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10 CFR 50.90

January 11, 2018
Serial: HNP-18-007

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

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400 / Renewed License No. NPF-63

Subject: License Amendment Request to Incorporate Tornado Missile Risk Evaluator into Licensing Basis – Supplement Regarding De Minimis Penetrations (EPID L-2017-LLA-0355)

Ladies and Gentlemen:

By letter dated October 19, 2017 (Agency Document Access and Management System (ADAMS) Accession No. ML17292B648), Duke Energy Progress, LLC (Duke Energy), submitted a pilot license amendment request (LAR) for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The proposed amendment request would pilot the Nuclear Energy Institute (NEI) Technical Report NEI 17-02, Revision 1, “Tornado Missile Risk Evaluator (TMRE) Industry Guidance Document” (ADAMS Accession No. ML17268A036), which was incorporated by reference into the LAR.

The proposed amendment request screens systems, structures, and components, using risk values to determine whether physical protection from tornado-generated missiles is warranted. The methodology would only be applicable to conditions discovered where tornado missile protection is currently required but is not provided.

By letter dated November 21, 2017 (ADAMS Accession No. 17319A501), U.S. Nuclear Regulatory Commission (NRC) staff provided the results of their acceptance review of this amendment request. The acceptance review was performed to determine if there is sufficient technical information in scope and depth to allow the NRC staff to complete its detailed technical review. The NRC staff concluded that the LAR provides technical information in sufficient detail to enable the NRC staff to complete its detailed technical review and make an independent assessment regarding the acceptability of the proposed amendment in terms of regulatory requirements and the protection of public health and safety and the environment.

However, the NRC staff noted that the LAR included application of the De Minimis screening approach. Justification for this approach is not addressed in NEI 17-02, Revision 1, or the subject LAR. The staff stated that if the intent is to continue to use application of the De Minimis screening approach, a detailed justification should be provided promptly to ensure a timely review.

Duke Energy applied the De Minimis considerations to three penetrations with a combined area less than ten square feet, which expose portions of the emergency service water system to a potential tornado missile. Recognizing the very limited application of the De Minimis considerations in the LAR, Duke Energy determined that there is minimal value in documenting and having NRC review the technical justification for the De Minimis screening approach. Therefore, Duke Energy respectfully withdraws the aspect of its LAR related to the De Minimis screening approach. As the De Minimis screening approach was described in NEI 17-02, Rev. 1, which was incorporated by reference into the LAR, the explicit aspects of the methodology requested to be withdrawn are attached as marked-up pages.

Section 3.3.6 of the LAR documented that some of the non-conformances were screened as having a negligible impact on risk. Three penetrations at the “A” Emergency Service Water Intake Structure had a combined effective area of approximately nine square feet, which met the De Minimis definition of the TMRE Methodology, and were therefore screened out assuming a negligible impact on risk. Section 3.3.9 of the LAR documented that the De Minimis penetration risk was evaluated to ensure it has a negligible impact on the TMRE conclusions. Section 3.3.9.2 of the LAR documented a sensitivity assessment for the vulnerabilities to which the De Minimis screening treatment was applied.

The sensitivity assessment added the targets back into the TMRE model to determine the actual impact on the results. Requantification of the model resulted in a core damage frequency increase of 2E-9 per year and large early release frequency increase of 3E-10 per year. The sensitivity assessment demonstrated that the assumption for the De Minimis penetrations was valid for the specific vulnerabilities addressed in the LAR, those specific penetrations had a negligible impact on the TMRE results, and the specific conclusions of the LAR are unaffected by that treatment. Therefore further analysis for the affected vulnerabilities is not required. However, with the removal of the De Minimis screening from the methodology in this supplement, the treatment will not be applicable to potential conditions discovered in the future where tornado missile protection should be, but is not currently provided. Future modifications to the facility requiring tornado missile protection would not be evaluated using the TMRE methodology and are therefore unaffected by this change.

