Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.54(f)

May 3, 2007
3F0507-06

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

Subject: Crystal River Unit 3 – 90-Day Response to NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

References:
1. Generic Letter 2007-01 dated February 7, 2007, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
2. Letter from James H. Riley (Nuclear Energy Institute) to Chief, Regulatory Analysis, Policy & Rulemaking (Nuclear Regulatory Commission) dated March 26, 2007, "Interpretation of GL 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
3. Letter from Michael J. Case (Nuclear Regulatory Commission) to James H. Riley (Nuclear Energy Institute) dated April 13, 2007, "Response to Nuclear Energy Institute (NEI) Letter Dated March 26, 2007 – RE: Interpretation of Generic Letter (GL) 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

Dear Sir:

On February 7, 2007, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients (Reference 1)," which requested licensees to provide a response to two questions within 90 days of the date of issuance of the GL. Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., hereby provides the requested 90-day response to GL 2007-01 for the Crystal River Unit 3 Nuclear Plant.

Reference 2 was prepared by the Nuclear Energy Institute (NEI) to document their interpretation of the two questions contained in GL 2007-01 for use by the industry in developing a response. Reference 3 documents the NRC's response to NEI's interpretation. The attached response reflects the guidance provided in References 2 and 3.

This letter establishes no new regulatory commitments.

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

A127

If you have any questions regarding this submittal, please contact Mr. Paul Infanger, Supervisor, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,

Dale E Young

Dale E. Young
Vice President
Crystal River Nuclear Plant

DEY/dar

Attachment: 90-Day Response to NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector

STATE OF FLORIDA

COUNTY OF CITRUS

Dale E. Young states that he is the Vice President, Crystal River Nuclear Plant for Florida Power Corporation, doing business as Progress Energy Florida, Inc.; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Dale E. Young
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 3rd day of May, 2007, by Dale E. Young.

Signature of Notary Public
State of Florida

ELLEN DEPPOLDER
MY COMMISSION # DD 408539
EXPIRES: July 8, 2009
Bonded Thru Notary Public Underwriters

(Print, type, or stamp Commissioned
Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

90-Day Response to Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

Responses to Questions from Generic Letter 2007-01

On February 7, 2007, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients." This GL requested each facility to provide a response to two questions within 90 days of the date of issuance of the GL. Reference 1 was prepared by the Nuclear Energy Institute (NEI) to document their interpretation of questions contained in GL 2007-01 for use by the industry in developing a response. Reference 2 documents the NRC's response to NEI's interpretation. The responses for Crystal River Unit 3 (CR-3), provided below, have been prepared by Florida Power Corporation (FPC) consistent with the information in References 1 and 2.

NRC Question 1

Provide a history of inaccessible or underground power cable failures for all cables that are within the scope of 10 CFR 50.65 (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.

FPC Response 1

To implement the guidance contained in References 1 and 2 correctly, the following conditions were considered in researching the history of inaccessible or underground power cable failures at CR-3:

- Only power cables were considered
  - This included distribution cables (buss, motor control centers, load center feeds).
  - This excluded cables for instrumentation, control, indication, etc.
- Voltage Range
  - All voltage levels for both alternating current (AC) and direct current (DC) were considered.
  - Only power cables were considered which excluded most DC cables, instrumentation, control and indication cables.
- Failure History
  - Research included cable failures that could be searched for in an electronic database, regardless of the actual date of failure.
  - In-service failures were included.
  - Testing failures were included.
  - Cable test failures should not be treated separately.

A review of the CR-3 history database for failures of these power cables routed in underground duct banks and conduits identified three related failures of the same cable, two of these being in-service failures, and the other, a test failure. The related in-service failures were the subject of the Licensee Event Report documented in Reference 5. The following description is provided for these related failures:

Type	HT (EPR) with ground cable, no shielding.
Manufacturer	Kerite
Date(s) of Failure	June 17, 2002 (In-service failure) July 20, 2002 (In-service failure) December 18, 2002 (Test failure during megger testing)
Type of Service	Normally energized power cable supporting the Offsite Power Transformer (OPT) in circuit MTM241 -- providing one of two qualified offsite power circuits required by CR-3 Improved Technical Specification (ITS) 3.8.1, AC Sources – Operating.
Voltage Class	Normal Voltage – 4.16 kilovolts alternating current (KVAC) Cable Rating Voltage – 5.0 KVAC
Years of Service	Placed in service 1989 Net Years of Service: 2002 – 1989 = 13 years
Root Causes for Failure	Damaged cable jacket, probably caused during installation. Short to ground, caused by lightning strike through damaged cable jacket.

