LimerickNPEm Resource

From: Christopher.Wilson2@exeloncorp.com
Sent: Friday, May 04, 2012 1:42 PM
To: Kuntz, Robert
Subject: FW: Emailing: 5.4.12 - LIM - Response to RAI dated 4.17.12 re. LGS LRA.pdf
Attachments: 5.4.12 - LIM - Response to RAI dated 4.17.12 re. LGS LRA.pdf

<<5.4.12 - LIM - Response to RAI dated 4.17.12 re. LGS LRA.pdf>> Rob....Letter transmitted to DCC today

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Mail Envelope Properties (9A15F707EB47A04D882D9FEB352EDDF803DE4F5E)

Subject: FW: Emailing: 5.4.12 - LIM - Response to RAI dated 4.17.12 re. LGS LRA.pdf
Sent Date: 5/4/2012 1:42:27 PM
Received Date: 5/4/2012 1:41:12 PM
From: Christopher.Wilson2@exeloncorp.com

Created By: Christopher.Wilson2@exeloncorp.com

Recipients:
"Kuntz, Robert" <Robert.Kuntz@nrc.gov>
Tracking Status: None

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MESSAGE	995	5/4/2012 1:41:12 PM
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Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

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10 CFR 50
10 CFR 51
10 CFR 54

May 4, 2012

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

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Responses to NRC Requests for Additional Information, dated April 17, 2012, related to the Limerick Generating Station License Renewal Application

Reference: 1. Exelon Generation Company, LLC letter from Michael P. Gallagher to NRC Document Control Desk, "Application for Renewed Operating Licenses", dated June 22, 2011
2. Letter from Robert F. Kuntz (NRC) to Michael P. Gallagher (Exelon), "Requests for Additional Information for the review of the Limerick Generating Station, Units 1 and 2, License Renewal Application (TAC Nos. ME6555, ME6556)", dated April 17, 2012

In the Reference 1 letter, Exelon Generation Company, LLC (Exelon) submitted the License Renewal Application (LRA) for the Limerick Generating Station, Units 1 and 2 (LGS). In the Reference 2 letter, the NRC requested additional information to support the staffs' review of the LRA.

Enclosed are the responses to these requests for additional information.

This letter and its enclosures contain no new or revised regulatory commitments.

If you have any questions, please contact Mr. Al Fulvio, Manager, Exelon License Renewal, at 610-765-5936.

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

Executed on 5-4-2012

Respectfully,

Michael P. Gallagher
Vice President - License Renewal Projects
Exelon Generation Company, LLC

Enclosure: Responses to Requests for Additional Information

cc: Regional Administrator – NRC Region I
NRC Project Manager (Safety Review), NRR-DLR
NRC Project Manager (Environmental Review), NRR-DLR
NRC Project Manager, NRR- DORL Limerick Generating Station
NRC Senior Resident Inspector, Limerick Generating Station
R. R. Janati, Commonwealth of Pennsylvania

Enclosure

Responses to Requests for Additional Information related to various sections of the LGS License Renewal Application (LRA)

RAI 4.1-1.1
RAI 4.3-6.1
RAI 4.3-6.2
RAI 4.3-9.1
RAI 4.3-10.1

RAI 4.1-1.1

Background

Updated Final Safety Analysis Report (UFSAR) Section 3.9.1.1.8 was referenced in the response to RAI 4.1-1. UFSAR Section 3.9.1.1.8 contains a listing of transients in the main steam isolation valve (MSIV) fatigue analysis. One of these transients included in this section is "Preop @ 100 F/hr" with a limit of 150 cycles.

Issue

The staff noted that the "Preop @ 100 F/hr" transient was not included in LRA Tables 4.3.1-1 and 4.3.1-2; therefore, it is not clear to the staff whether this transient is monitored, needs to be monitored or will be monitored during the period of extended operation.

Request

Clarify if this transient, "Preop @ 100 F/hr," is associated with a transient that is already monitored by the Fatigue Monitoring Program. If not, justify why this transient does not need to be monitored by the Fatigue Monitoring Program.

Exelon Response

The *"Preop at 100ºF/hr"* thermal transient referenced in UFSAR Section 3.9.1.1.8 does not require monitoring by the Fatigue Monitoring Program for the reasons described below. LRA Tables 4.3.1-1 and 4.3.1-2 do not include this transient and do not require revision.

The Main Steam Isolation Valves were designed in accordance with the *"Draft ASME Code for Pumps and Valves for Nuclear Power (Dated November 1968)."* The design specification describes this transient as *"Preoperational and Periodic Inservice Testing."* A total of 150 preoperational and inservice test cycles is anticipated during the 40-year plant life. Temperature change rate will not exceed 100ºF per hour. Pressure changes will be insignificant."