The conclusions of the No Significant Hazards Consideration in the LAR are unaffected by this change.

This letter contains no regulatory commitments.

In accordance with 10 CFR 50.91, Duke Energy is notifying the State of North Carolina of this LAR supplement by transmitting a copy of this letter to the designated State Official.

If there are any questions or if additional information is needed, please contact John Caves at (919) 362-2406.

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

Executed on January 11, 2018.

Sincerely,

Tanya M. Hamilton

Attachment: Markup of affected pages of NEI 17-02, Rev. 1

cc: Mr. J. Zeiler, NRC Sr. Resident Inspector, HNP
Mr. W. L. Cox, III, Section Chief, N.C. DHSR
Ms. M. Barillas, NRC Project Manager, HNP
Ms. E. Brown, NRC Project Manager, DORL TMRE
Mr. E. Miller, NRC Project Manager, HNP TMRE LAR
Mr. A. Schwab, NRC DPR
Ms. C. Haney, NRC Regional Administrator, Region II

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Attachment

Markup of affected pages of NEI 17-02, Rev. 1

(4 pages plus cover)

HWEL – high winds equipment list
IA – instrument air
LAR – license amendment request
LERF – large early release frequency
LOOP – loss of off-site power
LOS – line of sight
MCC – motor control center
MFW – main feed water
MIP – missile impact parameter
MOV – motor operated valve
NEI – Nuclear Energy Institute
NPP – nuclear power plant
NRC – Nuclear Regulatory Commission
NUREG - U.S. Nuclear Regulatory Commission technical report designation
PRA – probabilistic risk assessment
PSAR – preliminary safety analysis report
RG – regulatory guide
RIS – regulatory issue summary
RWST – reactor water storage tank
SEP – safety evaluation program
SSC – system, structure, component
SSEL – safe shutdown equipment list
SR – supporting requirement
SW – service water
TMRE – tornado missile risk evaluator
UFSAR – updated final safety analysis report

1.5 DEFINITIONS

Correlation - The relationship between two or more SSCs that infers that by nature of their proximity to each other they could be damaged by a single tornado missile.

~~**De Minimus Penetration** - Any penetration in a tornado-generated missile resistant reinforced concrete wall or other tornado-generated missile resistant structure that is less than 10 square feet.~~

Exposed Equipment Failure Probability (EEFP) - The conditional probability that an exposed SSC is hit and failed by a tornado missile, given a tornado of a certain magnitude.

High Winds Equipment List (HWEL) – List of potential vulnerabilities, vulnerabilities, and nonconforming SSCs identified during the walkdown that can be evaluated using the TMRE to determine the risk of leaving them unprotected.

Missile Impact Parameter (MIP) - The probability of a tornado missile hit on a target, per target unit surface area, per missile, per tornado.

TMRE PRA - An adaption of the plant internal events PRA suitable for use in the TMRE.

As noted, the HWEL will include potentially vulnerable SSCs from the TMRE PRA. This will require initial work to create the TMRE PRA, at least to the degree that is needed to support HWEL development. Section 6.1 describes the initial step of selecting the event trees from the internal events PRA model that will be used to form the TMRE PRA model. After completing the step described in Section 6.1, the analyst will be able to determine what SSCs will be included in the TMRE PRA. The SSCs considered in the TMRE PRA and the previously identified nonconforming SSCs form the initial list of SSCs to consider for the HWEL. The following steps are taken to refine the HWEL:

a. Screen out SSCs that are not included in the selected accident sequences (if not already done in the Section 6.1 steps) and non-equipment basic events.

b. Screen out SSCs that are located inside Category I structures and that are located away from vulnerable openings or features (e.g., ventilation louvers, roll-up doors). ~~SSCs that are potentially exposed to tornado missiles through a De Minimus penetration can also be screened.~~

c. Screen SSCs that are dependent on offsite power, since the TMRE assumes there will be a non-recoverable loss of offsite power.

d. Determine SSC location, normal position, desired position (from the TMRE PRA), and failed position (for MOVs and AOVs).

