NEXTera ENERGY
DUANE ARNOLD

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

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Response to Request for Additional Information Related to the Duane Arnold Energy Center License Renewal Application – Response to Requests for Additional Information on Implementation

References:

1. Letter, Richard L. Anderson (FPL Energy Duane Arnold, LLC) to Document Control Desk (USNRC), "Duane Arnold Energy Center Application for Renewed Operating License (TSCR-109)," dated September 30, 2008, NG-08-0713 (ML082980623)
2. Letter, Richard L. Anderson (FPL Energy Duane Arnold, LLC) to Document Control Desk (USNRC), "License Renewal Application, Supplement 1: Changes Resulting from Issues Raised in the Review Status of the License Renewal Application for the Duane Arnold Energy Center," dated January 23, 2009, NG-09-0059 (ML090280418)
3. NUREG-1955, Safety Evaluation Report Related to the License Renewal of Duane Arnold Energy Center

By Reference 1, FPL Energy Duane Arnold, LLC submitted an application for a renewed Operating License (LRA) for the Duane Arnold Energy Center (DAEC). Reference 2 provided Supplement 1 to the application. In Reference 3 the Staff documented their Safety Evaluation Report related to the license renewal for Duane Arnold Energy Center. Subsequent to issuance of NUREG-1955, in a telephone conference on November 16, 2010, the Staff requested additional information regarding implementation of the One-Time Inspection Program, Selective Leaching Program, Structures Monitoring Program and environmentally assisted fatigue analyses. Enclosure 1 provides the DAEC responses to these four requests.

There are four new commitments associated with this letter.

If you have any questions or require additional information, please contact Mr. Kenneth Putnam at (319) 851-7238.

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I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 23, 2010.

Christopher R. Costanzo
Vice President, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

Enclosure: DAEC Response to NRC Requests for Additional Information

cc: M. Rasmusson (State of Iowa)

RAI B.3.32-4

Background

GALL AMP XI.M32, "One-Time Inspection" states in element 4, "detection of aging effects" that the inspection includes a representative sample of the system population, and, where practical, focuses on the bounding or lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin.

In the response to RAI B.3.32-1 dated October 13, 2009, the applicant stated that it will inspect those areas most susceptible to aging, outlined the four sample groups (fuel oil, lube oil, reactor coolant/sodium pentaborate, and steam/treated water) from which it will select its samples, the materials of construction in each sample group, the number of components in each sample group, and the minimum number of components that will be inspected in each group. The staff reviewed the number of components that will be inspected in each group and noted that for populations less than 200 components, the sample sizes are relatively small (less than 10%). The staff also noted that for populations greater than 200 components, the number of components sampled was also relatively small (less than 10 components).

Issue

Due to the uncertainty in determining the most susceptible locations, and the potential for aging to occur in other locations, the staff noted that large sample sizes (at least 20%) may be required in order to adequately confirm an aging effect is not occurring. It is unclear to the staff how the sample sizes outlined in the response to RAI B.3.32-1 are adequate to provide confidence that the remaining population of components that are not inspected are not experiencing degradation.

Request

Provide technical justification for the adequacy of the sample sizes chosen at ensuring that the components not inspected are not experiencing degradation.

DAEC Response to RAI B.3.32-4

For the sample groups listed in DAEC RAI response B.3.32-1 submitted to the NRC in NG-09-0764 dated October 13, 2009, the number of samples will be increased to 20% with a maximum of 25 components. Historical maintenance activities may be included in the sample population where appropriate. In order to be included in the sample, historical maintenance activities have to be performed within 10 years of the period of extended operation, have a documented inspection of the component and performed by an individual qualified for the task. Where historical maintenance activities do not bring the sample size up to 20% with a maximum of 25 components, additional focused inspections will be performed.

The one difference to this plan will be the Carbon Steel, Cast Iron and Stainless Steel in Fuel Oil sample. The justification for a reduced sample size is provided below.