The 1968 Draft ASME Code for Pumps and Valves, Section 454, required the manufacturer to verify the adequacy of the valve for its expected cyclic loading conditions by computing a thermal cyclic index, I_t, which was required to be less than 1.0. The design reports for the valves computed values for I_t and demonstrated they were less than the limit of 1.0. The Preoperational and Periodic Inservice Testing transient was excluded from consideration in these cyclic duty evaluations, as provided for in Code Section 454.1.d. Therefore, since this transient did not contribute to the I_t values determined for the MSIVs, it does not require inclusion in LRA Tables 4.3.1-1 and 4.3.1-2 and does not require monitoring.

RAI 4.3-6.1

Background

The response to RAI 4.3-6, in letter dated February 29, 2012, discusses the environmental assisted fatigue evaluation for American Society of Mechanical Engineers (ASME) Code Class 1 valves. The applicant's results of the analyzed ASME Code Class 1 valves from this evaluation were also provided as part of the response.

Issue

LRA Sections 4.3.3 and A.4.3.3 were not updated to include the results and description of the evaluation of environmentally assisted fatigue for ASME Code Class 1 valves. Therefore, it is not clear whether these environmental assisted fatigue evaluations are included as part of the 10 CFR 54.21 (c)(1)(iii) disposition and are part of the Fatigue Monitoring Program.

Request

Confirm that the environmental assisted fatigue analyses for ASME Code Class I valves are managed by the Fatigue Monitoring program and are included in the disposition in accordance with 10 CFR 54.21 (c)(1)(iii) in LRA Section 4.3.3 and A.4.3.3.

If not, justify that LRA Sections 4.3.3 and A.4.3.3 do not need to be updated to include information associated with the environmentally assisted fatigue evaluations for ASME Code Class 1 valves and that they are also managed by the Fatigue Monitoring Program for environmentally assisted fatigue.

Exelon Response

The environmental fatigue analyses prepared for ASME Code Class 1 valves will be managed by the Fatigue Monitoring program in the same manner as all other Class 1 environmental fatigue analyses discussed in LRA Sections 4.3.3 and A.4.3.3. The program will ensure that the cumulative number of occurrences of each transient type is maintained below the number of cycles used in the most limiting fatigue analysis, including these Class 1 valve environmental fatigue analyses.

The Class 1 valve environmental fatigue analyses are included within the disposition provided in LRA Sections 4.3.3 and A.4.3.3: 10 CFR 54.21(c)(1)(iii) - The effects of environmental fatigue on the intended functions of Class 1 components will be adequately managed for the period of extended operation by the Fatigue Monitoring program.

RAI 4.3-6.2

Background

Page 15 of 30 in response to RAI 4.3-6, in letter dated February 29, 2012, it states "[t]he RHR shutdown cooling system valves are exposed to transients associated with shutdown cooling operations that are not experienced by the RHR LPCI and core spray injection valves. The RHR LPCI and core spray injection valves are only exposed to transients that are also experienced by the RHR shutdown cooling return valves."

Issue

It is not clear what transients are experienced by the RHR SDC valves and by the RHR LPCI and core spray injection valves.

Request

Confirm that statements 1 and 2 are true:

1) RHR SDC valves experience: (transients associated with shutdown cooling operations) + (transients X, Y, Z ...)

2) RHR LPCI and core spray injection valves experience: (transients X, Y, Z ...)
AND
RHR LPCI and core spray injection valves DO NOT experience: (transients associated with shutdown cooling operations)

If both statements are not true, clarify what transients are experienced by the RHR SDC valves and by the RHR LPCI and core spray injection valves.

Exelon Response

The RHR SDC valves and RHR LPCI and Core Spray injection valves are analyzed for the same numbers and types of design transients as those listed in LRA Tables 4.3.1-1 and 4.3.1-2, except for those that only apply to the Reactor Pressure Vessel (transient numbers 1, 4, 5, 6, and 11), but the thermal profile of the Shutdown transient is different for the SDC valves than for the others. The thermal profiles of these design transients are defined on load histograms (cycle diagrams) for each system or subsystem. The thermal profile for the Shutdown transient applicable to the RHR LPCI and Core Spray injection valves is a cooldown from reactor temperature to ambient at a rate not exceeding 100ºF/hr. There is no flow through these valves during a Shutdown transient, so they slowly cool down with RPV temperature. This Shutdown transient may be excluded from consideration since it meets the exemption criteria of NB-3552 (d) of the design code.

The thermal profile for the Shutdown transient applicable to the RHR SDC valves is different because there is flow through the RHR SDC valves during a Shutdown transient. The Shutdown transient is analyzed in the F050 RHR SDC valve design analysis because it includes a step change from 553ºF to 100ºF associated with SDC operation when cold water in the piping is assumed to flow through the hot valve. The fatigue usage associated with this step change accounts for approximately two thirds of the total fatigue usage in the analysis. Therefore, since the Shutdown transient is more severe for the RHR SDC valve than for the

RHR LPCI and Core Spray injection valves, the environmental fatigue evaluation of the RHR SDC valve is considered representative of the RHR LPCI and Core Spray injection valves.

