



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
WASHINGTON, D.C. 20555-0001

June 2, 2016

MEMORANDUM TO: Victor M. McCree  
Executive Director for Operations

FROM: Edwin M. Hackett, Chairman **/RA/**  
Committee to Review Generic Requirements

SUBJECT: COMMITTEE TO REVIEW GENERIC REQUIREMENTS:  
MINUTES OF MEETING NUMBER 441

By memorandum of May 2, 2016 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML16120A384), the Office of Nuclear Reactor Regulations (NRR) requested that the Committee to Review Generic Requirements (CRGR, the Committee) review and endorse proposed compliance backfit evaluation, "Evaluation for Compliance Backfit Exception: Open Phase Condition Design Vulnerability in Electric Power System" (ADAMS Accession No. ML15254A208). With its request, the staff provided to the Committee a chronology and discussion of regulatory, legal, and policy implications related to the evaluation for compliance backfit exception.

On May 17, 2016, the CRGR held Meeting Number 441 with the staff to discuss the evaluation for compliance backfit exception document. Enclosure 1 provides the list of meeting attendees. Roy Mathew, with the support of Jacob Zimmerman, David Beaulieu, Serita Sanders, all from NRR, and Robert Fretz from the Office of Enforcement, briefed the CRGR and addressed the Committee's questions. The Office of the General Counsel's subject matter experts on the legal aspects of the subject backfit evaluation document provided support to the staff and responded to CRGR questions. The staff's presentation materials are located in ADAMS Accession No. ML16140A042.

The staff briefed the CRGR and provided the technical background regarding the initiating event of the open phase condition at Byron that occurred on January 30, 2012. This briefing also discussed the purpose of the U.S. Nuclear Regulatory Commission Bulletin 2012-01, "Design Vulnerability in Electric Power System" (Accession No. ML12074A115) that the CRGR reviewed back on May 23, 2012 (Accession No. ML121220353).

The staff and the CRGR discussed the Byron reactor trip event that was caused by an open phase condition. This open phase condition was due to the broken insulator stack of the phase C conductor for the 345-kV power circuit that supplies both station auxiliary transformers (SATs). The licensee and staff review of this event identified design vulnerabilities in the protection scheme for the 4.16-kV ESF buses.

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This specific failure mode was the result of an unrecognized design vulnerability involving certain offsite power open phase conditions (OPCs).

These design vulnerabilities contributed to the failure of the 4.16-kV ESF buses to adequately provide power “to permit functioning of structures, systems, and components important to safety.” This is contrary to 10 CFR Part 50, Appendix A, “General Design Criteria for Nuclear Power Plants” (for currently operating plants with construction permits issued after May 21, 1971). More specifically, GDC 17, “Electric Power Systems,” was not met which states in part that:

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. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents...

The staff discussed that for pre-GDC plants, the principal design criteria specified in the plant Updated Final Safety Analysis Report (UFSAR) sets forth criteria similar to GDC 17. These design criteria require, among other things, that plants have an offsite and an onsite electric power system with adequate capacity and capability to ensure the functioning of safe shutdown components important to safety in the event of anticipated operational occurrences and postulated accidents.

The following electrical design criteria were used for licensing of pre-GDC nuclear power plants by the Atomic Energy Commission (AEC). They represent the Atomic Industrial Forum (AIF) version of proposed criteria issued by the AEC for public comments. The specific criteria specified in the plant UFSAR for electric power system requirements are:

- AIF- Criterion 21

Sufficient normal and emergency sources of electrical power must be provided to assure a capability for prompt shutdown and continued maintenance of the reactor facility in a safe condition under all credible circumstances.

- AIF- Criterion 24

In the event of loss of all offsite power, sufficient alternate sources of power shall be provided to permit the required functioning of the protection systems.

- AIF- Criterion 39

An emergency power source shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning of the engineered safety features and protection systems required to avoid undue risk to the health and safety of the public. This power source shall provide this capacity assuming a failure of a single active component.

In addition, the staff discussed the basis for applying the compliance backfit exception as an “omission of fact” because this OPC scenario was not previously identified and because this specific design vulnerability was not considered when the NRC provided approval to the plant design for its protective schemes of electrical power systems. The GDC requirement was in existence, and the electrical power protective schemes were in place to prevent general electrical power failures.

However, the particular protection scheme design did not include the capability to detect the specific failure scenario that occurred at Byron and could potentially occur at other U.S. nuclear reactor plants. Because of this unrecognized vulnerability, this is an “omission of fact” and not a change in staff position. Therefore, the staff determined the compliance backfit exception as stated in 10 CFR 50.109(a)(4)(i) of the Backfit Rule is applicable.

