portions of the reinforced concrete columns above the foundation are included under generic component type "Reinforced Concrete: walls, floors and ceilings." This component type covers building structural load bearing related reinforced concrete exposed to an air-indoor environment. Concrete beams and columns supporting floor slabs are integral to the building design and are considered as sub-components under generic component type "Reinforced Concrete: walls, floors and ceilings."

Generic component type is used for grouping components that are of similar design and perform the same intended function(s). The components determined to be passive and long-lived for a given component type are addressed with a single aging management review based on similar materials of construction and similar environments and service conditions.

RAI 2.4.8-1

Table 2.4-8 of the LRA, the Radwaste Control Building, has the "Partition Walls" listed with the intended function of Support of Criterion (a)(2) (SRE). The intended function of the safety-related equipment (SRE) is defined in LRA Table 2.0-1 as, "Provide structural or functional support required to meet the Commission's regulations for any of the regulated events in 10 CFR 54.4(a)(3)." However, there is also a component type listed as, "Reinforced Concrete: walls, floors and ceilings" that has the same SRE intended function. Please provide a more detailed description of the "Reinforced Concrete: walls, floors and ceilings" and the "Partition Walls" that are listed as a separate component type, including their intended function in order to clarify the difference or the relationship between the two components.

Energy Northwest Response:

The component type "Reinforced Concrete: walls, floors, and ceilings" is a generic component type for interior concrete. Part of the Radwaste Control Building is a cast-in-place reinforced concrete structure. The areas which are constructed of reinforced concrete are the radwaste area, the centrifuge area, the demineralizers area, and the control room tower.

The intended functions of "Reinforced Concrete: walls, floors, and ceilings" in the Radwaste Control Building are to provide shelter or protection to safety-related equipment (EN), provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas (FB), provide shielding against radiation (SHD), provide pressure boundary or essentially leak tight barrier to protect public health and safety in the event of postulated design basis events (SPB), provide structural or functional support

required to meet the Commission's regulations for any of the regulated events in 10 CFR 54.4(a)(3) (SRE), and provide structural or functional support to safety-related equipment (SSR).

The "Partition Walls" are not included under "Reinforced Concrete: walls, floors, and ceilings" because they are metal partitions.

During this review, it was determined that the intended function of the metal partitions was incorrectly identified as Support for Criterion (a)(3) Equipment (SRE) because it is not credited for Fire Protection. The correct intended function of the Partition Walls is Support for Criterion (a)(2) Equipment (SNS) due to its proximity to safety-related equipment.

Updates to LRA Table 2.4-8 and Table 3.5.2-8 are provided in the Enclosure to this letter to show the intended function of "Partition Walls" in the Radwaste Control Building as "SNS."

RAI B.2.26-4

Background:

Problem Evaluation Report (PER) 201-0825, dated May 17, 2001, stated that water samples taken from various fire protection systems as part of a proactive biofouling detection program indicated the potential for microbiologically-induced corrosion (MIC), based on the identification of sulfate reducing bacteria in the samples. The PER also stated that the MIC concern was considered moderate to low in the Columbia Generating Station (CGS) fire protection system. The initial assessment stated that MIC may at some point lead to a breach of the system in the form of pinhole leaks. The follow-up corrective actions to mitigate MIC, as stated in the PER, included sampling of the fire protection system water for bacteria during annual performance testing, and initiating a MIC trending program for the various plant systems effected.

Issue:

The staff noted that although the Fire Water System Program includes activities capable of managing the aging effects of MIC, neither the LRA nor any of the other supporting documents reviewed during the AMP audit discussed the results of the follow-up analyses and trending performed regarding the MIC concern in the fire protection system. Without this information, it is unclear to the staff whether the MIC issues in the fire protection system are being adequately managed by the Fire Water System Program.

Request:

Describe the water sampling and MIC trending program results for the fire protection systems and discuss how these results are used to mitigate MIC.

Energy Northwest Response:

As a result of the subject problem evaluation report, the procedure that directs periodic flushes and internal sprinkler system inspections of the Fire Protection System was revised to include periodic sampling for MIC.

A scrape and/or solid swab sample is taken periodically from inside the sprinkler piping at the system engineer's direction and at appropriate intervals based on the results for the sprinkler system sampled. The sample is evaluated by a laboratory and the results are entered into a Corrosion Monitoring Database, with MIC concern identified as low, moderate, or high.

The MIC sampling results are reviewed annually and the Fire Protection Engineer has a MIC tracking/trending notebook. Recent trends show that MIC is not pervasive in the Fire Protection piping and samples continue to be taken, evaluated and reviewed periodically. The results of periodic MIC sampling and inspection either confirm that no additional actions are needed for mitigation of MIC or identify the areas of concern and initiate a condition report for evaluation and resolution and perform a system flush to return the system to optimal condition.

