



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

September 21, 2010

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 - REQUEST FOR  
ADDITIONAL INFORMATION REGARDING PROPOSED TECHNICAL  
SPECIFICATION ALLOWED OUTAGE TIME EXTENSIONS TO SUPPORT  
RESIDUAL HEAT REMOVAL SERVICE WATER (RHRSW) MAINTENANCE  
(TAC NOS. ME3551 AND ME3552)

Dear Mr. Pacilio:

By letter dated March 19, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100810151), Exelon Generation Company, LLC (Exelon) submitted a license amendment request proposing to extend the Technical Specification allowed outage time for the Limerick Generating Station, Units 1 and 2, Suppression Pool Cooling mode of the Residual Heat Removal system, the Residual Heat Removal Service Water (RHRSW) system, the Emergency Service Water system, and the A.C. Sources - Operating (Emergency Diesel Generators) from 72 hours to 7 days in order to allow for repairs of the RHRSW system piping.

The Nuclear Regulatory Commission staff has been reviewing the response and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). The questions were sent via electronic transmission on August 3, 2010, to Mr. Glenn Stewart, of your staff. The draft questions were sent to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. The draft questions were discussed in a teleconference with your staff on September 9, 2010. It was agreed that a response to this RAI would be submitted by October 29, 2010.

Please contact me at 301-415-2833, if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Peter Bamford".

Peter Bamford, Project Manager  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure: As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION  
LIMERICK GENERATING STATION, UNITS 1 AND 2  
PROPOSED TECHNICAL SPECIFICATION ALLOWED OUTAGE TIME EXTENSIONS  
TO SUPPORT RESIDUAL HEAT REMOVAL SERVICE WATER MAINTENANCE  
DOCKET NOS. 50-352 AND 50-353

By letter dated March 19, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100810151), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request (LAR) proposing to extend certain Limerick Generating Station (LGS) Units 1 and 2, Technical Specification (TS) allowed outage times (AOTs). Specifically these AOTs are for the Suppression Pool Cooling (SPC) mode of the Residual Heat Removal (RHR) system, the Residual Heat Removal Service Water (RHRSW) system, the Emergency Service Water (ESW) system, and the A.C. Sources - Operating (Emergency Diesel Generators (EDGs)). The AOTs would be extended from 72 hours to 7 days in order to allow for repairs of the RHRSW system piping. The Nuclear Regulatory Commission (NRC) staff has been reviewing the submittal and has determined that additional information is needed to complete its review.

1. The NRC staff has identified the following issues with the format and content of the proposed TS changes contained in Attachment 2 of the LAR:
  - a. The footnotes extending the completion time (CT) are ambiguous in that each says the AOT "may be extended...for up to a period of 7 days..." (*added emphasis*). This could be interpreted as a 7-day extension of the 72-hour CT, for a 10-day total. The wording "may be extended to 7 days" is more explicit and the licensee is requested to revise the proposed TS changes accordingly.
  - b. The footnotes in each limiting condition for operation (LCO) action requirement identify that the extended CT may be applied once per calendar year "for one unit only," and also specify the status of the "opposite unit." Since the TSs are unit-specific, the references to the other unit are vague. Since the actual frequency of use for each unit is once per 2 years, this should be the stated frequency (i.e., "once every other calendar year"), and the "opposite unit" should refer to "Limerick Generating Station Unit X."
  - c. In the proposed TS changes, the reference to the compensatory measures refers to the NRC staff's safety evaluation authorizing this change. As this is a permanent change to the TSs, it would be more appropriate to identify the compensatory measures in the TSs, and not in an external reference. The licensee is requested to delineate in the TSs the compensatory measures being credited, consistent with the risk evaluation, and include any appropriate surveillances for those measures. Further, several compensatory measures refer to the availability of TS equipment covered by other LCOs (e.g., commitments 2b, 8a, and 8b). The TS change should specifically reference these LCOs being met without reliance upon any action requirement, rather than referring to non-TS commitments for availability of the same components already covered by TS LCOs.

