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CENG
SM
a joint venture of
Constellation Energy
EDF

NINE MILE POINT
NUCLEAR STATION

October 25, 2012

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

**ATTENTION:** Document Control Desk

**SUBJECT:** Nine Mile Point Nuclear Station
Unit Nos. 1 and 2; Docket Nos. 50-220 and 50-410

NRC Bulletin 2012-01: Design Vulnerability in Electric Power System

The NRC issued Bulletin 2012-01, Design Vulnerability in Electric Power System, to achieve the following objectives: (1) to notify the addressees that the NRC is requesting information about the facilities' electric power system designs, in light of the recent operating experience that involved the loss of one of the three phases of the offsite power circuit (single-phase open circuit condition) at Byron Station, Unit 2, to determine if further regulatory action is warranted; (2) to require that the addressees comprehensively verify their compliance with the regulatory requirements of General Design Criterion (GDC) 17, "Electric Power Systems," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 or the applicable principal design criteria in the updated final safety analysis report; and the design criteria for protection systems under 10 CFR 50.55a(h)(2) and 10 CFR 50.55a(h)(3); and (3) to require that addressees respond to the NRC in writing, in accordance with 10 CFR 50.54(f).

NRC Bulletin 2012-01 requests a 90-day response addressing the two issues related to the electric power systems that are described in the Requested Action section of the bulletin. Attachments 1 and 2 to this letter provide the requested response for Nine Mile Point Nuclear Station Unit 1 and Unit 2, respectively.

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A list of regulatory commitments contained in this submittal is provided in Attachment 3.

Should you have any questions regarding the information in this submittal, please contact John J. Dosa, Director Licensing, at (315) 349-5219.

Very truly yours,

M. Philippon

**STATE OF NEW YORK** :
: **TO WIT:**
**COUNTY OF OSWEGO** :

I, Michel A. Philippon, being duly sworn, state that I am the Nine Mile Point Plant General Manager, and that I am duly authorized to execute and file this response on behalf of Nine Mile Point Nuclear Station, LLC. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other Nine Mile Point employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

M. Philippon

Subscribed and sworn before me, a Notary Public in and for the State of New York and County of Oswego, this 25 day of October, 2012.

**WITNESS** my Hand and Notarial Seal:

Lisa M. Doran
Notary Public

My Commission Expires:

9/12/2013
Date

**Lisa M. Doran**
**Notary Public in the State of New York**
**Oswego County Reg. No. 01DO6029220**
**My Commission Expires 9/12/2013**

MAP/DEV

Attachments:
1. Nine Mile Point Unit 1, NRC Bulletin 2012-01 Response
2. Nine Mile Point Unit 2, NRC Bulletin 2012-01 Response
3. List of Regulatory Commitments

cc: Regional Administrator, Region I, NRC
Project Manager, NRC
Resident Inspector, NRC

# ATTACHMENT 1

# NINE MILE POINT UNIT 1

# NRC BULLETIN 2012-01 RESPONSE

**Nine Mile Point Nuclear Station, LLC**
**October 25, 2012**

## Overview

- System Description - Items 2., 1.d, 2.a, 2.c
- System Protection - Items 1., 1.a, 2.b, 2.d
- Consequences - Items 1.b, 1.c, 2.e

Figure 1 - Simplified One-Line Diagram for Nine Mile Point Unit 1

Table 1 - ESF Buses Continuously Powered from Offsite Power Source(s)

Table 2 - Normally Energized Major Loads Powered from Offsite Power Source

Table 3 - Offsite Power Transformers

Table 4 - Protective Devices

**System Description**

Items 2., 1.d, 2.a, and 2.c of Bulletin 2012-01 request system information and will be addressed in this section.

***2. Briefly describe the operating configuration of the ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) at power (normal operating condition).***

See Figure 1 for a simplified one-line diagram.

The 115-kV system provides continuously connected offsite power to the two reserve station service transformers, XF-101N and XF-101S, for Nine Mile Point Unit 1 (NMP1).

The reserve supply to engineered safety feature (ESF) loads, and the normal supply to selected auxiliary loads, is obtained from the 115-kV reserve bus located within the NMP1 115-kV switchyard. This bus is fed by two 115-kV transmission lines from remote generating stations: the Lighthouse Hill Station, through the James A. FitzPatrick switchyard (Line 4) and the South Oswego Steam Station (Line 1). The 115-kV reserve bus is equipped with a normally closed motor-operated sectionalizing disconnect (MDS-8106). This disconnect is provided with an automatic opening circuit to provide physical independence to the two incoming 115-kV lines in the event that it is required.

