



RIS 2015-06
EGM 15-002
DSS-ISG-2016-01

SVP-18-022

March 23, 2018

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Quad Cities Nuclear Power Station, Unit 1 and Unit 2
Renewed Facility Operating License No. DPR-29 and DPR-30
NRC Docket No. 50-254 and 50-265

Subject: Request to Extend Enforcement Discretion Provided in Enforcement Guidance Memorandum 15-002 for Tornado-Generated Missile Protection Non-Conformances Identified in Response to Regulatory Issues Summary 2015-06, "Tornado Missile Protection"

Exelon Generation Company, LLC, (EGC) requests that the NRC extend the period of Enforcement Discretion for the Quad Cities Nuclear Power Station (QCNP) from June 10, 2018 to June 10, 2020 pursuant to EGM 15-002 Revision 1. QCNP has identified three non-conforming conditions (NCCs) regarding Tornado Missile Protection (TMP) requirements affecting structures, systems and components (SSCs) within the scope of the QCNP Technical Specifications (TS). The NCCs have been documented in the EGC corrective action process in accordance with station procedures and all required notifications have been made.

QCNP has completed discovery activities in response to RIS 2015-06. A summary of the discovery methodology, scope and results is provided in the Attachment.

Consistent with the guidance provided in EGM 15-002 Revision 1 and DSS-ISG-2016-01 Revision 1, compensatory measures have been implemented for the identified NCCs affecting TS SSCs and are described in the Attachment. These compensatory measures will remain in place until the identified NCCs are resolved.

A collective review of all compensatory measures currently in place along with expected operator actions in response to severe weather has been performed and confirmed that these compensatory measures can be performed in an effective manner.

We request your approval before May 31, 2018.

There are no regulatory commitments contained in this submittal.

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Attachment

Justification for Request to Extend the Expiration Date for Enforcement Discretion Regarding Tornado Missile Protection Requirements for the Quad Cities Nuclear Power Station

ATTACHMENT

JUSTIFICATION FOR REQUEST TO EXTEND THE EXPIRATION DATE FOR ENFORCEMENT DISCRETION REGARDING TORNADO MISSILE PROTECTION REQUIREMENTS FOR THE QUAD CITIES NUCLEAR POWER STATION

1. Introduction

This attachment provides the justification for the Exelon Generating Company, LLC, (EGC) request to extend the expiration date for enforcement discretion regarding tornado missile protection requirements for the Quad Cities Nuclear Power Station (QC).

In Reference 1, the NRC issued Regulatory Issue Summary (RIS) 2015-06, "Tornado Missile Protection," to, in part, remind licensees of the need to conform with a plant's current, site-specific licensing basis for tornado-generated missile protection.

In Reference 2, the NRC provided in Enforcement Guidance Memorandum (EGM) 15-002 guidance to exercise enforcement discretion when a licensee does not comply with a plant's current site-specific licensing basis for tornado-generated missile protection. EGM 15-002 identified QC as a higher tornado missile risk site (Group A), resulting in an enforcement discretion expiration date of June 10, 2018.

EGC has completed a comprehensive tornado missile protection assessment for QC and has conservatively identified non-conforming conditions regarding tornado missile protection requirements. Compensatory measures were implemented to address the non-conforming conditions in accordance with regulatory guidance.

EGC is requesting an extension to the enforcement discretion expiration date to allow sufficient time to address the non-conforming conditions.

EGC plans to submit a license amendment request (LAR) to request approval for the use of the Tornado Missile Risk Evaluator (TMRE) methodology, currently under development by the industry, for evaluating the identified non-conformances.

This request to extend enforcement discretion was prepared in accordance with guidance provided in Appendix B of Revision 1 of Interim Staff Guidance DSS-ISG-2016-01 (Reference 3).