The CR-3 OPT and associated cables were first installed in 1989. The power feed from the OPT, circuit MTM241, is one of two qualified circuits required by CR-3 ITS 3.8.1, AC Sources – Operating. It is a 4.16 KVAC line containing six three-conductor bundles, each conductor having an area of 750 thousand circular mil, with Kerite HT (EPR) insulation and 125 mils of chlorosulfonated polyethylene as the jacket material (see Figure 1). Except where the cable passed over the discharge canal, it was laid out in a concrete underground duct bank.

During a storm on June 17, 2002, the OPT, which was feeding the Engineered Safeguards Actuation 4.16 KVAC switchgear at the time, tripped off-line. This in-service failure occurred during an electrical storm and was attributed to an apparent lightning strike. A lightning-induced voltage surge created a short to ground where the cable jacket had been stripped to splice the conductors during installation. After this failure occurred, the damaged conductor insulation was repaired. Follow-up cable insulation megger testing identified some unusually low insulation resistance on other cables. All cables were repaired, retested, and found to be acceptable.

On July 20, 2002, the OPT tripped again. This time, there was no electrical storm activity in the area. Inspection of the same power feed cables from the OPT indicated another short to ground had occurred, but this time it was on a different conductor. This in-service failure resulted from an aberration in the conductor insulation that was most likely a consequence of the June 17, 2002 lightning event. The insulation in which the short to ground occurred was located under a zippered mechanical protective cover placed on the cable as part of the June 17, 2002 repair. As corrective measure for the July 20, 2002 in-service failure, these mechanical covers were replaced with splicing tape. As a preventative measure, periodic megger testing was initiated to monitor any future cable degradation.

On December 18, 2002, the periodic megger testing identified a conductor in this same set of cables that fell below the minimum accepted standard of 5.0 megohms indicating potential insulation damage consistent with the two previous in-service failures. This was considered a testing failure. Because of the its degraded condition, the cable was taken out of service. Since then, the entire circuit from the OPT to the termination enclosure has been replaced.

These cable failures are not age-induced. The root cause for the in-service failures was defined as a short to ground caused by a lightning strike (or in the second and third occurrence, most likely caused by latent damage from the lightning strike) in the presence of damaged cable insulation. In all cases, the insulation damage was the result of a lightning surge, not age.
A potential contributing factor to the last two occurrences was the as-left configuration of the cables following the June 2002 repairs. The conductors and cable grounds were bundled together and covered with the zippered protective cover. In an unspliced cable, filler material maintains a separation of approximately a quarter inch between the conductor and ground cables. Following the June 2002 repairs, water that had collected in the duct bank, and subsequently, in the zippered jackets, had leached out this filler material. As such, the separation it provided between the conductor and ground cables was most likely compromised.

NRC Question 2

Describe inspection, testing and monitoring programs to detect the degradation of inaccessible or underground power cables that support EDGs, offsite power, ESW, service water, component cooling water and other systems that are within the scope of 10 CFR 50.65 (the Maintenance Rule).

FPC Response 2

At CR-3, the medium voltage power cables that are inaccessible or underground provide support to the following systems:

- Emergency Diesel Generators
- Circulating Water System
- OPT

The only medium voltage inaccessible or underground power cables connected to large pumps at CR-3 that are tested are those for the Circulating Water Pumps. These are tested with the pump motors in accordance with the motor testing program procedure (Reference 3) during every refueling outage. The standard test consists of a low resistance DC bridge, inductive AC bridge, AC capacitance to ground, DC megohm to ground, and a polarization index. High potential testing is performed on new or newly repaired motors.