Two separate circuits from the 115-kV reserve bus supply each of two reserve station service transformers. Reserve station service transformer XF-101N feeds the onsite emergency power distribution system through its 4.16-kV secondary winding, which normally provides power to Power Board (PB) 102. Reserve station service transformer XF-101S feeds the onsite emergency power distribution system through its 4.16-kV secondary winding, which normally provides power to PB 103.

***1.d Describe the offsite power transformer (e.g., start-up, reserve, station auxiliary) winding and grounding configurations.***

See Table 3 for offsite power transformer winding and grounding configurations.

***2.a Are the ESF buses powered by offsite power sources? If so, explain what major loads are connected to the buses including their ratings.***

For at-power (normal operating condition) configurations, the ESF buses are continuously powered by the offsite power sources. See Table 1 for ESF bus power sources.

There are no ESF bus major loads that are energized during normal power operations; however, there are major loads powered from non-ESF PB 101, which is normally powered by reserve station service transformer XF-101S. These loads, including their ratings, are given in Table 2. Some non-safety loads are also normally energized from safety related 4.16-kV and 600-V buses.

***2.c Confirm that the operating configuration of the ESF buses is consistent with the current licensing basis. Describe any changes in offsite power source alignment to the ESF buses from the original plant licensing.***

The following at-power (normal operating condition) configuration has been confirmed to be consistent with the current licensing basis, as described in NMP1 Updated Final Safety Analysis Report (UFSAR) Section IX.

The NMP1 offsite power configuration consists of two 115-kV lines that are provided from two offsite sources to serve as preferred power sources for the emergency onsite power distribution system. One of the 115-kV transmission lines is fed from the Lighthouse Hill Station (Line 4) via a series loop in the James A. Fitzpatrick 115-kV switchyard. The other transmission line (Line 1) is fed from the South Oswego Substation. Each of the two 115-kV transmission lines supplying the 115-kV switchyard independently have sufficient capacity and capability to supply the switchyard's electrical loads to mitigate design basis accident conditions.

The station service loads are divided into loads normally supplied from offsite power (Line 1 and Line 4) via the two 115-kV/ 4.16-kV reserve station service transformers (XF-101N and XF-101S). The ESF PB 102 and PB 103 are normally supplied from reserve station service transformers T101N and T101S, respectively, via separate circuit breakers.

As indicated in Table 1, there have been no changes in the offsite power source alignment to the ESF buses since the original plant licensing (i.e., since the full-term operating license was issued in 1974).

**System Protection**

Items 1., 1.a, 2.b, and 2.d of Bulletin 2012-01 request information regarding electrical system protection and will be addressed in this section.

***1. Given the requirements above, describe how the protection scheme for ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) is designed to detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited off-site power circuit or another power sources. Also, include the following information:***

Consistent with the current licensing basis, existing protective circuitry will separate the ESF buses from a connected failed offsite source due to a loss of voltage or a sustained, balanced degraded grid voltage concurrent with certain design basis accidents. The relay systems were not specifically designed to detect an open single phase of a three phase system. Detection of a single-open phase condition is beyond the approved design and licensing basis of the plant.

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***1.a The sensitivity of protective devices to detect abnormal operating conditions and the basis for the protective device setpoint(s).***

Consistent with the current licensing basis, existing electrical protective devices are sufficiently sensitive to detect design basis conditions of a loss of voltage or degraded voltage, but were not designed to detect a single phase open circuit condition. See Table 4 for undervoltage protective devices and the basis for the device setpoints.

Existing electrical protective devices are also sufficiently sensitive to detect a ground fault. Table 4 lists the ground protection on the ESF buses and the basis for the device setpoints.

***2.b If the ESF buses are not powered by offsite power sources, explain how the surveillance tests are performed to verify that a single-phase open circuit condition or high impedance ground fault condition on an off-site power circuit is detected.***

Not Applicable. The ESF buses at NMP1 are powered by offsite power sources.

***2.d Do the plant operating procedures, including off-normal operating procedures, specifically call for verification of the voltages on all three phases of the ESF buses?***

The current plant operating procedures, including operating procedures for off-normal alignments, do not specifically call for verification of the voltages on all three phases of the 4.16-kV ESF buses (PB 102 and PB 103). However, in addition to the loss of voltage and degraded voltage relays that monitor the 4.16-kV ESF buses, the following are monitored in accordance with the operator rounds guide procedure: (1) voltage on 600-V ESF PB 16B and PB 17B (normally fed from the 4.16-kV ESF buses); and (2) each of the 115-kV line (Line 1 and Line 4) phase currents. Abnormal or unusual readings would be reported to the Shift Manager, who would ensure that appropriate actions are taken to assess the condition. In addition, as a result of the 2005 open phase event at NMP1 and the James A. FitzPatrick plants (reference NMP1 Licensee Event Report 05-004 submitted by letter dated February 17, 2006), a plant process computer alarm is generated for low current (3 amps or less) on each of the three Line 1 and Line 4 phases.