The six (6) elements of the ISG are addressed as follows:

a. description of the non-conformances where the EGM was applied

- *Section 4. RIS 2015-06 Assessment Scope and Results*

b. description of the prompt compensatory actions

- *Section 5. Initial Actions*

c. description of the long-term compensatory actions

- *Section 6. Long Term Compensatory Measures*

d. assessment of all compensatory measures

- *Section 7. Assessment of Long-Term Compensatory Measures Coincident with Other Operator Actions*

e. basis for the need for additional enforcement discretion time

- *Section 10. Basis and Reason for Extension Request*

f. timeline for restoring compliance with the licensing basis

- *Section 9. Plans for Permanent Resolution*

2. RIS 2015-06 Assessment Methodology

The methodology followed by EGC which was developed in response to RIS 2015-06 includes 3 objectives:

- (1) Document the current facility licensing basis (CLB) for tornados and tornado missile protection (TMP)
- (2) Evaluate the site's conformance with the TMP licensing basis through a design review and plant walk-downs and document any TMP non-conforming conditions (NCCs)
- (3) Resolve TMP NCCs within the Corrective Action Program (CAP)

3. Summary of CLB for Tornado and Tornado Missile Protection Design

The QC CLB for tornados and tornado missiles pertinent to RIS 2015-06 are described in Revision 14 of the Updated Final Safety Analysis Report (UFSAR).

In addition to what is currently documented in the QC UFSAR, original plant licensing documents were reviewed to determine licensing requirements that are not specifically detailed in the QC UFSAR. The additional documents which were reviewed include the original FSAR, AEC Questions and Answers applicable to tornados and tornado missile protection, and the draft General Design Criteria (GDC).

CLB for Tornado Protection Design

As discussed in UFSAR Section 3.3.2.1, the design basis tornado has a tangential velocity of 300 miles per hour (mph) and a translational velocity of 60 mph and causes a pressure change of 3 pounds per square inch (psi) at the vortex in 3 seconds.

CLB for Tornado Missile Protection Design

Section 3.5.4 of the QC UFSAR describes the two types of missiles which have been considered. They are a utility pole 35 feet 0 inches long with a butt diameter of 13 inches and a unit weight of 50 lb/ft³ having a velocity of 150 mph; and a 1-ton mass with a velocity of 100 mph and a contact area of 25 square feet.

CLB for Safe Shutdown Equipment

Quad Cities is licensed to protect against the effects of a single bounding tornado generated missile impact and not to multiple impacts by bounding missiles. In addition, Class I redundant systems are physically separated.

CLB References

- QC FSAR, UFSAR and associated Q&A
- QC PDAR and associated Q&A

4. RIS 2015-06 Assessment Scope and Results

The assessment completed reviews and walk downs for QC Class 1 structures, which were designed to withstand the tornado and tornado generated missiles specified in the CLB as well non-Class 1 structures which house components important to the safe shut down of the plant. The non-conforming condition identified during the design reviews and walkdowns was documented in the following condition report within the corrective action program:

IR 04110003

"...a non-conforming condition [exists] with the Unit 1, Unit 2 and Unit 1/2 Emergency Diesel Generator (EDG) intake and exhaust stacks, fuel oil tank vents, and day tank vents with respect to tornado missile protection. If any of these lines were to become crimped by a missile impact the associated EDG may become unavailable."

"Due to the ambiguity in the licensing basis, with regard to exterior missiles, the EDG intake and exhaust stacks, fuel oil tank vents, and day tank vents are conservatively being identified as non-conforming."

5. Initial Actions

The following initial actions were taken in response to the identified non-conforming conditions in accordance with EGM 15-002 and DSS-ISG-2016-01:

- a. The non-conforming conditions were reported by QC as an eight-hour notification on March 1, 2018 (ENS #53235) under the following regulations:
 - 10 CFR 50.72(b)(3)(ii)(B), "The nuclear power plant being in an unanalyzed condition that significantly degrades plant safety."
 - 10 CFR 50.72(b)(3)(v)(D), "Mitigate the consequences of an accident."

The NRC resident inspector was also notified.

