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0CAN031802

March 19, 2018

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

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 Issue Summary 2015-06, "Tornado Missile Protection"
Arkansas Nuclear One, Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

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

The NRC provided information in Enforcement Guidance Memorandum (EGM) 15-002 (Reference 2) with respect to exercising 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 discovery of a non-complying structure, system, or component (SSC). 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). The EGM categorized Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2), as Group A plants.

The NRC issued Revision 1 of EGM 15-002 (Reference 3) to provide guidance for a licensee to request an extension of the enforcement discretion expiration date, if appropriately justified. This extension would be granted on a case-by-case basis and should remain in place until compliance is achieved.

In accordance with EGM 15-002, Revision 1, Entergy Operations, Inc. (Entergy) hereby requests that the NRC extend the expiration date for the period of enforcement discretion for ANO-1 and ANO-2 from June 10, 2018 to June 10, 2020.

Entergy has completed a comprehensive assessment for ANO-1 and ANO-2, and has identified non-conforming conditions (NCCs) regarding tornado missile protection requirements that affect the operability of SSCs addressed in the ANO-1 and ANO-2 Technical Specifications (TSs). A summary of the assessment methodology, scope, and results is provided in the attachment to this letter. The non-conforming conditions have been documented in the Entergy corrective action program in accordance with Entergy procedures and all required notifications have been completed, as discussed in the attachment.

Consistent with the guidance provided in NRC Interim Staff Guidance DSS-ISG-2016-01 (Reference 4), initial and comprehensive compensatory measures have been implemented for the ANO-1 and ANO-2 NCCs, as described in the attachment. Additionally, a collective review of all compensatory measures currently in place, including expected operator actions in response to severe weather and a subsequent loss of offsite power, has been performed to confirm that the site can perform these compensatory measures and operator actions in an effective manner. These compensatory measures will remain in-place until the non-conformances are resolved.

The requested enforcement discretion due date extension would provide Entergy sufficient time to address the non-conforming conditions and achieve compliance. Entergy has concluded that there is no undue risk associated with the requested extension.

Entergy requests approval of this request to extend the expiration date of the enforcement discretion by June 9, 2018.

If there are any questions or if additional information is needed, please contact me.

Sincerely,

ORIGINAL SIGNED BY STEPHENIE L. PYLE

SLP/dbb

REFERENCES:

1. NRC Regulatory Issue Summary 2015-06, *Tornado Missile Protection*, dated June 10, 2015 (ML15020A419)

2. NRC memorandum, *Enforcement Guidance Memorandum 15-002, Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance*, dated June 10, 2015 (ML15111A269)

3. NRC memorandum, *Enforcement Guidance Memorandum 15-002, Revision 1: Enforcement Discretion for Tornado-Generated Missile Protection Non-Compliance*, dated February 7, 2017 (ML16355A286)

4. NRC Interim Staff Guidance DSS-ISG-2016-01, Revision 1, *Clarification of Licensee Actions in Receipt of Enforcement Discretion Per Enforcement Guidance Memorandum EGM 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance,"* dated November 2017 (ML17128A344)

Attachment: Justification for Request to Extend the Expiration Date for Enforcement Discretion Regarding Tornado Missile Protection Requirements for the Arkansas Nuclear One, Units 1 and 2

cc: Mr. Kriss M. Kennedy
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Attachment to

0CAN031802

Justification for Request to Extend the Expiration Date for Enforcement Discretion Regarding Tornado Missile Protection Requirements for the Arkansas Nuclear One, Units 1 and 2

Justification for Request to Extend the Expiration Date for Enforcement Discretion Regarding Tornado Missile Protection Requirements for the Arkansas Nuclear One, Units 1 and 2

1. INTRODUCTION

The information herein provides the justification for the Entergy Operations, Inc. (Entergy) request to extend the expiration date for enforcement discretion regarding tornado missile protection requirements for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2).

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

The NRC provided information in Enforcement Guidance Memorandum (EGM) 15-002, *Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance,* (Reference 2) with respect to exercising 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. EGM 15-002 identified ANO as a higher tornado missile risk site (Group A), resulting in an enforcement discretion expiration date of June 10, 2018.

Entergy has completed a comprehensive tornado missile protection assessment for ANO-1 and ANO-2 which identified non-conforming conditions regarding tornado missile protection requirements. Entergy is requesting an extension to the enforcement discretion expiration date to allow sufficient time to address the non-conforming conditions.

Entergy plans to submit a license amendment request (LAR) for NRC approval for the use of the Tornado Missile Risk Evaluator (TMRE) methodology for evaluating some of the identified non-conformances. An industry initiative to develop TMRE is currently in progress with three pilot plant LARs under NRC review. Plant modifications will be performed for the remaining non-conforming structures, systems, or components (SSCs).

This request to extend enforcement discretion was prepared in accordance with guidance in Appendix B of Interim Staff Guidance DSS-ISG-2016-01, Revision 1, *Clarification of Licensee Actions in Receipt of Enforcement Discretion Per Enforcement Guidance Memorandum EGM 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance,* (Reference 4).

2. RIS 2015-016 ASSESSMENT METHODOLOGY

The methodology followed in response to RIS 2015-06 includes the following three objectives:

(1) Document the ANO-1 and ANO-2 current licensing basis (CLB) for tornados and tornado missile protection,

(2) Evaluate the site's conformance with the tornado missile protection CLB through a design review and plant walkdowns, and document any non-conforming conditions, and

(3) Resolve the non-conforming conditions within the Entergy corrective action program.

3. SUMMARY OF CLB FOR TORNADO MISSILE PROTECTION

The ANO-1 CLB for tornado and tornado missile protection pertinent to the RIS 2015-06 assessment is described in Amendment 28 of the ANO-1 Safety Analysis Report (SAR), Sections 2.3.3.3.4, *Tornados*, 5.1.3.1, *Seismic Class 1 Structures Design (Excluding Reactor Building)*, 5.1.5, *Wind and Tornado Loads*, and 5.2, *Reactor Building*. The ANO-1 construction permit was issued in December 1968. ANO was aware of the proposed Atomic Energy Commission (AEC) General Design Criteria (GDC); however, ANO received the construction permit prior to issuance of the GDC. Although ANO-1 was not governed by the GDC, ANO-1 SAR, Section 1.4.2, includes a discussion of how ANO-1 meets the intent of GDC 2.

