

**NUCLEAR POWER DEPARTMENT
SAFETY EVALUATION REPORT**

SER _____
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Title of Proposed Modification,
Procedure Change, Test or Experiment:

MR 96-070, "Replace Breakers on 2Y-05/06"

Reference Document(s) #:

CR 96-539, Calculation 96-0245, Calculation 96-0262

Prepared By: _____

Reviewed By: _____

Reviewed by Multidisciplinary Review Team:

1. _____

2. _____

Date: 11/15/96

Date: 11/15/96

Date: _____

Date: _____

Date: _____

MSS Review/Date: _____

MSS #: _____

Manager - PBNP Approval: _____

Date: _____

In lieu of MSS and Manager signature, attach PBF-0026d if serial review has been conducted. (MSS and manager approvals are not necessary for a determination of non-applicability.)

Section 1

Screening - Determination if Safety Evaluation is Required

- A. Describe the modification, procedure change, test, or experiment and its expected effects. Include interim configurations or conditions.

only 1 action item

Modification MR 96-070 involves the replacement of the molded-case circuit breakers for six circuits in non-safety-related 120 VAC instrument panels 2Y-05 and 2Y-06. The affected circuits are 2Y-05-01, 2Y-05-05, 2Y-05-06, 2Y-05-10, 2Y-06-01, and 2Y-06-05. Action item #2 of condition report CR 96-539 identifies that the existing breakers for these circuits do not provide adequate short-circuit protection for the internal main control board wiring in the circuits. A short-circuit fault on one of the circuits could therefore result in damage to not only the circuit conductors themselves, but also to adjacent conductors for safety-related circuits. Furthermore, because of an identified lack of electrical train separation in the main control boards, such a fault could result in simultaneous damage to conductors for opposite-train safety-related circuits. Such damage could, in turn, simultaneously disable redundant, opposite-train safety functions.

Modification MR 96-070 will replace the existing circuit breakers for the six non-safety-related circuits identified above with breakers having lower trip ratings. The final design description for MR 96-070 documents the acceptability of the replacement breakers in providing fault protection for the main control board conductors in these circuits. The modification will therefore eliminate the potential for conductor damage in these circuits under short-circuit conditions, and will thus also eliminate the potential for damage to adjacent safety-related conductors.

- B. List the FSAR sections or VSC-24-SAR sections where the system, structure, component, procedure, test or experiment is described.

N/A

- C. Does the change, test or experiment involve a change in the Technical Specification?
If a change is required, briefly describe what the change should be and why it is required.

☐ Yes ☒ No

NOTE: NRC approval is required prior to implementation.

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Section I - Continuation

D. Screening for 10 CFR 50.59 and 10 CFR 72.48 Applicability:

1. 10 CFR 50.59 Screening:

- a. Will any system, structure or component (SSC) described in the PBNP FSAR, including its figures, be altered? (Refer to NP 10.3.1, step 3.1.2 for exception. This question may be answered "no" although the SSC is described in the PBNP FSAR.) ☐ Yes ☒ No
- b. Could, within reasonable possibility, the proposed change affect the intended design, operation, function, or method of function, of an SSC important to safety which is described in the PBNP FSAR? (This includes interim conditions.) ☐ Yes ☒ No
- c. Will any procedure described in the PBNP FSAR be altered? (Refer to NP 10.3.1, Attachment A, Part E, for guidance.) ☐ Yes ☒ No
- d. Will a test or experiment be performed which is not described in the PBNP FSAR and affects the design, operation, function, or method of function, of an SSC important to safety which is described in the PBNP FSAR? ☐ Yes ☒ No
- e. Will implementation affect a prior documented regulatory commitment to the NRC pertaining to the design, operation, function, or method of function, of an SSC important to safety which is described in the PBNP FSAR? ☐ Yes ☒ No
- f. Is a 10 CFR 50.59 evaluation required (are any of the above questions answered yes)? ☐ Yes ☒ No