- b. Operability determinations were completed and documented in the corrective action program. The non-conforming equipment was initially declared inoperable. Guidance in Revision 1 of EGM 15-002 (Reference 4) was used to declare the equipment operable but non-conforming and to implement enforcement discretion.

c. QC Licensee Event Report 1-18-002 will be submitted in accordance with 10 CFR 50.73 due to Technical Specification-required equipment that did not meet CLB requirements for protection against tornado missiles.

d. The following Initial Compensatory Measures have been verified to be in place in accordance with NRC EGM 15-002 and DSS-ISG-2016-01, Appendix A.

1.) Verify that procedures are in place and training is current for performing actions in response to a tornado, such as:

a. The affected unit's abnormal and emergency operating procedures addressing tornados/high winds, and the loss of the tornado missile vulnerable equipment.

Quad Cities procedures currently implemented to address this are:

- OP-AA-108-111-1001, "Severe Weather and Natural Disaster Guidelines"
- QCOA 0010-10, "Tornado Watch-Warning, Severe Thunderstorm Warning, or Severe Winds"

b. The affected unit's Diverse and Flexible Coping Strategies (FLEX) equipment and procedures, if available. If site FLEX equipment and procedures are not available, specific measures should be put in place with equipment staged, procedures written, and training completed for actions to lessen the likelihood of tornado missile effects on the affected SSCs, or for prompt recovery of SSC function from tornado missile effects.

Quad Cities procedures currently implemented to address this are:

- CC-AA-118, "Diverse and Flexible Coping Strategy (FLEX) and Spent Fuel Pool Instrumentation Program Document"
- CC-QC-118, "Site Implementation of Diverse and Flexible Coping Strategies (FLEX) and Spent Fuel Pool Implementation Program"
- QCOP 0050-03, "FLEX Site Damage Assessment"

2.) Verify that procedures are in place and training is current for the following actions to be taken if a tornado watch is issued for the area, such as:

a. Remove, relocate, or secure potential missiles.

Quad Cities procedure QCOA 0010-10 Step D.10.a requires personnel to "inspect the site for potential missiles, particularly in the areas around the transformers and in the 345 kV switchyard, and secure these items as necessary."

OP-AA-108-111-1001 Step 4.3.1 directs the following:

"If high winds, hurricane, or tornado activity is forecasted for the site or likely to occur, then walk downs of the site should be performed to identify items and take action to reduce potential threat that could become projectiles in high wind situations."

- b. From a work management/configuration control perspective, protect equipment important to maintaining safe shutdown conditions.

Quad Cities procedure QCOA 0010-10 Step D.10.i directs the following: "For a Severe Thunderstorm Warning, evaluate on-line risk, by toggling HRE for Grid/Weather/Loop in Paragon. (NOTE: There is NO change in risk associated with a Tornado Watch.)"

- c. Promptly complete or restore equipment from maintenance activities in progress on equipment important to maintaining safe shutdown conditions.

Quad Cities procedures QCOA 0010-10 Steps:

D.10.b: "Verify the Unit 1, Unit 2, and Unit 1/2 Emergency Diesel Generators are available. (1) IF minor maintenance is being performed or short duration Clearance Orders are in effect on any Diesel Generator, THEN consider returning the Emergency Diesel Generator to available status.",

D.10.c: "IF the Unit 2 125 VDC Alternate Battery is supplying Station loads, THEN consider transferring back to the Normal Unit 2 125 VDC Battery using QCOP 6900-24.",

D.10.d: "IF the 345 kV ring bus is open, or is planned to be opened, for maintenance, THEN consider taking actions to restore the ring bus as soon as possible and delay the planned maintenance.",

D.10.e: "Review in-progress and planned work activities and consider expediting in-progress work and/or delaying upcoming work on systems needed to mitigate a loss of off-site power, mitigate transients, or place the Unit in a Cold Shutdown condition.",

And OP-AA-108-111-1001 Step 4.3.9: "If testing or maintenance in progress, then CONSIDER stopping testing/maintenance."

- d. Restore equipment important to maintaining safe shutdown conditions if undergoing maintenance or testing, if possible.

