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

October 20, 2010

Mr. S.K. Gambhir
Vice President Technical Services
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Energy Northwest
MD PE04
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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE COLUMBIA GENERATING STATION, LICENSE RENEWAL APPLICATION (TAC NO. 3058) CONCERNING STRUCTURES

Dear Mr. Gambhir:

By letter dated January 19, 2010, Energy Northwest submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54), to renew operating license NPF-21 for Columbia Generating Station, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Abbas Mostala and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-4029 or by e-mail at evelyn.gettys@nrc.gov.

Sincerely,

Evelyn Gettys

Evelyn Gettys, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
As stated

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COLUMBIA GENERATING STATION
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION

RAI B.2.5-2 Buried Pipe Follow-up RAI

Background

Given that there have been a number of recent industry events involving leakage from buried or underground piping, the staff needs further information to evaluate the impact that these recent industry events might have on the applicant's Buried Piping and Tanks Inspection Program. By letter dated June 30, 2010, the staff issued a request for additional information (RAI) B.2.5-1 requesting that the applicant provide information regarding how Columbia Generating Station (Columbia) will incorporate the recent industry operating experience (OE) into its aging management reviews (AMRs) and aging management programs (AMPs). The applicant responded on August 26, 2010. In reviewing the response, the staff had further questions.

Issue

1) The license renewal application (LRA) states that circulating water, diesel fuel oil, fire protection, radwaste building HVAC, standby service water, tower make-up water, and condensate nuclear systems include in-scope buried piping. The applicant's response did not provide specifics on the number of buried or underground pipe and tank inspections that would be conducted. The staff believes that in order to provide a reasonable assurance that in-scope buried piping and tanks will be capable of performing its current license basis (clb) function(s) and not release hazardous materials (i.e., material which, if released, could be detrimental to the environment such as diesel fuel and radioisotopes that exceed the Environmental Protection Agency drinking water standards) to the environment, each category of in-scope buried piping based on material, safety/Code class, and potential to contain hazardous material should be inspected. The LRA and supplemental material did not contain enough specifics on the planned inspections for the staff to determine if the inspections would be adequate to manage the aging effect for in-scope buried pipes and tanks based on material, safety/Code class, and potential to contain hazardous material categories.

2) The applicant's response did not state if they would utilize examination methods other than excavation and direct visual inspection of buried piping. The staff acknowledges that examining buried pipe from the exterior surface may not be possible sometimes due to plant configuration (e.g., the piping is located underneath foundations); nevertheless, it is important to expose a large enough length of the piping in order to establish reasonable assurance of the condition of the piping system. The staff believes that in instances where it is not possible to examine the program designated length of piping during each inspection, an alternative examination should be proposed. For example, the staff notes that it is reasonable to substitute an ultrasonic volumetric examination from the interior of the pipe provided the surface is properly prepared.

3) The LRA does not contain details on (a) which in-scope buried piping systems are protected by a cathodic protection system, (b) the availability of the cathodic protection system, and (c)

what periodic testing is conducted on the cathodic protection system. The staff's position is that cathodic protection is an important preventive measure for steel piping.

4) Neither the LRA nor the RAI response described the quality of the backfill in the vicinity of buried in-scope piping. The presence of rocks and sharp objects in the backfill around buried pipes is a leading precursor of degradation of buried piping. Over time ground movement causes these materials to come in contact with the buried pipe resulting in damage to the pipe's coating or external surfaces. Also, based on the staff's review of LRA Section 2.3, the Updated Final Safety Analysis Report (UFSAR) and the License Renewal boundary Drawings, it is not clear to the staff if the in-scope buried piping for the radwaste building HVAC has a safety related function.