**Consequences**

Items 1.b, 1.c, and 2.e of Bulletin 2012-01 request information regarding the electrical consequences of an event and will be addressed in this section.

***1.b The differences (if any) of the consequences of a loaded (i.e., ESF bus normally aligned to offsite power transformer) or unloaded (e.g., ESF buses normally aligned to unit auxiliary transformer) power source.***

The installed protective relays at NMP1 were not designed to detect single phase open circuit conditions. Existing loss of voltage and degraded voltage relays may respond depending on load and possible grounds.

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***1.c If the design does not detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited offsite power circuit or another power sources, describe the consequences of such an event and the plant response.***

1. The Current Licensing Basis (CLB) for NMP1, described in UFSAR Section IX-B and Technical Specification Section 3.6.2, Table 3.6.2i, does not credit the Class 1E protection scheme (for the ESF buses) to be designed to detect and automatically respond to a single-phase open circuit condition on a credited offsite power source.

   Two physically separated circuits supply electric power from the 115-kV switchyard to the two 4.16-kV ESF buses.

2. Since NMP1 did not credit the ESF bus protection scheme as being capable of detecting and automatically responding to a single phase open circuit condition, an open phase fault was not included in the design criteria for either the loss of voltage or the degraded voltage relay (DVR) schemes. Since open phase detection was not credited in the NMP1 design or licensing basis, no design basis calculations or design documents exist that previously considered this condition.

3. Without formalized, site-specific engineering calculations or engineering evaluations, the electrical consequences of such an open phase event (including plant response), can only be evaluated to the extent of the generic overviews that have already been published by EPRI and Basler. These are generic assessments and cannot be formally credited as a basis for an accurate response for NMP1. Detailed plant specific models would need to be developed (e.g., transformer magnetic circuit models, electric distribution models, motor models; including positive, negative, and zero sequence impedances (voltage and currents), and the models would need to be compiled and analyzed for the NMP1 specific Class 1E electric distribution system).

As a result of the findings above, the following compensatory actions have been completed:

- NMP1 Operations Shift Managers were briefed on the Byron event including operating indications (e.g., pictures of what was seen in the switchyard at the Byron event) that would be present for a similar event at Nine Mile Point.

- Additional guidance was given to NMP1 Operations Shift Managers to monitor each phase of the 115-kV phase line currents in the Control Room during shift rounds, per the operator rounds guide procedure.

- Revised the alarm response procedures to add "loss of a single phase of offsite power between 115kV Bus and Transformer 101N high voltage connection" and "loss of a single phase of offsite power between 115kV Bus and Transformer 101S high voltage connection" as possible causes

for the control room alarms for PB 102 bus voltage low and PB 103 bus voltage low, respectively.

NMP1 Licensee Event Report 05-004 describes an event in which it was discovered that one phase of Line 4 had fallen to the ground in the James A Fitzpatrick (JAF) switchyard. This resulted in the Line 4 power source to NMP1 supplying only two of the three phases, a condition that went undetected for 21 days. This condition was not flagged by any alarms at NMP1, JAF, or National Grid installations and was not noted by control room operators at either NMP1 or JAF. The NMP1 event differs from the Byron event in that the loss of a phase on Line 4 to NMP1 resulted from a component failure external to the NMP site. There were no actual consequences associated with this event since offsite power to the ESF buses continued to be supplied by Line 1.

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***2.e If a common or single offsite circuit is used to supply redundant ESF buses, explain why a failure, such as a single-phase open circuit or high impedance ground fault condition, would not adversely affect redundant ESF buses.***

Not applicable since NMP1 does not normally use a common or single offsite circuit to supply redundant ESF buses.

Figure 1
Simplified One-Line Diagram for Nine Mile Point Unit 1
(Ref.: Drawing C19409C-1B)

