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10 CFR 50.54(f)

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December 7, 2007

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Oyster Creek Nuclear Generating Station
Facility Operating License No. DPR-16
NRC Docket No. 50-219

Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

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Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Three Mile Island Nuclear Station, Unit 1
Facility Operating License No. DPR-50
NRC Docket No. 50-289

Subject: Exelon Generation Company, LLC/AmerGen Energy Company, LLC Response to the Request for Additional Information (RAI) Regarding Resolution of NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients"

References:

1. Letter from D. M. Benyak (Exelon Generation Company, LLC/AmerGen Energy Company, LLC) to U.S. NRC, "Response to NRC Generic Letter 2007-01, Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients", dated May 7, 2007

2. Letter from G. Edward Miller (NRC) to Mr. Charles G. Pardee (Exelon Generation Company, LLC/AmerGen Energy Company, LLC), dated November 6, 2007, "Braidwood Station, Units 1 and 2; Byron Station, Units 1 and 2; Clinton Power Station, Unit 1; Dresden Nuclear Power Station, Units 1, 2, and 3; LaSalle County Station, Units 1 and 2; Limerick Generating Station, Units 1 and 2; Oyster Creek Nuclear Generating Station; Peach Bottom Atomic Power Station, Units 1, 2, and 3; Quad Cities Nuclear Power Station, Units 1 and 2; and Three Mile Island Nuclear Station, Unit 1, - Request for Additional Information Re: Response to Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Management [sic] Systems or Cause Plant Transients" (TAC NOS. MD4298, MD4299, MD4305, MD4306, MD4312, MD4323, MD4324, MD4340, MD4341, MD4342, MD4343, MD4356, MD4361, MD4362, MD4369, MD4370, AND MD4389)"

On February 7, 2007, the NRC issued Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients". The GL requested that all holders of operating licenses submit a written response within 90 days in accordance with 10 CFR 50.54, "Conditions of licenses," paragraph (f). The GL requested the following information.

(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.

(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).

In the Reference 1 letter, Exelon Generation Company, LLC (EGC) and AmerGen Energy Company, LLC (AmerGen) provided the 90-day response to the requested information to GL 2007-01 for Braidwood Station, Byron Station, Clinton Power Station, Dresden Nuclear Power Station, LaSalle County Station, Limerick Generating Station, Oyster Creek Nuclear Generating Station, Peach Bottom Atomic Power Station, Quad Cities Nuclear Power Station, and Three Mile Island Nuclear Station Unit 1.

In the Reference 2 letter, the NRC requested additional information to complete its review of GL 2007-01. The RAI requested the following information:

(1) The NRC staff has received the cable failure histories for the subject plants in response to GL 2007-01. The licensee stated that the second phase of the cable-testing program (Step Voltage HiPot Testing) used appropriate diagnostic test methodologies if the results of the first phase of the testing program indicated problems. Describe the diagnostic testing program and test methodologies implemented in the second phase of the cable-testing program.

(2) *Oyster Creek Only*: The licensee stated that it had replaced 26 cables at Oyster Creek prior to failure due to indications from the cable-testing program. The licensee also stated that it replaced eight additional cables due to a possible extent of condition concern because of some failures of Anaconda UniShield cables. Provide the information for the replaced cables as requested in GL 2007-01, or justify why these cables are not within the scope of the GL.

The Attachment provides the Exelon/AmerGen response to this RAI. There are no regulatory commitments made in this letter. Should you have any questions concerning this letter, please contact Frank Mascitelli at (610) 765-5512.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7th day of December 2007.

Respectfully,

9 for

Pamela B. Cowan
Director - Licensing and Regulatory Affairs
Exelon Generation Company, LLC
AmerGen Energy Company, LLC

Attachment:

"Response to Generic Letter 2007-01 RAI for Braidwood Station, Byron Station, Clinton Power Station, Dresden Nuclear Power Station, LaSalle County Station, Limerick Generating Station, Oyster Creek Nuclear Generating Station, Peach Bottom Atomic Power Station, Quad Cities Nuclear Power Station, and Three Mile Island Nuclear Station Unit 1"

