



U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

NRC BULLETIN 2012-01: DESIGN VULNERABILITY IN ELECTRIC POWER SYSTEM

**Roy Mathew and Singh Matharu
NRRR/DE/EEEE
August 21, 2012**



Presentation Outline

- Why a Bulletin?
- Purposes of Bulletin
- Regulatory Requirements
- Requested Information
- Staff's Review of Responses

Why a Bulletin?

- **Staff recommendation to issue a Bulletin**
 - **Loss of safety function of electric power systems (onsite and offsite)**
 - **Needed operator action to restore power to the safety-related buses**
 - **To obtain information for the NRC to determine whether additional actions are needed to ensure compliance with existing requirements and whether enhancements to the existing requirements, or both, are necessary.**



Purposes of Bulletin

- To notify the licensees the NRC staff is requesting information about the facilities' electric power system designs, in light of the recent operating experience that involved the open phase event at Byron Station, Unit 2, to determine if further regulatory action is warranted
- To require that the addressees comprehensively verify their compliance with the regulatory requirements of GDC) 17 and 10 CFR 50.55a(h)(2); and plant TS for AC Power Systems
- To require that addressees respond to the NRC in writing, in accordance with 10 CFR 50.54(f)



Regulatory Requirements

- **GDC 17 states: An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety.**
Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.
- **10 CFR 50.55a(h)(2) requires protective actions to be completely automatic. IEEE 279 and IEEE 603 provide additional details**

- The NRC requests that licensees address the following two issues related to their electric power systems by October 25, 2012
 1. Describe how the protection scheme for ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) is designed to detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited off-site power circuit or another power sources. Also, include the following information:
 - a. The sensitivity of protective devices to detect abnormal operating conditions and the basis for the protective device setpoint(s).
 - b. The differences (if any) of the consequences of a loaded (i.e., ESF bus normally aligned to offsite power transformer) or unloaded (e.g., ESF buses normally aligned to unit auxiliary transformer) power source.



BULLETIN - REQUESTED ACTION (Cont.)

- c. **If the design does not detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited offsite power circuit or another power sources, describe the consequences of such an event and the plant response.**
 - d. **Describe the offsite power transformer (e.g., start-up, reserve, station auxiliary) winding and grounding configurations.**
- 2. Briefly describe the operating configuration of the ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) at power (normal operating condition). Include the following details:**
- a. **Are the ESF buses powered by offsite power sources? If so, explain what major loads are connected to the buses including their ratings.**
 - b. **If the ESF buses are not powered by offsite power sources, explain how the surveillance tests are performed to verify that a single-phase open circuit condition or high impedance ground fault condition on an off-site power circuit is detected.**

BULLETIN - REQUESTED ACTION (Cont.)

- c. Confirm that the operating configuration of the ESF buses is consistent with the current licensing basis. Describe any changes in offsite power source alignment to the ESF buses from the original plant licensing.**
- d. Do the plant operating procedures, including off-normal operating procedures, specifically call for verification of the voltages on all three phases of the ESF buses?**
- e. If a common or single offsite circuit is used to supply redundant ESF buses, explain why a failure, such as a single-phase open circuit or high impedance ground fault condition, would not adversely affect redundant ESF buses.**

Staff's Review of Responses

- **Based on the information the licensees will submit in response to this bulletin, the NRC will determine:**
 - **Additional clarifications are needed from the licensees— RALs, conference calls, etc.,**
 - **Additional regulatory actions are needed to ensure compliance with existing regulatory requirements**
 - **Enhancements are needed to the existing regulations or guidance, or both, are necessary**
- **The NRC plans to issue close-out letters to each licensee documenting its evaluation**

Questions