Carbon Steel, cast iron, and stainless steel in fuel oil should experience no loss of material with the exception of a location where water or other contaminants are present for an extended time. Components in this sample group at DAEC are associated with three systems (Emergency Diesel Generators, Auxiliary Boiler, and Diesel Fire Pump in

the Fire Protection System) with a limited number of tanks and piping runs where low points and collection areas are readily identifiable allowing a smart selection of the more susceptible locations. Inspection of 20 percent of the components would require inspection of approximately 17 locations. Inspections of 6 locations will be adequate to ensure that low points and stagnant areas are checked for these three systems while minimizing repetitive inspections of similar or less susceptible components that could extend system out of service time.

Duane Arnold makes the following commitment with regards to the One-Time Inspection Program:

The sample selection for the DAEC One-Time Inspection program will include a representative sample of approximately 20% of the population (defined as having the same material environment combination) or a maximum of 25 components with the exception of carbon steel and cast iron in a fuel oil environment. Existing maintenance records that document component condition will be used as part of the sample.

RAI B.3.36-3

Background

GALL AMP XI.M33, "Selective Leaching of Materials" states in element 1, "scope of program" that the program includes a one-time visual inspection and hardness measurement of a selected set of sample components to determine whether loss of material due to selective leaching is not occurring for the period of extended operation.

In the response to RAI B.3.36-1 dated October 13, 2009, the applicant stated that the inspection population and sample size for the Selective Leaching Program is based on the component type/material and their subjected environment. The applicant also stated that a minimum of one type of component/material type subjected to raw water, treated water or groundwater will be inspected to determine whether loss of material due to selective leaching is occurring and whether the extent of that material loss will affect the ability of the component sample to continue to perform its intended function during the period of extended operation.

Issue

Given that different materials can experience selective leaching in the same environment but at different rates, it was unclear to the staff how inspecting only one component/material type is adequate to provide confidence that the remaining population of components constructed of other material types are not experiencing degradation.

Due to the uncertainty in determining the most susceptible locations and the potential for aging to occur in other locations, the staff noted that large sample sizes (at least 20%) may be required in order to adequately confirm an aging effect is not occurring. The applicant's Selective Leaching Program did not include specific information regarding how the selected set of components to be sampled or the sample size will be determined.

Request

Provide specific information regarding how the selected set of components to be sampled will be determined and the size of the sample of components that will be inspected.

Provide technical justification for why inspecting only one component/material type is adequate to provide confidence that the remaining population of components constructed of other material types are not experiencing degradation.

DAEC Response to RAI B.3.36-3

Duane Arnold makes the following commitment with regards to the Selective Leaching Program:

The sample selection for the DAEC Selective Leaching program will include a representative sample of approximately 20% of the population for each susceptible material group or a maximum of 25 components. Existing maintenance records that document component condition will be used as part of the sample.

RAI B.3.37

Background:

NRC staff review has determined that adequate acceptance criteria for the Structures Monitoring Program should include quantitative limits for characterizing degradation. Chapter 5 of ACI 349.3R provides acceptable criteria for concrete structures. If the acceptance criteria in ACI 349.3R are not used, the plant-specific criteria should be described and a technical basis for deviation from ACI 349.3R should be provided.

Issue:

The LRA did not clearly identify quantitative acceptance criteria for Structures Monitoring Program inspections.

Request:

a) Provide the quantitative acceptance criteria for the Structures Monitoring Program. If the criteria deviate from those discussed in ACI 349.3R, provide technical justification for the differences.

b) If quantitative acceptance criteria will be added to the program as an enhancement, provide plans and a schedule to conduct a baseline inspection with the quantitative acceptance criteria prior to the period of extended operation.

DAEC Response to RAI B.3.37

(a) The existing Structures Monitoring Program uses qualitative acceptance criteria where deficiencies are characterized consistent with ACI 201. The acceptance criteria will be enhanced to incorporate acceptance criteria for concrete inspections from ACI 349.3R-96 "Evaluation of Existing Nuclear Safety-Related Concrete Structures" prior to entry into the period of extended operation. Reviews and evaluations performed for observed conditions will take into consideration the intended function of the structure.

Duane Arnold makes the following commitment with regards to the Structures Monitoring Program:

The DAEC Structures Monitoring Program will be enhanced to incorporate quantitative acceptance criteria for concrete inspections of all in-scope structures as determined from reviewing ACI 349.3R-96. Enhancements will be made to the program prior to entry into the period of extended operation. Conditions that are acceptable without further evaluation (ACI 349.3R-96 Section 5.1) observed during visual surveys will not be documented in the survey reports if the inspection is performed by a "responsible engineer" as defined in ACI 349.3R-96 Section 7.

