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Dominion®

February 3, 2014

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 13-678
NL&OS/ETS R0
Docket Nos. 50-338/339
50-280/281
50-336/423
License Nos. NPF-4/7
DPR-32/37
DPR-65
NPF-49

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
DOMINION NUCLEAR CONNECTICUT (DNC)
NORTH ANNA POWER STATION UNITS 1 AND 2
SURRY POWER STATION UNITS 1 AND 2
MILLSTONE POWER STATION UNITS 2 AND 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI)
REGARDING INITIAL RESPONSE TO NRC BULLETIN 2012-01
DESIGN VULNERABILITY IN ELECTRIC POWER SYSTEM

On July 27, 2012, the NRC issued NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," to 1) request information regarding each facility's electric power system design in light of the recent operating experience that involved the loss of one of the three phases of the offsite power circuits at Byron Station Unit 2, and 2) require a comprehensive verification of each facility's compliance with the regulatory requirements of GDC 17, "Electric Power Systems," in Appendix A, General Design Criteria (GDC) for Nuclear Power Plants to 10 CFR Part 50, or the applicable principal design criteria in the updated final safety analysis report. In an October 24, 2012 letter (Serial No. 12-519), Dominion and DNC provided a response to the Bulletin for each facility.

In a December 20, 2013 letter, the NRC requested additional information to verify that licensees have completed interim corrective actions and compensatory measures, and to determine the status of the long-term corrective actions. The attachments to this letter provide the requested information for the operating Dominion facilities.

IE76
NRR

If you have any questions or require additional information, please contact Mr. Thomas Shaub at (804) 273-2763.

Sincerely,

Mark D. Sartain
Vice President – Nuclear Engineering

VICKI L. HULL
Notary Public
Commonwealth of Virginia
140542
My Commission Expires May 31, 2014

Attachments:

1. North Anna Power Station Response to NRC RAI for Bulletin 2012-01
2. Surry Power Station Response to NRC RAI for Bulletin 2012-01
3. Millstone Power Station Response to NRC RAI for Bulletin 2012-01

Commitments made in this letter: No new regulatory commitments.

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Mark D. Sartain, who is the Vice President – Nuclear Engineering of Virginia Electric and Power Company and Dominion Nuclear Connecticut, Inc,. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 3rd day of February, 2014.

My Commission Expires: 5-31-14.

Vicki L. Hull
Notary Public

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ATTACHMENT 1

North Anna Power Station Response to NRC RAI for Bulletin 2012-01

Virginia Electric and Power Company
(Dominion)
North Anna Power Station Units 1 and 2

Request for Additional Information
Bulletin 2012-01, "Design Vulnerability in Electric Power System"

Background

On July 27, 2012, the NRC issued NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," (Agencywide Documents Access and Management System Accession No. ML1204A115) to all holders of operating licenses and combined licenses for nuclear power reactors. Bulletin 2012-01 requested information about each facility's electric power system design, in light of recent operating experience involving the loss of one of the three phases of the offsite power circuit (single-phase open circuit condition) at Byron Station, Unit 2.

In order for the NRC staff to complete its review of responses to the bulletin, the following information is requested:

NRC Question 1

Provide a summary of all interim corrective actions that have been taken since the January 30, 2012, event at Byron Station, Unit 2, to ensure that plant operators can promptly diagnose and respond to open conditions on the offsite power circuits for Class -1E vital buses until permanent corrective actions are completed.

Dominion Response

North Anna Power Station has identified and implemented the following interim corrective actions to address the Byron event. These interim corrective actions ensure that plant operators can promptly diagnose and respond to open phase conditions:

- Plant operators have been trained on the Byron event and on the indications expected if a loss of phase condition were to occur.

- Plant annunciator response procedures have been changed to include instruction for phase verification when the applicable control room annunciators actuate. The additional instruction is intended to assist Operations personnel with diagnosing the open phase condition and further instructs Operations personnel to manually separate from the affected offsite source if required.