*NOTE: If no, then provide basis for decision in Part D.
If yes, complete Sections 2 and 3.*

2. 10 CFR 72.48 Screening for the Independent Spent Fuel Storage Installation (ISFSI):

- a. Will any system, structure, or component (SSC) described in the ISFSI Licensing Basis document, including its figures, be altered? (Refer to Step 3.1.2 for exception. This question may be answered "no" although the SSC is described in the ISFSI Licensing Basis documents.) ☐ Yes ☒ No
- b. Could, within reasonable possibility, the proposed change affect the intended design, operation, function, or method of function, of an SSC important to safety which is described in the ISFSI Licensing Basis documents? (This includes interim conditions.) ☐ Yes ☒ No
- c. Will any procedures described in the ISFSI Licensing Basis documents be altered? ☐ Yes ☒ No
- d. Will a test or experiment be performed which is not described in the ISFSI Licensing Basis documents and affects the design, operation, function, or method of function, of an SSC important to safety which is described in the ISFSI Licensing Basis documents? ☐ Yes ☒ No
- e. Will implementation affect a prior documented regulatory commitment to the NRC pertaining to the design, operation, function, or method of function, of an SSC important to safety which is described in the ISFSI Licensing Basis documents? ☐ Yes ☒ No

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Section 1 - Continuation

- f. Is a 10 CFR 72.48 evaluation required (are any of the above questions answered yes)?

☐ Yes ☒ No

*NOTE: If no, then provide basis for decision in Part D.
If yes, complete Sections 4 and 5.*

- D. Basis for determination that a safety evaluation is not required:

Modification MR 96-070 will replace the existing molded-case circuit breakers for six circuits in non-safety-related instrument panels 2Y-05 and 2Y-06 with breakers having lower trip ratings. The possible safety consequences of the configuration changes and interim conditions associated with the modification will be discussed separately below:

Configuration Changes

This modification will replace six circuit breakers in 120 VAC instrument panels 2Y-05 and 2Y-06. The replacement breakers will be identical in manufacturer and style to the existing breakers, but will have reduced trip ratings to provide improved MCB conductor protection. The physical dimensions, mounting configuration, and failure mechanisms for the replacement breakers will also be identical to those of the existing breakers. The replacement breakers meet all requirements of Design Guideline DG-E04, "Selection of Molded-Case Circuit Breakers." All parts used for the modification will be QA-scope, so the Augmented-QA classification of the 2Y-06 panel will not be affected (the 2Y-05 panel is classified as non-QA scope). The only configuration change associated with MR 96-070 is therefore the reduction in trip rating for the six breakers which will be replaced. The final design description for the modification determines that the trip ratings of the replacement breakers are adequate to ensure that the breakers will be able to supply their maximum possible load currents without tripping. The design description also determines that the breakers will provide adequate short-circuit and overload protection for all downstream field cable conductors and MCB internal wiring. Furthermore, neither the breakers themselves nor any of the associated loads are classified as safety-related, and none are capable of initiating any equipment malfunctions or accidents described in the FSAR.

Based on the above, it is concluded that there are no safety concerns regarding the configuration changes associated with modification MR 96-070.

Interim Conditions

This modification will replace circuit breakers 2Y-05-01, 2Y-05-05, 2Y-05-06, 2Y-05-10, 2Y-06-01, and 2Y-06-05 in 120 VAC instrument panels 2Y-05 and 2Y-06. During the installation of the modification, the loads supplied from these six breakers will be deenergized to facilitate breaker replacement. A complete list of the loads which will be deenergized is attached to this evaluation. Other loads on the 2Y-05 and 2Y-06 panels will not be affected. None of the loads which will be deenergized are classified as safety-related, and none are required to mitigate the consequences of any accidents. With the exception of annunciator cooling fans and power failure alarms (see below), all of the affected loads are specific to Unit 2. The installation will be performed with Unit 2 shutdown and defueled. Under these conditions, none of the affected Unit 2 loads will be required to perform their design functions, so there will be no potential for a plant transient to result from the installation. Since all loads (other than annunciator cooling fans and power failure alarm) are specific to Unit 2, the installation will not affect the operation of Unit 1 or any required common plant equipment.