RAI B.2.42-1

Background:

The GALL Report Open-Cycle Cooling Water Program (XI.M20) scope of program element indicates that this program is used to manage aging effects of material loss and fouling.

Issue:

The applicant's LRA indicates that the scope of the program includes cracking of copper alloys and aluminum components.

Request:

Provide additional information explaining the basis for how cracking will be managed in the Open-Cycle Coaling Water Program.

Energy Northwest Response:

The Columbia LRA (Appendix A.1.2.42, B.2.42, Table 3.3.2-14 row 24, Table 3.3.2-29 row 19, Table 3.3.2-32 row 16, Table 3.3.2-34 rows 36, 37, 45 and 46, Table 3.3.2-36 row 41, Table 3.3.2-37 row 36, and the table notes on page 3.3-400a) has been amended in Amendment 1 of the LRA to remove cracking of aluminum and copper alloys as an aging effect managed by the Open-Cycle Cooling Water Program.

The aluminum alloy components that were identified in the LRA as susceptible to cracking and managed by the Open-Cycle Cooling Water Program are fins on cooling coils in the Heating, Ventilation, Air Conditioning (HVAC) systems for the Diesel Generator Building, Reactor Building, and Pumphouse. These fins are exposed to a condensation environment, and were conservatively evaluated as susceptible to cracking. However, aluminum alloys are susceptible to cracking only if the zinc (Zn) content is greater than 12% or the magnesium content is greater than 6%. Further research has determined that the subject fins are fabricated of an aluminum alloy that does not have a zinc content greater than 12% or a magnesium content greater than 6%. Therefore, the subject fins are not susceptible to cracking.

The copper alloy > 15% Zn component (valve body) that was identified in the LRA as susceptible to cracking and managed by the Open-Cycle Cooling Water Program is in the Process Sampling System, and is exposed to the raw water environment of the Service Water System. This component will be managed by the Monitoring and Collection Systems Inspection instead of the Open-Cycle Cooling Water System. The Monitoring and Collection Systems Inspection will use a combination of volumetric (e.g., ultrasonic (UT)) and enhanced visual (e.g., VT-1 or equivalent) examination techniques performed by qualified personnel on the subject component to identify evidence of cracking or to confirm a lack thereof on the internal surfaces.

RAI B.2.42-2

Background:

The GALL Report Open-Cycle Cooling Water System Program (XI.M20) preventive actions element indicates that the components are lined or coated to protect the underlying metal surfaces.

Issue:

The LRA indicates that an exception is taken for the use of protective coatings. However, the LRA does not indicate what actions are taken to ensure that the lack of protective coatings is adequate to ensure the operability of the open-cycle systems.

Request:

Provide additional information explaining how the lack of coatings in the open-cycle system is acceptable to maintain the system's integrity and functionality.

Energy Northwest Response:

Components that are within the scope of the Columbia Open-Cycle Cooling Water Program are not lined or coated.

Other preventive measures of the program, however, include:

- periodic cleaning of heat exchanger components, including tube cleaning;
- mechanical cleaning of service water piping at specific sites that meet selection criteria, and based on results of visual inspections; and
- chemical treatments of the water (based on target corrosion rates) to inhibit corrosion and control deposits, and to control macro- and micro-biological infestations.

In addition to these preventive measures, the program includes:

- periodic thermal performance and eddy current testing of heat exchangers;
- uniform corrosion monitoring through the use of coupons; and
- nondestructive examinations, including volumetric (UT) and visual (VT) inspections.

All of these elements, in addition to operating experience, provide reasonable assurance that the Open-Cycle Cooling Water Program will maintain the integrity and functionality of the systems and components within the scope of the program.

RAI 3.3.2.2.9-1

Background:

Standard Review Plan - License Renewal (SRP-LR), Table 3.3-1, item 3.3.1-20 and GALL Report item VII.H1-10 state that for steel piping, piping components, piping elements, and tanks exposed to fuel oil, the aging effects to be managed include loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling. The GALL Report recommends GALL AMP XI.M30, "Fuel Oil Chemistry," augmented by GALL AMP XI.M32, "One-Time Inspection," to manage aging for these components and recommends that detection of aging effects, including fouling, be evaluated.

Issue:

The applicant addresses SRP-LR item 3.3.1-20 in LRA Section 3.3.2.2.9.1, and states that "Fouling is not identified as an aging effect for fuel oil." It is not clear to the staff why the applicant determined that fouling is not an applicable aging effect for steel components exposed to fuel oil.

Request:

Provide the technical basis for excluding fouling as an aging effect to be managed for steel components exposed to fuel oil.

Energy Northwest Response:

NUREG-1801 Revision 1, Section IX.E does not include fouling as an aging effect. Rather, Section IX.F, Aging Mechanisms, defines fouling as,

> An accumulation of deposits. This term includes accumulation and growth of aquatic organisms on a submerged metal surface and also includes the accumulation of deposits, usually inorganic, on heat exchanger tubing.

