ENT000562
Submitted: August 20, 2012

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

September 10, 2010

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Energy Kewaunee, Inc.
Innsbrook Technical Center – 2SW
5000 Dominion Blvd.
Glen Allen, VA 23060-6711

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE KEWAUNEE POWER STATION, LICENSE RENEWAL APPLICATION (TAC NO. MD9408)

Dear Mr. Heacock:

By letter dated August 12, 2008, Dominion Energy Kewaunee, Inc. submitted an application for renewal of operating license DPR-43 for the Kewaunee Power Station. The staff of the U.S. Nuclear Regulatory Commission (the staff) is reviewing this application in accordance with the guidance in NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants." During its review, the staff has identified areas where additional information is needed to complete the review. The staff's requests for additional information are included in the enclosure. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Mr. Paul Aitken, of your staff, and a mutually agreeable date for the response is within 15 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-3873 or by e-mail at John.Daily@nrc.gov.

Sincerely,

Jay E. Robinson (for)

John Daily, Sr. Project Manager
Program Operations Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-305

Enclosure:
As stated

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KEWAUNEE POWER STATION
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION

Request for Additional Information (RAI) B2.1.7-3a, Concerns Regarding Buried and Underground Piping and Tanks, Kewaunee Power Station (Kewaunee) license renewal application (LRA) – Follow-up

Background

The staff of the U.S. Nuclear Regulatory Commission (the staff) evaluated the Dominion Energy Kewaunee, Inc's (the applicant's) response to RAI B2.1.7-3 which requested the applicant to provide a list and brief summary of any leaks or adverse conditions discovered during inspections of buried and underground piping and tanks, and how the aging management programs (AMPs) that manage buried and underground piping will address plant-specific and industry operating experience (OE). The staff conducted a follow-up conference call with the applicant on August 5, 2010.

Issue

In the RAI response, while the applicant stated that all in scope circulating water system buried piping and all but 100 feet of the buried diesel fuel oil piping are cathodically protected, it is not clear to the staff that the applicant has committed to maintaining the cathodic protection available; at what frequency the periodic National Association of Corrosion Engineers (NACE) surveys are performed; and if the performance of these surveys is a commitment. During the conference call, based on inspections of other portions of the buried diesel fuel oil piping, the applicant discussed the expected condition of the quality of coating for the 100 feet of buried diesel fuel oil piping that is not cathodically protected, but it did not propose any further preventive measures or augmented condition monitoring for this piping. Also during the conference call, the staff discussed the performance of similar buried pipe inspections during the final 10 years of the period of extended operation, for which no commitments have been currently proposed by the applicant.

Request

1. Provide a commitment to maintain the existing cathodic protection system available 90 percent of the time.

2. Provide a commitment to perform annual NACE cathodic protection surveys.

3. Discuss any enhancements that may be developed for the preventive measures (e.g., cathodic protection) and clarify that the planned inspection of diesel fuel oil piping will occur in the 100' of buried diesel fuel oil piping which is not cathodically protected.

4. Clarify the commitment to perform inspections of buried piping and tanks to also include inspections in the 50 – 60 year period.

ENCLOSURE

RAI B3.2-2a, FatiguePro™ and Metal Fatigue AMP – Follow-up

Background

LRA Section B3.2 states that the Metal Fatigue of Reactor Coolant Pressure Boundary Program uses all three modules of Electric Power Research Institute (EPRI) software FatiguePro™ to perform cycle counting, cycle-based fatigue monitoring, and stress-based fatigue (SBF) monitoring. As discussed in RAI B3.2-2, FatiguePro™ takes a simplified approach, in its SBF monitoring module, by producing only one stress component and using that single stress component for fatigue usage evaluation. Commitment 41 was provided by the applicant by letter dated February 2, 2010.

The applicant submitted a summary report, by letter dated June 1, 2010, of the 60-year environmentally-assisted fatigue analysis. The applicant provided the analysis results for the two locations, the surge line hot leg nozzle and the charging line nozzle, for which EPRI FatiguePro's™ SBF monitoring method was originally used in the applicant's Metal Fatigue of Reactor Coolant Pressure Boundary Program. The applicant's submittal of the analysis for these locations was in fulfillment of Commitment No. 41.