RAI 4.3-9.1

Background and issue

The response to RAI 4.3-9 (Part 1), provided by letter dated February 29, 2012, stated that the revised environmental fatigue analysis evaluates the inside surface location at the clad/base metal interface directly below the limiting outside surface location. This location was selected to represent the wetted internal surface of the forging but takes no credit for the presence of the cladding. Since this location was not originally analyzed for metal fatigue, no ASME Code cumulative usage factor (CUF) value is reported. However, the response revised Table 4.3.3-1 for the ASME Code CUF value for Core Spray Nozzle (Forging) from 0.097 to 0.0016. The response does not explain what the value of 0.0016 represents since the response indicated that no ASME Code CUF value is reported for this location.

The staff also noted that for the core spray piping in Table 4.3.3-2, the difference in F_{en} values between Limerick Generation Station (LGS), Units 1 and 2 is substantial. The staff recognized that different nodes are reported. However, the response did not explain the difference in F_{en}.

Request

1. Explain the ASME Code CUF value of 0.0016 for Core Spray Nozzle (Forging) in Table 4.3.3-1.

2. Explain why the F_{en} values for the core spray piping are different between LGS, Units 1 and 2.

Exelon Response

1. The original RPV stress report evaluated the core spray nozzle forging and reported a CUF value of 0.097 for the bounding location, which is node 22, located on the external surface of the nozzle. The report did not report a CUF value for node 17, located on the inside surface of the nozzle. However, it did report that the number of allowable cycles for node 17 is 300,000 cycles, based on the ASME Code fatigue curve. It also showed that the total number of design cycles, combined, is 485 cycles. During development of the environmental fatigue analysis for node 17, the original ASME CUF value was determined to be 485 ÷ 300,000 = 0.0016.

2. The F_{en} values for the Unit 1 and Unit 2 core spray piping were each computed in accordance with the NUREG/CR-6909 methodology. An individual F_{en} value was computed for each transient pairing within each analysis. The 6909 F_{en} value reported in LRA Table 4.3.3-2 is a weighted average value determined by dividing the CUF_{en} value for the analysis by the NUREG/CR-6909 CUF value.

   The individual F_{en} values computed for Unit 1 assume the default (worst-case) value for strain rate of 0.0004 percent/second provided in NUREG/CR-6909, with a resulting average 6909 F_{en} value of 4.36 and CUF_{en} value of 0.856. In the Unit 2 analysis, the F_{en} value uses a computed strain rate value of 0.0484 percent/second, which is appropriate since this transient pair is associated with SRV and OBE cycles, which are relatively fast events that

have high strain rates. The average 6909 F_{en} value is 2.89 and the CUF_{en} value is 0.786.

RAI 4.3-10.1

Background and issue

The response to RAI 4.3-10, provided by letter dated February 29, 2012, provided the CUF values for a list of components that have been analyzed for fatigue. The response indicated that the steam dryer, steam dryer support brackets, and control rod guide tube are "exempt." The response did not explain why these three components are exempted in the fatigue analysis.

Request

Clarify why these three components are exempted. As part of the clarification, if applicable, identify the provisions in the ASME Code Section III that allowed the exemption of the required fatigue analysis for these components.

Exelon Response

1. The steam dryer was not analyzed for fatigue because it is not subject to ASME Section III design requirements. This is because it does not perform a pressure retaining function, since it is entirely encased within the Reactor Pressure Vessel, and because it is not a core support structure, as stated in UFSAR Section 3.9.5.1.1.9, *"Steam Dryers."* The NSSS New Loads Design Adequacy Evaluation evaluated the effects of hydrodynamic loading on the steam dryer and did not include a fatigue analysis or any other cyclic loading analysis.

2. The steam dryer support brackets are attached to the Reactor Pressure Vessel and were evaluated in the RPV stress report, which states that *"exemption from fatigue analysis per N-415.1 (of the design Code) is satisfied."* The design Code is ASME Section III, 1968 Edition, with Addenda through Summer 1969. In addition, the NSSS New Loads Design Adequacy Evaluation states that: *"After analyzing the effects of MSRV cycles on the steam dryer brackets, the analysis for cyclic service remained exempt."*

3. The control rod guide tube is not attached to the Reactor Pressure Vessel and therefore was not evaluated in the RPV stress report. The NSSS New Loads Design Adequacy Evaluation states that: *"The control rod guide tube is exempted from fatigue analysis per Paragraph NG-3222.4d of the ASME Code, Section III,"* which is entitled *"Components Not Requiring Evaluation for Cyclic Service."*