As mentioned above, the installation of this modification will require the deenergization of the annunciator cooling fans and annunciator DC power failure alarms for main control boards C-01, C-02, 2C-03, and 2C-04. To compensate for the loss of annunciator cooling during installation, the control boards will be provided with temporary auxiliary cooling if deemed necessary by the DSS. No compensatory actions will be taken regarding the annunciator power failure alarm. However, the duration of the installation will be very brief (less than one shift), so the probability of a loss of annunciator DC power occurring during the installation is extremely small. Furthermore, the alarm is not safety-related, and its operation is not credited for mitigating the consequences of

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any accidents or equipment malfunctions.

The installation of this modification will be performed under Work Order work plans. A separate work plan will be created for each of the six breakers which are to be replaced. Each work plan will list the specific loads to be deenergized, indicate any expected effects or alarms, and specify any required or recommended compensatory actions (e.g. auxiliary annunciator cooling). Each work plan will also include DSS or Operations signoffs to authorize the deenergization of specific loads. These signoffs will serve as a final pre-installation verification that load deenergization will not have any adverse impacts on plant operations. Finally, each work plan will specify appropriate post-maintenance and/or return-to-service testing requirements to ensure the proper operation of all affected loads following the installation.

Based on the above, it is concluded that there are no safety concerns regarding the interim (installation) conditions associated with modification MR 96-070.

Conclusion

There are no safety concerns regarding either the configuration changes or the interim installation conditions associated with modification MR 96-070. The modification will not alter or affect the operation of any systems, structures, or components which are safety-related, important to safety, or described in the FSAR. No FSAR procedures will be altered. The modification will not affect any equipment capable of initiating an FSAR accident or equipment malfunction, or any equipment credited for mitigating the consequences of such an accident or equipment malfunction. None of the equipment affected by the modification is specified in the basis for any Technical Specifications. The implementation of the modification does not constitute an Unreviewed Safety Question. A 10CFR50.59 evaluation is not required.

None of the equipment affected by modification MR 96-070 is described in the ISFSI Licensing Basis documents. Configuration changes and interim conditions associated with the modification will not affect any systems, structures, or components described in the ISFSI documents. Implementation of the modification will not affect any prior NRC commitments pertaining to the ISFSI or any of its associated SSCs. A 10CFR72.48 evaluation is not required.

