VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

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Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION ENERGY)
NORTH ANNA POWER STATION UNITS 1 AND 2
SUMMARY OF FACILITY CHANGES, TESTS AND EXPERIMENTS

Pursuant to 10 CFR 50.59(d)(2), a report containing a brief description of any changes, tests, and experiments, including a summary of the evaluation of each, must be submitted to the NRC, at intervals not to exceed 24 months. Attachment 1 provides a summary description of Facility Changes, Tests and Experiments identified in 10 CFR 50.59 Evaluations performed at the North Anna Power Station during 2018.

If you have any questions, please contact Donald R. Taylor at (540) 894-2100.

Very truly yours,

N. Larry Lane
Site Vice President

Attachments

1. 10 CFR 50.59 Summary Description of Facility Changes, Tests and Experiments
2. Commitment Change Evaluation Summary

cc: Regional Administrator
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IE47
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ATTACHMENT 1

10 CFR 50.59 SUMMARY DESCRIPTION OF FACILITY CHANGES, TESTS AND EXPERIMENTS

NORTH ANNA POWER STATION UNITS 1 AND 2
VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION ENERGY)

NORTH ANNA UNITS 1 AND 2

10 CFR 50.59 SUMMARY DESCRIPTION OF FACILITY CHANGES, TESTS AND EXPERIMENTS

10 CFR 50.59 EVALUATION: NAPS0-EVAL-2018-0004

Document Evaluated: DC NA-17-00105, Switchyard Transformer #1 Open Phase Detection System

Brief Description: A new Alstom/GE Open Phase Detection (OPD) system will be installed to detect an open phase event at the high side of Switchyard Transformer #1 (TX-1). Detailed design, installation documentation, testing, and supporting analyses for implementing the Alstom/GE OPD System at transformer TX-1 in the switchyard are performed by Dominion Electric Transmission (ET). This DC documents the installation and evaluates the plant impacts.

Reason for Change: Currently, an ungrounded open phase condition at the high voltage side of Switchyard Transformer #1 (TX-1) could possibly go undetected by existing power system protection relays and could result in thermal damage to plant motors that are important to safety.

Summary: The proposed change will install Alstom/GE Open Phase Detection (OPD) relays on the 500kV side of 500-36.5kV Switchyard Transformer No. 1 (TX-1). Actuation of the new protection relays will result in the following:

1. An alarm in the Unit 1 Main Control Room
2. Lockout of Switchyard Transformer No. 1 (TX-1)
3. Loss of voltage seen at the connected emergency bus(es), which will result in auto-start and load-sequencing of the associated EDG(s)

The primary design function of the new TX-1 open phase detection relays is to protect downstream connected safety-related equipment from damage due to an open phase on the power source. The new TX-1 OPD relays are designed to detect open phase conditions that have been analyzed to go undetected by the new Safety-Related voltage unbalance (negative sequence) relays being installed at the 4kV emergency buses by DCs NA-15-00061, NA-15-00062, NA-15-00063, and NA-15-00064. In addition, a design function for the new OPD system is that it only actuates in response to a valid signal, since spurious actuation of the system would lead to an unnecessary loss of offsite power on the connected emergency bus(es). Protection relays installed by this Design Change are classified as Non-Safety Related since they are connected to and trip Non-Safety Related switchyard transformer TX-1 and other TX-1 protective relays are also classified as NS.

The 50.59 Screen for this activity identified the addition of the new TX-1 open phase detection relays can adversely affect an UFSAR described design function. This is due to the new relays increasing the probability of loss of preferred power source to emergency buses due to possible spurious actuation of the new relays. This 50.59 evaluation evaluates the impact of this adverse consequence.

Although open phase detection relays may under rare conditions operate to cause a spurious operation and unnecessary tripping of equipment, it will also, with proper (and expected) operation, prevent the loss of equipment important to safety. These two effects more than offset. Therefore, the effect of the proposed activity does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the UFSAR.

The NEI 06-07 guidance states that a change which involved the installation of additional equipment protective features (for example, adding protective devices to breakers), provided that all applicable design and functional requirements to be met, is an example of a situation where there would not be more than a minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety. The installation of the new relays is being performed using the same design requirements as that used for the existing protective relaying. The applicable function requirements of the new system are similar to the functional requirements of the existing protective relaying. Therefore, the proposed modification does not result in more than minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety previously evaluated in the UFSAR.