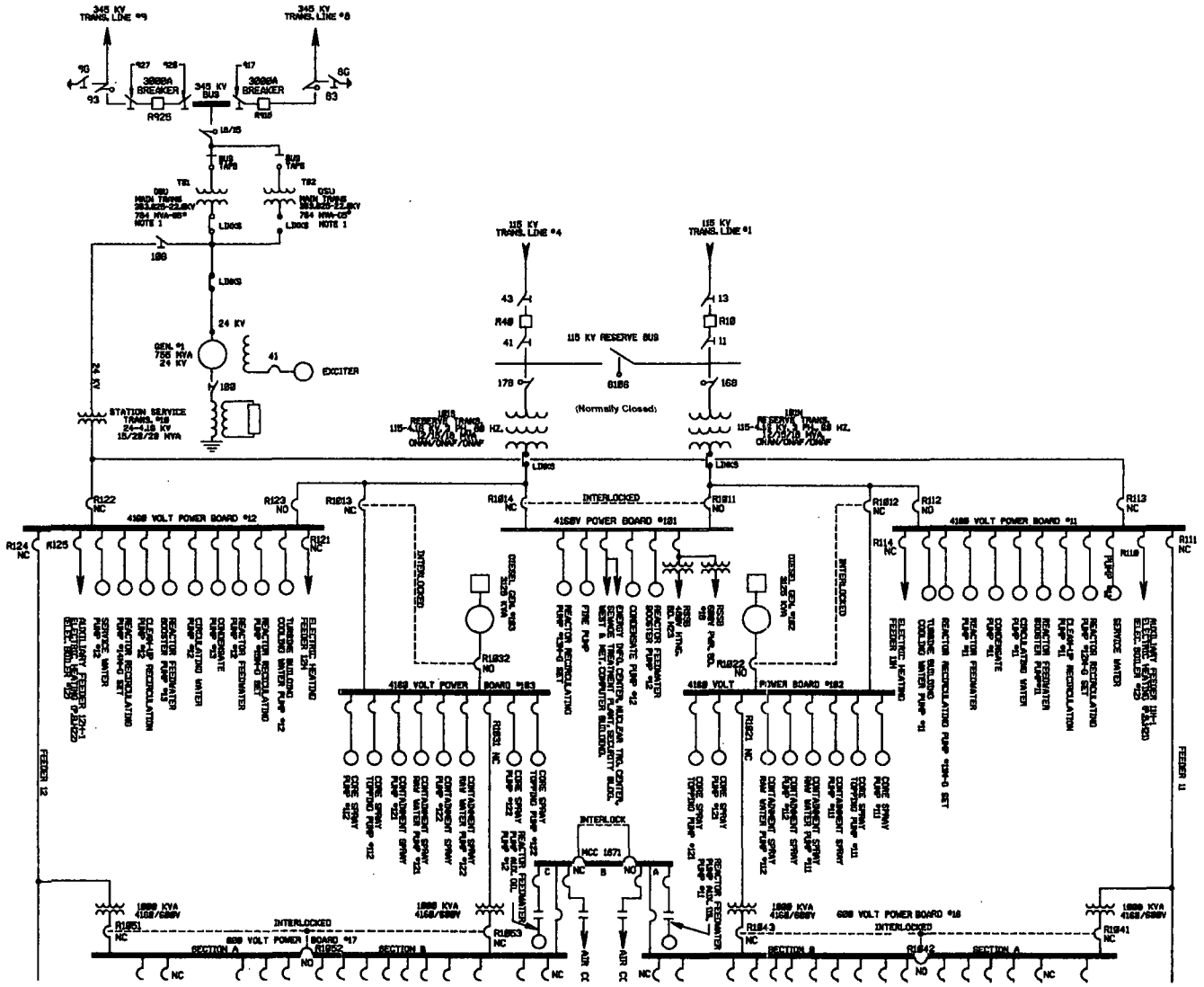

**Table 1 - ESF Buses Continuously Powered from Offsite Power Source(s)**

| Description of ESF Bus Power Source | ESF Bus Name (normal operating condition) | Original licensing basis configuration (Y/N) |
|---|---|---|
| Reserve Station Service Transformer XF-101N | 4.16-kV PB 102 | Y |
| Reserve Station Service Transformer XF-101S | 4.16-kV PB 103 | Y |

**Table 2 - Normally Energized Major Loads Powered from Offsite Power Source**

| Bus | Load | Voltage Level | Rating (HP) |
|---|---|---|---|
| Non-Safety Related 4.16-kV PB 101 | Feedwater Booster Pump #12 | 4160 V | 1500 HP |
| | Condensate Pump #12 | 4160 V | 1000 HP |
| | Reactor Recirculating Pump #13 M-G Set | 4160 V | 1250 HP |

**Table 3 - Offsite Power Transformers**

| Transformer | Winding Configuration | MVA Size (AO/FA/FA) | Voltage Rating (Primary/Secondary) | Grounding Configuration |
|---|---|---|---|---|
| XF-101N, XF-101S | Wye-Delta-Wye (Buried Teritiary) | 12 MVA / 15 MVA / 18 MVA ONAN / ONAF / ONAF | 115-kV / 4.16-kV | Wye Grounded / Wye Resistive Grounded |