The ANO-2 CLB for tornado and tornado missile protection pertinent to the RIS 2015-06 assessment is described in Amendment 27 of the ANO-2 SAR, Sections 2.3.1.3.5, *Tornados*, 3.3.2, *Tornado Loadings*, and 3.5.2.4, *Tornado Generated Missiles*, and 3.5.3.3, *Tornado Missiles*. ANO-2 was originally designed to comply with the 70 "Proposed General Design Criteria for Nuclear Power Plant Construction Permits," published in July 1967. Nevertheless, Sections 3.1.1 through 3.1.6 of the ANO-2 SAR provide a comparison with the AEC GDC published as Appendix A to 10 CFR 50 in 1971, illustrating how the intent of each GDC (as published in 1971) is met.

ANO-1 CLB for Tornado and Tornado Missile Protection Design

Per the ANO-1 SAR, Section 5.1.2.1, Seismic Class 1 SSCs are defined as those which could cause uncontrolled release of radioactivity upon failure or those essential for safe shutdown of the nuclear steam supply system and long-term operation following a loss of coolant accident (LOCA). These structures include the Reactor Building, the Auxiliary Building (housing engineered safeguards systems, Control Room, spent fuel pool (SFP), emergency diesel generators (EDGs), and radioactive materials), portions of the Intake Structure (housing Service Water pumps and support features), the emergency diesel fuel oil storage vault, and the post-accident sampling system building. As discussed in SAR Section 5.1.5, Class 1 structures were analyzed for tornado loading (not coincident with accident or earthquake) on the following basis:

- Differential bursting pressure between the inside and outside of the structures is three psi positive pressure.

- Lateral force on the structures is assumed as the force caused by a tornado funnel having a peripheral tangential velocity of 300 miles per hour (MPH) and a forward progression of 60 mph. The tornado resistant design of the ANO units was completed prior to the issuance of Regulatory Guide 1.76, “Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants.” As a result, the radius of maximum rotational speed is not significant to the ANO design, and Class 1 structures were designed considering a uniform pressure resulting from the 300 mph wind velocity. The applicable portions of wind design methods described in American Society of Civil Engineers (ASCE) Paper 3269, “Wind Forces on Structures,” were used, particularly for shape factors. The provisions for gust factors and variations of wind velocity with height do not apply.

Components in Class 1 buildings, such as, penetrations, locks, doors, large openings, SFP, EDG rooms, etc., are inherently tornado protected by virtue of being housed in tornado resistant structures. The SFP walls are inherently resistant to missiles. The main steam line and containment purge line reactor building penetrations are not located within a tornado resistant structure or protected by a missile shield. In accordance with the SAR, these penetrations will withstand tornado winds and pressure drop loadings, and it is considered highly improbable that these penetrations will be pierced by tornado missiles. Further analysis also indicates that, in the unlikely event these penetrations are impinged by tornado missiles, the incident will not cause a LOCA or prevent a safe shutdown of the plant.

Per Section 5.1.5 of the ANO-1 SAR, Class 1 structures were designed, except as noted below, for the following CLB tornado missiles:

- A 4-inch thick by 12-inch wide by 12-foot long wood plank traveling end-on at a velocity of 300 mph.
- An airborne 4,000-pound passenger automobile traveling at a velocity of 50 mph, not more than 25 feet above the ground.
- A 3-inch diameter schedule 40 pipe, 10 feet long, traveling end-on at 100 mph, sticking anywhere over the full height of the structure was also considered.

The possibility of the generation of secondary missiles within structures from tornado missiles was analyzed. The 3-inch diameter pipe, as described above, was considered as potentially damaging due to its high density. However, based on results of U.S. Army Corps of Engineers investigation, only 13 inches of concrete thickness is required to prevent spalling of 3,000 psi concrete from an impact by the 3-inch diameter pipe missile. Since 18 inches is the minimum exterior wall and slab thickness provided for Class 1 structures, the safety related equipment and systems will not be affected by secondary missiles.

Vertical missiles are not considered in the CLB.

ANO-2 CLB for Tornado and Tornado Missile Protection Design

Per Section 3.3, *Wind and Tornado Loadings*, of the ANO-2 SAR, Class 1 structures were designed for the most severe local wind phenomena and tornado effects which can be expected to occur at the site. These structures include: the Containment Building, the Auxiliary Building, the SFP wall, the EDG rooms within the Auxiliary Building, the diesel fuel oil underground vault, and the Intake Structure.

As reflected in Section 3.3.2, *Tornado Loadings*, of the ANO-2 SAR, tornado-protected Class 1 structures were analyzed for tornado loadings not coincident with any unrelated accident condition or earthquake. For Class 1 structures designed to withstand tornadoes and tornado generated missiles, the following parameters were applied in combinations to produce the most critical conditions.

- The dynamic wind pressure is caused by a tornado funnel having a peripheral tangential velocity of 300 mph and a forward procession of 60 mph. The tornado resistant design of the ANO units was completed prior to the issuance of Regulatory Guide (RG) 1.7.6, *Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants*. As a result, the radius of maximum rotational speed is not significant to the ANO design, and Class 1

structures were designed considering a uniform pressure resulting from the 300 mph wind velocity. The applicable portions of wind design methods described in ASCE Paper No. 3269 were used, particularly for shape factors. The provisions for gust factors and variation of wind velocity with height were not applied.

- The structure interior bursting pressure is taken as rising 1 psi/sec for three seconds followed by a 2-second calm, then decreasing at 1 psi/sec for three seconds. This cycle accounted for reduced pressure in the eye of a passing tornado. All fully enclosed Class 1 structures were designed to withstand the full 3 psi pressure differential.

Tornado-generated missiles will not cause loss of containment integrity, penetrate the Control Room boundary, or cause loss of integrity to the SFP. SSCs were designed such that tornado missiles will not cause loss of function to any system required for hot shutdown of the reactor from the Control Room even assuming the failure of a single active component, and will not cause loss of function of any system required for cold shutdown.