Request

1) For buried in-scope piping and tanks, respond to the following:
   i. Understanding that the total number of inspections performed will be dictated by plant-specific and industry operating experience, what minimum number of inspections of buried in-scope piping are planned during the 30 – 40 year, 40 - 50 year, and 50 – 60 year operating period? When defining the minimum number of planned inspections, categorize the buried in-scope piping inspection quantities into material, code/safety-related piping, and potential to contain hazardous material.
   ii. As part of the planned inspections, what lengths of piping will be excavated and have a direct visual inspection?
   iii. While it is clear to the staff that the diesel fuel oil piping contains hazmat material, the staff does not have sufficient information to determine if the circulating water, fire protection, radwaste building HVAC, standby service water, tower make-up water, and condensate nuclear systems contain hazmat. Which of these systems contain hazmat during normal operation?
   iv. For in-scope buried piping containing hazmat, what percent of total linear feet will be inspected during each ten year period, beginning at a time period, ten years prior to the period of extended operation?
   v. If there are no planned inspections for in-scope buried piping containing hazmat, justify why it is acceptable to not inspect in-scope buried piping containing hazardous materials.
   vi. How many inspections will be conducted for the buried diesel fuel oil storage tanks during the 30 – 40 year, 40 – 50 year, and 50 – 60 year operating period? If each tank will not be inspected at least once during the 30 – 60 year operating period, justify why any lesser number of inspections will be effective at providing a reasonable assurance that the buried in-scope tanks will meet their current licensing basis function.

2) For buried in-scope piping respond to the following:
   i. If excavated direct visual inspections of buried pipe are not possible, describe what alternative inspection methods will be utilized.

ii. Justify why alternative volumetric examination method, beyond ultrasonic examinations, will be effective at providing a reasonable assurance that the buried in-scope piping system will meet their CLB function, if it is used to conduct an interior wall thickness as an alternative for excavating and visually inspecting a buried piping segment.

iii. If a volumetric examination method is used in lieu of direct visual examination, what percentage of interior axial length of the pipe will be inspected?

3) For buried in-scope steel piping respond to the following:
   i. Which piping systems are cathodically protected? Include portions of a system that are cathodically protected, and portions of a system that are not cathodically protected.
   ii. If a piping system or portions of a system are not cathodically protected:
      a. Justify how the piping will meet or exceed the minimum design wall thickness throughout the period of extended operation.
      b. State what augmented inspections will be conducted. If no augmented inspections are planned, justify how a reasonable assurance will be established that the piping will meet its CLB throughout the period of extended operation.
   iii. State the availability of the cathodic protection system. If portions of the system are not available 90% of the time or allowed to be out of service for greater than 90 days in any given year, justify how the piping will meet or exceed the minimum design wall thickness throughout the period of extended operation.
   iv. If annual ground potential surveys of the cathodic protection system are conducted, what is the acceptance criteria. If annual ground potential surveys are not conducted, justify how the piping will meet or exceed the minimum design wall thickness throughout the period of extended operation.

4) For buried in-scope piping respond to the following:
   i. Describe and provide details on the quality of the backfill in the vicinity of in-scope buried pipes.
      a. If there is no information on the condition of the quality of backfill beyond initial installation specifications (i.e., no documented observations of the quality of the backfill), justify why the planned inspections are adequate to detect potential degradation as a result of coating damage or holidays, or damage to the exterior surface of non-coated piping.

5) State if the in-scope buried piping for the radwaste building HVAC has a safety related function.

<u>RAI 3.2.2-1 - Elastomers</u>

Background

The program description for GALL AMP XI.M32, "One-time Inspection Program" states in part,

> "The program includes measures to verify the effectiveness of an aging management program (AMP) and confirm the insignificance of an aging effect. Situations in which additional confirmation is appropriate include (a) an aging

effect is not expected to occur but the data is insufficient to rule it out with reasonable confidence; (b) an aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than that generally expected; or (c) the characteristics of the aging effect include a long incubation period. For these cases, there is to be confirmation that either the aging effect is indeed not occurring, or the aging effect is occurring very slowly so as not to affect the component or structure intended function during the period of extended operation."