**Table 4 - Protective Devices**

| Protection Zone | Protective Device | UV Logic | Setpoint (Nominal) | Basis for Setpoint |
|---|---|---|---|---|
| 4.16-kV PB 102, PB 103 | Loss of Voltage Relay | 2 of 3 | 3200 Volts (77% of 4160V) | To actuate upon complete loss of ESF bus voltage condition. |
| 4.16-kV PB102, PB103 | Degraded Voltage Relay | 2 of 3 | 3705 Volts (89% of 4160V) | To detect slow degradation of voltage on the 4.16-kV ESF buses, trip offsite power, and power the ESF buses from onsite diesel generators should offsite power supply voltage degrade to a point where operation of ESF equipment is endangered. |
| 4.16-kV PB 102, PB 103 | Ground Protection | N/A | 20A | Set to coordinate with downstream instantaneous ground relays. |

# ATTACHMENT 2

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# NINE MILE POINT UNIT 2

# NRC BULLETIN 2012-01 RESPONSE

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**Nine Mile Point Nuclear Station, LLC**
**October 25, 2012**

## Overview

- System Description - Items 2., 1.d, 2.a, 2.c
- System Protection - Items 1., 1.a, 2.b, 2.d
- Consequences - Items 1.b, 1.c, 2.e

Figure 1 - Simplified One-Line Diagram for Nine Mile Point Unit 2

Table 1 - ESF Buses Continuously Powered from Offsite Power Source(s)

Table 2 - ESF Buses Normally Energized Major Loads

Table 3 - Offsite Power Transformers

Table 4 - Protective Devices

## System Description

Items 2., 1.d, 2.a, and 2.c of Bulletin 2012-01 request system information and will be addressed in this section.

***2. Briefly describe the operating configuration of the ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) at power (normal operating condition).***

See Figure 1 for a simplified one-line diagram.

The 115-kV system provides continuously connected offsite power to the two reserve station service transformers, 2RTX-XSR1A and 2RTX-XSR1B, for Nine Mile Point Unit 2 (NMP2).

Reserve station service transformer 2RTX-XSR1A, energized from offsite Scriba Substation Line 5, normally feeds Division 1 and Division 3 of the onsite emergency power distribution system through its 4.16-kV tertiary winding. The 13.8-kV secondary winding of 2RTX-XSR1A serves as a backup source for the plant normal power distribution system, which normally receives power from the unit generator via normal station service transformer 2STX-XNS1 located in the 345-kV switchyard.

Reserve station service transformer 2RTX-XSR1B, energized from offsite Scriba Substation Line 6, normally feeds Division 2 of the onsite emergency power distribution system through its 4.16-kV tertiary winding. The 13.8-kV secondary winding of 2RTX-XSR1B serves as a backup source for the plant normal power distribution system.

In addition, either the Division 1 or Division 2 emergency 4.16 kV bus can be powered from a third qualified source, the auxiliary boiler transformer 2ABS-X1. The auxiliary boiler transformer is normally energized from offsite Scriba Substation Line 5.

***1.d Describe the offsite power transformer (e.g., start-up, reserve, station auxiliary) winding and grounding configurations.***

See Table 3 for offsite power transformer winding and grounding configurations.

***2.a Are the ESF buses powered by offsite power sources? If so, explain what major loads are connected to the buses including their ratings.***

For at-power (normal operating condition) configurations, the engineered safety feature (ESF) buses are continuously powered by the offsite power sources. See Table 1 for ESF bus power sources.

See Table 2 for ESF bus major loads energized during normal power operations, including their ratings.

***2.c Confirm that the operating configuration of the ESF buses is consistent with the current licensing basis. Describe any changes in offsite power source alignment to the ESF buses from the original plant licensing.***

The following at power (normal operating condition) configuration has been confirmed to be consistent with the current licensing basis, as described in NMP2 Updated Safety Analysis Report (USAR) Sections 8.2 and 8.3.

The NMP2 offsite power configuration consists of two 115-kV lines that are provided from two offsite sources to serve as preferred power sources for the emergency onsite power distribution system. Under normal operating conditions, reserve station service transformer 2RTX-XSR1A is energized from the 115-kV Scriba Substation Line 5, and reserve station service transformer 2RTX-XSR1B is energized for the 115-kV Scriba Substation Line 6. The ESF buses are normally powered as follows:

- ESF bus 2ENS*SWG101 (Division 1) is powered by reserve station service transformer 2RTX-XSR1A.
- ESF bus 2ENS*SWG103 (Division 2) is powered by reserve station service transformer 2RTX-XSR1B.
- ESF bus 2ENS*SWG102 (Division 3, high pressure core spray system) is normally powered by reserve station service transformer 2RTX-XSR1A, but can also be powered by reserve station service transformer 2RTX-XSR1B.

In addition, NMP2 has a third qualified source, the auxiliary boiler transformer 2ABS-XS1, which is normally fed from 115-kV Scriba Substation Line 6. The auxiliary boiler transformer normally energizes non-safety related switchgear 2NPS-SWG002.