Section 3.3.2.1 of the ANO-2 SAR considers three types of tornado missiles. Each type was considered to act independently, with only one type occurring at any one time. The three types of missiles are as follows:

- A wood plank, 4-inches x 12-inches in cross section, weighing 108 pounds, traveling end-on at a speed of 300 mph and striking the structures at any elevation.
- A steel pipe, schedule 40, 3-inches in diameter x 10-feet long, weighing 75.8 pounds, traveling end-on at 100 mph and striking the structure at any elevation.
- An automobile of 4,000-pound weight, striking the structure at 50 mph on a contact area of 20 square feet, any portion of the impact area being not more than 25 feet above grade.

Section 3.3.2.3 of the ANO-2 SAR states that failure of Class 2 structures is not expected to affect the ability of Class 1 structure to perform their functions based on the following:

- Tornado missiles that may be formed by the failure of Class 2 structures will not exceed the force of those postulated and described above, against which Class 1 structures were designed.

- An investigation of the structural frame of the Class 2 Turbine Building in the vicinity of the Auxiliary Building revealed the Turbine Building will not collapse when subjected to tornado loadings, assuming that one-third of the exterior metal siding would be exposed to the full tornado load. The structural steel framing enclosing the Auxiliary Building SFP area has also been checked for the same conditions, with the same results. This condition is commonly observed in tornado damage. The fasteners are known to be much weaker in shear and in pull out than the continuous sheet acting as a catenary. Therefore, in the event of a tornado, the fasteners on the two ends of the sheet can be expected to fail and the sheathing assumed to remain balanced and restrained by the central portion of the panel against the girts.

Missile barriers capable of withstanding tornado-generated missiles and designed to provide protection from identified missiles are outlined below (Reference ANO-2 SAR, Table 3.5-1).

Protected Components	**Missile Barrier**
Reactor Coolant System (RCS) and other protected equipment and systems inside containment	Prestressed concrete containment, primary and secondary shields, reinforced concrete and refueling cavity wall, internal structures and beams, movable missile shield
Control Room Components	Enclosure by reinforced concrete Auxiliary Building walls and slabs
Safety injection, spray, boron addition, cooling water, ventilation, electrical instrumentation and control and other protected equipment in Auxiliary Building	Reinforced concrete Auxiliary Building. Separation of safety-related trains and enclosure by Auxiliary Building internal structure, walls and slabs.
Spent Fuel Pool	SFP wall. Heavy structural Auxiliary Building components are designed such that missile impact will not cause them to fall into the SFP.
Emergency Diesel Generators	Separation and enclosure by reinforced concrete Auxiliary Building walls and slabs.
Diesel Fuel Oil System	Separation and enclosure by reinforced concrete vault partially underground.
Service Water Pumps	Separation and enclosure by reinforced concrete intake structure walls and slabs.
Auxiliary Feedwater Pumps	Separation and enclosure by reinforced concrete Auxiliary Building walls and slabs
Category 1 Electrical Cables	Reinforced concrete cover
Condensate Storage Tank (T41B) Pipe Trenches and Valve Pits	Reinforced concrete cover
Condensate Storage Tank T41B	Reinforce concrete wall

Protection from tornado-generated horizontal and vertical missiles was considered for the following components: Intake Structure Exhaust Fans and Air Intake, EDG Rooms Air Intake and Exhaust Fans, EDG Combustion Air Intake, Service Water Piping Between Emergency Cooling Pond (ECP) and Intake Structure / Auxiliary Building (3-feet of earth), ECP Sluice Gate, and EDG Fuel Storage Tanks. Otherwise, only horizontal missiles were considered.

4. RIS 2015-06 ASSESSMENT SCOPE AND RESULTS (Non-Conformances – DSS-ISG-2016-01, Appendix B, Item 1.a)

The assessment completed reviews and walk downs for ANO-1 and ANO-2 Class 1 structures, which were designed to withstand the tornado missiles specified in the CLB. Note that it is unclear whether a single tornado missile or multiple missiles were assumed during the original design phase of either ANO unit. Therefore, multiple missiles were conservatively assumed to be present when assessing tornado missile vulnerabilities with respect to RIS 2015-06.

The non-conforming conditions, and affected systems, identified during the design reviews and walkdowns which required application of EGM 15-002 (Reference 2) were documented in the following condition reports (CRs) within the corrective action program:

- CR-ANO-1-2016-1788 – ANO-1 Upper South Electrical Penetration Room

  Tornado missile vulnerability was identified for Door 77 and some of the safety-related SSCs in the ANO-1 Upper South Electrical Penetration Room. Specifically, there is a potential deficiency associated with the missile shield wall inside this room. A horizontal tornado generated missile could penetrate the hollow metal door and then penetrate the unqualified concrete masonry unit wall before striking safety-related cables. The cable supplying the following components could be impacted by a tornado missile:

  - Reactor Protection System (RPS) Channel C (hot leg temperature from RCS Loop B and the power range nuclear instrument).
  - Engineered Safeguards Actuation System (ESAS) Analog Channel 3: (Reactor Building pressure signal and RCS Loop B Loop pressure signal).
  - Emergency Feedwater Initiation and Control (EFIC) Channel C (low and high range Steam Generator (SG) level and pressure signals from each of the two SGs).
  - Main Steam Isolation Valves (MSIVs).

  Modifications have been completed; extension of enforcement discretion is not needed.

- CR-ANO-1-2016-2514 – Components on Both ANO-1 Safety-Related Trains

  A tornado could generate multiple missiles capable of striking the ANO-1 Cable Spreading Room and rendering certain components on both safety-related trains inoperable.

  Modifications have been completed; extension of enforcement discretion not needed.

- CR-ANO-1-2016-2752 – Safety-Related Electrical Raceways

  Design vulnerability was identified for postulated tornado missiles entering the ANO-1 Controlled Access area from the Turbine Building by penetrating block walls and hollow metal doors, and striking safety-related cables. In addition to impacting several safety-related green train electrical raceways, a tornado could generate multiple missiles capable of rendering both safety-related Emergency Feedwater (EFW) trains inoperable.