The new protection relays do not contribute to initiation of the accidents evaluated in the UFSAR. Therefore, this modification does not result in a minimal increase in the consequences of an accident previously evaluated in the UFSAR.

Failure of the new protection scheme to actuate in response to a valid signal would be no different than the present response of the electrical power systems to an open phase condition. Therefore, this modification does not result in a minimal increase of a malfunction of equipment important to safety previously evaluated in the UFSAR. This modification also does not create a possibility for an accident of a different type than previously evaluated in the UFSAR nor creates a possibility for a malfunction of equipment important to safety with a different result than previously evaluated in the UFSAR.

UFSAR Section 8.2 requires revision as a result of this Design Change. A new TRM section will also be added via LBDCR/TRCR-191 to address open phase detection system requirements.

It has been determined that NRC prior approval is not required for this Design Change. However, the design changes for the Safety Related voltage unbalance relays (DCs NA-15-00061 through -00064) require Technical Specifications changes which has been submitted for NRC review via LAR 18-072. The Technical Evaluation section of the LAR, which addresses the station's overall design strategy for protecting against possible open phase conditions, describes the switchyard transformer TX-1 open phase detection relay system that is being installed by this Design Change.

10 CFR 50.59 EVALUATION: NAPS0-EVAL-2018-0005

Document Evaluated: DC NA-17-00106, Switchyard Transformer #2 Open Phase Detection System

Brief Description: A new Alstom/GE Open Phase Detection (OPD) system will be installed to detect an open phase event at the high side of Switchyard Transformer #2 (TX-2). Detailed design, installation documentation, testing, and supporting analyses for implementing the Alstom/GE OPD System at transformer TX-2 in the switchyard are performed by Dominion Electric Transmission (ET). This DC documents the installation and evaluates the plant impacts.

Reason for Change: Currently, an ungrounded open phase condition at the high voltage side of Switchyard Transformer #2 (TX-2) could possibly go undetected by existing power system protection relays and could result in thermal damage to plant motors that are important to safety.

Summary: The proposed change will install Alstom/GE Open Phase Detection (OPD) relays on the 500kV side of 500-36.5kV Switchyard Transformer No. 2 (TX-2). Actuation of the new protection relays will result in the following:

1. An alarm in the Unit 1 Main Control Room
2. Lockout of Switchyard Transformer No. 2 (TX-2)
3. Loss of voltage seen at the connected emergency bus(es), which will result in auto-start and load-sequencing of the associated EDG(s)

The primary design function of the new TX-2 open phase detection relays is to protect downstream connected safety-related equipment from damage due to an open phase on the power source. The new TX-2 OPD relays are designed to detect open phase conditions that have been analyzed to go undetected by the new Safety-Related voltage unbalance (negative sequence) relays being installed at the 4kV emergency buses by DCs NA-15-00061, NA-15-00062, NA-15-00063, and NA-15-00064. In addition, a design function for the new OPD system is that it only actuates in response to a valid signal, since spurious actuation of the system would lead to an unnecessary loss of offsite power on the connected emergency bus(es). Protection relays installed by this Design Change are classified as Non-Safety Related since they are connected to and trip Non-Safety Related switchyard transformer TX-2 and other TX-2 protective relays are also classified as NS.

The 50.59 Screen for this activity identified the addition of the new TX-2 open phase detection relays can adversely affect an UFSAR described design function. This is due to the new relays increasing the probability of loss of preferred power source to emergency buses due to possible spurious actuation of the new relays. This 50.59 evaluation evaluates the impact of this adverse consequence.

Although open phase detection relays may under rare conditions operate to cause a spurious operation and unnecessary tripping of equipment, it will also, with proper (and expected) operation, prevent the loss of equipment important to safety. These two effects more than offset. Therefore, the effect of the proposed activity does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the UFSAR.

The NEI 06-07 guidance states that a change which involved the installation of additional equipment protective features (for example, adding protective devices to breakers), provided that all applicable design and functional requirements to be met, is an example of a situation where there would not be more than a minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety. The installation of the new relays is being performed using the same design requirements as that used for the existing protective relaying. The applicable function requirements of the new system are similar to the functional requirements of the existing protective relaying. Therefore, the proposed modification does not result in more than minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety previously evaluated in the UFSAR.

The new protection relays do not contribute to initiation of the accidents evaluated in the UFSAR. Therefore, this modification does not result in a minimal increase in the consequences of an accident previously evaluated in the UFSAR.