only 1
work plan
was used

MR 96-070
List of Affected Loads

Supply Breaker	Description of Load
2Y-05-01	Unit 2 Turbine Left/Right Stop Valves Test Circuit/Valves
2Y-05-01	Unit 2 Turbine Left/Right Stop Valves (Position Indication on 2C-03)
2Y-05-01	Unit 2 Turbine Upper/Lower Left/Right Governor Valves (Position Indication on 2C-03)
2Y-05-05	2C-03 Annunciator 2F 4-3, "Turbine Supervisory"
2Y-05-05	Unit 2 Turbine Supervisory Indication on 2C-03
2Y-05-06	2MS-2085, HX-22D Moisture Separator Reheater Inlet Steam Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2MS-2086, HX-22C Moisture Separator Reheater Inlet Steam Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2MS-2087, HX-22B Moisture Separator Reheater Inlet Steam Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2MS-2088, HX-22B Moisture Separator Reheater Inlet Steam Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2517A, HX-22D Moisture Separator Reheater Shell Side Level Control (Indication on 2C-03)
2Y-05-06	2FD-2521B, T-25C Moisture Separator Reheater Stilling Manifold Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2522B, T-25B Moisture Separator Reheater Stilling Manifold Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2641B, T-25A Moisture Separator Reheater Stilling Manifold Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2642B, T-25D Moisture Separator Reheater Stilling Manifold Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2516A, HX-22A Moisture Separator Reheater Shell Side Level Control (Indication on 2C-03)
2Y-05-06	2FD-2516B, HX-22A Moisture Separator Reheater Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2515A, HX-22C Moisture Separator Reheater Shell Side Level Control (Indication on 2C-03)
2Y-05-06	2FD-2518A, HX-22B Moisture Separator Reheater Shell Side Level Control (Indication on 2C-03)
2Y-05-06	2FD-2513B, HX-21B High Pressure Feed Water Heater 5B Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2514B, HX-21A High Pressure Feed Water Heater 5A Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2532B, T-23 Heater Drain Tank Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2516B, HX-22A Moisture Separator Reheater Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2518B, HX-22B Moisture Separator Reheater Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2515B, HX-22C Moisture Separator Reheater Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2FD-2517B, HX-22D Moisture Separator Reheater Dump to Condenser Control (Indication on 2C-03)
2Y-05-06	2MS-2037, Z-53A/B Priming Air Ejector Inlet Steam Regulator Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2AR-3511, Z-53A Priming Air Ejector Air Side Suction Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2AR-3512, Z-53B Priming Air Ejector Air Side Suction Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	Unit 2 Turbine Auto Stop Reset Solenoid 20/ASR
2Y-05-06	Unit 2 Turbine Vacuum Trip Reset Solenoid 20/VTL
2Y-05-06	2MS-2701, High Pressure Turbine Drain Upper Left Control (Solenoid)
2Y-05-06	2MS-2702, High Pressure Turbine Drain Lower Left Control (Solenoid)
2Y-05-06	2MS-2703, High Pressure Turbine Drain Upper Right Control (Solenoid)
2Y-05-06	2MS-2704, High Pressure Turbine Drain Lower Right Control (Solenoid)
2Y-05-06	2MS-2705, High Pressure Turbine Drain Inlet Control (Solenoid)
2Y-05-06	2MS-2706, High Pressure Turbine Drain Extraction Outlet Control (Solenoid)