- A modification to the Plant Computer System (PCS) has been completed to continuously monitor phase to phase voltage imbalance. An alarm level of 3.5% that automatically annunciates at a larger magnitude was set to aid Operations personnel in diagnosis of an open phase event. As identified by the Engineering analysis performed for the Byron event, presence of elevated percent voltage imbalance is directly correlated to a possible open phase condition. Therefore,

institution of these points has provided a method for continuous monitoring for an open phase event.

- The Electric Transmission weekly walkdown procedure has been changed to inspect the conditions of the lines supplying the Switchyard Offsite Supply Transformers.

NRC Question 2

Provide a status and schedule for completion of plant design changes and modification to resolve issues with an open phase of electric power.

Dominion Response

Status

- All holders of operating licenses and combined licenses for nuclear power reactors are investigating options being researched by several vendors (PSC2000, EPRI, Schweitzer, etc.) to detect open phase condition (OPC) faults.

- Dominion has not identified any off-the-shelf technology that has been proven to detect all of the required open phase fault conditions for the in-scope fleet transformers made up of various configurations (connections).

- Dominion is fully engaged with industry peers in development of the NEI OPC guidance document, as well as monitoring enhancements to software tools being used to analyze OPC faults. With the goal of ensuring accurate detection without compromising nuclear safety or increasing plant risk, this new OPC technology is being thoroughly evaluated and will be tested (as applicable), both singularly and with existing in-line protection.

- Dominion is currently performing load flow studies for the nuclear fleet at Millstone Power Station, North Anna Power Station and Surry Power Station to serve as a benchmark for forthcoming transient and load imbalance evaluations.

Schedule

The Dominion nuclear fleet plants committed to the generic schedule provided in the Industry OPC Initiative. Although it was Dominion's intention to meet the milestones of the initiative, the current status of Dominion's efforts to identify, develop and test a detection scheme, identify available equipment and integrate the existing fleet transformer outage and replacement schedules no longer support the OPC Initiative schedule. Specifically, Dominion will not complete the design, installation and testing of hardware/software for all applicable North Anna Power station's transformers by the 2016 date for installation and the 2017 date for functionality. The current schedule for completion of functionality for all applicable transformers, which assumes that viable

solutions for both voltage-based and current-based solutions have been developed and tested by December 31, 2014, is now December 31, 2020 for North Anna.

Dominion and the industry are investigating both voltage-based and current-based detection schemes. At this time, a solution for the voltage-based detection has been identified which appears to be a viable detection/protection option for the delta/wye transformer configurations. To date, a viable current-based detection scheme that could reliably provide the required protection without increasing other unwanted electrical distribution system transients (which in turn could increase plant risk and decrease reliability) has not been indentified and/or tested. A viable current-based detection scheme appears to be needed for some of North Anna Power Station's other transformer configurations (connections).

- Any further deviation from the Industry OPC Initiative schedule will be documented through the pending deviation/exemption process addressed in the NEI OPC Guidance Document.

ATTACHMENT 2

Surry Power Station Response to NRC RAI for Bulletin 2012-01

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

Request for Additional Information
Bulletin 2012-01, "Design Vulnerability in Electric Power System"

Background

On July 27, 2012, the NRC issued NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," (Agencywide Documents Access and Management System Accession No. ML1204A115) to all holders of operating licenses and combined licenses for nuclear power reactors. Bulletin 2012-01 requested information about each facility's electric power system design, in light of recent operating experience involving the loss of one of the three phases of the offsite power circuit (single-phase open circuit condition) at Byron Station, Unit 2.

In order for the NRC staff to complete its review of responses to the bulletin, the following information is requested:

NRC Question 1

Provide a summary of all interim corrective actions that have been taken since the January 30, 2012, event at Byron Station, Unit 2, to ensure that plant operators can promptly diagnose and respond to open conditions on the offsite power circuits for Class-1E vital buses until permanent corrective actions are completed.

Dominion Response

Surry Power Station has identified and implemented the following interim corrective actions to address the Byron event. These interim corrective actions ensure that plant operators can promptly diagnose and respond to open phase conditions.

