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0CAN050701

May 7, 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Response to Generic Letter 2007-01
Arkansas Nuclear One – Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

References:

1. NRC Generic Letter 2007-01, dated February 7, 2007 "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients" (0CNA020707)

2. NEI letter from J. H. Riley to Administrative Points of Contact, dated March 16, 2007 "Guidance for Response to Generic Letter (GL) 2007-01"

3. NRC Letter from Michael J. Case, to J. H. Riley dated April 13, 2007, "Response to Nuclear Energy Institute (NEI) Letter Dated March 26, 2007 – Re: Interpretation of GL 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

Dear Sir or Madam:

Per reference 1, the NRC issued GL 2007-01 to request facilities to submit the following information to the NRC within 90 days of the date of the generic letter:

(1) Provide a history of inaccessible or underground power cable failures for all cables that are within the scope of 10CFR50.65 (the maintenance rule), and for all voltage levels indicate the type, manufacturer, date of failure, type of service, voltage class, years of service, and the root causes for the failure.

(2) Describe inspection, testing and monitoring programs to detect the degradation of inaccessible or underground power cables that support emergency diesel generators, offsite power, essential service water, service water, component cooling water, and other systems that are within the scope of 10CFR50.65 (the maintenance rule).

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The response to Question 1 is provided in the attachment to this letter. In researching plant records for the requested information, Entergy used the NEI and NRC guidance provided in references 2 and 3 to clarify the population of cables of interest. Data bases researched included plant condition reporting system, plant data management system, and the maintenance rule database. To date, Arkansas Nuclear One (ANO) has experienced five cable failures within the scope of the GL.

In response to Question 2, ANO inspection, testing, and monitoring practices presently include visual cable inspection during routine operations, periodic meggering of cables and connected equipment associated with maintenance activities, and periodic inspection of manholes for dewatering. The ANO corrective action program is used to determine root cause and extent of conditions where deemed necessary and would be the mechanism for determining the need for and extent of any increased cable monitoring.

No new commitments are identified in this submittal. If you have any questions or require additional information, please contact Ms. Natalie Mosher at (479) 858-4635.

The requested information is being provided pursuant the requirements of 10CFR50.54(f). I declare under the penalty of perjury that the foregoing information is true and correct. Executed on May 7, 2007.

Sincerely,

TGM/nbm

Attachment

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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Arlington, TX 76011-8064

NRC Senior Resident Inspector
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U. S. Nuclear Regulatory Commission
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Attachment to

0CAN050701

History of Inaccessible or Underground Power Cable Failures Within the Scope of 10CFR50.65 for ANO

History of Inaccessible or Underground Power Cable Failures within the Scope of 10CFR50.65 for ANO

Cable Type	Voltage Class	Manufacturer	Date of Failure/ Service (Yrs.)	Type of Service	Root Cause *
250 Million Circular Mils (MCM) Black Ethylene Propylene Rubber (EPR) (shielded)	5 kV cable rating 4160 VAC nominal service	Anaconda	05/06/93 (15 yrs) (original installation in 1978)	2P-4A (ANO-2 service water pump) Normally energized. Cable ID: R2A302A, B, C	Indeterminate. Independent test lab concluded that there was no direct evidence for the cause of the fault. Other than the fault site, the remainder of the cable was electrically sound.
250 MCM Black EPR (shielded)	5 kV cable rating 4160 VAC nominal service	General Cable Corporation	11/10/95 (21 yrs) (original installation in 1974)	P-4C (ANO-1 service water pump) Normally energized. Cable ID: GPA402A (now identified as GPA402B, C, D after cable replacement and splice in manhole #3)	Indeterminate. First failure occurred between the pump and manhole #3. Just this section of cable was replaced. Independent lab testing revealed no exact cause for the failure, and testing of the cable at locations other than the fault site revealed above average breakdown level for cable of this vintage, indicating that the failure was an isolated incident.

Cable Type	Voltage Class	Manufacturer	Date of Failure/ Service (Yrs.)	Type of Service	Root Cause *
250 MCM Black EPR (shielded)	5 kV cable rating 4160 VAC nominal service	General Cable Corporation	10/10/99 (25 yrs) (original installation in 1974)	P-4C (ANO-1 service water pump) Normally energized. Cable ID: GPA402A (now identified as GPA402B1, C1, D1 after cable replacement)	Indeterminate. Second failure occurred between the breaker and manhole #3. Just this section of cable was replaced. Independent lab testing (using different lab than previous failure) indicated that the failure was most likely due to voids or water treeing; however, due to the dark color of the insulation (Black EPR), a conclusive inspection for water treeing was unable to be performed.
250 MCM Black EPR (shielded)	5 kV cable rating 4160 VAC nominal service	General Cable Corporation	01/27/01 (27 yrs) (original installation in 1974)	P-6A (electric fire water pump) Normally energized. Cable ID: A114A (now identified as A114A1, B1, C1 after cable replacement)	Trouble shooting revealed a tear in the cable jacket at the fault site, indicating that it was most likely due to damage that occurred during the original cable pull.

Cable Type	Voltage Class	Manufacturer	Date of Failure/ Service (Yrs.)	Type of Service	Root Cause *
250 MCM Black EPR (shielded)	5 kV cable rating 4160 VAC nominal service	Anaconda	02/05/03 (25 yrs) (original installation in 1978)	2P-4C (ANO-2 service water pump) Normally energized. Cable ID: G2A402A, B, C	No formal failure analysis was performed. Since this was the fifth failure of underground cables, an adverse trend condition report (CR) was written to address the failures.

*The adverse trend CR (CR-ANO-C-2003-00067) was written concurrently with the fifth failure of underground cables in a 10-year period. As shown in the table, the exact cause of these failures was indeterminate, but the most probable cause is now believed to be water treeing. The failed underground cables at ANO had black EPR insulation and therefore, could not be microscopically inspected for water treeing. (The water treeing test requires a cable sample to be boiled until translucent to allow for inspection, and black EPR insulation doesn't turn translucent). It is now known that black EPR insulation is made using carbon black which has a tendency to pull in moisture making it more susceptible to water treeing. The corrective action plan from this adverse trend CR replaced all remaining black EPR insulated underground safety-related 4160 VAC power cables at ANO with red EPR insulated cables that contain no carbon black. EPRI Report 1003664, *Medium-Voltage Cables in Nuclear Plant Applications – State of Industry and Condition Monitoring*, dated October 2003, provides more information on the water treeing phenomenon.