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List of Affected Loads

Supply Breaker	Description of Load
2Y-05-06	2MS-2729, HX-22A/C Moisture Separator Reheater Crossunder Piping Drain Control (Solenoid)
2Y-05-06	2MS-2730, HX-22B/D Moisture Separator Reheater Crossunder Piping Drain Control (Solenoid)
2Y-05-06	2MS-2040, T-26 Steam Generator Blowdown Tank Outlet Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2504B, HX-17A Low Pressure Feed Water Heater 2A Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2505B, HX-17A Low Pressure Feed Water Heater 1A Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2501B, HX-17B Low Pressure Feed Water Heater 2B Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2502B, HX-17B Low Pressure Feed Water Heater 1B Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2543B, HX-19B Low Pressure Feed Water Heater 3B Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2544B, HX-19A Low Pressure Feed Water Heater 3A Dump to Condenser Control (Solenoid and Position Indication on 2C-03)
2Y-05-06	2FD-2504A, HX-17A Low Pressure Feed Water Heater 2A Drain to 1A Control (Position Indication on 2C-03)
2Y-05-06	2FD-2501A, HX-17B Low Pressure Feed Water Heater 2B Drain to 1B Control (Position Indication on 2C-03)
2Y-05-06	2FD-2502A, HX-17B Low Pressure Feed Water Heater 1B Drain to Condenser Control (Position Indication on 2C-03)
2Y-05-06	2FD-2543A, HX-19B Low Pressure Feed Water Heater 3B Drain to HX-17B Control (Position Indication on 2C-03)
2Y-05-06	2FD-2544A, HX-19A Low Pressure Feed Water Heater 3A Drain to HX-17A Control (Position Indication on 2C-03)
2Y-05-06	2C-03 Annunciator Cooling Fans
2Y-05-06	2C-03 Annunciator DC Power Failure Relay/Alarm
2Y-05-10	2TR-2001, Plant Thermocouple Monitor Temperature Recorder
2Y-05-10	2TR-2002, Generator Hydrogen Gas Temperature Recorder
2Y-05-10	2C-04 Permissive and Bypass Status Lights
2Y-05-10	Unit 2 Reactor Coolant Make-Up Control (Unit 2 Blender) and Indication on 2C-04
2Y-05-10	2C-04 Annunciator Cooling Fans
2Y-05-10	2C-04 Annunciator DC Power Failure Relay/Alarm
2Y-05-10	2VNPSE-03269, W-2A/B Unit 2 Containment Purge Supply Fan Outside Air Suction Damper (Solenoid)
2Y-05-10	2FS-3233, R-1 Reactor Vessel Cavity Cooling Air Flow Switch (Status Light on 2C-04)
2Y-05-10	2FS-3222A, W-3A/B Control Rod Drive Shroud Fan Flow Switch (Status Light on 2C-04)
2Y-05-10	2FS-3222B, W-3A/B Control Rod Drive Shroud Fan Flow Switch (Status Light on 2C-04)
2Y-05-10	2FS-3214, W-43A/B Unit 2 Containment Fan Inlet Flow Switch (Status Light on 2C-04)
2Y-05-10	2FS-3278, W-6A/B Containment Purge Exhaust Fan Suction Flow Switch (Status Light on 2C-04)
2Y-05-10	2FS-3206, W-2A/B Unit 2 Containment Purge Supply Fan Discharge Flow Switch (Status Light on 2C-04)
2Y-05-10	Unit 2 NIS "Channel Test" Alarm Relay A29 (2C-04)
2Y-05-10	2TR-2000A, Plant Thermocouple Monitor Temperature Recorder
2Y-05-10	2TR-2000B, Plant Thermocouple Monitor Temperature Recorder
2Y-05-10	Unit 2 Delta Flux Differential Amplifiers 2-1DA and 2-2DA (for 2NR-45)
2Y-06-01	C-01 Annunciator Cooling Fans
2Y-06-01	C-01 Annunciator DC Power Failure Relay/Alarm