LRA Section B.2.27 states that the Flexible Connection Inspection Program is a new one-time inspection that will detect and characterize the material condition of elastomeric components that are exposed to treated water, dried air, gas, and indoor air environments. Additionally, the following LRA Tables have flexible connection AMR line items exposed to air-indoor uncontrolled (external) that credit the Flexible Connection Inspection Program:

Table
3.2.2-5 Standby Gas Treatment
3.3.2-4 Containment Exhaust Purge and Containment Supply Purge
3.3.2-15 Diesel Cooling Water
3.3.2-22 Fire Protection

Issue

The staff does not believe that it is possible to state that the aging effects of <u>all</u> elastomeric materials meets at least one of the three criteria contained in the program description for GALL AMP XI. M32. Many elastomers will harden and loose strength over a sixty year period particularly in the presence of ultraviolet light, ozone, or radiation, and the degradation mechanism expected to occur, does not necessarily progress slowly, nor does it include a long incubation period. The "detection of aging effects" program element of GALL AMP XI. M32 states that one time inspections should be performed in accordance with examples provided in the accompanying GALL AMP table, and in cases where "If the applicant chooses to use an alternative to the recommendations in this table, a technical justification should be provided as an exception to this AMP. This exception should list the AMR line item component, examination technique, acceptance criteria, evaluation standard and a description of the justification." The staff notes that while the applicant stated that the use of physical manipulation and prodding will augment visual inspections of elastomeric material, there is no justification why a one-time inspection is acceptable for any specific material and environment combination in relation to the three criteria in GALL AMP XI.M32.

Request

Justify the utilization of a one-time inspection program to confirm the insignificance of an aging effect, for each specific elastomeric material exposed to a specific environment (e.g., temperature, radiation, ultraviolet light, ozone, chemical effects) listed in the above table to confirm that (a) an aging effect is not expected to occur but the data is insufficient to rule it out with reasonable confidence; (b) an aging effect is expected to progress very slowly in the

establish that each component will be capable of meeting their CLB function(s) throughout the period of extended operation.

RAI 3.3.2-1

Background

The applicant stated that the following items exposed to moist air (internal and air-uncontrolled (external) or air-indoor uncontrolled (external) have no aging effect and no AMP is proposed.

LRA Table	Component	Material
3.3.2-41	Sight Glasses	Polymer
3.3.2-16	Flexible Connections	Elastomer
3.3.2-20	Flexible Connections	Elastomer
3.5.2-13	Cable Tie Wraps	Nylon
3.5.2-13	Piping and Mechanical Equipment Insulation	Fiberglass

Issue

Non-metallic components constructed of the polymer, elastomer, nylon, and fiberglass materials are susceptible to aging due to exposure to radiation, ozone, high temperature or ultraviolet light. The applicant stated in plant-specific note 0532, that the nylon tie wraps are allowed outside the radiologically controlled area where they will not be exposed to environmental stresses such as extreme temperature, ultraviolet radiation, or harsh chemicals. However, it is not clear to the staff that the applicant has taken into consideration the ultraviolet radiation produced by fluorescent or mercury vapor lights.

Request

1) Justify why radiation, ozone, high temperature, and/or ultraviolet light levels in the vicinity of the polymer sight glasses would not lead to (or contribute to) aging effects during the period of extended operation.

2) Justify why ultraviolet light levels or high temperature in the vicinity of the elastomeric flexible connections would not lead to (or contribute to) aging effects during the period of extended operation.

3) Justify why ultraviolet light levels produced by fluorescent or mercury vapor lights or ozone in the vicinity of the nylon cable tie wraps would not lead to (or contribute to) aging effects during the period of extended operation.

4) Justify why radiation or ozone in the vicinity of the fiberglass piping and mechanical equipment insulation would not lead to (or contribute to) aging effects during the period of extended operation.

RAI 3.3.2-2

Background

In LRA Tables 3.3.2-32 and 3.5.2-13, the applicant stated that for polymer piping and elastomeric waterstops, expansion boots and waterproofing membrane exposed to soil (external) there are no aging effects thus no AMP is proposed.

Issue

The staff understands that damage to buried polymer pipe and elastomeric components during installation is not an aging management issue. However, the staff also understands that buried polymer pipe and elastomeric components can be damaged by exposure to backfill that contains large or sharp material during both installation and operation. During operation, large or sharp objects a short distance away can migrate to the outside surface of the pipe or component due to ground movement caused by normal seasonal changes or movement of heavy loads above the buried pipe. Once in contact with the exterior surface of the pipe or component, this movement can cause wear to the material.