cc: Regional Administrator - NRC Region I
Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Braidwood Station
NRC Senior Resident Inspector - Byron Station
NRC Senior Resident Inspector - Clinton Power Station
NRC Senior Resident Inspector - Dresden Nuclear Power Station
NRC Senior Resident Inspector - LaSalle County Station
NRC Senior Resident Inspector - Limerick Generating Station
NRC Senior Resident Inspector - Oyster Creek Nuclear Generating Station
NRC Senior Resident Inspector - Peach Bottom Atomic Power Station
NRC Senior Resident Inspector -Three Mile Island Nuclear Station, Unit 1
NRC Senior Resident Inspector - Quad Cities Nuclear Power Station
NRC Project Manager, NRR - Braidwood Station
NRC Project Manager, NRR - Byron Station
NRC Project Manager, NRR - Clinton Power Station
NRC Project Manager, NRR - Dresden Nuclear Power Station
NRC Project Manager, NRR - LaSalle County Station
NRC Project Manager, NRR - Limerick Generating Station
NRC Project Manager, NRR - Oyster Creek Nuclear Generating Station
NRC Project Manager, NRR - Peach Bottom Atomic Power Station
NRC Project Manager, NRR - Three Mile Island Nuclear Station, Unit 1
NRC Project Manager, NRR - Quad Cities Nuclear Power Station
Illinois Emergency Management Agency - Division of Nuclear Safety
Director, Bureau of Radiation Protection - Pennsylvania Department of Environmental Resources
Director, Bureau of Nuclear Engineering, New Jersey Department of Environmental Protection
Chairman, Board of County Commissioners of Dauphin County, PA
Chairman, Board of Supervisors of Londonderry Township, PA
Mayor of Lacey Township, Forked River, NJ
R. I. McLean, State of Maryland
R. R. Janati, Commonwealth of Pennsylvania
B. Fore, Clinton Power Station (Electronic Copy)
D. Tubbs, Mid-American Energy (Quad Cities)
PA DEP BRP Inspector - LGS, SSB2-4

ATTACHMENT
Response to Generic Letter 2007-01 RAI for Braidwood Station, Byron Station, Clinton Power Station, Dresden Nuclear Power Station, LaSalle County Station, Limerick Generating Station, Oyster Creek Nuclear Generating Station, Peach Bottom Atomic Power Station, Quad Cities Nuclear Power Station and Three Mile Island Nuclear Station Unit 1

NRC Request 1

The NRC staff has received the cable failure histories for the subject plants in response to GL 2007-01. The licensee stated that the second phase of the cable-testing program (Step Voltage HiPot Testing) used appropriate diagnostic test methodologies if the results of the first phase of the testing program indicated problems. Describe the diagnostic testing program and test methodologies implemented in the second phase of the cable-testing program.

Response

The following is the response (Ref. 1) previously provided for those sites that are in the screening stage of cable testing (Braidwood Station, Byron Station, Clinton Power Station, Dresden Nuclear Power Station, LaSalle County Station, Quad Cities Nuclear Power Station and Three Mile Island Nuclear Station Unit 1):

> *"If the results of screening indicate problems with the cables, then an appropriate diagnostic cable test program is implemented. The diagnostic test methodology will be selected based upon the nature of the identified cable degradation. The diagnostic cable testing will be applied to all cables in the suspect population. Note that a sizeable population of the Exelon Nuclear cables is unshielded and, as such, the testing methodologies identified in the GL (i.e., partial discharge, time domain reflectometry, dissipation factor, and very low frequency alternating current) would not be applicable."*

As indicated in the response, a specific diagnostic testing methodology has not been identified, nor is there an identified preferred testing methodology pre-selected for every contingency. There are many considerations in selecting a diagnostic testing methodology. A comprehensive discussion is provided on cable testing methodologies in both IEEE 400, "IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems," and NEI document NEI 06-05, "Medium Voltage Underground Cable White Paper." The recurring theme in both of these documents is that there are advantages and disadvantages to every cable testing methodology, and that the selected methodology needs to be customized to the cable and anticipated failure modes.

The Exelon Nuclear Cable Condition Monitoring Program, ER-AA-3003, describes two pilot programs currently being utilized for diagnostic cable monitoring. Limerick Generating Station is piloting the use of Very Low Frequency (VLF) Dissipation Factor (Tan-δ) testing. Oyster Creek Nuclear Generating Station is piloting the use of Online Partial Discharge testing. Exelon has had success with both of these methodologies, and would consider extending their application to other facilities as appropriate, if the need for diagnostic testing arose. This is not to imply that other test methodologies as described in IEEE 400 would not be utilized based upon the circumstances.