MR 96-070
List of Affected Loads

Supply Breaker	Description of Load
2Y-06-01	C-02 Annunciator Cooling Fans
2Y-06-01	C-02 Annunciator DC Power Failure Relay/Alarm
2Y-06-01	2WL-4101, P-10B Residual Heat Removal Pump Drain to Sump Control (Solenoid and Indicating Lights on C-01)
2Y-06-01	2LS-4102, P-10A Residual Heat Removal Pump Room Level Switch (Indicating Light on C-01)
2Y-06-01	2WL-4100, P-10A Residual Heat Removal Pump Drain to Sump Control (Solenoid and Indicating Lights on C-01)
2Y-06-01	2LS-4103, P-10B Residual Heat Removal Pump Room Level Switch (Amber Indicating Light on C-01)
2Y-06-01	2FIS-640, P-10A/B Residual Heat Removal Pump Seal Water Heat Exchanger Shell Side Outlet Flow Indicating Switch
2Y-06-01	2FIS-649, P-14A/B Containment Spray Pump Seal Water Heat Exchanger Shell Side Outlet Flow Indicating Switch
2Y-06-01	2FIS-650, P-15A/B Safety Injection Pump Seal Water Heat Exchanger Shell Side Outlet Flow Indicating Switch
2Y-06-01	2HIC-957, T-34A/B Safety Injection Accumulator Nitrogen Supply Line Vent Hand Controller
2Y-06-01	2HC-105, T-34A/B Safety Injection Accumulator Nitrogen Supply Line Vent Hand Controller
2Y-06-01	2POT/T-2085, Pneumatic Time Pattern Transmitter
2Y-06-01	2TC-3520, Turbine Temperature Controller
2Y-06-01	Unit 1 Main Generator Breaker #122 Auxiliary Relay for "Generator On Line" Computer Input and Annunciator
2Y-06-01	Unit 2 Main Generator Breaker #142 Auxiliary Relay for "Generator On Line" Computer Input and Annunciator
2Y-06-01	2MS-2083, HX-1A Steam Generator Sample Isolation Control (Solenoid and Position Indication on C-01)
2Y-06-01	2MS-2084, HX-1B Steam Generator Sample Isolation Control (Solenoid and Position Indication on C-01)
2Y-06-01	2PS-2115, Condenser Pressure High Alarm Pressure Switch
2Y-06-01	2C-03 Annunciator 2F 4-2, "Turbine Rotor Stopped"
2Y-06-01	Unit 2 Turbine Turning Gear Engage Solenoid 20/TGE
2Y-06-01	Unit 2 Turbine Turning Gear Disengage Solenoid 20/TGD
2Y-06-01	Unit 2 Turbine Turning Gear Engage Air Vent Solenoid 20/TGV
2Y-06-01	Unit 2 Turbine Turning Gear Oil Solenoid 20/TGO
2Y-06-01	2MS-2045, HX-1B Steam Generator Steam Header Blowdown Control (Solenoid and Position Indication on 2C-03)
2Y-06-01	2MS-2042, HX-1A Steam Generator Steam Header Blowdown Control (Solenoid and Position Indication on 2C-03)
2Y-06-01	2MS-2090, P-29 Auxiliary Feed Water Pump Bearing Cooling Inlet (Solenoid and Local Position Indication at 2TB-174)
2Y-06-01	2MS-5958, HX-1B Steam Generator Blowdown Isolation (Auto Open Disabled)
2Y-06-01	2MS-5959, HX-1A Steam Generator Blowdown Isolation (Auto Open Disabled)
2Y-06-05	Unit 2 Preseparator System

CONDITION REPORT
CR 96-539

STATUS: OPEN UNIT: 0 SYSTEM: AF INITIATED: 08/15/96 CLOSED:
MSS #: ADMINISTRATOR:
INITIATOR: ISSUE MANAGER: R
NUMBER OF OPEN ACTIONS: 1 NUMBER OF CLOSED ACTIONS: 0

Redundant Safety-Related Circuits Routed in Common Raceway

DESCRIPTION:

During the evaluation of CR 96-385 #1 (Potential for inadequate main control board separation), it was discovered that several conductors in the control circuit for 1B-29 turbine-driven auxiliary feedwater pump minimum recirculation valve 1AF-4002 may have inadequate electrical protection. The conductors in this circuit are identified on Wolfe+Mann drawing E-1267E-B as #14 AWG type SIS. Per CHAMPS and Westinghouse drawing 499B466 Sheet 816, the conductors are protected by a 30 amp Westinghouse type HFA2030 circuit breaker in panel D-12 (breaker D-12-16). Inspection of the breaker time-current characteristics and the conductor thermal damage curve indicates that conductor damage could occur prior to breaker operation for short circuit faults between 90 and 485 amps. Preliminary calculations performed using the DC/ELF software indicate that the maximum short circuit current available in this circuit at main control board 1C-03 exceeds 1900 amps. During the evaluation of CR 96-385 #1, it was determined that portions of the circuit are routed in common raceways with other redundant safety-related circuits. Therefore, a short-circuit fault on the 1AF-4002 conductors in 1C-03 could potentially result in both conductor damage and damage to other safety-related circuits.

Significance: Potential for short-circuit fault in 1AF-4002 control circuitry at 1C-03 to result in damage to adjacent circuits, including redundant safety-related circuits.

Completed corrective actions: MTN has replaced the 30 amp breaker on Unit 1 with a more conservative 15 amp breaker. They are also replacing the 40 amp breaker on Unit 2 with a 15 amp breaker. Additionally, more fuses are being installed on both units to protect the neighboring wiring.