- CR-ANO-1-2016-2804 – Both Safety-Related ANO-1 AC Electrical Trains

  Design vulnerability was identified for postulated tornado missiles entering ANO-1 Rooms 99 and 100 from the Turbine Building and striking vital switchgear in the rooms. A tornado could generate multiple missiles capable of striking vital ANO-1 electrical distribution equipment and rendering both safety-related AC electrical trains inoperable.

  Modifications have been completed; extension of enforcement discretion is not needed.

- CR-ANO-1-2017-1171 – Components on Both ANO-1 Safety-Related Trains
  (CR was closed to roll-up CR-ANO-C-2017-3755)

  Design vulnerability was identified for postulated tornado missiles entering ANO-1 Rooms 73 and 104 from the Turbine Building and striking vital conduits and cable trays in the rooms. A tornado could generate multiple missiles capable of striking vital ANO-1 electrical equipment and rendering certain components on both safety-related trains inoperable.

- CR-ANO-2-2017-1555 – ANO-2 #1 Emergency Diesel Generator
  (CR was closed to roll-up CR-ANO-C-2017-3755)

  A tornado-generated missile vulnerability associated with a conduit in the ANO-2 Fire Brigade Area of the ANO-2 Auxiliary Building was identified. A western bound missile could strike the conduit in the Fire Brigade area above the ceiling tiles. The conduit contains cables for instruments, controls, and interlocks for the #1 EDG.

5. INITIAL ACTIONS (DSS-ISG-2016-01, Appendix B, Item 1.b)

The following initial compensatory measures were taken in response to the identified non-conforming conditions:

a. The non-conforming conditions were reported as follows:

- CR-ANO-1-2016-1788 – no immediate reportability was required.

  The event was reported pursuant to:

  10 CFR 50.73(a)(2)(i)(B): *Any operation or condition which was prohibited by the plant's Technical Specifications*.

  The NRC resident inspector was also notified.

- CR-ANO-1-2016-2514 (EN # 52195)

  The event was an 8-hour report pursuant to:

  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)(A) *Shut down the reactor and maintain it in a safe shutdown condition.*

  10 CFR 50.72(b)(3)(v)(B) *Remove residual heat.*

  10 CFR 50.72(b)(3)(v)(D) *Mitigate the consequences of an accident.*

  The NRC resident inspector was also notified.

- CR-ANO-1-2016-2752 (EN #52234)

  The event was reported pursuant to:

  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)(B) *Remove residual heat*.

  10 CFR 50.72(b)(3)(v)(D) *Mitigate the consequences of an accident*.

  The NRC resident inspector was also notified.

- CR-ANO-1-2016-2804 (EN # 52242)

  The event was reported pursuant to:

  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)(A) *Shut down the reactor and maintain it in a safe shutdown condition*.

  10 CFR 50.72(b)(3)(v)(B) *Remove residual heat*.

  10 CFR 50.72(b)(3)(v)(D) *Mitigate the consequences of an accident*.

  The NRC resident inspector was also notified.

- CR-ANO-1-2017-1171 – no immediate reportability was required.

  The event was reported pursuant to:

  10 CFR 50.73(a)(2)(i)(B): *Any operation or condition which was prohibited by the plant's Technical Specifications*.

  The NRC resident inspector was also notified.

- CR-ANO-2-2017-1555 – no immediate reportability was required.

  The event was reported pursuant to:

  10 CFR 50.73(a)(2)(i)(B): *Any operation or condition which was prohibited by the plant's Technical Specifications*.

  10 CFR 50.73(a)(2)(ii)(B) *The nuclear power plant being in an unanalyzed condition that significantly degrades plant safety*.

  10 CFR 50.73(a)(2)(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 declared inoperable. Guidance in Revision 1 of EGM 15-002 (Reference 2) was used to declare the equipment operable but non-conforming, and for application of enforcement discretion.

c. To address the appropriate compensatory actions for identified tornado-missile vulnerabilities above, ANO developed COPD-038, "Implementation of Enforcement Discretion," which provides administrative guidance for application of EGM 15-002 (Reference 2). In accordance with the guidance the following steps were completed for the identified vulnerabilities

- The status of the affected TS components was documented in the Station Log noting that the component was declared inoperable due to tornado-generated missile protection non-compliance and that COPD-038 was being implemented to allow the use of EGM 15-002.

- Similar or redundant components (i.e., Counterpart Equipment) required for safe shutdown that perform the same function as the affected component (i.e., the component that has been identified as being vulnerable to tornado-generated missiles) were identified and designated to be treated as protected during severe weather events. A list of equipment that could potentially be lost due to a tornado missile vulnerability, along with a list of corresponding Counterpart Equipment, was added to COPD-038. This provides Operations a single location for assessing potential impacts and developing strategies based on current plant configuration when severe weather is predicted.

- Diverse and Flexible Coping Strategies (FLEX) equipment that could be used to fulfill the function of the affected component was identified.

- Potential missile hazards in the vicinity of the actual physical location subject to the missile hazard (i.e., Impact Zone) and in the vicinity of the Counterpart Equipment were removed or secured, as necessary.

- Affected areas were assessed to determine where compensatory measures, if any, could be employed to reduce effects of the identified tornado missile hazard.

- Counterpart and FLEX equipment identified were verified to be ready for use by verifying surveillances and preventive maintenance activities were current. In addition, a review of pending maintenance requests was performed to verify no challenges exist to the equipment's capability of fulfilling its function.

- Reviews of the appropriate sections of the unit specific Natural Emergency procedures were performed to ensure the associated actions could be implemented based on the affected components.

- The NRC resident inspector and the ANO operating crews were briefed with respect to the equipment that could potentially be affected during a site tornado event and the compensatory actions identified to both minimize the potential for tornado missiles during severe weather and to mitigate the consequences of potential tornado missiles.

- Changes were made to the unit specific Natural Emergencies Abnormal Operation Procedures (AOPs) OP-1203.025 and OP-2203.008 (ANO-1 and ANO-2, respectively) to direct the review of COPD-038 in the event of severe weather, including tornado watches and tornado warnings.

d. Licensee Event Reports (LERs) 50-313/2016-002-00, 50-313/2016-003-00, 50-313/2016-003-01, and 50-368/2017-001-00 (References 5, 6, 7, and 8, respectively) were submitted in accordance with 10 CFR 50.73 due to Technical Specification-required equipment that did not meet CLB requirements for protection from tornado missiles.