As indicated in Table 1, there have been no changes in the offsite power source alignment to the ESF buses since the original plant licensing (i.e., since the operating license was issued in 1987).

**System Protection**

Items 1., 1.a, 2.b, and 2.d of Bulletin 2012-01 request information regarding electrical system protection and will be addressed in this section.

***1. Given the requirements above, describe how the protection scheme for ESF buses (Class 1E for current operating plants or non-Class 1E for passive plants) is designed to detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited off-site power circuit or another power sources. Also, include the following information:***

Consistent with the current licensing basis and General Design Criterion (GDC) 17, existing protective circuitry will separate the ESF buses from a connected failed offsite source due to a loss of voltage or a sustained, balanced degraded grid voltage concurrent with certain design basis accidents. The relay systems were not specifically designed to detect an open single phase of a three phase system. Detection of a single-open phase condition is beyond the approved design and licensing basis of the plant.

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***1.a The sensitivity of protective devices to detect abnormal operating conditions and the basis for the protective device setpoint(s).***

Consistent with the current licensing basis and GDC 17, existing electrical protective devices are sufficiently sensitive to detect design basis conditions of a loss of voltage or degraded voltage, but were not designed to detect a single phase open circuit condition. See Table 4 for undervoltage protective devices and the basis for the device setpoints.

Existing electrical protective devices are also sufficiently sensitive to detect a ground fault. Table 4 lists the ground protection on the ESF buses and the basis for the device setpoints.

***2.b If the ESF buses are not powered by offsite power sources, explain how the surveillance tests are performed to verify that a single-phase open circuit condition or high impedance ground fault condition on an off-site power circuit is detected.***

Not Applicable. The ESF buses at NMP2 are powered by offsite power sources.

***2.d Do the plant operating procedures, including off-normal operating procedures, specifically call for verification of the voltages on all three phases of the ESF buses?***

The current plant operating procedures, including operating procedures for off-normal alignments, do not specifically call for verification of the voltages on all three phases of the ESF buses.

**Consequences**

Items 1.b, 1.c, and 2.e of Bulletin 2012-01 request information regarding the electrical consequences of an event and will be addressed in this section.

***1.b The differences (if any) of the consequences of a loaded (i.e., ESF bus normally aligned to offsite power transformer) or unloaded (e.g., ESF buses normally aligned to unit auxiliary transformer) power source.***

The installed protective relays at NMP2 were not designed to detect single phase open circuit conditions. Existing loss of voltage and degraded voltage relays may respond depending on load and possible grounds.

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***1.c If the design does not detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on a credited offsite power circuit or another power sources, describe the consequences of such an event and the plant response.***

1. The Current Licensing Basis (CLB) for NMP2, described in USAR Section 8.2 and Technical Specification 3.3.8.1, does not credit the Class 1E protection scheme (for the ESF buses) to be designed to detect and automatically respond to a single-phase open circuit condition on a credited offsite power source.

   The 115-kV offsite power circuits at NMP2 consists of two electrically and physically separated circuit supply electric power sources, Line 5 and Line 6. Reserve Station Transformer 2RTX-XSR1A, Reserve Station Transformer 2RTX-XSR1B, and Auxiliary Boiler Transformer 2ABS-XS1 are fed from the 115-kV offsite power circuits. The reserve station transformers energize 4.16-kV ESF buses during normal operation.

2. Since NMP2 did not credit the ESF bus protection scheme as being capable of detecting and automatically responding to a single phase open circuit condition, an open phase fault was not included in the design criteria for either the loss of voltage or the degraded voltage relay (DVR) schemes. Since open phase detection was not credited in the NMP2 design or licensing basis, no design basis calculations or design documents exist that previously considered this condition.

3. Without formalized, site-specific engineering calculations or engineering evaluations, the electrical consequences of such an open phase event (including plant response), can only be evaluated to the extent of the generic overviews that have already been published by EPRI and Basler. These are generic assessments and cannot be formally credited as a basis for an accurate response for NMP2. Detailed plant specific models would need to be developed (e.g., transformer magnetic circuit models, electric distribution models, motor models; including positive, negative, and zero sequence impedances (voltage and currents), and the models would need to be compiled and analyzed for the NMP2 specific Class 1E electric distribution system).