(b) The existing Structures Monitoring Program uses qualitative acceptance criteria developed from ACI 201 similar to that of ACI 3493R criteria. The deficiencies identified during the last Structures Monitoring Program inspection will be reviewed and compared to acceptance criteria outlined within ACI 349 R3 1996. Identified additional actions will be documented in the site's Corrective Action Program for disposition prior to the period of extended operation.

RAI 4.3.4

Background

In LRA Section 4.3.4 (Supplement 1, dated January 22, 2009), the applicant provided a discussion on the methodology used to determine the locations that required environmentally assisted fatigue analyses, consistent with NUREG/CR-6260. The applicant indicated that it performed environmentally assisted fatigue evaluations for all the locations listed in NUREG/CR-6260 for older-vintage GE plant.

Issue

GALL AMP X.M1 states the impact of the reactor coolant environment on a sample of critical components should include the locations identified in NUREG/CR-6260, as a minimum, or propose alternatives based on plant configuration. During its review, the staff was concerned whether the applicant had verified that the plant-specific components listed in the 2nd column of LRA Table 4.3.4-1 per NUREG/CR 6260 were bounding for the generic NUREG/CR-6260 locations in the 1st column of LRA Table 4.3.4-1. Furthermore, the staff noted that the applicant's plant-specific configuration may contain locations that should be analyzed for the effects of reactor coolant environment, other than those generic locations identified in NUREG/CR-6260. The staff noted this may include locations, for example, (1) that are limiting or bounding for a particular plant-specific configuration or (2) that have calculated CUF values that are greater when compared to the locations identified in NUREG/CR-6260.

Request

(1) Confirm and justify that the plant-specific components listed in the 2nd column of LRA Table 4.3.4-1 were bounding for the generic NUREG/CR-6260 locations in the 1st column of LRA Table 4.3.4-1.

(2) If the only locations selected for EAF are consistent with NUREG/CR-6260, justify these locations were selected for EAF, at a minimum, to be bounding for the plant. Confirm and justify that the locations selected for environmentally assisted fatigue analyses, consistent with NUREG/CR-6260, are the most limiting and bounding for the plant. If these locations are not the most limiting and bounding for the plant, clarify the locations that require an environmentally assisted fatigue analysis and the actions that will be taken for these additional locations. If the limiting component identified consists of nickel alloy, clarify that the methodology used to perform environmentally-assisted fatigue calculation for nickel alloy is consistent with NUREG/CR-6909. If not, justify the method chosen and why NUREG/CR-6909 is not used.

DAEC Response to RAI 4.3.4

(1) The second column of LRA Table 4.3.4-1 identifies the location/component in the DAEC design that is the equivalent of the location selected in NUREG/CR-6260 for older BWRs listed in column one of the table. Once the equivalent location was selected a calculation for that DAEC component was performed using a bounding environmental fatigue multiplier (F_{en}) for the selected component.

(2) The only locations selected for EAF evaluation are consistent with NUREG/CR-6260. To confirm and justify that the locations selected for environmentally assisted fatigue analyses, consistent with NUREG/CR-6260, are representative of the most

limiting combined usage factor and are bounding for the plant will require a review of existing design basis calculations for ASME Class 1 components. This review will be completed prior to the period of extended operation.

Duane Arnold makes the following commitment with regards to environmentally assisted fatigue analyses:

DAEC will perform a review of usage factors for ASME Class 1 components with design basis calculations to determine whether the NUREG/CR-6260-based components that have been evaluated for the effects of the reactor coolant environment on fatigue usage are the limiting components for the DAEC plant configuration. This review includes qualitative or quantitative comparisons of components. If more limiting components are identified, the most limiting component usage factor will be evaluated for the effects of the reactor coolant environment on fatigue usage prior to entry into the period of extended operation. If a new limiting component identified consists of nickel alloy, the methodology used to perform environmentally-assisted fatigue calculation for nickel alloy will be consistent with NUREG/CR-6909.