Failure of the new protection scheme to actuate in response to a valid signal would be no different than the present response of the electrical power systems to an open phase condition. Therefore, this modification does not result in a minimal increase of a malfunction of equipment important to safety previously evaluated in the UFSAR. This modification also does not create a possibility for an accident of a different type than previously evaluated in the UFSAR nor creates a possibility for a malfunction of equipment important to safety with a different result than previously evaluated in the UFSAR.

UFSAR Section 8.2 requires revision as a result of this Design Change. A new TRM section will also be added via LBDCR/TRCR-191 to address open phase detection system requirements.

It has been determined that NRC prior approval is not required for this Design Change. However, the design changes for the Safety Related voltage unbalance relays (DCs NA-15-00061 through -00064) require Technical Specifications changes which has been submitted for NRC review via LAR 18-072. The Technical Evaluation section of the LAR, which addresses the station's overall design strategy for protecting against possible open phase conditions, describes the switchyard transformer TX-2 open phase detection relay system that is being installed by this Design Change.

10 CFR 50.59 EVALUATION: NAPS0-EVAL-2018-0013

Document Evaluated: ETE-CME-2018-0004 Rev. 0, Implementation of ORS Pump Startup Flow Analyses and UFSAR LOCA Containment Analyses

Brief Description: This activity implements an engineering calculation of the Outside Recirculation System (ORS) pump startup flow transient during a LOCA event and related UFSAR Chapter 6 LOCA containment NPSH analyses as follows:

1) The analysis of the ORS pump startup flow transient was performed to provide adequate design basis information for ORS pump operation as described in CA3005994 and parent CR1007081. Specifically, a detailed thermal-hydraulic analysis is documented in MPR calculation 1114-0045-02, Rev. 0, for the time period when the ORS pumps are started and the discharge piping and spray ring headers are filling. The analysis explicitly addresses high initial pump flows and removal of air from the system and demonstrates positive NPSH margin through the pump start transient.

2) The ORS pump startup flow calculation predicts high initial flow rates, resulting in a shorter time to fill the ORS pump discharge pipe and spray headers than the value currently assumed in the UFSAR Chapter 6 containment analyses. This faster fill time has an adverse effect on the ORS and IRS pump NPSH calculations, requiring reanalysis. Similar effects occur for the IRS pumps although they are less limiting for NPSH concerns primarily due to the shorter suction line and resulting lower flow resistance. NPSH analysis updates are documented in calculation SM-1513, Rev. 1, Addendum E.

As a result of this activity, updates to UFSAR Chapter 6 will be made to reflect small changes to IRS and ORS pump NPSH values and pipe fill times. In addition, clarification will be added to distinguish pump flow and related NPSH during the pump startup period from the (post-startup) containment analysis NPSH values calculated by the GOTHIC code and currently reported in UFSAR Chapter 6.

Reason for Change: This ETE provides the basis for implementing these analyses and making associated changes to the design and licensing bases sufficient to close OD CA3144073 and CA3147619.

Summary: ETE-CME-2018-0004 implements revisions to the North Anna Power Station Units 1 and 2 containment analyses described in UFSAR Chapter 6. The changes involve modifications to analysis design inputs that are allowed within the NRC approved analysis methodology. There are no changes to the UFSAR methods of evaluation. The specific analysis input changes are the delay times to fill the IRS and ORS pump discharge piping assumed in the IRS and ORS pump NPSH analyses.

As a result of this activity, updates to UFSAR Chapter 6 will be made to reflect small changes to IRS and ORS pump NPSH values. In addition, clarification will be added to distinguish IRS and ORS pump flow and related NPSH during the pump startup period from the containment analysis NPSH values calculated by the GOTHIC code and reported in UFSAR Chapter 6.

A 50.59 Evaluation is required because there was an adverse change to a design function and it was necessary to revise a UFSAR safety analysis to demonstrate that all required safety functions and design requirements continue to be met. A summary of the answers to the eight questions in Part II of the evaluation follows:

1. The activity does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the SAR, because the activity only revises UFSAR Chapter 6 LOCA containment analyses, which assumes that a LOCA has already occurred (the initiating event).

2. The activity does not result in more than a minimal increase in the likelihood of occurrence of a malfunction of a SSC important to safety previously evaluated in the SAR, because the activity makes conservative assumptions relative to single failures and the loss-of-offsite power and continues to ensure adequate NPSH margins for the IRS and ORS pumps such that required performance is maintained throughout the LOCA event.