Enclosure

- d. The proposed change to add a fourth footnote to clarify the applicability of LCO 3.5.1, Emergency Core Cooling System, during hot shutdown conditions, is worded differently than the other footnotes, in that: 1) no reference is made to the status of the opposite unit being shutdown with the reactor vessel head removed and the reactor cavity flooded; and 2) the compensatory measures are not identified. Although this footnote is intended to clarify applicability (see request number 1.f for further discussion regarding this footnote) and does not extend a CT, these two omissions could have been included. The licensee should submit a revised specification for this footnote or explain why these two conditions should not specifically be applied to LCO 3.5.1. Alternatively, the licensee may provide a direct reference to LCO 3.7.1.1 for this and other supported system TS actions.
  - e. The footnotes specifically address “repairs of one RHRSW subsystem piping.” This would preclude the applicability of the extended CT for ESW system piping repairs, even though the amendment request identifies ESW as a system that is experiencing piping corrosion. The licensee is requested to confirm its understanding of the scope of system piping repairs permitted by this proposed change.
  - f. The marked up TS pages contained in Attachment 2 of the LAR, Insert A, states that “one of the two remaining LPCI [low-pressure coolant injection] subsystems may be inoperable in that it is aligned in the shutdown cooling mode...” Insert A does not direct any ACTIONS that may be derived from this note. Thus, as constructed, and under the conditions specified, the ACTIONS for the two remaining LPCI subsystems would have to be applied with the one subsystem lined up for shutdown cooling declared inoperable (3 subsystems total inoperable). If the intent of the note is to not require taking the ACTIONS required for the third subsystem inoperable, it must be re-worked. The approach taken in NUREG-1433, Standard Technical Specifications [Boiling Water Reactor] BWR/4, may be helpful in determining a proper construction.
2. In the LAR, Table 4-1 of Attachment 3 identifies plant changes not incorporated into the probabilistic risk assessment (PRA) model and provides a disposition of these items as to their impact on the application. Four changes are identified (LG2007-048, LG2007-049, LG2008-009, and LG2009-001) as deferred and not yet implemented, and the disposition is “no impact,” based on the changes not yet being implemented. The licensee does not identify the risk impact on the TS change risk analyses once the plant changes are implemented. The licensee is requested to provide its disposition of the potential impact of each planned modification on the risk results supporting this proposed permanent TS change.
  3. In the LAR, Table 4-2 of Attachment 3 identifies that supporting requirement SY-A12b from the PRA standard is not met, and identifies that a detailed investigation for flow diversion pathways has not been performed but would have a “very limited impact.” The licensee is requested to provide its basis as to why this technical issue has a very limited impact. In addition, please address how flow diversion pathways were considered for the RHRSW and ESW systems for this application; if such pathways exist and are not modeled, then a sensitivity study or other disposition of the impact on the risk analyses needs to be provided.
  4. In the LAR, Table 4-2 of Attachment 3 identifies that supporting requirement HR-A1 is not met since a formal review of plant maintenance and testing procedures and practices was not done to identify potential pre-initiator alignment errors. The impact is identified as “no impact” since the pre-initiator errors in the PRA model include those for specific systems identified as most relevant to this application. However, neither the RHRSW nor ESW

systems are included in the scope of the pre-initiator events included in the PRA model. The licensee is requested to justify not including pre-initiator alignment errors for these systems in the PRA model, or disposition the impact of such errors.

5. In the LAR, Table 4-2 of Attachment 3 identifies that supporting requirements DA-C6 and DA-C7 are not met for the use of actual plant data and practices in compiling component demand data, but identifies a minimal impact in that the values used in the PRA are a “reasonable representation of the best estimate reliability response of the plant.” The data source is only identified as the “maintenance rule database,” but there is no discussion of how this data is collected. The licensee needs to provide its basis for concluding that the data used to determine component demands and the number of surveillance tests and maintenance activities reasonably reflect the as-operated plant.
6. In the LAR, Section A.3.1 of Attachment 3 discusses the technical aspects of the fire PRA model. The fire PRA is characterized as an update of the Individual Plant Examination of External Events and specifically identifies plant areas that are modeled (Main Control Room, Auxiliary Equipment Room, Turbine Building), unit-specific models, cable data for control rod drive system, and completion of specific tasks from NUREG/CR-6850, “Fire PRA Methodology for Nuclear Power Facilities.” The staff requests additional information to understand how the scope and technical adequacy of this model supports the requested TS change risk evaluation:
  - a. The Main Control Room, Auxiliary Equipment Room, and Turbine Building compartments are specifically identified as “refined analyses” and “integrated into the fire PRA results.” It is not clear then how other plant areas are being treated in the fire PRA. If other areas are screened from consideration or conservatively modeled, do these areas include plant equipment (including required cables) that is relied upon during the RHRSW outage, such that the prior screening could be invalidated, or the conservative treatment could be masking the change in risk for the RHRSW outage configuration? The licensee is requested to better describe the scope of the fire PRA model for the plant areas modeled, and if appropriate, provide additional risk analysis for fire areas previously screened or conservatively modeled for this application.
  - b. Several areas of conservatism in the fire PRA model are identified. If a fire area is conservatively treated in the baseline model, then this may mask the change in risk for an application such as the RHRSW outage evaluation. For the delta-risk calculation, has an evaluation of the impact of the conservative treatments been made, and what are the conclusions of that evaluation? The licensee needs to demonstrate that model conservatism is not masking the fire risk impacts associated with the RHRSW outage evaluation. In addition, specifically address multiple spurious operations, instrumentation, iterations, and multi-compartment modeling assumptions for this specific application.
7. The calculated incremental conditional core damage probability (ICCDP) for internal fires for train A and train B differ for each unit by more than a factor of two, with train B being more significant in each unit. This effect is present in the internal events core damage frequency, but to a lesser degree. In addition, the unit-specific risk calculations are not identical for internal events for a train A outage, but are the same for train B, and the fire ICCDPs are different for each unit. Internal events large early release frequency values are also different between the two units. No explanation is provided for these asymmetries. The licensee is

requested to explain the unit and train differences in the risk metrics in terms of actual plant differences or PRA modeling assumptions, and identify any insights obtained from these differences.