6. LONG TERM COMPENSATORY MEASURES (DSS-ISG-2016-01, Appendix A, Items 3.a and 3.b, and Appendix B, Item 1.c)

As long-term comprehensive compensatory measures, OP-1203.025, OP-2203.008, and COPD-038 were further revised to address tornado missile vulnerabilities identified at ANO.

When severe weather conditions, including possible tornados, are predicted within the next 72 hours by the National Weather Service for the four-county area (Pope, Yell, Logan or Johnson counties), the Natural Emergencies AOPs are entered.

In the event of a tornado watch or warning, the AOPs include steps to notify plant personnel to seek a designated tornado shelter or sheltered area immediately. The AOPs also include steps to stop switchyard or transformer maintenance activities. If fuel handling activities are in progress in the SFP area, any fuel assembly in transit is placed in a safe configuration and the fuel handling machine is parked and de-energized. Cranes are parked and secured in position. The Diesel Oil Storage Tank (T-25) is isolated from the EDG Fuel Oil Storage Tanks.

The AOPs direct Operations personnel to refer to Attachment 1, *Identified Tornado Missile Vulnerabilities*, of COPD-038. Steps in the AOPs require inspections of the affected equipment that is identified in COPD-038 to ensure any missile hazards are either removed or secured. In addition, where Counterpart Equipment (similar or redundant components which may be required for safe shutdown that perform the same function as the affected component) has been identified, any missile hazards in the associated vicinities are removed or secured. If a missile hazard cannot be resolved by Operations that might impact the affected equipment, the hazard, location and issue is identified with an individual or group assigned to resolve the concern. The AOPs also direct walk-downs of other areas of the site. If a tornado watch is in effect, identified issues are resolved in a timely manner either by Operations or with maintenance coordination.

The AOPs also direct, where possible, restoration of equipment that is out of service to normal configuration within 24-hours of predicted severe weather. Within 24-hours of predicted severe weather, work is prohibited that would remove Counterpart Equipment from service. Such equipment is visually inspected, with verification that surveillances (where applicable) are current and preventive maintenance is up-to-date. If there are out of service or degraded tornado missile barriers or features, compensatory actions are initiated as needed where reasonably feasible.

Onsite power via at least one EDG is verified to be available (note that EDGs are maintained in automatic standby and not permitted to be tied to a bus when severe weather is approaching). The AOP also directs a risk evaluation that considers the reliability of offsite power supplies, which may result in the need for additional compensatory measures or removing the unit from service.

Maintenance and testing of safety system actuation systems is discontinued unless otherwise directed by the Shift Manager. Any equipment that is necessary for compensatory actions to be satisfied based on current plant configuration is staged in areas protected from exposure to the tornado event that is promptly accessible. FLEX equipment is also protected.

Risk is reduced by defining specific actions to be taken during severe weather and subsequent to a tornado strike. The specific actions include restoration of out of service equipment and prohibiting work on equipment associated with identified Counterpart Equipment. As stated previously, the affected equipment and Counterpart Equipment listings provided in COPD-038 permit site personnel to promptly prepare for severe weather based on the plant configuration at the time of the event.

COPD-038 and unit specific procedures, along with training and/or crew briefings, permit the identification of potential additional actions that may be required in response to a severe weather event. These tools are judged to be both risk beneficial and acceptable until the identified tornado missile vulnerabilities are permanently resolved. The revised procedures are easily/promptly accessible by the Operations staff.

These long-term compensatory measures are considered appropriate in meeting the intent of EGM 15-002 (Reference 2) and Interim Staff Guidance DSS ISG 2016-01 (Reference 4), and will remain in-place until the non-conformances are resolved.

7. ASSESSMENT OF COMPENSATORY MEASURES COINCIDENT WITH OTHER OPERATOR ACTIONS (DSS-ISG-2016-01, Appendix B, Item 1.d)

The aforementioned long-term compensatory measures and other expected operator actions in response to severe weather, assuming a coincident loss of off-site power (LOOP) as a result of the severe weather, were collectively assessed. The assessment concluded that the implemented long-term compensatory measures coincident with other required actions in a severe weather LOOP event can be completed without placing unnecessary burden on the station Operators.

As discussed previously, COPD-038 contains a listing of important equipment that could potentially be affected by one or more tornado missiles, along with a listing of associated Counterpart Equipment which, if available, could be used in place of equipment that could be rendered unavailable. However, the majority of the listed equipment is not required to ensure safe shutdown or maintenance of Mode 3 conditions in response to a tornado with LOOP event.

There are four tornado missile vulnerable areas identified which currently require application of the EGM 15-002 enforcement discretion. Three areas are associated with ANO-1. Two of these three areas, the Lower South Electrical Equipment Room and the ground-level access way referred to as the “Bowling Alley,” are planned to be shown as acceptable without future modification through application of the current industry Tornado Missile Risk Evaluator (TRME) initiative. This is discussed further in Section 9 below.

The third ANO-1 area, the Controlled Assess Point (commonly referred to as CA-1), is currently in the process of being modified to eliminate the identified tornado missile vulnerability, except for three small ventilation duct openings (which are planned to be resolved under the future TMRE application discussed in Section 9 of this letter). However, this modification is extensive and not expected to complete prior to expiration of the current enforcement discretion provided by EGM 15-002. Therefore, the assessment of affected equipment and associated compensatory measures in this area is also included below.

The single tornado missile vulnerability associated with ANO-2 involves a conduit in the Fire Brigade Area of the ANO-2 Auxiliary Building. A western bound missile could strike the conduit in the Fire Brigade area above the ceiling tiles, which contains cables for instruments, controls, and interlocks for the #1 EDG. This non-conformance is also planned to be shown as acceptable without future modification as part of the application of the TMRE, as discussed further in Section 9 below.

ANO-1 Tornado Missile Vulnerabilities

Because the three relevant areas are physically separated (different elevations), each is discussed below individually, assuming multiple tornado missiles impacted only one of the three areas during any single tornado event. Following these individual area assessments, a final conservative assessment has been performed (and also described below) assuming all three areas are impacted by tornado missiles during a single tornado event. Again, only that equipment and associated compensatory measures that may be needed for safe shutdown and maintenance of Mode 3 conditions are discussed in each case. A full listing of all other potentially impacted equipment important to safety is contained in COPD-038.

