UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

December 29, 2015

MEMORANDUM TO: Eddy Crowe
Senior Resident Inspector
Division of Reactor Projects

FROM: Leonard D. Wert, Jr. ***/RA Laura A. Dudes Acting for/***
Acting Regional Administrator

SUBJECT: SPECIAL INSPECTION CHARTER TO EVALUATE THE POWER CABLE FAILURES/DEGRADATIONS ON THE OCONEE UNITS 1 AND 3 STARTUP TRANSFORMERS

You have been selected to lead a Special Inspection to assess the circumstances surrounding the power cable failures/degradation on the Units 1 and 3 startup transformers at the Oconee Nuclear Station. Your onsite inspection should begin on January 5, 2016. Marcus Riley will be assisting you in this inspection. Brendan Collins will also be available to assist you in this inspection via telephone.

A. Basis

During operator rounds on December 7, 2015, an auxiliary operator discovered the Oconee Unit 3 startup transformer (CT-3) with one of its phases disconnected at the phase bushing. After isolation and repairs, the connector (wire clamp) and wire were sent to McGuire Nuclear Plant laboratory for analysis of the failure mechanism. Verbal communication between the lab and Oconee indicates that high cycle fatigue was the cause of the Unit 3 failure.

Subsequently, the licensee performed extent-of-condition reviews and made temporary repairs to degraded connections on all three phases of another transformer (CT-1) by cutting off the degraded cabling and re-clamping the cables. In most instances, the damage was not readily visible from ground level observation. The number of strands of each phase' cabling that was actually damaged varied. The startup transformers with degraded connections were being considered inoperable until repairs were completed.

In accordance with Management Directive (MD) 8.3, "NRC Incident Investigation Program," deterministic and conditional risk criteria were used to evaluate the level of NRC response for this operational event. Through review of the MD 8.3 deterministic criteria, the staff concluded that this event could involve repetitive failures or events involving safety-related equipment or deficiencies in operations. The conditional core damage probability (CCDP) for this event was in the overlap region between a Special Inspection and an Augmented Inspection. In consultation with NRR, Region II determined that the appropriate level of NRC response is a Special Inspection.

This Special Inspection is chartered to identify the circumstances surrounding the power cable failures/degradation on the Units 1 and 3 startup transformers, review the licensee's actions following discovery of the condition, assess the licensee's maintenance practices, evaluate the history of power cable failures on transformers at Oconee, assess the licensee's conclusions on the operability and past operability of the start-up transformer with the failure/degradation of the power cables, and evaluate operating experience.

B. Scope

The inspection is expected to perform data gathering and fact-finding in order to address the following:

1. Develop a detailed sequence of events from the time of discovery of the CT-3 power cable failure until the licensee completed assessing extent of condition. Include any recent work/maintenance completed on CT-3 and CT-1.

2. Review and evaluate the licensee's causal evaluation related to this event, including the cause of the material failures as well as any programmatic contributors (e.g., lack of cable replacement, cyclic fatigue, corrosion, etc)

3. Review and evaluate the licensee's actions to detect and prevent open phase conditions in offsite power system in view of industry operating experience identified in NRC Information Notice IN 2012-03 and Bulletin 2012-01 are in accordance with the licensee's response dated February 3, 2014 (ADAM Accession No. ML14035A453).

4. Review the lab report associated with the analysis of the failure mechanism from CT-3 and CT-1. Include information from analysis of intact CT-2 cables.

5. Review and assess the licensee's testing and maintenance practices related to the maintenance/inspection of wires/cables in the startup transformers and other transformers onsite.

6. Review and evaluate the licensee's compliance with vendor recommendations regarding maintenance and testing of transformer cables at the site.

7. Review and verify the licensee's reportability determination was in accordance with the reportability criteria in 10 CFR 50.72 and NUREG-1022.

8. Review and evaluate the licensee's immediate corrective actions taken related to the issue and the extent of condition completed for the other startup transformers, CT-5, and the Keowee step-up transformer. Verify acceptability of the completed temporary modifications.

9. Review and evaluate the licensee's operability and past operability determinations of CT-3 and CT-1, to include:

    a. How many strands of wire are necessary to carry 80 amps and 35MWe which is the ESF loading criteria.
    b. Exact times that the emergency AC power paths were out of service over the required operability times from the last time it was proven that these startup transformers would have carried full load.
    c. Review available Duke test data of the intact core of CT-2 cable which was removed to verify it would carry 100 amps for applicability to conditions discovered on CT-3.

10. Assess the licensee's actions resulting from NRC generic communications, vendor technical bulletins, and industry operating experience related to similar events.

11. Collect data necessary to support completion of the significance determination process, if applicable.

12. Identify any potential generic safety issues and make recommendations for appropriate follow-up action (e.g., Information Notices, Generic Letters, and Bulletins).

C. Guidance

Inspection Procedure 93812, "Special Inspection," provides additional guidance to be used during the conduct of the Special Inspection. Your duties will be as described in Inspection Procedure 93812. The inspection should emphasize fact-finding in its review of the circumstances surrounding the event. Safety or security concerns identified that are not directly related to the event should be reported to the Region II office for appropriate action.

You will report to the site, conduct an entrance, and begin inspection no later than January 5, 2016. A daily status briefing of Region II management will be provided beginning the second day on-site at approximately 12:00 p.m., Eastern Daylight Time (EDT). In accordance with IP 93812, you should promptly recommend a change in inspection scope or escalation if information indicates that the assumptions utilized in the MD 8.3 risk analysis were not accurate. A report documenting the results of the inspection should be issued within 45 days of the completion of the inspection. The report should address all applicable areas specified in section 3.02 of Inspection Procedure 93812. At the completion of the inspection you should provide recommendations for improving the reactor oversight process baseline inspection procedures and the special inspection process based on any lessons learned.

This charter may be modified should you develop significant new information that warrants review. Should you have any questions concerning this charter, contact Frank Ehrhardt at 404-997-4611.

Docket No. 50-269, 50-287
License No. DPR-38, DPR-55

CONTACT: Frank Ehrhardt, RII/DRP
404-997-4611

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ADAMS: ☒ Yes ACCESSION NUMBER: ML15363A296 ☒ SUNSI REVIEW COMPLETE ☐ FORM 665 ATTACHED

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