As a result of the findings above, the following compensatory actions have been completed:

- NMP2 Operations Shift Managers were briefed on the Byron event including operating indications (e.g., pictures of what was seen in the switchyard at the Byron event) that would be present for a similar event at Nine Mile Point

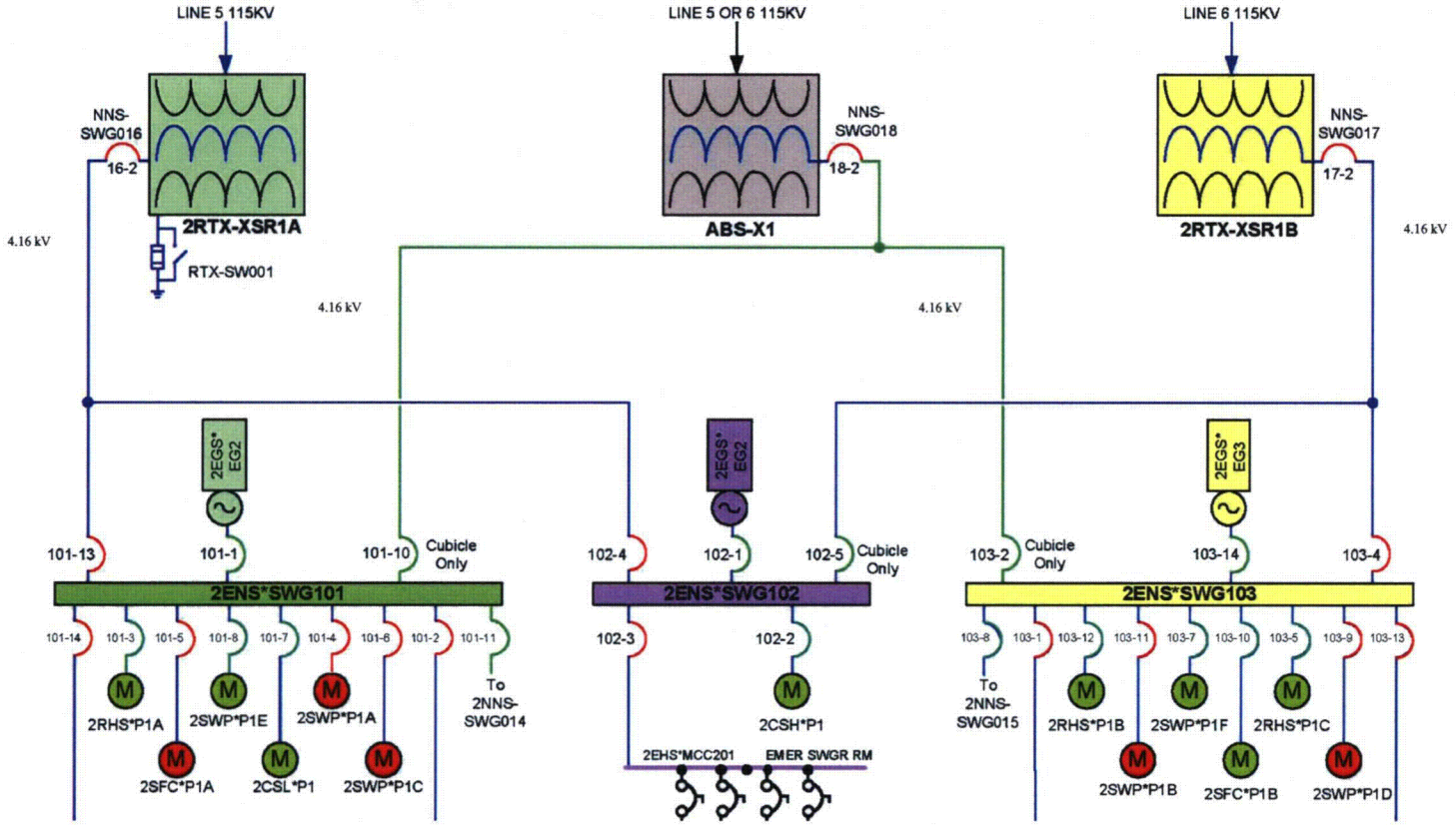
- Revised the alarm response procedures to add "Loss of a single phase of offsite power" as another possible cause for the control room alarm for "4kV Bus 101 Undervoltage" and "4kV Bus 103 Undervoltage." Also, a note was added that states: "Loss of a single phase of 115kV offsite power may result in a bus undervoltage alarm, but no automatic action. The affected phase 115kV phase voltage and current reading zero would confirm the condition."

Plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012.

***2.e If a common or single offsite circuit is used to supply redundant ESF buses, explain why a failure, such as a single-phase open circuit or high impedance ground fault condition, would not adversely affect redundant ESF buses.***

Not applicable since NMP2 does not use a common or single offsite circuit to supply ESF buses 2ENS*SWG101 (Division 1) and 2ENS*SWG103 (Division 2). These two ESF buses feed all station redundant safety-related loads except for the High Pressure Core Spray system (HPCS, Division 3) loads. The HPCS system loads are fed by bus 2ENS*SWG102. All three divisions are normally energized from offsite power sources through the tertiary winding of the reserve station service transformers, buses 2ENS*SWG101 and 2ENS*SWG102 from transformer 2RTX-XSR1A (fed from Line 5), and bus 2ENS*SWG103 from transformer 2RTX-XSR1B (fed from Line 6). Bus 2ENS*SWG102 also has a breaker cubicle (102-5) for connection to reserve station service transformer 2RTX-XSR1B, if required.