Quad Cities procedures QCOA 0010-10 Steps:

D.10.b: "Verify the Unit 1, Unit 2, and Unit 1/2 Emergency Diesel Generators are available. (1) IF minor maintenance is being performed or short duration Clearance Orders are in effect on any Diesel Generator, THEN consider returning the Emergency Diesel Generator to available status,"

D.10.c: "IF the Unit 2 125 VDC Alternate Battery is supplying Station loads, THEN consider transferring back to the Normal Unit 2 125 VDC Battery using QCOP 6900-24,"

D.10.d: "IF the 345 kV ring bus is open, or is planned to be opened, for maintenance, THEN consider taking actions to restore the ring bus as soon as possible and delay the planned maintenance,"

D.10.e: "Review in-progress and planned work activities and consider expediting in-progress work and/or delaying upcoming work on systems needed to mitigate a loss of off-site power, mitigate transients, or place the Unit in a Cold Shutdown condition,"

And OP-AA-108-111-1001 Step 4.3.9: "If testing or maintenance in progress, then CONSIDER stopping testing/maintenance."

- e. Verify equipment is ready to use by visual inspection, surveillances and preventive maintenance are current, and review pending equipment maintenance requests.

All Safety equipment deficiencies are tracked in the DEL, and reviewed by all Licensed Operators on shift. Equipment is verified ready for use by Operator rounds. Work control schedules surveillance appropriately to ensure no past due surveillances exceed Tech Spec timeclocks.

Quad Cities procedures currently implemented to address this are:

OP-AA-108-111-1001, "Severe Weather and Natural Disaster Guidelines"
WC-AA-101, "On-Line Work Control Process"
WC-AA-107, "Seasonal Readiness"
WC-AA-101-1006, "On-Line Risk Management and Assessment"
WC-AA-111, "Surveillance Program Requirements"
OP-AA-112-101, "Shift Turnover and Relief"
OP-AA-102-102, "General Area Checks and Operator Field Rounds"

- 3.) Verify that procedures are in place and training is current for actions to be taken if a tornado warning is issued for the area, such as:

- a. Warning and protection strategies for site personnel.

Quad Cities procedures QCOA 0010-10 Step D.6 and OP-AA-108-111-1001 Step 4.3.5 address this action.

- b. Strategies for prompt damage assessment and initiation of restorative actions (e.g., pre-staging of equipment and plant staff at safe, strategic locations to promptly implement any necessary mitigative actions).

Quad Cities procedures QCOA 0010-10 Step D.15, D.16, D.17 and OP-AA-108-111-1001 Step 4.3.10 address this action.

- 4.) Establish a heightened level of station awareness and preparedness relative to identified tornado missile vulnerabilities. This can be accomplished by including:

- a. A description of the nonconforming SSC(s) and the associated compensatory measures in the shift manager turnover notes.

Quad Cities currently implements this through Shift Manager Turnovers.

- b. Discussing these actions during shift turnover briefings.

Quad Cities currently implements this through Shift Manager Turnovers Checklists.

- c. Including the compensatory actions in the operability determination documentation maintained in the control room.

Compensatory actions are maintained in the Main Control Room.

6. Long-Term Compensatory Measures

As a long-term comprehensive compensatory measure, the following procedure was revised as described:

- a. QCOA 0010-10 has been revised to include the tank vents identified in IR 04110003. This procedure, previously in place, included guidance for cutting away any crimped piping.

This long-term comprehensive compensatory measure is in accordance with EGM 15-002 and Interim Staff Guidance DSS-ISG-2016-01, and will remain in-place until the non-conformance is resolved.

7. Assessment of Long-Term Compensatory Measure Coincident with Other Operator Actions

The above long-term compensatory measures established to address the non-conforming conditions and other expected operator actions in response to severe weather were collectively assessed. This assessment considered the timing and duration of the operator actions specified within the compensatory measures coincident with the other actions the operators may need to perform in response to a tornado event.