STATUS UPDATE:

(09/16/96) An LER was written on this event by . This was submitted to the NRC on 9/13/96.

SCREENED BY :

ER

DATE: 08/16/96

REGULATORY REPORTABLE..... (Y/N) : Y
10 CFR 21..... (Y/N) : N
OPERABILITY IMPACT PER TS. (Y/N) : Y
MSS REVIEW..... (Y/N) : N
OPERABILITY DETERMINATION. (Y/N) : N

TS VIOLATION..... (Y/N) : N
TS LCO..... (Y/N) : Y
JCO REQUIRED..... (Y/N) : N
SCAO..... (Y/N) : Y
COMMITMENT..... (Y/N) : N

SUPPORTING DETERMINATIONS:

A one-hour report was made to the NRC regarding this CR. This directly affects the operability of the Aux. Feedwater system. This report is being classified as a scag due to its direct relationship to nuclear safety. Action items will evaluate if this report is applicable to other safety-related systems.

REFERENCES:

CARDS
WEST. DWG. 499B466 SH. 816
CR 96-385

CHAMPS
WOLFE & MANN DWG. E-1267E-R
LET 266/96-007-00

TRENDING INFORMATION:

WHEN : NON-OUTAGE
THIRD QUARTER OF 1996

WHO :
WHY : DESIGN SPECIFICATION WAS LESS THAN ADEQUATE
WHAT : ELECTRICAL BREAKER RELATED
SYSTEM:

ACTIONS	PRI	ACTION STATUS	RESPONSIBLE PERSON	DUE DATE
1	43	ACTION VERIFICATION		10/15/96

***** Responsible Person: *****
* Trkid: CR 96-539 * Urgency: NOT DUE / IN CLOSEOUT
* Action Number: 1 * Work Priority: 43

ASSOCIATED WITH A SCAQ ISSUE

Activity Pending is: ACTION VERIFICATION

-----TITLE AND TASK DESCRIPTION-----

Redundant Safety-Related Circuits Routed in Common Raceway

Evaluate the applicability of this condition report to similar main control board circuits, and recommend modifications to correct the situations. Also ensure that preventive measures taken to provide adequate protection to the #14 SIS conductors in the 1AF-4002 control circuit are adequate.

-----DATES-----

Source Record: 08/15/96	***** Evaluation *****	***** Correction *****
Commitment:	Eval Due:	Corr Act Due: 10/15/96
Action Create: 08/16/96	Orig Eval Due:	Orig CA Due: 10/15/96
Action Closed:	Eval Done:	Corr Act Done: 12/14/96

-----PEOPLE-----

Responsible for Overall Action: EEG
Responsible for Current Pending Activity: OER
Issue Manager:
Initiator:
Punchlist Administrator:

-----UPDATE-----

(08/16/96) Set Work Priority to 43. This is an initial priority set.
Evaluation of this action item may result in a change to this work
priority.EEG
Responsible Person:

(08/29/96 Requested Due Date: 10/15/96

(09/11/96 Changed the Due Date from: << BLANK >> to 10/15/96

(10/15/96 Passed to for acceptance of work.

(10/15/96 The operability report for Main Control Board Separation has been updated and included with the closeout documentation. This report covers the circuit reviews completed to determine any other potential separation problems. Design changes have been initiated to replace the 15 breakers that may not adequately protect #14 SIS wire.

(10/15/96) In addition, the breaker supplying the 1AF-4002 control circuit was changed to a 15 amp breaker.

(11/15/96 ...) After reviewing the circuits again, only fourteen circuits need to be replaced. MR 96-069 and MR 96-070 will replace the circuit breakers with acceptable breakers.

(12/14/96) Passed to for Verification.
AC/DC Cabling Review and Analysis Results

A review of all DC cabling routed through the Main Control Panel was completed on 8/22/96 and the AC cabling on 10/4/96. This review concluded that no single failure would result in the loss of redundant Safety Related AC or DC control circuit functionality.