Following these steps, an initial HWEL will be developed; it will then be used to support the Vulnerable SSC Walkdown.

Prior to the walkdown, any ex-control room human failure events (HFE) should be identified. These actions will need to be reviewed with an operator and the operator locations, transit pathways and operation locations will need to be evaluated as part of the walkdown. The following information should be reviewed with an operator prior to the walkdown:

a. Operator action task (e.g., switch CST suction for AFW pumps)

b. Operator action location, where the action takes place

c. Normal location of the operator(s) at the time of the event. If the site procedures have specific locations for operators to take shelter during a tornado, those should be the starting location for the operators. Otherwise, potential operator locations will need to be considered.

d. Potential pathways for the operator to transit from their initial location to the action location.

3.2 Vulnerable SSC Walkdown

The purpose of the Vulnerable SSC Walkdown is to locate and document all potentially vulnerable and previously identified nonconforming SSCs and any TMRE PRA SSCs that are not protected from tornado missiles. Additionally, actions performed outside of the control room (ex-control room actions) will be reviewed to verify that station personnel can safely get from their initial location to the action location after a tornado has struck the plant.

3.2.1 Personnel for Vulnerable SSC Walkdown

The Vulnerable SSC Walkdown should be performed by a team consisting of personnel familiar with the plant systems, personnel responsible for the TMRE PRA, and a civil or structural engineer familiar with the plant. Structural personnel provide expertise to identify screening characteristics applicable to SSCs.

a. Locate and identify the SSC; verify that the SSC is located where it is documented to be. Note any support systems or subcomponents, such as electrical cabling, instrument air lines, and controllers.

b. Photograph the SSC, including its surroundings. Ensure that any subcomponents or support systems identified are photographed. Example photographs are provided in Section 4 of the EPRI walkdown guidance, EPRI 3002008092 [Ref.3.1].

c. Document and describe barriers that could prevent or limit exposure of the SSC to tornado missiles; Photograph any barriers that could prevent tornado missiles from impacting the SSC. This may include barriers or shielding designed to protect an SSC from tornado missiles, as well as other SSCs that may preclude or limit the exposure of the target SSC to missiles (e.g., buildings, large sturdy components).

d. Identify directions from which tornado missiles could come from to strike the target. This may best be done with sketches and notes, in addition to photographs of the area surrounding the SSC. For SSCs inside Category I structures, note whether there is a line of sight from an opening to the SSC. ~~De Minimis penetrations that are credited for protection of SSCs should be identified.~~

e. Determine and/or verify the dimensions of the target SSCs, including any subcomponents or support systems. It is helpful to have the dimensions from drawings or other documents prior to the walkdown, so that the walkdown can be used for confirmation. Determine the dimensions of any openings that allow the SSC to be exposed to a tornado missile.

f. Determine the proximity and potential correlation to other target SSCs. For the purpose of the TMRE, correlated targets are SSCs that can be struck by the same tornado missile.[1] Photographs of SSCs that are close together (correlated or not) are useful for documenting the decision made regarding correlation.[1]

g. Note any nearby large inventories of potential tornado missiles. Relocation of large groups of potential missiles in close proximity to exposed risk significant SSCs may be considered to improve defense in depth. The intent of this is not to count missiles, since that is done in a separate walkdown.

h. Proximity of non-Category I structures to exposed target SSCs should be documented. A non-Category I structure may collapse or tip-over and cause damage to an SSC.