Request

Provide historical data on the quality of the backfill used in the vicinity of polymer piping and elastomeric waterstops, expansion boots and waterproofing membranes that would support the conclusion that aging will not occur due to large or sharp material contained in the backfill.

RAI 3.3.2.2.13-2

Background

In RAI 3.3.2.2.13-1, the staff requested the applicant to justify why improper design, application or operation resulting in the loss of material due to wear for elastomer seals and components in HVAC systems exposed to air-indoor uncontrolled (internal or external) is not considered an aging effect requiring aging management during the extended period of operation. In its response, the applicant stated, "Consistent with the Statements of Consideration for 10 CFR 54, Section III.d.(1), improper design, faulty manufacturing processes, improper application, faulty maintenance, improper operation, or personal errors may cause events that result in significant wear of components, but this cause of degradation is not aging related. Therefore, loss of material due to wear is not an applicable aging effect for the elastomeric components that are subjects to an-air-indoor uncontrolled environment."

Issue

The staff notes that the statement that the applicant excerpted from the 10 CFR 54 Statements of Consideration was written in a context of why it was acceptable for the rule to focus the Integrated Plant Assessment on aging effects versus aging mechanisms. The associated text from the Statements of Consideration is as follows:

> "The corrective actions that should be taken following identification of functional degradation logically include determination of the cause of the degradation, which could involve mechanisms other than aging (e.g., faulty manufacturing processes, faulty maintenance, improper operation, or personnel errors). If one or more aging mechanisms are the cause of functional degradation, corrective actions should focus, as appropriate, on prevention, elimination, or management of the effects caused by the mechanism(s) in the future. Licensees are required by current regulations to develop and implement programs that ensure that conditions adverse to quality, including degraded system, structure, and component function, are promptly identified and corrected."

The staff notes that the above excerpt was not directly related to wear as might be inferred by the applicant's response to the RAI; however, the staff acknowledges that there are other mechanisms beyond age related mechanisms that can cause a loss of material, including those that cause wear. These other mechanisms (e.g., faulty manufacturing processes, faulty maintenance, improper operation, or personnel errors) are not subject to consideration during the development of the Integrated Plant Assessment because they would be identified by station personnel and corrected by the corrective action program. Nevertheless, within the definition of the term "wear" in GALL Report Section IX.F, there are three factors to consider that could cause age related wear due to the design of the joint, including (a) relative motion between two surfaces, under the influence of hard abrasive particles, (b) frequent manipulation, or (c) in clamped joints where relative motion is not intended but may occur due to a loss of the clamping force.

It is unclear to the staff whether there are any in-scope components that are designed in such a way that they could be impacted by the three age related factors considered in the definition of wear.

Request

1) State whether there any in-scope elastomeric HVAC components which are designed with relative motion that are exposed to an internal or external environment that includes hard abrasive particles.

2) State whether any in-scope elastomeric HVAC components that are susceptible to wear that over time, due to their frequent manipulation could challenge the CLB function(s) of the component.

3) State whether any in-scope elastomeric HVAC components that have clamped joints where relative motion is not intended but may occur due to a loss of the clamping force over time causing wear that could challenge the CLB function(s) of the component.

RAI B.2.25-5

Background

GALL AMP XI.M26, "Fire Protection" recommends that a periodic visual inspection and functional test is performed at least once every six months for the halon and carbon dioxide fire suppression systems.

LRA Section B.2.25, as amended by letter dated August 19, 2010, states an exception to the "parameters monitored or inspected" and "detection of aging effects," program elements. The applicant stated that "functional tests and inspections of the halon and carbon dioxide fire suppression systems that are included in the Fire Protection Program are performed at an interval greater than biannually, which has been demonstrated to be adequate, based on the absence of any related problems as reported through the corrective action program."

Issue

The LRA does not provide the frequency of the visual inspection and functional tests of the halon 1301 and carbon dioxide fire suppression systems.