3. The activity does not result in more than a minimal increase in the consequences of an accident previously evaluated in the SAR, because the activity revises the UFSAR Chapter 6 LOCA containment analyses and demonstrates similar results for acceptance criteria associated with IRS and ORS pump NPSH margins. In addition, there is no effect on the radiological consequences analyses.

4. The activity does not result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the SAR, because the activity makes conservative assumptions relative to single failures and the loss-of-offsite power and continues to ensure adequate NPSH margins for the IRS and ORS pumps such that required performance is maintained throughout the LOCA event.

5. The activity does not create the possibility for an accident of a different type than any previously evaluated in the SAR, because the activity revises the UFSAR Chapter 6 LOCA containment analyses to accommodate a minor design input change. This activity does not introduce any new failure modes and all containment analysis acceptance criteria continue to be met.

6. The activity does not create a possibility for a malfunction of a SSC important to safety with a different result than any previously evaluated in the SAR, because the activity revises the UFSAR Chapter 6 LOCA containment safety analyses and demonstrates similar results for IRS and ORS pump NPSH margins. No new failure modes are introduced by this activity and all acceptance criteria continue to be met.

7. The activity does not result in a design basis limit for a fission product barrier described in the SAR being exceeded or altered. This activity revises the UFSAR

Chapter 6 LOCA containment safety analyses for IRS and ORS pump NPSH with no changes to the containment pressure response. Thus, the radiological consequences analyses are not affected by this activity.

8. The activity does not result in a departure from a method of evaluation described in the SAR used in establishing the design bases or in the safety analyses. This activity revises UFSAR Chapter 6 containment analyses and uses the same UFSAR Chapter 6 analysis methodologies that were used for the analyses of record. All design input changes have been reviewed to ensure that there are no changes to any element of the methods used in the revised analyses.

10 CFR 50.59 EVALUATION: NAPS2-EVAL-2018-0001

Document Evaluated: DC NA-15-00063, Installation of voltage Unbalance Protection (2H)

Brief Description: This Design Change (DC) addresses INPO Event Report (IER) 12-14, Revision 1, "Automatic Reactor Scram Resulting from a Design Vulnerability in the 4.16kV Bus Undervoltage Protection Scheme" by installing voltage unbalance (negative sequence) relays on 2H 4160V Emergency Bus, which will provide North Anna Power Station with the capability to protect safety related equipment from a voltage unbalance event. Similar to the existing degraded and undervoltage protection schemes, the new protection scheme is designed to detect a voltage unbalance, isolate 2H Emergency Bus from the Non-Safety Related source (Station Service Bus or Reserve Station Service), and start/load the Emergency Diesel Generator (EDG).

Reason for Change: This modification will provide North Anna Power Station with the capability to protect safety related equipment from a voltage unbalance event, similar to that in IER 12-14.

Summary: The proposed change will install voltage unbalance (negative sequence) relays (Basler BE1-47N) on the 4.16kV potential transformers (PTs) on 2H Emergency Bus. The new protection scheme will result in the following:

1. An alarm in the Unit 2 Main Control Room

2. Isolation of the 2H Emergency Bus based on if 2 of 3 negative sequence relays sense a volatage unbalance on the bus.

3. Auto start and load sequencing of the 2H EDG.

A new voltage balance relay (ABB-60 relay) will be installed on the 4kV and 480V PTs in order to provide a way of detecting failure of the 4.16kV PT or a PT blown fuse. If this relay detects a failed PT or a PT blown fuse, the ABB-60 relay will block the new negative relays from inadvertantly isolating the bus, auto start of the EDG, and load sequencing.

The primary design function of the new voltage unbalance scheme is to protect safety related equipment from damage due to a high voltage unbalance affecting the Emergency Bus. In addition, a design function for the new system is that it only actuates in response to a valid signal, since spurious actuation of the system would lead to an unnecessary isolation of the Emergency Bus, automatic start of the EDG, and load sequencing. Protection relays installed by this Design Change are classifed as safety related since they provide Emergency Bus tripping functions which ensures other safety related components can perform their design basis function.

The 50.59 Screen for this activity identified the addition of the new protective relaying to the 2H Emergency Bus can adversely affect a UFSAR described design function. This is due to the new scheme increasing the probability of a bus isolation and EDG start due to spurious actuation of the new voltage unbalance protective relays. This 50.59 evaluation evaluates the impact of this adverse consequence.