The Exelon/AmerGen response to Generic Letter 2007-01 (Reference 1) identified concerns with Peach Bottom Atomic Power Station's capability to perform cable screening. Peach Bottom Atomic Power Station has a commitment under License Renewal to perform cable testing for a representative sample population of inaccessible medium voltage cables. The cables identified in the representative sample population include XLPE, tree resistant XLPE, and EPR cables. The testing will be completed in accordance with the timing set forth in the License Renewal commitment. A testing methodology has not yet been finalized for this effort; however, considerations are consistent with the items discussed above.

The Exelon/AmerGen nuclear fleet consists of 10 sites with a vast variety of medium voltage cable types, consisting of butyl rubber, XLPE and various EPR types of insulation. Cable installations consist of shielded and unshielded cables, and utilize traditional and Unishield design cable construction. Each of these cables presents different challenges for diagnostic testing. There are presently no industry consensus approved methodologies for diagnostic testing of unshielded cables. Unshielded cables represent a significant percentage of the fleet's medium voltage cables. Unlike the table of criterion presented in IEEE 400 for Tan-δ testing of EPR cables, there is very little library information available on butyl rubber insulated cables.

In summary, a standard test methodology has not been adopted for diagnostic testing. If the screening or internal/external operating experience were to identify issues associated with particular medium voltage cables, the Corrective Action Program and Cable Condition Monitoring Program will have the identified condition analyzed and a potential extent of condition identified. An appropriate diagnostic test methodology per IEEE 400 will be identified (for shielded cables) based upon the cable type and failure mechanism. Cables within the extent of condition population will be subject to the diagnostic testing.

NRC Request 2

Oyster Creek Only: The licensee stated that it had replaced 26 cables at Oyster Creek prior to failure due to indications from the cable-testing program. The licensee also stated that it replaced eight additional cables due to a possible extent of condition concern because of some failures of Anaconda UniShield cables. Provide the information for the replaced cables as requested in GL 2007-01, or justify why these cables are not within the scope of the GL.

Response

The 26 cables that were replaced as a result of the cable testing program, and the eight additional cables that were replaced due to possible extent of condition concerns were not included in the response since these were not considered failures. The cable testing program was begun under the corrective action program as a result of the initial cable failures. Testing of the original GE cables (Step voltage Hi-Pot) was successful in identifying degrading cables for replacement prior to failures.

The following table (Table 1) is a list of the cables that were replaced based upon results of the cable testing program. Note that the last four cables listed in the table (Startup and Aux Transformers) were not routed underground.

Table 1
Oyster Creek Nuclear Generating Station

Cable Type (Size, #/C, Ins., Shielded, metallic	**Voltage Class** (Class / Oper.)	**Manufacturer**	**Date of Replace ment/ Service** (Yrs.)	**Type of Service** (Energized, Duct, Conduit)
6-1/C 500 mcm XLPE, shielded, metallic, two feeds, 3-1/C each	5KV/ 4160V	GE	1991/22	Feed water A, Underground conduit, energized continuously.
6-1/C 500 mcm XLPE, shielded, metallic, two feeds, 3-1/C each	5KV/ 4160V	GE	1984/15	Feed water B, Underground conduit, energized continuously.
6-1/C 500 mcm XLPE, shielded, metallic, Two feeds, 3-1/C each	5KV/ 4160V	GE	1984/15	Feed water C, Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Condensate Pump B. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Condensate Pump C. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1993/24	Reactor Recirc. MG Set Motor A. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1993/24	Reactor Recirc. MG Set Motor B. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1993/24	Reactor Recirc. MG Set Motor C. Underground conduit, energized continuously.

Cable Type (Size, #/C, Ins., Shielded, metallic	**Voltage Class** (Class / Oper.)	**Manufacturer**	**Date of Replace ment/ Service** (Yrs.)	**Type of Service** (Energized, Duct, Conduit)
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1998/29	Reactor Recirc. MG Set Motor D. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Reactor Recirc. MG Set Motor E. Underground conduit, energized continuously.
3-1/C 4/0, XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Unit substation 1B1, Underground conduit, energized continuously.
3-1/C 500 mcm XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Unit substation 1A2. Underground conduit, energized continuously.
3-1/C 500 mcm EPR, unishield	5KV/ 4160V	Anaconda	1991/ 7	Unit substation 1A2. Underground conduit, energized continuously.
3-1/C 500 mcm XLPE, shielded, metallic	5KV/ 4160V	GE	1984/15	Unit substation 1B2. Underground conduit, energized continuously.
3-1/C 500 mcm EPR, unishield	5KV/ 4160V	Cablec	1996/6	Unit substation 1B2. Underground conduit, energized continuously.
6-1/C 500 mcm EPR, unishield, two feeds 3-1/C each.	5KV/ 4160V	Cablec	1994/6	EDG-2, Underground conduit, energized continuously.
3-1/C 2/0 XLPE, shielded, metallic	5KV/ 4160V	GE	2000/31	Clean-up pump A. Underground conduit, energized continuously.

