



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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February 28, 2019

MEMORANDUM TO: David C. Lew, Regional Administrator, Region I
Catherine Haney, Regional Administrator, Region II
Darrell J. Roberts, Regional Administrator, Region III
Scott A. Morris, Regional Administrator, Region IV

FROM: Ho K. Nieh, Director /RA/
Office of Nuclear Reactor Regulation

SUBJECT: CLOSEOUT OF LOW SAFETY SIGNIFICANT/LOW RISK
CONCERNS – TORNADO-GENERATED MISSILE PROTECTION

The purpose of this memorandum is to provide guidance to and context for the regional staff on the resolution of any remaining tornado missile protection issues. The U.S. Nuclear Regulatory Commission's (NRC's) licensing and inspection activities help support its mission to provide reasonable assurance of adequate protection of public health and safety. On February 28, 2019, the Office of Nuclear Reactor Regulation (NRR) issued a letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18338A085) to the industry regarding actions that NRC licensees may consider in the resolution of issues with tornado missile protection.

Safety Significance and Reasonable Assurance of Adequate Protection

Tornado missile scenarios that may lead to core damage are generally very low probability events, because safety-related structures, systems, and components are typically designed to withstand the effects of tornados. For a tornado missile-induced scenario to occur, a tornado would have to hit the site and result in the generation of missiles that would hit and fail vulnerable, unprotected safety-related equipment and/or unprotected safety-related subcomponents in a manner that is non-repairable and non-recoverable (ADAMS Accession No. ML15111A269).

In 2014, NRR conducted a generic bounding risk assessment (ADAMS Accession No. ML14114A556), which concluded that the typical tornado missile protection issue does not rise to the level of adequate protection or require immediate plant shutdown because the risk is bounded by the initiating event frequency of 4E-4 per year even in the most severe tornado region, which is well below the 1E-3 plant core damage frequency per year guidance, among other considerations (e.g., defense-in-depth), provided in NRR Office Instruction LIC-504, "Integrated Risk-Informed Decision-Making Process for Emergent Issues." Furthermore, this bounding risk assessment was very conservative in that it assumed a tornado-generated missile would fail all emergency core cooling equipment with no ability to recover and did not consider plant-specific characteristics. Through licensing activities related to tornado missile protection, NRR has considered qualitative and quantitative risk insights, as well as sufficient margins to safety, and defense-in-depth. NRR's position is that this issue, based on both these insights and

the experience to date, when plant-specific considerations such as tornado missile probabilities are considered, is typically of very low safety significance and well below a level where adequate protection would be in question.

Consideration of General Design Criteria in Regulatory Oversight

The General Design Criteria (GDC) of Appendix A to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), as well as the pre-GDC, were intended to provide a basis for judging the adequacy of the preliminary design of the facility at the construction permit stage and the detailed design and construction at the operating license stage. The GDC were not intended to be living requirements for the control and operation of nuclear power plants.

During the licensing of the majority of the operating fleet in the 1970s, the regulatory guidance (e.g., Regulatory Guides and Standard Review Plans) for addressing tornado missiles in plant designs evolved. Thus, it is important to understand the specific standards and guidance used by the licensee in the design of its facility for this issue. The tornado missile protection design which was reviewed and approved by the NRC establishes the applicable licensing basis for each facility.

As a general matter in addressing design inconsistencies with the GDCs, where there is sufficient ambiguity regarding the interpretation of the approved licensing basis stemming from lack of clarity or information, and assuming that there is not an adequate protection concern, the staff must proceed with a backfit analysis or invoke the compliance exception of the backfit rule. In a December 20, 2016, memorandum, the NRC Solicitor provided Commission-approved guidance that addressed, in part, GDCs and their relationship to the backfit rule under 10 CFR 50.109. While the NRC is not categorically precluded from reliance on the GDCs as the source of a “requirement” in terms of a compliance exception to the backfit rule, it is expected that these situations would be rare and would exist only when a more specific requirement, such as technical specifications, does not address the situation. In this context, it is important to keep in mind that the determination of compliance must be based on what was known and understood at the time and not what we know today that was not known at the time.

NRC Staff Review of Licensee Actions on Tornado Missile Protection and Backfit

The February 28, 2019, NRR letter to industry discusses the various options available to licensees to address tornado missile protection issues. Licensees may either:

- Take no further regulatory action if the as-found configuration is within the existing licensing basis; or
- Bring the facility back into compliance by facility modifications and/or licensing basis changes through 10 CFR 50.59 (with or without prior NRC approval depending on the specific circumstances), a license amendment request, or an exemption request.

If regional staff have questions about next steps, or disagree with a licensee’s actions on these matters, then they should contact the NRR plant project manager to facilitate the coordination with headquarters personnel to discuss next steps, which may include beginning the backfit evaluation process.

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TORNADO-GENERATED MISSILE PROTECTION DATED
FEBRUARY 28, 2019

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