Although voltage unbalance protection devices may under rare conditions, operate to cause a spurious operation and unnecessary stopping and starting of equipment, it will also, with proper (and expected) operation prevent the loss of equipment important to safety and a loss of safety functions. These two effects more than offset. Therefore, the effect of the proposed activity does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the UFSAR.

The NEI 06-07 guidance states that a change which involves the installation of additional equipment protective features (for example, adding protective devices to breakers), provided that all applicable design and functional requirements to be met, is an example of a situation where there would be not more than a minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety. The installation of the new relays is being performed using the same design requirements as that used for the existing protective relaying. The applicable function requirements of the new system, in isolating equipment important to safety from a degraded power source before it can be damaged so it will be available to perform its safety function, is similar to the functional requirements of the existing protective relaying. Therefore, the proposed modification does not result in more than minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety previously evaluated in the UFSAR.

The new protection scheme does not contribute to initiation of the accidents evaluated in the UFSAR. Therefore, this modification does not result in a minimal increase in the consequences of an accident previously evaluated in the UFSAR.

Failure of the new protection scheme to acutate in response to a valid signal would be no different than the present response of the electrical power systems to a voltage unbalance condition. Therefore, this modification does not result in a minimal increase of a malfunction of equipment important to safety previously evaluated in the UFSAR. This modification also does not create a possibility for an accident of a different type than previously evaluated in the UFSAR, nor creates a possibility for a malfunction of equipment important to safety with a different result than previously evaluated in the UFSAR.

UFSAR Section 8.3.1, Technical Specifications (TS) Basis 3.3.5, 3.8.1, and 3.8.2 and Technical Requirements Manual (TRM) Tables 4.5-1 and 4.9-1 require revision as a result of this design change.

The 50.59 Screen for this Design Change identified TS Section 3.3.5 requires revision due to the addition of the voltage unbalace protection. Since a change to Technical

Specifications will be performed, NRC approval is required. This 50.59 Evaluation was performed to verify the effects of the new voltage unbalance pretection on the 2H Emergency Bus.

10 CFR 50.59 EVALUATION: NAPS2-EVAL-2018-0002

Document Evaluated: DC NA-15-00064, Installation of voltage Unbalance Protection (2J)

Brief Description: This Design Change (DC) addresses INPO Event Report (IER) 12-14, Revision 1, "Automatic Reactor Scram Resulting from a Design Vulnerability in the 4.16kV Bus Undervoltage Protection Scheme" by installing voltage unbalance (negative sequence) relays on 2J 4160V Emergency Bus. Similar to the existing degraded and undervoltage protection schemes, the new protection scheme is designed to detect a voltage unbalance, isolate 2J Emergency Bus from the Non-Safety Related source (Station Service Bus or Reserve Station Service), and start/load the Emergency Diesel Generator (EDG).

Reason for Change: This modification will provide North Anna Power Station with the capability to protect safety related equipment from a voltage unbalance event, similar to that in IER 12-14.

Summary: The proposed change will install voltage unbalance (negative sequence) relays (Basler BE1-47N) on the 4.16kV potential transformers (PTs) on 2J Emergency Bus. The new protection scheme will result in the following:

1. An alarm in the Unit 2 Main Control Room

2. Isolation of the 2J Emergency Bus based on if 2 of 3 negative sequence relays sense a volatage unbalance on the bus.

3. Auto start and load sequencing of the 2J EDG.

A new voltage balance relay (ABB-60 relay) will be installed on the 4kV and 480V PTs in order to provide a way of detecting failure of the 4.16kV PT or a PT blown fuse. If this relay detects a failed PT or a PT blown fuse, the ABB-60 relay will block the new negative relays from inadvertantly isolating the bus, auto start of the EDG, and load sequencing.

The primary design function of the new voltage unbalance scheme is to protect safety related equipment from damage due to a high voltage unbalance affecting the Emergency Bus. In addition, a design function for the new system is that it only actuates in response to a valid signal, since spurious actuation of the system would lead to an unnecessary isolation of the Emergency Bus, automatic start of the EDG, and load sequencing. Protection relays installed by this Design Change are classifed as safety related since they provide Emergency Bus tripping functions which ensures other safety related components can perform their design basis function.