Power cables from the emergency diesel generators to the 4.16 KVAC switchgear are tested as part of the diesel generator stator insulation check every two years (Reference 4). This procedure performs a megger test on the stator windings and includes the cables.

There is no inspection, testing or monitoring program for inaccessible or underground power cables supporting the OPT.

At CR-3, the low voltage power cables that are inaccessible or underground provide support to the following six items:

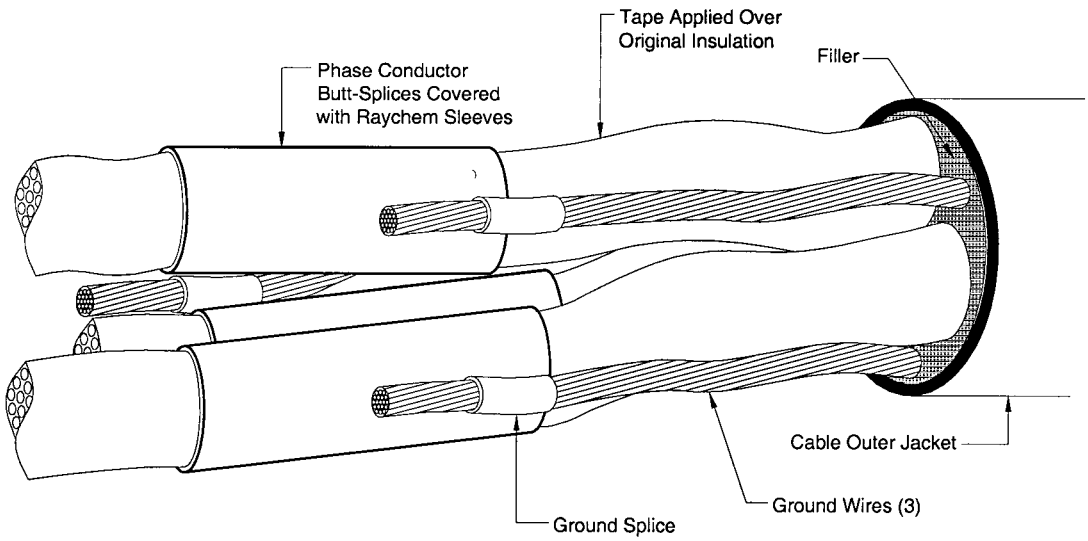
- Emergency Diesel Generators
- Emergency Feedwater System
- Circulating Water System

- Station Air
- Substation
- Miscellaneous AC distribution panels that fall within the scope of 10 CFR 50.65 (the Maintenance Rule)

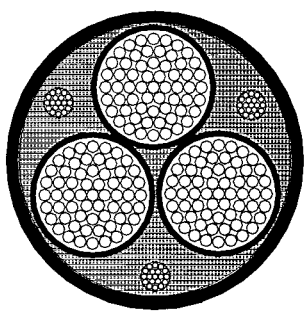
Currently, there is no inspection, testing or monitoring program to detect the degradation of inaccessible or underground power cables that are low voltage at CR-3. However, a preventive maintenance task (Work Item PMID 41879-01) exists to examine manholes and duct banks annually and to pump out any water found.

References:

1. Letter from James H. Riley (NEI) to Chief, Regulatory Analysis, Policy, & Rulemaking (NRC) dated March 26, 2007, "Interpretation of GL 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
2. Letter from Michael J. Case (Office of Nuclear Reactor Regulation) to James H. Riley (NEI) dated April 13, 2007, "Response to Nuclear Energy Institute (NEI) Letter Dated March 26, 2007 – RE: Interpretation of Generic Letter (GL) 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"
3. Preventive Maintenance PM-105. Inspection, Testing and Maintenance of Electrical Motors
4. Preventive Maintenance PM-123. Periodic Electrical Checks of Emergency Diesel Generators
5. Licensee Event Report 50-302/02-001-00 dated August 14, 2002, "Automatic Start Of An Emergency Diesel Generator Due To Loss Of The Offsite Power Transformer"



AS-LEFT CABLE CONFIGURATION AFTER JULY 20, 2002 EVENT



ORIGINAL CABLE CONFIGURATION

Figure 1: Offsite Power Transformer Cable