The compensatory measure incorporated in the revision to QCOA 0010-10 verifies that the vent lines for the EDG main fuel oil storage tanks are not crimped following high winds or a tornado event. If the vent lines are crimped, the procedure directs the station to immediately repair or remove the obstruction. These steps would be performed during the visual inspections of the EDG exhaust and intake that are already required by the procedure.

The guidance added to the basis documents for QCOA 0010-10 does not contain any additional operator actions.

The operator actions credited as long-term compensatory measures in the operating procedure revisions are limited and were determined to have minimal impact on other operator actions that may be needed.

A review of time-critical actions/time-sensitive actions (TCAs/TSAs) was also performed. TCAs/TSAs that occur outside of the control room and other field actions plausibly necessary concurrent with a high winds/tornado event involving missile strike(s) on the

equipment identified in IR 04110003 include station battery load stripping for station blackout events and cross-tying electrical buses as needed. No detrimental effects were identified. These items are trained on a recurring frequency. Operators are proficient with performing these tasks.

8. Site procedural guidance for the equipment non-conformances listed in Section 4 is described below:

Emergency Diesel Generator Support Systems Non-Conformance

The Unit 1, Unit 2 and Unit ½ Emergency Diesel Generator (EDG) intake and exhaust stacks, fuel oil tank vents, and day tank vents are unprotected from missile impact. Any of these lines becoming crimped could prevent functionality of the associated EDG.

Procedural Guidance:

Procedure QCOA 0010-10 directs the station to visually inspect the main fuel oil storage tanks vents, day tank vents, exhaust piping, and intake piping to assess for damage following a tornado event. In the unlikely event that a vent line is crimped, the procedure instructs the station immediately repair or remove the obstruction.

Additional Discussion

The operators maintain cognizance of the tornado-generated missile protection non-conformances by reviewing a report of plant non-conformances every shift, as required by site procedures.

Operator actions to address plant conditions resulting from the tornado-generated missile protection non-conformances are contained within plant operating procedures, as discussed above. Operator cognizance of these procedural actions is ensured via initial and continuing operator training, which includes reviews of procedural guidance for acts of nature.

QC is in compliance with NRC Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events. This Order directed licensees to develop and implement (FLEX) strategies and guidance to maintain or restore core cooling, containment cooling, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event in which ac power and normal access to the ultimate heat sink are lost. QC has implemented procedures which use equipment staged within a tornado missile protected building to respond to such an event. The FLEX procedures and equipment would be available to address plant conditions resulting from the tornado missile protection non-conformances, in addition to the operator actions described in the procedural guidance above.

9. Plans for Permanent Resolution

EGC will be submitting a License Amendment Request to incorporate the results of the TMRE analysis once the TMRE methodology is approved and finalized.

If the TMRE analysis methodology or results for QC are determined to be unacceptable, permanent resolution will be reevaluated.

10. Basis and Reason for Extension Request

In EGM 15-002 (Reference 2), the NRC provided guidance to exercise enforcement discretion when an operating power reactor licensee does not comply with a plant's current site-specific licensing basis for tornado-generated missile protection. The NRC would exercise this enforcement discretion only when a licensee implements initial compensatory measures to provide additional protection, followed by more comprehensive, long-term compensatory measures implemented within 60 days of issue discovery. The enforcement discretion would expire three years after issuance of RIS 2015-06, dated June 10, 2015, for plants of a higher tornado missile risk (Group A Plants), and five years after RIS issuance for plants of a lower tornado missile risk (Group B Plants). EGM 2015-002 identified QC as a plant of a higher tornado missile risk; therefore, its enforcement discretion would expire on June 10, 2018.

In Reference 4, the NRC issued Revision 1 of EGM 15-002, which stated that licensees may request an extension to their enforcement discretion expiration date if proper justification is provided. This extension would be granted on a case-by-case basis.

In accordance with the revised EGM 15-002, EGC is requesting an extension of the expiration date for enforcement discretion at QC from June 10, 2018 to June 10, 2020.