The 50.59 Screen for this activity identified the addition of the new protective relaying to the 2J Emergency Bus can adversely affect a UFSAR described design function. This is due to the new scheme increasing the probability of a bus isolation and EDG start due to spurious actuation of the new voltage unbalance protective relays. This 50.59 evaluation evaluates the impact of this adverse consequence.

Although voltage unbalance protection devices may under rare conditions, operate to cause a spurious operation and unnecessary stopping and starting of equipment, it will also, with proper (and expected) operation prevent the loss of equipment important to safety and a loss of safety functions. These two effects more than offset. Therefore, the effect of the proposed activity does not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the UFSAR.

The NEI 06-07 guidance states that a change which involves the installation of additional equipment protective features (for example, adding protective devices to breakers), provided that all applicable design and functional requirements to be met, is an example of a situation where there would be not more than a minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety. The installation of the new relays is being performed using the same design requirements as that used for the existing protective relaying. The applicable function requirements of the new system, in isolating equipment important to safety from a degraded power source before it can be damaged so it will be available to perform its safety function, is similar to the functional requirements of the existing protective relaying. Therefore, the proposed modification does not result in more than minimal increase in the likelihood of occurrence of a malfunction of equipment important to safety previously evaluated in the UFSAR.

The new protection scheme does not contribute to initiation of the accidents evaluated in the UFSAR. Therefore, this modification does not result in a minimal increase in the consequences of an accident previously evaluated in the UFSAR.

Failure of the new protection scheme to acutate in response to a valid signal would be no different than the present response of the electrical power systems to a voltage unbalance condition. Therefore, this modification does not result in a minimal increase of a malfunction of equipment important to safety previously evaluated in the UFSAR. This modification also does not create a possibility for an accident of a different type than previously evaluated in the UFSAR, nor creates a possibility for a malfunction of equipment important to safety with a different result than previously evaluated in the UFSAR.

UFSAR Section 8.3.1, Technical Specifications (TS) Basis 3.3.5, 3.8.1, and 3.8.2 and Technical Requirements Manual (TRM) Tables 4.5-1 and 4.9-1 require revision as a result of this design change.

The 50.59 Screen for this Design Change identified TS Section 3.3.5 requires revision due to the addition of the voltage unbalace protection. Since a change to Technical Specifications will be performed, NRC approval is required. This 50.59 Evaluation was performed to verify the effects of the new voltage unbalance pretection on the 2J Emergency Bus.

10 CFR 50.59 EVALUATION: NAPS1-EVAL-2018-0003

Document Evaluated: 0-OP-4.3 Rev 18-OTO1

Brief Description: On 3/23/18, 1-FH-CRN-13 hoist stopped while lowering fuel assembly 09H in the cask pit video inspection area for benchmark video inspections. On 3/24/18, 0-OP-4.3 OTO1 was used to transfer fuel assembly 09H from Hoist 2 of 1-FH-CRN-13 to 1-MH-CRN-15 via the long handling tool. This new OTO1 of 0-OP-4.3 being evaluated here will transfer fuel assembly 09H back to 1-FH-CRN-13 Hoist 2 following repairs. 1-MH-CRN-15 will be used in conjunction with spotters and an underwater camera to lower 09H to a height in the cask pit area of the SFP where the load can be transferred to Hoist 2 of 1-FH-CRN-13 from the deck without using a ladder or platform and risking personnel safety.

An evaluation is required due to 1-MH-CRN-15 not being designed to the same standards as 1-FH-CRN-13 while handling a single fuel assembly. Use of 1-MH-CRN-15 to move a single fuel assembly requires further evaluation.

Reason for Change: This OTO is to perform a hook-to-hook transfer of a fuel assembly from 1-MH-CRN-15 to 1-FH-CRN-13 and return the assembly to its assigned location.

Summary: The requirements for cranes and hoists used to lift spent fuel have a limited maximum lift height so that the minimum required depth of water shielding is maintained. In this procedure this requirement will be established by the physical configuration of the rigging and the maximum height difference of the two cranes involved, 1-FH-CRN-13 and 1-MH-CRN-15. This was determined using controlled drawings 11715-FM-3A and 11715-FM-3B. 1-MH-CRN-15 Auxiliary hook has a maximum height of 320'4" and 1-FH-CRN-13 has a maximum hook height of 313'10" a difference of 6'6". Rigging will be at least 8' in length. There are maximum travel elevations marked on the fuel handling tool that will be monitored to ensure the fuel assembly complies with the minimum depth requirement.