Request

Provide the frequency of the periodic visual inspection and functional tests for the halon 1301 and carbon dioxide fire suppression systems and its basis, including the frequency in the current licensing basis and any technical specification requirements. If the inspection frequency is greater than at least once every 18 months, justify the inspection frequency, including a detailed summary of any deficiencies found during the last three visual inspection and functional tests for each system.

RAI 3.3.2.2.10.2-2

Background

The GALL Report, Chapter VII.A4, Auxiliary Systems, Spent Fuel Pool Cooling and Cleanup (BWR), item VII.A4-5, recommends that GALL AMP XI.M2, "Water Chemistry" be used to manage loss of material due to pitting and crevice corrosion for aluminum piping exposed to treated water, and that the program be augmented by GALL AMP XI.M32, "One-Time Inspection" to verify the effectiveness of water chemistry control. In several other GALL line items (V.D2-19, VII.E3-7,VII.D2-1, and VIII.E-15) for the same material, environment, and aging effect combination, the GALL Report also recommends that GALL AMP XI.M2, "Water

Chemistry" be used to manage aging and be augmented by GALL AMP XI.M32, "One-Time Inspection" to verify the effectiveness of water chemistry control.

LRA Table 3.5.2-2, row number 16 states that aluminum spent fuel pool gates exposed to treated water are being managed for loss of material by the BWR Water Chemistry Program. The item references GALL Report item VII.A4-5, LRA Table 3.3.1 item 3.3.1-24, and cites generic note C and plant specific notes 0513 and 0514. Plant specific note 0513 states that "monitoring of the fuel pool level and leak chase channels activities also indirectly manage this component." Plant specific note 0514 states that the spent fuel pool is "not a low flow or stagnant flow area" and that NUREG-1801 Chapter VII.A2 Spent Fuel Storage and its spent fuel gates do not require the Water Chemistry Program to be augmented by a one-time inspection.

In LRA Section 3.3.2.2.10.2, which is associated with item 3.3.1-24, the applicant states that loss of material for the stainless steel spent fuel pool gates is managed by the BWR Water Chemistry Program and the Chemistry Program Effectiveness Inspection which will provide a verification of the effectiveness of the BWR Water Chemistry Program. The section also states that "there are no aluminum components subject to AMR in the auxiliary systems that are exposed to treated water." However, there are no associated line items for aluminum spent fuel pool gates which cite a program to verify the effectiveness of the BWR Water Chemistry Program.

Issue

It is unclear to the staff how utilization of fuel pool level and leak chase channel activities will serve to manage the loss of material for the spent fuel pool gates.

It is unclear to the staff why the spent fuel pool is not considered a low flow or stagnant area where water chemistry control may not be effective and would require verification of the effectiveness of the chemistry control program.

There are inconsistencies between LRA Section 3.3.2.2.10.2, and Table 3.5.2-2, item 16, as to whether the spent fuel pool gates are (1) stainless steel or aluminum; and (2) whether they are subject to aging management using both the BWR Water Chemistry Program and the Chemistry Program Effectiveness Inspection or only the BWR Water Chemistry Program.It is unclear to the staff why the applicant states in Section 3.3.2.2.10.2 that there are no aluminum components subject to the AMR in the Auxiliary Systems when aluminum is identified in Table 3.5.2-2.

Request

1) Reconcile the inconsistencies between LRA Section 3.3.2.2.10.2, and Table 3.5.2-2, item 16 and:
   a. State the material of construction for the spent fuel pool gates, and
   b. State the aging management program(s) being used to manage loss of material for the spent fuel pool gates.

2) If the spent fuel pool gates are not being managed by an effectiveness verification program,

a. Justify how monitoring (by what frequency and parameters) fuel pool level and leak chase channels will aid in management of the spent fuel gates for loss of material, and
b. Justify why the spent fuel pool is not considered a low flow or stagnant area.

October 20, 2010

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Sincerely,
/RA/
Evelyn Gettys, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-397
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Letter to S.K. Gambhir from E. Gettys dated October 20, 2010

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