Any additional equipment that may be necessary to support a plant cooldown to Mode 5 is not discussed below, since a cooldown should not be required solely due to a tornado plus LOOP event. In addition, because Mode 3 conditions can be safely maintained, sufficient time is available to restore affected cooldown-related equipment, if any, prior to cooling down to Mode 5. Note that the ANO-1 TSs generally permit at least 30 hours to reach Mode 5 conditions from a Mode 3 condition. In addition, depending on the severity of the event, a TS requirement to reach Mode 5 may be delayed, if necessary, in accordance with 10 CFR 50.54(x).

ANO-1 has two independent and redundant trains of safety related equipment, commonly referred to as the Red and Green trains. Following a significant tornado event with coincident LOOP, EFW is the preferred method for ensured safe shutdown and maintenance of Mode 3 conditions. ANO-1 has two 100% capacity EFW pumps, one AC motor-driven (Red train) and one DC-powered steam-driven pump (Green train). The two EFW trains normally take suction from a qualified condensate storage tank (QCST) and deliver water to each of the two SGs. The SGs are fed and steamed to provide the primary method of decay heat removal. Because the steam-driven EFW train is DC-powered and battery backed, this train remains available even upon loss of all offsite and onsite AC power.

The QCST is partially protected from tornado missiles, providing a 30-minute water supply to the EFW pumps. Assuming tornado missiles have damaged the non-protected portion of the QCST, the suction of one or both EFW pumps must be manually transferred to the Service Water system prior to the 30-minute QCST supply being exhausted. This manual operator action is currently part of the ANO-1 licensing basis and is not a new operator action resulting from this assessment of enforcement discretion acceptability.

An RCS makeup source will eventually be required, but is not expect to be immediately critical, assuming a cooldown beyond Mode 3 conditions is not initiated. ANO-1 has three RCS makeup pumps, also referred to as High Pressure Injection (HPI) pumps, one for each safety train and a swing pump.

Assuming an EFW pump remains available, a Service Water (SW) pump/loop will also be required soon after the event. ANO-1 has three SW pumps, one for each safety train and a swing pump, located in a tornado protected Intake Structure. SW will be required at the 30-minute point as described above, assuming the QCST has been impacted by tornado missiles at the lowest unprotected level.

A SW loop is also required to support operation of the respective EDG. The EDG will be required to power a SW and HPI pump. If the Green train steam-driven EFW pump is in service, the EDG should not be required until SW is needed, 30 minutes post-event (again, assuming worst-case QCST tornado missile impact and loss of non-safety related feedwater sources). During normal event response, both EDGs will automatically start and connect to the respective vital buses, and both SW loops will automatically return to service, immediately following a LOOP event.

At a minimum, a significant tornado event would result in an Alert declaration, which fully staffs the Emergency Response Organization. While such staffing is not credited for the first 30 minutes post-event, the additional staffing will enable prompt recovery efforts of equipment, prioritized based on the unit needs at the time. Any manual actions required within the first 30 minutes of an event are considered in this post-event assessment supporting an extension of enforcement discretion.

While it is impossible to ascertain the magnitude of unprotected non-vital equipment loss following a significant tornado event, in general the following assessment assumes this equipment is not readily available absent any recovery efforts, unless otherwise stated. For example, ANO has an Alternate AC Diesel Generator (AACDG), commonly referred to as a station blackout diesel generator, which is capable of supplying both units; however, it is conservatively assumed that the AACDG will not be readily available post-event. Likewise, non-safety related feedwater sources are also assumed to be unavailable absent any recovery effort.

Lower South Electrical Equipment Room

Tornado missiles affecting this room (Room 104) could render equipment unavailable, all of which is associated with the Red safety train. Because only one train is impacted, redundant equipment may be relied upon to ensure safe shutdown and maintenance of Mode 3 conditions. As discussed previously, procedures act to protect (or restore, if necessary) any Counterpart Equipment that could be necessary to support safe shutdown and maintenance of Mode 3 conditions before a severe weather event impacts the site. Based on the describe measures in place, no specific compensatory measure has been pre-identified for this area. Nevertheless, procedures require establishing compensatory measures, when necessary, based on the plant configuration that exists at the time of the predicted severe weather.

Bowling Alley

This area contains both Red and Green train cabling, although with some separation.

The SW suction supply to the Green train steam-driven EFW pump could be lost such that local operation of the SW valves may be required. The valve(s) are physically located in the Auxiliary Building and protected from tornado events. However, the current ANO licensing basis assumes potential local-manual operation of this SW source, which is considered a Time Critical Operator Action (TCOA). This action is contained in procedure OP-1015.050, "Time Critical Operator Actions Program."

Assuming all cabling is impacted, the Green train SW pump could be disabled along with one or more SW loop cross-tie valves which are physically located (and protected from tornado events) in the Intake Structure. This could require an Operator to manually manipulate one of the four cross-tie valves locally (at the Intake Structure) in order to separate the Red train SW loop from the Green train loop which was lost. The ANO-1 operating staff maintains three non-licensed Operators, two licensed Reactor Operators (ROs), two licensed Senior Reactor Operators (SROs), and a Shift Technical Assistant (STA). One non-license Operator is currently assumed to be available to align SW suction to any required EFW pump suction. One of the remaining two non-licensed operators would be available, if needed, to manipulate a SW cross-tie valve at the Intake Structure. It is qualitatively estimated that this evolution would take approximately 20-25 minutes, accounting for identification of the need for the action, transit time, and valve manipulation time. Operator cues are supported by low SW pressure indications (assuming only one pump is supplying both loops if the loops are cross-tied) and the listing of these valves as potentially impacted in COPD-038. With Operations referring to COPD-038 pre-event, the operating crew will already be alerted for a potential loss of the cross-tie valves. Since it is unlikely that all four SW cross-tie cabling would be impacted, loop separation can be completed from the Control Room with no local action required. Therefore, this action is not included in OP-1015.050 (i.e., only one valve needs to remain available in order to separate loops from the Control Room).

