

Ms. Annette L. Vietti-Cook
Secretary of the Commission
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Office of Nuclear Reactor Regulation (NRR) Director's Decision - 2.206 Petition on Current Operating Nuclear Power Plants - Open Phase Conditions (OPCs) in Electric Power System Which Lead to Loss of Safety Functions of Both Offsite and Onsite Power Systems (NRC Bulletin 2012-01)

Dear Madam: On January 8, 2018, you issued an Order to extend the time for Commission review of NRR Director's Decision (DD-17-04) on OPC petition until February 26, 2018 based on your authority under 10 C.F.R. § 2.206(c)(3).

The purpose of this letter is to inform the Commission that the petitioners' comments dated October 11, 2017 (ADAMS Accession No. ML 17291A040) had not been satisfactorily addressed in the Director's decision. The DD-17-04 comments disposition contained many inaccurate information that the Commission must be aware of when it reviews the NRR Director's Decision (DD-17-04) on OPC petition. Some of the inaccurate information is discussed below.

For example, NRC response to comment 1 stated that, "the regulations do not require licensees to assume the failure of all non-safety-related protection on electrical supply systems to safety-related buses. For example, there are typically no safety-related relays for underfrequency or over frequency monitoring the safety buses." Please note that the NRC staff has previously reviewed the reliability of the offsite power system with respect to underfrequency or over frequency protection requirements at the engineered safety features (ESF) buses through its Generic Safety Issue (GSI) program and determined that there are no common mode failure vulnerabilities or operating events exist that should be addressed at the ESF bus level other than maintaining adequate voltage protection (undervoltage and degraded voltage). Degraded voltage protection issue was addressed by requiring a safety related relay installed at the ESF bus level which meets the single failure criteria (GSI-A35). It is incorrect to state that the regulations do not require licensees to assume the failure of all non-safety-related protection on electrical supply systems to safety-related buses. Current regulations require that a non-Class 1E circuit should not preclude the safety-related onsite electrical power system (e.g., emergency diesel generator) from being able to perform its safety function given a single failure in the onsite power system. Only safety-related systems and components are relied upon to perform safety functions and are credited in the safety analyses to mitigate design basis events and accidents.

Specifically, GDC 17 establishes requirements for the electric design of nuclear power plants for which a construction permit application was submitted after the Commission promulgated the GDC. For current operating power plants designed before the promulgation of GDC 17, the plant-specific UFSAR sets forth criteria similar to GDC 17, which requires, among other things, that plants have an offsite and an onsite electric power system with adequate capacity and capability to permit the functioning of structures, systems, and components important to safety in the event of anticipated operational occurrences and postulated accidents. It also requires that if offsite power system cannot perform its intended safety functions, the onsite power system has to perform its function meeting the single failure criteria without any reliance on the

offsite power system. In addition, 10 CFR 50.55a(h)(2) requires nuclear power plants with construction permits issued after January 1, 1971, but before May 13, 1999, to have protection systems that meet the requirements in Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1968, "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems; IEEE Standard 279-1997, "Criteria for Protection Systems for Nuclear Power Generating Stations"; or IEEE Standard 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. For nuclear power plants with construction permits issued before January 1, 1971, protection systems must be consistent with their licensing basis or meet the requirements of IEEE Standard 603-1991 and the correction sheet dated January 30, 1995.