Issue

As indicated in the summary report submitted, all six components of the transient stress tensor were used throughout the evaluation in accordance with American Society of Mechanical Engineers (ASME) Code Section III requirements. The summary report concluded that, including the consideration of environmental effects, the fatigue usage factors for the two locations are less than the ASME Code Section III allowable value. However, the report did not demonstrate that the simplified analysis in the FatiguePro™ SBF monitoring methods will provide acceptable results. In particular, the staff noted that for the surge line hot leg nozzle, the cumulative usage factor (CUF) and environmentally-assisted usage factor in the summary report are greater than in LRA Table 4.3-2. However, for the charging line nozzle, the CUF and environmentally-assisted usage factor in the summary report are less than those in LRA Table 4.3-2. Furthermore, the summary report did not demonstrate or justify that the input parameters and assumptions are the same as those in the FatiguePro™ SBF monitoring. It is also not clear to the staff if the SBF monitoring method utilizing FatiguePro™ will continue to be used by the applicant in the Metal Fatigue of Reactor Coolant Pressure Boundary Program during the period of extended operation.

Request

1. Clarify whether the SBF monitoring module in EPRI FatiguePro™ will be used in the Metal Fatigue of Reactor Coolant Pressure Boundary Program.

2. If this module will be used, justify its use for monitoring fatigue usage for the charging line nozzle and surge line hot leg nozzle. Specifically, demonstrate that the fatigue analyses performed by the FatiguePro™ software are conservative when compared to the fatigue analyses that were performed consistent with ASME Code Section III, Subsection NB-3200, for the charging line nozzle and surge line hot leg nozzle. Clarify if relevant input parameters and assumptions used in both fatigue analyses (those

performed by the FatiguePro™ software and those performed consistent with ASME Code Section III, Subsection NB-3200) are the same; if not, provide justification for any differences.

3. If this module will not be used, clarify the monitoring method (including but not limited to software that incorporates a six-component stress tensor method meeting ASME Section III NB-3200 requirements) that will be used to manage the effects of fatigue for the charging line nozzle and the surge line hot leg nozzle, and justify the use of this method.

RAI 3.1.2.2.13-1a, Ni-Alloy Steam Generator Divider Plate Cracking due to Primary Water Stress-Corrosion Cracking (PWSCC) – Follow-up

Background

Based on foreign OE, the staff's concern in RAI 3.1.2.2.13-01 was about the potential impact of PWSCC cracks in the steam generator (SG) divider plate assembly. This OE reported detecting these cracks in steam generators that were about 20 years old, through penetrant testing, followed in some cases by other means. The staff's concern is that adjacent components which are part of the reactor coolant pressure boundary (channel head, tubesheet, tube-to-tubesheet weld...) could be impacted by such cracks. In its answer dated July 22, 2010, the applicant describes the materials of its SG divider plate assemblies, which are nickel alloy 600 for the stub runner and the divider plate, and alloy 52/152 for the welds between the divider plate and the stub runner, and between the stub runner and the tubesheet. The applicant also provides additional elements in order to justify why such cracks could not propagate to adjoining elements of the SG divider plate assembly and, consequently, why no inspection would be required.

Issue

Although not considered to be an immediate safety issue, the likely presence of cracks in Alloy 600 steam generator divider plate assemblies may result in a condition where these cracks could propagate into surrounding pressure boundary areas, such as the tube-to-tubesheet welds and the channel head. Although the applicant's prior RAI response provided essentially qualitative arguments for concluding that divider plate crack growth is not a concern, the RAI response does not provide a reasonable and sufficient basis for justifying the applicant's conclusions. Further, the use of analytical tools to predict the behavior of service-induced cracking (in other components) has not always bounded actual service performance of these cracks.

Request

Provide an AMP, changes to an existing AMP, or a commitment to inspection(s) that would demonstrate the condition of the steam generator divider plate assemblies to support a conclusion that there will be no adverse consequences of divider plate assembly degradation during the renewed license period.