While the closing of a SW cross-tie valve will separate the SW loops, if the swing SW pump is the only pump available post-event, it may also be necessary to manually close the SW supply valve to the Auxiliary Cooling Water (ACW) system. This valve is also located at the Intake Structure and can be closed by the same operator manipulating the subject SW cross-tie. Isolating ACW will ensure no SW pressure losses to this non-safety related portion of the system. Again, this valve is denoted in COPD-038 for the affected Bowling Alley area.

CA-1

As stated previously, this area is in the process of being modified. Identified non-grouted walls have now been grouted. The design phase of the overall modification has been completed and the installation phase has been initiated. However, a large number of core drills are required to install protective plating which will resolve the non-conforming condition. Due to the sensitivity of the area, upcoming refueling outages, and other unforeseen circumstances that could arise during the installation phase, the modifications are not expected to complete until the fall of 2018. Therefore, this area is assessed as if it remains vulnerable to tornado missiles beyond the enforcement discretion period currently allowed by EGM 15-002.

Tornado missiles affecting this area could render equipment unavailable, all of which is associated with the Green safety train (with the exception of one safety-related, but non-essential instrument). Because only one train is impacted, redundant equipment may be relied upon to ensure safe shutdown and maintenance of Mode 3 conditions. As discussed previously, procedures act to protect (or restore, if necessary) any Counterpart Equipment that could be necessary to support safe shutdown and maintenance of Mode 3 conditions before a severe weather event impacts the site. Based on the describe measures in place, no specific compensatory measure has been pre-identified for this area. Nevertheless, procedures require establishing compensatory measures, when necessary, based on the plant configuration that exists at the time of the predicted severe weather.

Combined Bowling Alley and Lower South Electrical Equipment Room Impact Assessment

The actions discussed under the "Bowling Alley" subsection above remain relevant for this combined assessment. In addition to the Bowling Alley actions, the swing SW pump may need to be transferred to Green train SW loop (Loop II), since both the Green train SW pump and the Red train EDG could become unavailable. This is easily performed from the Control Room. Procedures governing a loss of SW direct this action which can be completed well in advance of the potential need to align SW to the appropriate EFW pump suction.

Assessment of Simultaneous Impact on All Three ANO-1 Non-Conforming Areas

It is important to recognize that the identified non-conformances involve limited exposure of equipment to tornado missiles, and, in many of the non-conformances, the equipment has redundancy or is partially protected. It is also unlikely that all equipment in all three non-conforming areas would be lost in a single tornado event given the spatial separation of the areas (located on different plant elevations) and the spatial separation of equipment within each area.

The actions discussed under the "Bowling Alley" subsection above remain relevant for this combined assessment.

With all equipment impacted in all three non-conforming areas, all AC power could be lost. This means that no RCS makeup source can be made available until at least one train of power is restored. In addition, recovery of one train of power is required to establish a SW source to the steam-driven EFW pump within 30 minutes post-event or to restore power to the motor-driven EFW pump and respective SW train. Availability of the AACDG or any offsite power source post-event cannot be predetermined (again, a LOOP is conservatively assumed for this assessment along with a loss of the AACDG). The tornado missile impacts affect cabling; equipment lost due to a damaged cable will not be electrically recoverable in short order.

The steam-driven EFW pump is expected to remain available; however, it could be necessary to control at least one of the two EFW flow paths locally (in the Auxiliary Building). The third non-licensed Operator can support this effort. If power is restored to an EDG, the respective EDG SW supply valve may need to be opened locally (also in the Auxiliary Building), which can be supported by this same Operator.

As before, if SW is not made available to the EFW pump suction within 30 minutes (assuming worst-case QCST tornado missile impact), all EFW could be lost (although there are other non-safety related condensate sources that may remain available). As SG inventory lowers

(assuming a loss of all EFW), RCS temperature and pressure will begin to rise until pressure relief settings are reached. Relief valves will protect the RCS from overpressure while efforts to restore an RCS cooling method are proceeding. There are no other known compensatory measures, given that the priority will be to restore power, which is a recovery effort that may require maintenance personnel to assist. Note that if ANO-2 retains a power source, this source can be shared with ANO-1, depending on the extent of cable damage between the two units.

Due to potential power loss to specific EFW Initiation and Control (EFIC) features (and assuming EFW is in operation), it may be necessary to isolate EFW to a faulted SG, either from the Control Room or locally in the Auxiliary Building, depending on the aggregate of equipment impacted; however, an unisolable fault on a SG main feedwater or main steam line is not assumed in the tornado event. EFW flow may require manual throttling from the Control Room upon a sufficient number of EFIC instrument input failures. Operators are well trained in this respect and procedures provide the necessary event identification and manual control guidance for effective task performance.

ANO 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 SFP cooling capabilities in the event of a beyond-design-basis external event in which a prolonged loss of AC power has occurred.

In the case above, power must be restored or FLEX strategies will need to be initiated. The FLEX strategies are fully implemented at ANO and maintain specific approved timelines for completing recovery efforts. FLEX strategies include establishing temporary power, makeup, and cooling sources for both ANO units.

Because this combination of potential equipment failures is unacceptable (i.e., simultaneous impact on all three non-conforming areas) to Entergy, modifications are underway which will significantly reduce the tornado missile risk associated with the non-conforming condition of CA-1.

ANO-2 Tornado Missile Vulnerability

The ANO-2 plant design and necessary systems to support stable Mode 3 operation following a tornado event in conjunction with a LOOP is very similar to that described above for ANO-1. However, the existing ANO-2 tornado missile vulnerability only impacts one EDG and does not prevent any safety function from being accomplished. The same pre- and post-event actions are taken for ANO-2 with respect to application of the unit specific Natural Emergencies procedure and COPD-038 such that all necessary precautions, heightened awareness, equipment recovery actions, etc., will be initiated as discussed above.

8. BASIS FOR EXTENSION REQUEST (DSS-ISG-2016-01, Appendix B, Item 1.e)

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 15-002 identified ANO-1 and ANO-2 as plants of a higher tornado missile risk; therefore, the enforcement discretion would expire on June 10, 2018.