Figure 1
Simplified One-Line Diagram for Nine Mile Point Unit 2




Key:
Breaker Normally Closed
Breaker Normally Open

**Table 1 - ESF Buses Continuously Powered from Offsite Power Source(s)**

| Description of ESF Bus Power Source | ESF Bus Name (normal operating condition). | Original Licensing Basis Configuration (Y/N) |
|---|---|---|
| Reserve Station Service Transformer 2RTX-XSR1A | 4.16-kV ESF Bus 2ENS*SWG101 - Division 1 | Y |
| Reserve Station Service Transformer 2RTX-XSR1B | 4.16-kV ESF Bus 2ENS*SWG103 - Division 2 | Y |
| Reserve Station Service Transformer 2RTX-XSR1A | 4.16-kV ESF Bus 2ENS*SWG102 - Division 3 | Y |

**Table 2 - ESF Buses Normally Energized Major Loads**

| ESF Bus | Load | Voltage Level | Rating (HP) |
|---|---|---|---|
| 2ENS*SWG101 | Service Water Pump 2SWP*P1A | 4160 V | 600 HP |
| | Spent Fuel Pool Cooling Pump 2SFC*P1A | 4160 V | 450 HP |
| | Service Water Pump 2SWP*P1C | 4160 V | 600 HP |
| | Service Water Pump 2SWP*P1E | 4160 V | 600 HP |
| 2ENS*SWG103 | Service Water Pump 2SWP*P1F | 4160 V | 600 HP |
| | Service Water Pump 2SWP*P1D | 4160 V | 600 HP |
| | Service Water Pump 2SWP*P1B | 4160 V | 600 HP |
| | Spent Fuel Pool Cooling Pump 2SFC*P1B | 4160 V | 450 HP |

**Table 3 - Offsite Power Transformers**

| Transformer | Winding Configuration | MVA Size (AO/FA/FA) | Voltage Rating (Primary/Secondary) | Grounding Configuration |
|---|---|---|---|---|
| 2RTX-XSR1A, 2RTX-XSR1B | Wye-Delta-Wye | 70 MVA OA / FA / FOA | 115-kV / 13.8-kV / 4.16-kV | Wye Grounded / Wye Resistive Grounded |
| 2ABS-X1 | Wye-Delta-Wye | 27.5 MVA OA / FA / FA | 115-kV / 13.8-kV / 4.16-kV | Wye Grounded / Wye Grounded |

**Table 4 - Protective Devices**

| Protection Zone | Protective Device | UV Logic | Setpoint (Nominal) | Basis for Setpoint |
|---|---|---|---|---|
| 2ENS*SWG101, 2ENS*SWG103, 2ENS*SWG102 | Loss of Voltage Relay | 2 of 3 | 3212.86 (77% of 4160V) | To provide protection against undervoltage operation of the ESF loads connected to the emergency power distribution system. |
| 2ENS*SWG101, 2ENS*SWG103, 2ENS*SWG102 | Degraded Voltage Relay | 2 of 3 | 3847V (92.4% of 4160V) | To detect slow degradation of voltage on the 4.16-kV ESF buses, trip offsite power, and power the ESF buses from onsite diesel generators should offsite power supply voltage degrade to a point where operation of ESF equipment is endangered. |
| 2ENS*SWG101, 2ENS*SWG103, 2ENS*SWG102 | Ground Protection | N/A | 30A | Set to coordinate with downstream instantaneous ground relays. |

# ATTACHMENT 3

## LIST OF REGULATORY COMMITMENTS

The following table identifies the regulatory commitments in this document. Any other statements in this submittal represent intended or planned actions. They are provided for information purposes and are not considered to be regulatory commitments.

| REGULATORY COMMITMENT | SCHEDULED COMPLETION DATE |
|---|---|
| Nine Mile Point Unit 1 plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012. | December 7, 2012 |
| Nine Mile Point Unit 2 plant-specific electrical analyses of the offsite circuits for an open phase circuit on the 115-kV system with and without a ground fault are currently in progress. In accordance with the guidance provided in the "Summary of August 21, 2012, Public Meeting on Bulletin 2012-01, 'Design Vulnerability in Electric Power System'" (ADAMS Accession No. ML12243A426), a description of the consequences of such an event and the plant response will be submitted to the NRC by December 7, 2012. | December 7, 2012 |