- Plant operators have been trained on the Byron event and on the indications expected if a loss of phase condition were to occur.

- Plant operating procedures have been changed to include instruction for phase verification when control room annunciator "Bus 1 H (Typical) Degraded Voltage" actuates. This control room annunciator is expected in the case where there is an open phase in the switchyard. The additional instruction is intended to assist Operations personnel with diagnosing the open phase condition and further instructs Operations personnel to manually separate from the affected offsite source.

- Daily Operations rounds procedures have been changed to visually verify that the lines to the Switchyard Offsite Supply Transformers are intact.

- Daily Operations rounds procedures have been changed to observe the state of the Undervoltage Relay Lamps at the Undervoltage Relay Panels.

- The Electric Transmission weekly walkdown procedure has been changed to inspect the conditions of the lines supplying the Switchyard Offsite Supply Transformers.

NRC Question 2

Provide a status and schedule for completion of plant design changes and modification to resolve issues with an open phase of electric power.

Dominion Response

Status

- All holders of operating licenses and combined licenses for nuclear power reactors are investigating options being researched by several vendors (PSC2000, EPRI, Schweitzer, etc.) to detect open phase condition (OPC) faults.

- Dominion has not identified any off-the-shelf technology that has been proven to detect all of the required open phase fault conditions for the in-scope fleet transformers made up of various configurations (connections).

- Dominion is fully engaged with industry peers in development of the NEI OPC guidance document, as well as monitoring enhancements to software tools being used to analyze OPC faults. With the goal of ensuring accurate detection without compromising nuclear safety or increasing plant risk, this new OPC technology is being thoroughly evaluated and will be tested (as applicable), both singularly and with existing in-line protection.

- Dominion is currently performing load flow studies for the nuclear fleet at Millstone Power Station, North Anna Power Station, and Surry Power Station to serve as a benchmark for forthcoming transient and load imbalance evaluations.

Schedule

- The Dominion nuclear fleet plants committed to the generic schedule provided in the Industry OPC Initiative. Although it was Dominion's intention to meet the milestones of the initiative, the current status of Dominion's efforts to identify, develop and test a detection scheme, identify available equipment and integrate the existing fleet transformer outage and replacement schedules no longer support the OPC Initiative schedule. Specifically, Dominion will not complete the design, installation and testing of hardware/software for the Surry transformers by the 2016 date for installation and the 2017 date for functionality. The current schedule for completion of functionality for all applicable transformers, which assumes that viable solutions for both voltage-based and current-based solutions have been developed and tested by December 31, 2014, is now December 31, 2019 for Surry.

Dominion and the industry are investigating both voltage-based and current-based detection schemes. At this time, a solution for the voltage-based detection has been identified which appears to be a viable detection/protection option for the delta/wye transformer configurations. To date, a viable current-based detection scheme that could reliably provide the required protection without increasing other unwanted electrical distribution system transients (which in turn could increase plant risk and decrease reliability) has not been indentified and/or tested. A viable current-based detection scheme appears to be needed for some of Surry Power Station's other transformer configurations (connections).

- Any further deviation from the Industry OPC Initiative schedule will be documented through the pending deviation/exemption process addressed in the NEI OPC Guidance Document.

ATTACHMENT 3

Millstone Power Station Response to NRC RAI for Bulletin 2012-01

Dominion Nuclear Connecticut, Inc.
(DNC)
Millstone Station Power Station Units 2 and 3

Request for Additional Information
Bulletin 2012-01, "Design Vulnerability in Electric Power System"

Background

On July 27, 2012, the NRC issued NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," (Agencywide Documents Access and Management System Accession No. ML1204A115) to all holders of operating licenses and combined licenses for nuclear power reactors. Bulletin 2012-01 requested information about each facility's electric power system design, in light of recent operating experience involving the loss of one of the three phases of the offsite power circuit (single-phase open circuit condition) at Byron Station, Unit 2.