RAI B2.1.32-5a, Review of Work Control Process (WCP) Program – Follow-up

Background

Dominion Letter Serial No. 09-188, dated April 13, 2009, provided the supporting documentation in an attempt to justify that the past periodic surveillance and preventative maintenance activities for the WCP provide sufficient evidence that ample inspection opportunity would exist for the components that the WCP is credited for managing.

Dominion Letter Seriel No. 09-597, dated September 25, 2009, provided a change in status for the WCP, changing the AMP from a plant-specific AMP to an AMP that, with an enhancement, will be consistent with the criteria in Generic Aging Lessons Learned (GALL) AMP XI.M32, "One Time Inspection," when applied on a one-time inspection basis, and with the criteria in GALL AMP XI.M38, "Internal Inspection of Miscellaneous Piping and Ducting Components," as subject to four exceptions taken to the GALL AMP XI.M38 criteria. Dominion Letter Serial No. 09-777, dated January 21, 2010, provides the applicant's responses to RAI Nos. B2.1.32-1, B2.1.32-2, B2.1.32-3, and B2.1.32-4. Dominion Letter Serial No. 10-286, dated May 13, 2010, provides the applicant's responses to RAI B2.1.32-5, Requests 1 – 4.

In RAI B2.1.32-5, Request 2, the staff asked the applicant: (1) to specify and justify the minimum percentage of components that will be used to establish the sample sizes for the component populations that are associated with the WCP and that will be managed by the WCP on a periodic condition monitoring basis, and (2) for these component populations, to specify and justify the maximum frequency that would be applied to the components in the sample sets for the populations. The applicant replied to RAI B2.1.32-5, Request 2, in Dominion Letter Serial No. 10-286. In its response to RAI B2.1.32-5, Request 2, the applicant continues to use a historical basis to support its position that the sample sizes and visual examination frequencies did not need to be defined for the material-environment-aging effect combinations that the AMP will manage on a period condition monitoring basis.

In RAI B2.1.32-5, Request 4, the staff asked the applicant to resolve several inconsistencies with the Updated Final Safety Analysis Report (UFSAR) Supplement A2.1.32, and the applicant's enhancement of the WCP, as given in LRA AMP B2.1.32, and amended in Serial Letter No. 09-777, and as reflected in LRA Commitment No. 25, which has been placed in LRA UFSAR Supplement Table A6.0-1. The applicant replied to RAI B2.1.32-5, Request 4, in Dominion Serial Letter No. 10-286.

Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(a)(3) requires that, for each structure and component that is scoped in for license renewal in accordance with one of the LRA scoping requirements in 10 CFR 54.4 and that is required to be screened in for an aging management review (AMR) in accordance with the LRA screening requirements in 10 CFR 54.21(a)(1), the applicant must "demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis (CLB) for the period of extended operation."

Issue

The request in RAI B2.1.32-5, Request 2, reflects an unresolved issue that the implementation of the WCP, when applied as a periodic condition monitoring program, could leave some doubt as to what the samples sizes would be for material-environment-aging effect component populations that the AMP manages, and whether the components in the sample sets would actually ever be scheduled for periodic inspection during the period of extended operation. The staff notes that the current basis for the program, as supplemented in the response to RAI B2.1.32-5, Request 2, still cannot ensure that the components in the sample sets will be inspected at least twice during the period of extended operation without the need to establish a limit criterion on the maximum amount of time that could elapse before the components in the sample sets would need to be scheduled (with certainty) for inspection on a periodic basis. Thus, the response to RAI B2.1.32-5 does not resolve the staff's concern that the WCP's sampling-based, condition monitoring basis may not ever actually schedule the components in these sample sets for inspection or perform inspections of the components in the sample set more than once during the period of extended operation.

Request

Since implementation of the WCP does not assure that the components in the sample sets will be inspected at any point during the period of extended operation, describe how the WCP will be modified to ensure a limit on the maximum amount of time that will elapse before the components in the sample sets will be inspected (e.g., one time each during the first and the last ten years of the period of extended operation).