8. The compensatory measures, which are referenced as the tier 2 evaluation for key principle 4 of RG 1.177, identified in Section 4.2 of the LAR, Attachment 1, are vague and require clarification as to exactly what the commitment involves:
  - a. Commitment #1 identifies that “adequate staffing” will be maintained onsite to respond to “unexpected conditions.” The staff does not understand the scope and meaning of these terms. For example, it unclear how “adequate staffing” will be determined and validated and what this commitment means in terms of numbers and disciplines of personnel.
  - b. Commitment #2 identifies “elective” maintenance and “discretionary” maintenance, as well as “testing.” The staff does not understand the scope of the two terms, and is unclear as to whether the commitment refers to all testing, or only “elective” or “discretionary” testing.
  - c. Subpart (a) Commitment #2 states that the proper standby alignment of RHRSW will be “ensured.” The staff does not understand how this will be accomplished (e.g., by alignment verification, by performance of surveillance test, by flow testing).
  - d. The staff also notes that Commitment #2 is poorly structured in that it puts some commitments in the opening paragraph, and others as detailed subparts (a) and (b). The licensee is requested to revise the structure of this commitment.
  - e. Commitment #3 states that switchyard activities that “adversely affect risk exposure” are to be prohibited. The staff does not understand the scope of activities that are intended to be prohibited.
  - f. Commitment #4 identifies “Operational Risk Activities” are to be “restricted.” The staff does not understand the use of the term “restricted,” nor does it understand the scope of “Operational Risk Activities.”
  - g. Commitment #7 identifies shift briefs and walkdowns to “reduce and manage” transient combustibles. The staff does not understand how the treatment of transient combustibles will be different than normal operations.
9. The following compensatory measures have been historically used to help ensure continued safe operation of plants during extended EDG outages. Please provide a discussion regarding your consideration of the following potential compensatory measures for LGS:
  - a. Avoiding scheduling of this planned maintenance during seasons when the probability of grid stress conditions are high or forecasted to be high.
  - b. Contacting the system load dispatcher prior to starting this maintenance to ensure no significant grid perturbations are expected during the extended AOT.
  - c. Verifying that the required systems, subsystems, trains, components, and devices that depend on the remaining EDG(s) are operable and positive measures will be provided to

preclude subsequent testing or maintenance activities on these systems, subsystems, trains, components, and devices.

10. The LAR, Attachment 1, states that planned RHRSW maintenance will begin with the 2012, LGS Unit 1 refueling outage. Please provide more detail regarding the planned work schedule for the currently-identified RHRSW system repairs. How will the use of the extended AOT (including the EDG AOT) be managed beyond the period of the currently contemplated repairs?
11. In the LAR, Attachment 1, Section 4.2, Compensatory Measure Item 2b, the licensee states that the availability of EDG D11, D21, and D23 will be verified when RHRSW subsystem A will be unavailable. Explain the basis for not requiring verification of the availability of EDG D13 when RHRSW system A will be unavailable.
12. Specifically regarding the EDGs, please describe how defense-in-depth will be maintained. For example, are there any contingency backup provisions that can be staged for cooling the EDGs made inoperable by the ESW alignment or, alternatively, is a supplemental AC source, with the capability of handling station blackout and loss-of-offsite power loads, available to supplement the existing EDGs during the proposed extended 7-day AOT?
13. For the compensatory measures identified in question 1(c) that are included in the TS and/or controlled by other mechanisms, how will operations personnel confirm that the required compensatory actions are established and in effect? Will a completed, controlled checklist of compensatory actions be made available in the Control Room? Will a special procedure be used?
14. Please identify any changes to procedures or any new procedures that will be required to support the proposed LAR.
15. In the LAR, Section 5.1 of Attachment 1 indicates that the emergency operating procedures (EOPs) will remain viable under the 7-day AOT configuration. How was/will the EOP sufficiency be validated?
16. In the LAR, Section 4.1 of Attachment 1 describes manual alignment of the spray pond sprays. How will manual alignment of spray pond sprays be addressed? This is not a compensatory measure and is not included in that listing. What cue tells the operator that this action is required? Is there any time constraint? How will the operator know whether the realignment was a success? What is the recovery action? How long does the operator have to recover?
17. The LAR, Attachment 1, Sections 4.1, 4.2, as well as, Attachment 3, Section 5.4, describes station provisions for "Alternate Remote Shutdown." Are there any design-basis accidents that would make "Alternate Remote Shutdown" impossible due to radiation or other extreme environmental conditions in the equipment areas or in the ingress or egress pathways?

September 21, 2010

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

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Sincerely,  
*/ra/*  
Peter Bamford, Project Manager  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353  
Enclosure: As stated  
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\* concurrence via memo and/or email

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