In order for the NRC staff to complete its review of responses to the bulletin, the following information is requested:

NRC Question 1

Provide a summary of all interim corrective actions that have been taken since the January 30, 2012, event at Byron Station, Unit 2, to ensure that plant operators can promptly diagnose and respond to open conditions on the offsite power circuits for Class-1E vital buses until permanent corrective actions are completed.

DNC Response

Millstone Power Station (MPS) has identified and implemented the following interim corrective actions to address the Byron event. These interim corrective actions ensure that plant operators can promptly diagnose and respond to open phase conditions:

- Plant operators have been trained, including simulator training, on the Byron event and the indications expected or lack of indication in some cases, as well as the course of action for the operators if a loss of phase condition were to occur.

- Operating procedures were revised to identify voltage imbalances during the weekly operator rounds. These procedure revisions are effective only for the grounded scenario since the voltages look normal for the ungrounded scenario.

- Operations, Maintenance and System Engineering walkdowns are also being performed periodically to help identify single phase open circuit conditions.

- In the fall of 2012, a multifunction relay was installed for voltage differential protection for Millstone Power Station Unit 2 (MPS2) RSST. (This relay was configured to detect both undervoltage and negative sequence voltage.) A computer alarm is generated in the MPS2 control room if either setpoint is reached.

- Switchyard locations where the insulator configurations are either cantilevered or underhung were identified. Since these configurations are more likely to lead to insulator failure, modifications to these configurations are currently being pursued by both Dominion and Northeast Utilities to minimize the probability of an insulator failure, which could result in an open phase scenario. The first modifications are currently scheduled for the spring of 2014 for MPS2 transformers.

NRC Question 2

Provide a status and schedule for completion of plant design changes and modification to resolve issues with an open phase of electric power.

Dominion Response

Status

- All holders of operating licenses and combined licenses for nuclear power reactors are investigating options being researched by several vendors (PSC2000, EPRI, Schweitzer, etc.) to detect open phase condition (OPC) faults.

- Dominion has not identified any off-the-shelf technology that has been proven to detect all of the required open phase fault conditions for the in-scope MPS2 and MPS3 transformers made up of various configurations (connections).

- Dominion is fully engaged with industry peers in development of the NEI OPC guidance document, as well as monitoring enhancements to software tools being used to analyze OPC faults. With the goal of ensuring accurate detection without compromising nuclear safety or increasing plant risk, this new OPC technology is being thoroughly evaluated and will be tested (as applicable), both singularly and with existing in-line protection.

- Dominion is currently performing load flow studies for the nuclear fleet at Millstone Power Station, North Anna Power Station, and Surry Power Station to serve as a benchmark for forthcoming transient and load imbalance evaluations.

Schedule

- The Dominion nuclear fleet plants have committed to the generic schedule provided in the Industry OPC Initiative. Although it was DNC's intention to meet the milestones of the initiative, the current status of Dominion's efforts to identify, develop and test a detection scheme, identify available equipment, and integrate the existing fleet transformer outage and replacement schedules no longer support the OPC Initiative schedule. Specifically, Dominion will not complete the design, installation and testing of hardware/software for the Millstone Power Station transformers by the 2016 date for installation and the 2017 date for functionality. The current schedule for completion of functionality for all applicable transformers,

which assumes that a viable solution for current-based solutions has been developed and tested by December 31, 2014, is now December 31, 2019 for MPS.

Dominion and the industry are investigating both voltage-based and current-based detection schemes. At this time, a solution for the voltage-based detection has been identified which appears to be a viable detection/protection option for the delta/wye transformer configurations. To date, a viable current-based detection scheme that could reliably provide the required protection without increasing other unwanted electrical distribution system transients (which in turn could increase plant risk and decrease reliability) has not been indentified and/or tested. A viable current-based detection scheme appears to be needed for some of Millstone Power Station's other transformer configurations (connections).

- Any further deviation from the Industry OPC Initiative schedule will be documented through the pending deviation/exemption process addressed in the NEI OPC Guidance Document.