RAI B2.1.21-1a, Kewaunee RAI on Submerged Inaccessible Low Voltage Cables

Background

NUREG-1801, Rev. 1, "Generic Aging Lessons Learned," addresses inaccessible medium voltage cables in AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The purpose of this program is to provide reasonable assurance that the intended functions of inaccessible medium voltage cables (2 kV to 35 kV) that are not subject to environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by moisture while energized, will be maintained consistent with the current licensing basis. The scope of the program applies to inaccessible (in conduits, cable trenches, cable troughs, duct banks, underground vaults or direct buried installations) medium-voltage cables within the scope of license renewal that are subject to significant moisture simultaneously with significant voltage.

The application of AMP XI.E3 to medium voltage cables was based on the OE available at the time Revision 1 of the GALL Report was developed. However, recently identified industry OE indicates that the presence of water or moisture can be a contributing factor in inaccessible power cables failures at lower service voltages (480 V to 2 kV). Applicable OE was identified in licensee responses to Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," which included failures of power cable operating at service voltages of less than 2 kV where water was considered a contributing factor.

Recently identified industry OE provided by NRC licensees in response to GL 2007-01 has shown: (a) that there is an increasing trend of cable failures with length of service beginning in the sixth through tenth years of operation, and (b) that moisture intrusion is the predominant factor contributing to cable failure. The staff has determined, based on the review of the cable failure distribution, that a combination of annual inspection of manholes and cable testing frequencies of at least every six years is a conservative approach to ensuring the operability of power cables, and therefore should be considered.

In addition, recently identified industry OE has shown that some NRC licensees may experience events, such as flooding or heavy rain, that subject cables within the scope of GALL AMP XI.E3 to significant moisture. The staff has determined that event-driven inspections in addition to a one year periodic inspection frequency is a conservative approach and, therefore, should be considered.

Issue

The staff has concluded, based on recently identified industry OE concerning the failure of inaccessible low voltage power cables (480 V to 2 kV) in the presence of significant moisture, that these cables can potentially experience age-related degradation. The staff noted that the applicant's Inaccessible Medium-Voltage Cables Program does not address inaccessible low voltage power cables (400 V (Nominally 480 V) to 2 kV inclusive). In addition, an evaluation of an increase in cable test and inspection frequencies (e.g., from 10 and two years, respectively, to six and one years, respectively) should be performed to ensure that the Inaccessible Medium Voltage Program test and inspection frequencies reflect industry and plant-specific OE and that test and inspection frequencies may be increased based on future industry and plant-specific OE.

Request

1. Provide a summary of your evaluation of recently identified industry OE and any plant-specific OE concerning inaccessible low voltage power cable failures within the scope of license renewal (not subject to 10 CFR 50.49 environmental qualification requirements), and how this OE applies to the need for additional aging management activities at your plant for such cables.

2. Provide a discussion of how you will manage the effects of aging on Kewaunee Power Station's inaccessible low voltage power cables within the scope of license renewal and subject to AMR; with consideration of recently identified industry OE and any plant-specific OE. The discussion should include assessment of your AMP description, program elements (i.e., Scope of Program, Parameters Monitored/Inspected, Detection of Aging Effects, and Corrective Actions), and updated safety analysis report summary description to demonstrate reasonable assurance that the intended functions of inaccessible low voltage power cables subject to adverse localized environments will be maintained consistent with the current licensing basis through the period of extended operation.

3. Provide an evaluation showing that your Inaccessible Medium Voltage Program test and inspection frequencies, including event-driven inspections, incorporate recent industry and plant-specific OE for both inaccessible low and medium voltage cable. Discuss how your Inaccessible Medium Voltage Program will ensure that future industry and plant-specific OE will be incorporated into the program such that inspection and test frequencies may be increased based on test and inspection results.

September 10, 2010

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Energy Kewaunee, Inc.
Innsbrook Technical Center – 2SW
5000 Dominion Blvd.
Glen Allen, VA 23060-6711

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE KEWAUNEE POWER STATION, LICENSE RENEWAL APPLICATION (TAC NO. MD9408)

Dear Mr. Heacock:

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Sincerely,

/RA by Jay E. Robinson for/

John Daily, Sr. Project Manager
Program Operations Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-305

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As stated

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE KEWAUNEE POWER STATION LICENSE RENEWAL APPLICATION (TAC NO. MD9408)

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