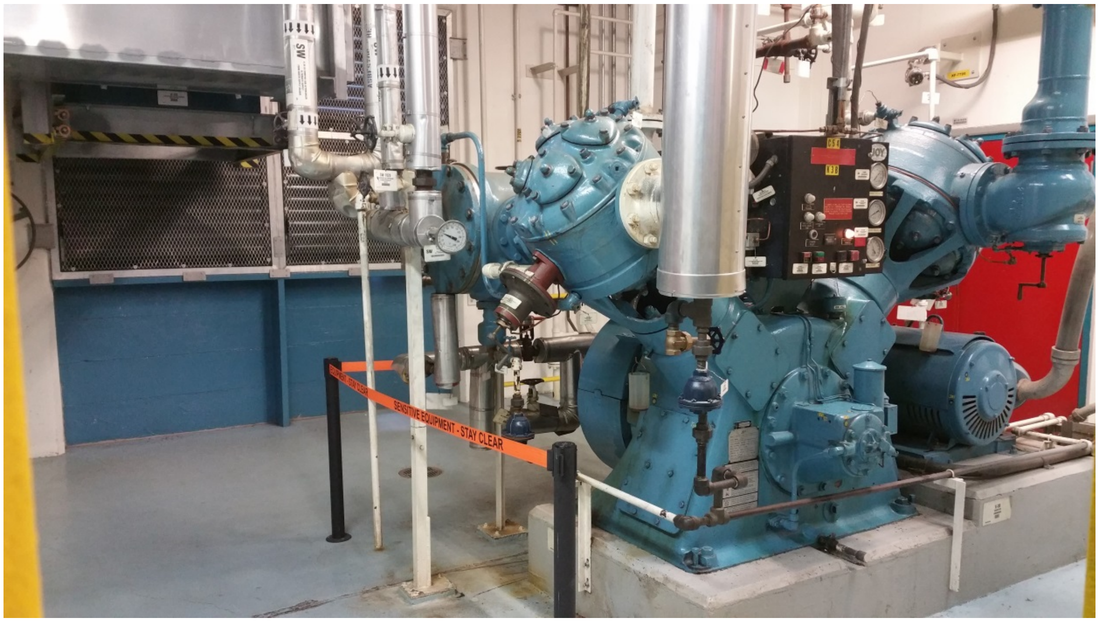
i. Identify vent paths for tanks that may be exposed to atmospheric pressure changes (APC). These should be noted during the documentation and drawing review, but verified and documented as part of the walkdown.

j. Look for additional issues affecting credited equipment or other potential vulnerabilities that may not have been previously identified.

General information on walkdowns can also be found in EPRI 3002008092, *Process for High Winds Walkdown and Vulnerability Assessments at Nuclear Power Plants* [Ref. 3.1].

[1] If targets are correlated, the entire area of the correlated targets should be determined, and one EEFP will be calculated for the correlated targets, to be used to fail all correlated SSCs.

Figure 5-4: Example Air Compressor with Subcomponents



Valves

Although valve bodies and their connections to piping are generally robust, their operators, actuators, and support systems (e.g., instrument air, electrical power) are not. When calculating the target area for a valve, all the exposed subcomponents and applicable support components (e.g., solenoid valves, controllers, cables, instrument air tubing) need to be included in the total valve area. When determining the number of missiles, the full missile count can be used for the combined components and subcomponents, or the calculation can be refined to apply the correct missile counts to individual components. It is important to understand the impact of the failure of support systems on the desired function of the valve. If failure of the support system does not cause a functional failure of the valve, components associated with the support system do not need to be included in the total area used for the valve in the EEFP.

Targets Located Inside of a Category I Structure

Some targets located inside of a Category I structure may be vulnerable to missile hits due to openings in the structure that are not missile barriers or due to roofs that are less than 12” of reinforced concrete (see Appendix C for the basis of required roof thickness). In cases such as these, the target would be considered the surface area of the opening (e.g., door, ventilation louver, piping penetration) through which a missile can travel and strike the SSC in question. ~~SSCs exposed to missiles only through De Minimis penetrations do not need to be considered as targets.~~ For roofs with SSCs below them, the target dimensions should be projected vertically to an area of the roof that is directly above the SSC or its subcomponents.

If the exposed area of a target inside the Category I structure is smaller than the opening through which a missile must pass to strike the target, then the exposed area of the target, when approached from the