The design of the Fuel Building Trolley (1-MH-CRN-15) includes the following additional provisions to ensure the safe handling of the fuel elements will be accomplished in the following ways to satisfy the 7 design requirements of 1-FH-CRN-13 listed on page 2. *

1) While holding the fuel assembly 1-MH-CRN-15 will only be operated in the Z axis (vertical) only. The auxiliary crane is rated for 10 ton capacity and the rigging is specified to be rated for 5 times the load weight. The assembly weighs 1467 lbs and the fuel handling tool weighs 330 lbs for a combined weight of 1797 lbs (Reference 0-OP-4.8.) In addition the crane hook of 1-MH-CRN-15 will be operated in the slow speed (vertical) Z axis only.

2) An unobstructed view of the assembly will be maintained by virtue of it's current location which will not be moved in the X or Y axis and is currently located in the Spent Fuel cask area in open water.

3)

The trolley will not be operated while transferring the fuel assembly and the hook will only be operated in the z axis while holding the fuel assembly, therefore no interlock is required.

4)

The highest and lowest position of 1-MH-CRN-15 is controlled as described in section 9.1.4.4.12 of the SAR. Each hoist is provided with limit switches to stop the hook in its highest and lowest positions. Each limit switch is wired so that the drive motor can be energized in the reverse direction after its limit switch has been actuated. The actuating mechanism of the limit switch is positioned so that it will trip the limit switch under all conditions of hoist load and hoist speed and in sufficient time to prevent the contact of the upper drum and lower blocks. There are two independent upper-limit switches. The failure of any one of the upper-limit switches will not affect the operation of the other.

5)

Same as 4 immediately above.

6)

Same as 4 immediately above. Additionally an underwater camera will be used to ensure the fuel assembly is not lowered too far and cause damage to the fuel from contacting structures on the bottom of the cask pit area.

7)

The requirement for a load limiting feature is to prevent damaging the assembly when lifting it from a spent fuel pit storage location. This design feature will not be required since the fuel assembly is located in the Spent Fuel Cask end of the SFP in open water. The nearest structure is a smooth vertical wall approximately two feet away from the assembly. Tri Nuc and associated hoses are located much further away and are on a different elevation than the fuel assembly. Therefore, contact with the fuel assembly with any other surface during the small vertical lift is not a credible threat. As an added precaution a refueling SRO will oversee this activity during the entire evolution. There are maximum travel elevations marked on the fuel handling tool that will be monitored to ensure the fuel assembly complies with the 7' minimum depth. A camera will be positioned in the cask area of the SFP to monitor the assembly while lowering it in order to ensure there are no interferences.

* <u>Design criteria of the fuel building crane (1-FH-CRN-13):</u>
The design of the motor-driven platform includes the following additional provisions to ensure the safe handling of the fuel elements:

1. All portions of the driveline are capable of withstanding sudden stops of rated load up to 150% of rated speed.
2. An unobstructed perpendicular view into the water surface is provided along the entire length of the platform to ensure that the fuel assembly remains in the operator's view during handling.
3. An interlock is provided to prevent the platform and trolley from moving while the hook is being operated. The interlocks provided are fail-safe; that is, most common failures will leave the interlock features intact, preventing operation of the equipment unless the interlock is manually bypassed. The less likely failure of an interlock in the permissive condition, caused by

a short circuit around a switch or by a relay sticking in the closed position, must be followed by an operator error for a possible accident situation to exist.

4. Each hoist is provided with a resolver which inputs to the Programmable Logic Controller (PLC) to stop the hook in its highest and lowest positions. The PLC allows the drive motor to be energized in the reverse direction after the hook's highest and lowest positions have been reached. The resolver PLC limit settings are set so as to stop hoist motion under all conditions of hoist load and hoist speeds and in sufficient time to prevent the contact of the upper and lower blocks.

5. The hoist is provided with redundant upper limits (a block operated switch and a PLC upper limit setting). The failure of either one of these devices will not affect the operation of the other.

6. Failure of the lower limit switch will not cause an accident.

7. The motor-driven platform hoists are provided with a load readout device and a load-limiting feature that stops hoist motion if a preset weight is exceeded. The setpoint of the load limiter is adjustable. Failure of this interlock will not cause an accident.

ATTACHMENT 2

Commitment Change Evaluation Summary

None in 2018