In Reference 3, the NRC issued Revision 1 of EGM 15-002, which stated that licensees may request an extension to the 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, Entergy is requesting an extension of the expiration date for enforcement discretion from June 10, 2018 to June 10, 2020, for both ANO-1 and ANO-2.

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 has redundancy or is partially protected. The three non-conforming areas associated with ANO-1 are spatially separated and located on different elevations. It is also unlikely that all equipment in all three non-conforming areas would be lost in a single tornado event given the spatial separation of the areas and the spatial separation of equipment within each area. In addition, tornado missile scenarios generally do not represent a significant safety concern because their risk is bounded by the initiating event frequency.

The single ANO-2 non-conformance does not present a significant risk exposure due to the availability of the redundant train and potentially the availability of other power sources (such as the AACDG and FLEX support equipment). In addition, ANO-2 SAR, Section 2.3.1.3.5, “Tornadoes,” states that the probability of a tornado hitting the site in any given year is .00137 with a return frequency of one every 730 years. While this is not specifically stated in the ANO-1 licensing basis, due to the proximity of the two plants, a similar probability can be applied to ANO-1. This probability further supports the low risk associated with a tornado event and the request to extend enforcement discretion.

A comprehensive assessment relevant to RIS 2015-06 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 NRC 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 achieve any required compensatory measure coincident with other standard required actions in a severe weather LOOP event, without placing unnecessary burden on the Operators. The ERO will also be activated upon any significant tornado event, upon declaration of an Alert emergency class declaration or above. Long-term compensatory measures will remain in-place throughout the period of extended enforcement discretion, in accordance with the NRC guidance, 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 have been submitted, with NRC approval of the pilot site LARs expected in 2018. Once the pilot site LARs have been approved, other licensees with identified tornado missile protection non-conformances may submit LARs, based on the approved pilot LARs, for

implementation of the TMRE methodology to address the non-conformances at their sites. Since NRC approvals of the pilot site LARs are not expected in time to allow submittal and approval of an ANO-specific TMRE LAR before June 10, 2018, an extension of the current enforcement discretion period is necessary.

To address the tornado missile protection non-conformances identified, a TMRE analysis for certain non-conformances is required, along with preparation and submittal of a LAR for use of the TMRE methodology to evaluate the non-conformances, and obtaining NRC approval of the LAR. The ANO LAR would be submitted after the LARs for the pilot sites have been approved and the TMRE methodology has been endorsed by the NRC. Current estimation of the TMRE submittal for ANO is late summer 2018. If the TMRE methodology is not approved thereafter by the NRC for ANO, then the use of the Electric Power Research Institute (EPRI) developed TORMIS methodology and/or the installation of plant modifications may need to be pursued. Entergy estimates that the success or failure of the ANO-specific TMRE application should be reasonably known by early 2019.

If modifications associated with the non-conforming areas that Entergy plans to resolve via application of the TMRE are later found to be required (i.e., the TMRE application is not approved), such modifications are estimated to take approximately 10 months to complete. The requested enforcement discretion expiration date of June 10, 2020, is expected to accommodate completion of any additional modifications. Although unlikely that ANO would pursue the TORMIS option, the requested enforcement discretion expiration date should also provide sufficient time to complete the TORMIS application and approval process.

The requested enforcement discretion expiration date of June 10, 2020, would allow Entergy sufficient time to resolve the ANO tornado missile protection non-conformances and restore the site to compliance. As reflected above, Entergy has completed modifications that resolve several identified conditions. In addition, completion of the modifications associated with the ANO-1 CA-1 area is anticipated by the fall of 2018. Finally, Entergy has performed a preliminary TMRE analysis that includes the remaining non-conformances intended to be resolved via the TMRE with acceptable results, which will be submitted to the NRC for approval after the pilot plant LARs are approved.

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

9. PLANS FOR PERMANENT RESOLUTION (DSS-ISG-2016-01, Appendix B, Item 1.f)

Entergy plans to submit a risk-informed LAR for the use of the TMRE methodology, which is currently in development by the industry. The TMRE methodology would be used to evaluate the identified non-conformances for the ANO-1 Lower South Electrical Equipment Room, the ANO-1 Bowling Alley area, the three CA-1 ventilation duct openings, and the ANO-2 Fire Brigade area. Other modifications are in progress for the ANO-1 CA-1 area, which are expected to complete in the fall of 2018. Plant modifications have been completed for all other areas discussed in Section 4 of this letter with the exception of those designated for application of the TMRE initiative. It is estimated that the total cost of all completed and planned modifications will exceed $3,500,000.

In the event that an approved TMRE methodology is not available for use, ANO will consider either the use of the TORMIS methodology to evaluate the identified non-conforming conditions, or performing plant modifications to eliminate the non-conformances, or a combination of the two, as described in Section 8 above.

10. REFERENCE

1. NRC Regulatory Issue Summary 2015-06, *Tornado Missile Protection*, dated June 10, 2015 (ML15020A419)

2. NRC memorandum, *Enforcement Guidance Memorandum 15-002, Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance*, dated June 10, 2015 (ML15111A269)

3. NRC memorandum, *Enforcement Guidance Memorandum 15-002, Revision 1: Enforcement Discretion for Tornado-Generated Missile Protection Non-Compliance*, dated February 7, 2017 (ML16355A286)

4. NRC Interim Staff Guidance DSS-ISG-2016-01, Revision 1, *Clarification of Licensee Actions in Receipt of Enforcement Discretion Per Enforcement Guidance Memorandum EGM 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance,"* dated November 2017 (ML17128A344)

5. License Event Report (LER) 2016-002-00, *Tornado Missile Vulnerability Resulting in Condition Prohibited by Technical Specifications,* dated August 11, 2016 (ML16224A767)

6. LER 50-313/2016-003-00, *Tornado Missile Vulnerabilities Resulting in Unanalyzed Condition,* dated October 19, 2016 (ML16293A664)

7. LER 50-313/2016-003-01, *Tornado Missile Vulnerabilities Resulting in Unanalyzed Condition*, dated June 9, 2017 (ML17163A272)

8. LER 50-368/2017-001-00, *Inadequate Protection from Tornado Missiles Identified Due to Nonconforming Design Conditions*, dated May 30, 2017 (ML17150A483)