There is no undue risk associated with this requested extension of the enforcement discretion due date. The identified non-conformances involve limited exposure of equipment to tornado missiles, and, in many of the non-conformances, the equipment is partially protected. In addition, tornado missile scenarios generally do not represent a significant safety concern because their risk is bounded by the initiating event frequency.

A comprehensive assessment of the site regarding tornado missile protection against the current licensing basis has been completed, revealing the non-conformances discussed above. The compensatory actions implemented for the non-conformances are consistent with the guidance in EGM 15-002 and Interim Staff Guidance DSS-ISG-2016-01, and provide assurance that the consequences of the identified non-conformances are minimized until permanently resolved. Additionally, a collective review was performed to confirm that the site operators can perform the long-term compensatory measures coincident with other actions they may need to perform in a severe weather event without putting unnecessary burden on the operators. These compensatory measures would remain in-place throughout the period of extended enforcement discretion, until the non-conformances are resolved.

The TMRE methodology is being developed by the industry to evaluate tornado missile protection non-conforming conditions. LARs for implementation of the TMRE methodology at several pilot sites are being submitted, with NRC approval of the pilot site LARs not expected until 2018. Once the pilot site LARs have been approved, then other licensees with identified tornado missile protection non-conformances would submit LARs, based on the approved pilot LARs, for implementation of the TMRE methodology to address the non-conformances at their sites.

To address the tornado missile protection non-conformances identified at QC, EGC would need to perform a TMRE analysis for the non-conformances, and prepare and submit a LAR for use of the TMRE methodology to evaluate the non-conformances. The QC LAR would be submitted after the LARs for the pilot sites have been approved. If the TMRE analysis methodology or results for QC are determined to be unacceptable,

permanent resolution will be reevaluated. This would all need to be completed by the current enforcement discretion expiration date of June 10, 2018. Since NRC approvals of the pilot site LARs are not expected until sometime in 2018, EGC actions to resolve the non-conformances at QC cannot be reasonably implemented in an orderly and cost-effective manner in the time remaining under the existing enforcement discretion.

The requested enforcement discretion expiration date of June 10, 2020 would allow EGC sufficient time to resolve the tornado missile protection non-conformances and restore the site to compliance. EGC expects that the TMRE analysis will resolve all of the identified non-conformances at QC. The requested enforcement discretion expiration date of June 10, 2020 would provide sufficient time for EGC to perform a TMRE analysis for the non-conformances, and to submit a LAR for implementation of the TMRE methodology at QC. EGC has begun performing walkdowns in support of the TMRE analysis, and plans to submit the TMRE LAR in 2019, pending approval of the pilot plant TMRE LARs. If, while performing the TMRE analysis, EGC unexpectedly determines that not all of the non-conformances will be resolved by the TMRE analysis, EGC would have sufficient time before the requested enforcement discretion expiration date of June 10, 2020 to pursue the use of the TORMIS methodology and/or install plant modifications, as discussed above, to resolve the non-conformances.

If conditions arise such that achieving tornado missile protection compliance at QC within the requested extended period of enforcement discretion is not possible, the NRC would be promptly notified.

11. References

1. NRC Regulatory Issue Summary 2015-06, "Tornado Missile Protection," dated June 10, 2015 (ADAMS Accession Number ML15020A419)
2. NRC memorandum, Enforcement Guidance Memorandum 15-002, "Enforcement Discretion for Tornado Generated Missile Protection Non-Compliance," dated June 10, 2015 (ADAMS Accession Number ML15111A269)
3. NRC Interim Staff Guidance, DSS-ISG-2016-01, "Clarification of Licensee Actions in Receipt of Enforcement Discretion Per Enforcement Guidance Memorandum EGM 15-002, Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance," Revision 1, dated November 2017 (ADAMS Accession Number ML17128A344)
4. NRC memorandum, Enforcement Guidance Memorandum 15-002, Revision 1: "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance," dated February 7, 2017 (ADAMS Accession Number ML16355A286)