To support its determination of the applicability of the compliance backfit exception, the staff considered the 1985 supplementary information on the 1985 final backfitting rule in which the Commission interpreted the compliance exception (Revisions of Backfitting Process for Power Reactors, 50 Fed. Reg. 38,097, 38,103, September 20, 1985). In this interpretation, the Commission stated that:

The compliance exception is intended to address situations in which the licensee has failed to meet known and established standards of the Commission because of omission or mistake of fact. It should be noted that new or modified interpretations of what constitutes compliance would not fall within the exception and would require a backfit analysis and application of the standard.

In addition, with the assistance of OGC compliance backfit experts, the staff developed the compliance backfit evaluation to highlight and address five key points connected with the above interpretation. These five key points are as follows:

- (1) The “known and established standards” at issue.
- (2) The prior NRC staff approval(s) of the licensee’s method of compliance with such “known and established standards.”
- (3) The specific omission or mistake of fact that undermines the prior NRC staff approval(s).
- (4) An evaluation explaining that, but for the identified omission or mistake of fact, the NRC staff would not have issued the prior approval.
- (5) A description of how the NRC has interpreted the “known and established standards” at issue (with respect to the specific licensee in the case of a facility-specific backfit or generically in the case of a generic backfit).

During the meeting, the CRGR focused its discussion with the staff on (1) the applicable regulatory requirements and how they have been applied by the staff and licensees, (2) the status of the U.S. reactor fleets and if compensatory measures are in place to address the subject vulnerability, and (3) the concerns raised by the industry with regard to the staff’s application of the compliance backfit exception.

Overall, on the basis of its review of the proposed evaluation for compliance backfit exception and the staff's supporting documents (enclosure 2), and its consideration of the clarifying technical and regulatory basis provided by the staff during the meeting, the CRGR concluded that the staff's understanding of GDC 17 and FSAR for the pre-GDC requirements concerning onsite electric power system and offsite electric power system is well thought out and sound.

The CRGR also concluded that the staff has not changed its position and has been consistent in articulating its position regarding the regulatory requirements as it pertains to the onsite electric power system and an offsite electric power system as mentioned in GDC 17 and the pre-GDC plant FSAR. For these reasons, the CRGR concluded that issuance of the proposed backfit evaluation would not impose any new staff position or any new requirement beyond what is permitted by the compliance backfit exception in 10 CFR 50.109(a)(4)(i) of the Backfit Rule in addressing compliance with the existing regulations. Therefore, the CRGR endorses the subject document, "Evaluation for Compliance Backfit Exception: Open Phase Condition Design Vulnerability in Electric Power System," for issuance by the staff.

Enclosures:

CRGR Meeting No. 441

List of Attendees

List of References

**CRGR MEETING No. 441**  
**LIST OF ATTENDEES**  
**(May 17, 2016)**

**CRGR Members**

Edwin M. Hackett, Chairman  
K. Steven West, NSIR  
Brian J. McDermott, NRR  
Joel T. Munday, NMSS (for Scott W. Moore, NMSS)  
John D. Monninger, NRO (for Gary M. Holahan, NRO)  
Edward L. Williamson, OGC  
Leonard D. Wert, RII

Les R. Cupidon, CRGR Staff

**NRC Staff**

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David M. Cylkowski, OGC/GCHEA/AGCMLE  
Geary S. Mizuno, OGC/RMR  
Adam S. Gendelman, OGC/RAR/DAGC  
Mary Jane Ross-Lee, NRR/DE  
Tania Martinez Navedo, NRR/DE/EEEB  
Jacob Zimmerman, NRR/DE/EEEB  
Robert J. Fretz, OE/EB  
Roy K. Mathew, NRR/DE/EEEB/EET  
Serita Sanders, NRR/DPR/PGCB  
David P. Beaulieu, NRR/DPR/PGCB  
Nicholas J. DiFrancesco, RES/FO  
John R. Jolicoeur, OEDO/AO  
Mirela Gavrilas, NRR/DPR  
Timothy J. McGinty, NRR/DSS

## **CRGR MEETING No. 441 LIST OF REFERENCES**

NRC Regulatory Issue Summary 2015-06, "Tornado Missile Protection" (ADAMS Accession No. ML15020A419).

NRC Regulatory Issue Summary 2011-12, Revision 1, "Adequacy of Station Electric Distribution System Voltages" (ML113050583).

Enforcement Guidance Memorandum 15-002, "Enforcement Discretion for Tornado Missile Protection Noncompliance" (ML15111A269).

LaSalle County Station, Units 1 and 2 - Unresolved Item Closure Inspection Report 05000373/2015010; 05000374/2015010 and Enforcement Discretion.

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**ADAMS Accession No.: ML16145A431**

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DATE	06/02/16	05/25/16	06/02/16

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