It should be noted that the NRC provided a response to the industry questions including a discussion of the planned open phase isolation system (OPIS) to be installed at each plant, in a letter to NEI dated November 25, 2014 (ADAMS Accession No. ML 14120A203). The NRC stated that the capability of the ESF onsite power system to permit functioning of structures, systems, and components may depend upon successful operation of OPIS, and that the proposed solution needs to fully address GDC 17 or the principal design criteria specified in each plant's UFSAR. The NRC also communicated four functional criteria for demonstrating compliance with existing regulatory requirements. These criteria are consistent with NRC's actions for 1977 Generic Action (Multi-plant Action B-23) and NRC RIS 2011-12 (ADAMS Accession No. ML113050583). As stated in the petitioners' comments "the function of OPIS is identical to the loss of voltage relays (LVRs) and degraded voltage relays (DVRs) installed on the safety related buses at all operating power plants. This comparison is based on the fact that the safety function of these relays (LVRs, DVRs, and OPIS) is to isolate a degraded GDC 17 power source in order to permit the remaining power source(s) to perform their safety function(s)." The Commission's SRM is silent on these NRC positions and requirements, it appears that the Commission has not reviewed the technical issues and adequacy of voluntary industry initiative (VII) to resolve a safety issue involving OPC. Therefore, I believe that the director's decision should not deny the petition because the NRC has not resolved the OPC issue (i.e., NRC's evaluations and verifications to confirm that modifications implemented by licensees via VII is adequate to address the safety issue communicated in NRC Bulletin 2012-01 and issues raised in this petition are completed).

Response to comment no. 3 states that the "The PRB notes that licensees have provided the NRC with extensive design information on their OPISs, including data from field tests. There are also design and engineering reports from the Electric Power Research Institute analyzing the industry designs. The NRC staff has reviewed some of these designs. PRB notes that the SRM directs the NRC staff to address the OPC concern by verifying licensee implementation of the voluntary industry initiative, thereby superseding some of the information in the NRC letter of November 25, 2014." This is incorrect because the NRC has not conducted a review of the OPIS design as well as the Commission has not reviewed the NRC letter dated November 25, 2014 letter that establishes the technical criteria for resolving OPC issue and has not made any recommendations in its SRM. My understanding is that the adequacy of the licensees' OPIS design is being reviewed and verified by the NRC for the first time via Temporary Instruction TI 2515/194. It should be noted that the SRM did not state that the industry VII is adequate to resolve the OPC issue but directed the staff to verify it and report back to the Commission, if there are policy issues.

In addition to the above, on December 12, 2017, the NRC issued a final director's decision (ADAMS Accession No. ML 17304A893). Subsequently, the NRC revised the final director's decision on January 18, 2018, to correct an error for the reference to an operating event at

Oconee Station. Specifically, Section D of the final director's decision refers to a December 2015 OPC event at Oconee and states, "Two separate transformers required for safe shutdown of the three operating Oconee nuclear units were identified with open phase conditions." NRC states that this statement is in error because only one Oconee transformer experienced an open phase condition. My review of the event indicated that there were indeed two OPC events occurred at Oconee. The licensee reported only one event associated with Unit 3 startup transformer. However, the NRC inspection report stated that open phase event also occurred at Oconee Unit1 startup transformer CT-1 (all six of the aluminum strands of the aluminum conductor steel-reinforced (ACSR) high voltage conductor on X" phase was broken). The licensee did not report this event because it considered the iron core of the conductor sufficient to satisfying the current carrying capability of the ACSR conductor. Since iron core of the ACSR conductor is only for providing mechanical strength to the conductor (structural support) and it is not credited for current carrying capability and if its relied on it causes increased voltage drop from lower electrical conductivity. At Oconee, onsite safety-related hydro power path uses the startup transformer. This makes the OPC issue more safety significant than other operating plants in the U.S. Hence, the OPC event at Oconee should have been considered as two and not one.

It is important to keep our primary mission of safety on this issue. While OPC may be considered a low probability event, it has happened 14 times already around the world at nuclear stations. The consequence is very high in that the core cooling pumps could be disabled beyond repair in redundant trains (common-cause failure) in a period of 2 to 10 min. depending on the plant design unless it is promptly detected and isolated. Even in the absence of a LOCA, the consequence could be comparable on a normal plant trip when offsite power is relied upon for cooldown experiences common-cause failure of all electric cooling pumps potentially leading to core damage.

For the above reasons, I disagree with NRR Director's decision to deny the 2.206 Petition on OPC dated February 19, 2016.

Sincerely,



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