125 VDC CONTROL CIRCUITS

A review was performed of all 125 VDC control cables routed to determine if a single faulted cable could damage A Train and B Train control circuits of redundant equipment.

A 125 VDC control circuit was deemed operable if it satisfied at least one of the following criteria :

1. The conductor was not routed into the Main Control Panels. 2. The maximum calculated conductor temperature reached during short circuit conditions was determined to be less than the wire short circuit temperature rating of 250 C. This criteria is bounded by criteria #3, however it is included as a separate category to demonstrate that the majority of conductors have fault protection that is adequate to ensure

that peak temperatures will not exceed this more conservative criteria. 3. The maximum calculated conductor temperature reached during short circuit conditions was determined to be less than the insulation ignition temperature, thus ensuring that insufficient energy is available for insulation ignition. Criteria #2 is bounded by this criteria, however it is included as a separate criteria to show that the majority of cables fall within

A total of 281 breaker positions on DC distribution panels were analyzed. 220 of the breaker positions were used in a 125 VDC. The results of the DC circuit analysis is summarized in Table 1.

120 VAC CIRCUITS

A review of all 120 VAC circuits was completed on 10/4/96. This review determined if there is a potential for damaging A Train and B Train control circuits of redundant equipment due to a fault on a 120 VAC circuit.

A 120 VAC circuit was deemed operable if it satisfied at least one of the following criteria:

1. The conductor was not routed through the Main Control Boards.
2. Either the breaker location is a spare or unused space.
3. The circuit was protected per the requirements of the National Electrical Code. Table 310-12 of the 1965 NEC states that insulated copper, #14 SIS cable has an ampacity of 25 amperes. There is a 50% derating factor for more than 42 conductors in a raceway (exception #8 from the Notes to Table 310-12). This would create a final ampacity of 12.5 amperes. Exception #10 from the Notes for Table 310-12 states, "Where the standard ratings and settings of overcurrent devices do not correspond with the ratings and settings allowed for conductors, the next higher setting may be used. This allows installation of a 15 ampere overcurrent protective device to protect #14 SIS wire. Therefore, a circuit protected by a 15 ampere or smaller breaker or fuse is deemed acceptable.
4. Only enters 1C-20 and 2C-20 ASIP control boards. Train separation criteria was reviewed during the design and installation of these panels. Therefore, no separation problems are assumed.

All 120 VAC instrumentation panels listed in Master Data Book Section 3.2.11 were included in this review. A total of 888 breaker positions on the AC instrumentation panels were analyzed. Also, the control circuits from 25 motor control centers were reviewed for adequate overcurrent protection. In all the MCC circuits reviewed, 15 ampere or smaller fuse protection was installed. The results of the 120 VAC instrument panel circuit analysis is summarized in Table 2.

References:

1. Calculation # 95-0040, Determination of Voltage Drop in Safety- Related MCC control circuits
2. Short Circuit Curves for # 14 AWG type SIS Conductor- (Attachment 2)
3. Memorandum of Telephone Conversation between J of Heinemann Electric Co. and J of Sargent and Lundy Engineers, dated 7-29-96 (Attachment 3)
4. Protective Device Time vs. Current Curves (Attachment 4 - XX)
5. 1965 National Electrical Code

Design changes were initiated to replace the circuit breakers on the fifteen circuits. The breakers will be replaced with 15 ampere or smaller circuit breakers to conform with the National Electrical Code.

(12/14/96) The operability review for the main control board separation issue still needs to be updated to include the results of the above described evaluation.

-----REFERENCES-----

CARDS	CHAMPS
WEST. DWG. 499B466 SH. 816	WOLFE & MANN DWG. E-1267E-B
CR 96-385	

-----MISCELLANEOUS-----

Originating Agency:	System: AF
NRC Open Item Number:	NRC Status:
Related Outages:	
Engineering Work Type: None Specified	