NUREG-1801, Revision 1, Section IX.F further states,

> Fouling can result in a reduction of heat transfer, loss of material, or a reduction in the system flow rate (this last aging effect is considered active and thus is not in the purview of license renewal).

Therefore, consistent with the NUREG-1801, Revision 1 definition, fouling is not considered as an aging effect for Columbia, but as an aging mechanism for the reduction in heat transfer aging effect and loss of material.

As listed in LRA Tables 2.3.3-18 and 2.3.3-22, and shown on boundary drawings LR-M512-1, LR-M512-2, LR-M512-3, LR-M512-4, LR-M513, LR-M515-1, and LR-M573-2, there are no Diesel Fuel Oil or Fire Protection components that contain fuel oil and have a heat transfer function.

As described in LRA Section A.1.2.29, the Fuel Oil Chemistry Program maintains fuel oil quality in order to mitigate degradation of the storage tanks and associated components containing fuel oil that are within the scope of license renewal. The Fuel Oil Chemistry Program manages the relevant conditions that could lead to the onset and propagation of loss of material. The relevant conditions are specific contaminants such as water or microbiological organisms in the fuel oil. It is recognized that corrosion products and other deposits (fouling) can contribute to the loss of material due to crevice corrosion, pitting corrosion, or microbiologically influenced corrosion. Therefore, the relevant conditions that could lead to a loss of material due to corrosion are the same conditions that could lead to a loss of material due to fouling. As such, the management of loss of material due to corrosion, including MIC, also reduces the possible foulants in the fuel oil.

LRA Tables 3.3.2-18 and 3.3.2-22 provide aging management review results for steel components exposed to a fuel oil environment. Table 3.3.2-18 indicates that the Fuel Oil Chemistry Program and Chemistry Program Effectiveness Inspection are credited for managing loss of material of these components in the Diesel Fuel Oil System. Table 3.3.2-22 indicates that the Fuel Oil Chemistry Program and the Fire Protection Program are credited for managing loss of material of these component types in the Fire Protection System.

License Renewal Application
Amendment 9

Section no.	Page no.	RAI response
Table 2.4-8	2.4-31	RAI 2.4.8-1
Table 3.5.2-8	3.5-102	RAI 2.4.8-1

Table 2.4-8
Radwaste Control Building
Components Subject to Aging Management Review

Component Type	Intended Function (as defined in Table 2.0-1)
Battery Racks	SSR
Control Room Ceiling	SSR
Exterior Walls (above grade)	EN, MB, SHD, SRE, SSR
Foundations	EN, EXP, SRE, SSR
Masonry Block Walls	FB, SHD, SRE
Metal Siding	SNS
Partition Walls	~~SRE~~ ← SNS
Reinforced Concrete: walls, floors, and ceilings	EN, FB, SHD, SPB, SRE, SSR
Roof	EN, MB, SSR
Structural Steel: Beams, Columns, Plates, and Trusses (includes welds and bolted connections)	EN, SSR, SRE
Sump Liners	SNS
Sumps	SNS

Table 3.5.2-8 Aging Management Review Results – Radwaste Control Building

Row No.	Component / Commodity	Intended Function[1]	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Battery Racks	SSR	Carbon Steel	Air-indoor	Loss of material	Structures Monitoring Program	III.B3-7	3.5.1-39	C
2	Control Room Ceiling	SSR	Carbon Steel	Air-indoor	Loss of material	Structures Monitoring Program	III.A1-12	3.5.1-25	A
3	Metal Siding	SNS	Galvanized Steel	Air-outdoor	Loss of material	Structures Monitoring Program	III.B2-7	3.5.1-50	C
4	Partition Walls	~~SRE~~ SNS	Galvanized Steel	Air-indoor	None	None	III.B5-3	3.5.1-58	C
5	Structural Steel: Beams, Columns, Plates, and Trusses (includes welds and bolted connections)	EN, SSR, SRE	Carbon Steel	Air-indoor	Loss of material	Structures Monitoring Program	III.A1-12	3.5.1-25	A
6	Structural Steel: Beams, Columns, Plates, and Trusses (includes welds and bolted connections)	EN, SSR, SRE	Galvanized Steel	Air-indoor	None	None	III.B5-3	3.5.1-58	C
7	Sump Liners	SNS	Stainless Steel	Air-indoor	None	None	III.B5-5	3.5.1-59	C
8	Exterior Walls (above grade)	EN, MB, SHD, SRE, SSR	Concrete	Air-outdoor	None	Structures Monitoring Program	N/A	N/A	I 0501
9	Foundations	EN, EXP, SRE, SSR	Concrete	Soil	None	Structures Monitoring Program	N/A	N/A	I 0501