Cable Type (Size, #/C, Ins., Shielded, metallic	**Voltage Class** (Class / Oper.)	**Manufacturer**	**Date of Replace ment/ Service** (Yrs.)	**Type of Service** (Energized, Duct, Conduit)
3-1/C 2/0 XLPE, shielded	5KV/ 4160V	GE	2002/33	Clean-up pump B. Underground conduit, energized continuously.
3-1/C 4/0 XLPE, shielded,	5KV/ 4160V	GE	1991/22	Circulating Water Pump A. Underground conduit. Energized continuously.
3-1/C 4/0 XLPE, shielded,	5KV/ 4160V	GE	1991/22	Circulating Water Pump B. Underground conduit. Energized continuously.
3-1/C 4/0 XLPE, shielded,	5KV/ 4160V	GE	1991/22	Circulating Water Pump C. Underground conduit. Energized continuously.
3-1/C 4/0 XLPE, shielded,	5KV/ 4160V	GE	1991/22	Circulating Water Pump D. Underground conduit. Energized continuously.
12-1/C, 1500 mcm (4-1/C per phase), non-shielded, XLPE, aluminum conductor	5KV/ 4160V	GE	1979/10	Start-up transformer 1A, energized continuously.
12-1/C, 1500 mcm (4-1/C per phase), non-shielded, XLPE, aluminum conductor	5KV/ 4160V	GE	1979/10	Start-up transformer 1B, energized continuously.
9-1/C, 1000 mcm (3-1/C per phase), XLPE non-shielded, aluminum conductor	5KV/ 4160V	GE	1979/10	Aux transformer 1A, energized continuously.
9-1/C, 1000 mcm (3-1/C per phase), XLPE non-shielded, aluminum conductor	5KV/ 4160V	GE	1979/10	Aux transformer 1B, energized continuously.

Anaconda Unishield cables were used as replacement cables for the GE cables. Oyster Creek started to experience failures of the replacement cables within 5-6 years of installation. The cable testing program was applied to the population of Anaconda cables; however, it was not providing trending information that could be used to replace the cables prior to failure. A decision was made to replace the critical Anaconda cables susceptible to failure prior to indication of failure. The eight cables listed in Table 2 are those that were replaced under that population.

Table 2
Oyster Creek Nuclear Generating Station

Cable Type (Size, #/C, Ins., Shielded, metallic	**Voltage Class** (Class / Oper.)	**Manufacturer**	**Date of Replacement/ Service** (Yrs.)	**Type of Service** (Energized, Duct, Conduit)
6-1/C 500 mcm EPR, unishield, two feeds, 3-1/C each	5KV/ 4160V	Anaconda	2004/20	Feed water B, Underground conduit, energized continuously.
6-1/C 500 mcm EPR, unishield, two feeds, 3-1/C each	5KV/ 4160V	Anaconda	2006/22	Feed water C, Underground conduit, energized continuously.
3-1/C 4/0 EPR, unishield	5KV/ 4160V	Anaconda	2004/20	Condensate Pump B. Underground conduit, energized continuously.
3-1/C 4/0 EPR, unishield, metallic	5KV/ 4160V	Anaconda	2006/22	Condensate Pump C. Underground conduit, energized continuously.
3-1/C 2/0, shielded, metallic	5KV/ 4160V	Anaconda	2006/18	Unit substation 1A3, Underground conduit, energized continuously.
3-1/C 4/0, EPR, unishield	5KV/ 4160V	Anaconda	2004/20	Unit substation 1B1, Underground conduit, energized continuously.
3-1/C 500 mcm EPR, unishield	5KV/ 4160V	Anaconda	2002/11	Unit substation 1A2. Underground conduit, energized continuously.
3-1/C 500 mcm EPR, unishield	5KV/ 4160V	Anaconda	2002/1	Unit substation 1B2. Underground conduit, energized continuously.