Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401
Telephone (612) 330-5500

July 6, 1984

Director
Office of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Description of Modifications for Automatic
Actuation of Scram Breaker Shunt Trip Attachment

In our letter dated November 4, 1983 we provided the results of our review of the positions contained in NRC Generic Letter 83-28 and, where possible, plans and schedules for needed improvements at Prairie Island. We stated that we would submit, for NRC review and pre-implementation approval, a preliminary design report for a plant specific scram breaker shunt trip modification and certain plant specific information. The purpose of this submittal is to provide the required design and plant information.

The following information is provided:

Attachment I - Shunt Trip Modification Preliminary Design Report for Prairie Island

Attachment II - Response to NRC Generic SER Questions Contained in a letter dated August 10, 1983 from the Director, Division of Licensing, to the Westinghouse Owners Group

Separate full size schematic diagrams showing the proposed modification will be provided to our Project Manager in the Division of Licensing to aid in the review of our design.

Please contact us if you have any questions related to the information we have provided.

David Musolf
Manager - Nuclear Support Services

DMM/dab

cc: Regional Administrator-III
NRR Project Manager, NRC
Resident Inspector, NRC
G Charnoff

Attachments

A001
1/1

SHUNT TRIP MODIFICATION PRELIMINARY DESIGN REPORT FOR PRAIRIE ISLAND

1.0 INTRODUCTION

This package has been developed in order to describe the conceptual design for the addition of an automatic reactor protection system trip of the reactor trip switchgear via the switchgear shunt coil trip attachment. This design is based on the generic Westinghouse design submitted to NRC on June 14, 1983. However, due to the availability of spare contacts on Reactor Protection System relays, the interposing relay used in the generic design is not necessary. The proposed system minimizes equipment and additional steps or complication in the test procedure, while providing the extra trip reliability via the shunt trip coil.

Included in this package are a discussion of design basis, conceptual hardware and design and testing procedures, and a discussion of licensing issues.

2.0 DESIGN BASIS

The purpose of this design modification is to utilize the shunt trip mechanism as a backup to the undervoltage (UV) trip mechanism for automatically initiated trip signals. By making this change a high level of reliability can be achieved by the reactor protection system. The shunt trip mechanisms have not been tested to show that they are capable of operating during and after a seismic event. Tests, however, have been performed to show that during a seismic event the shunt trip mechanisms will not degrade the operation of the breakers or the automatic UV trip mechanisms.

The shunt trip mechanism for Reactor Trip Breaker A shall receive automatic trip signals from the Train A protection system logic. The shunt trip mechanism for Reactor Trip Breaker B shall receive automatic trip signals from the Train B protection system logic. The addition of the automatic shunt trip to the bypass breakers is not necessary since there is little benefit and a high expense for adding the automatic shunt trip to the bypass breakers.

Test hardware and procedures shall be provided to demonstrate that the shunt and UV trip mechanisms are independently operable on line at power and capable of providing sufficient force to open the reactor trip breakers on automatic demand by the reactor protection system.

The incorporation of the shunt trip attachment into the RPS will provide diverse backup to the undervoltage trip attachments for automatically tripping the reactor trip breakers. The shunt trip mechanisms shall be Class 1E equipment. The quality assurance program shall ensure that the function of the shunt trip mechanism is met. The general requirements of IEEE Standard 279-1971 and other applicable standards and criteria shall be met by the shunt trip mechanisms to provide this assurance. System reliability and plant availability shall be maximized through the use of reliable components and conservative design practices. The response time of the shunt trip mechanism shall be equal to or faster than the response time of the undervoltage mechanism in order to preserve FSAR assumptions.

The shunt trip mechanisms shall meet all the requirements normally associated with protection systems except for the failure mode criteria specified in GDC 23, since electrical power is required to initiate a reactor trip via the shunt trip coil mechanism. The requirements of GDC 23, however, are still met by the UV trip mechanisms.

3.0 FUNCTIONAL REQUIREMENTS

The modification of the reactor protections system will be in accordance with the design criteria applied to the Prairie Island Plant, as expressed in the Prairie Island USAR. The installation will be done such that no unreviewed safety question is created, with no degradation of existing protection systems, and without increased risk to public health and safety.

The following environmental qualification conditions apply to the shunt trip mechanisms. It must be demonstrated that the shunt trip mechanisms can function during and after each of the following conditions and yet not cause a spurious trip to occur.

Plant Design Normal and Abnormal Operating Conditions

The reactor trip switchgear including the shunt trip coil are located in the rod drive rooms. The design normal conditions for these rooms is 65°F-105°F, and 20%-90% relative humidity. During design abnormal conditions temperature could go as high as 120°F.

Plant Operating Conditions for Design Basis Events

The only design basis event affecting the shunt trip mechanism is the postulated seismic event. The seismic testing of the shunt trip attachment for qualification is an ongoing WOG project which NSP is supporting. The proposed modification will not change the seismic response of the existing shunt trip or switchgear.

Test hardware and procedures shall be provided to independently demonstrate that the shunt and UV trip mechanisms are operable at power on automatic demand by the RPS. Consideration to human factors principles shall be given to the development of test features, indications, and procedures such that testing avoids the generation of spurious trips or undue unavailability of the trip breakers.

The power supply for the shunt trip mechanisms shall be from a class 1E electrical power source and shall be such a reliability that it is not interrupted during plant transients. The power supply for Reactor Trip Breaker A shunt trip mechanism shall be from a Train A power supply and the power supply for Reactor Trip Breaker B shunt trip mechanism shall be from a Train B power supply.

4.0 CONCEPTUAL DESIGN FOR AUTOMATIC SHUNT TRIP OF REACTOR TRIP BREAKERS

4.1 Introduction

This design concerns the addition of automatic trip signals to the shunt trip devices of the main circuit breakers in the Reactor Trip Switchgear (RTS). In the Reactor Protection System (RPS) designs, automatic reactor trip signals actuate the undervoltage trip devices of all the circuit breakers in the RTS.

4.2 Background Information

The configuration of RTS is two main reactor trip breakers and two reactor trip bypass breakers. The bypass breakers allow testing of the main breakers at power (see attached sketch). The four-breaker RTS is equipped with type DB-50 circuit breakers.

Electrically-operated type DB-50 circuit breakers are equipped with an electrical closing circuit and a shunt trip circuit for control from a remote location. The breaker is closed by momentarily energizing the closing circuit. The breaker mechanism is mechanically latched in the closed position. The breaker is unlatched to the tripped (open) position when the shunt trip coil is momentarily energized. For the reactor trip application, the undervoltage trip option is added to the basic circuit breaker. The undervoltage (UV) trip coil must be continuously energized in order to close the breaker and keep it closed. Tripping on loss of voltage is required to meet General Design Criterion 23.

A reactor trip signal removes voltage from the normally energized UV trip coil. This releases the UV trip lever, which actuates the trip bar, causing the breaker to unlatch from the closed position. The trip bar is also actuated by a shunt trip lever when the normally de-energized shunt trip coil is energized. In the present RPS designs, the shunt trip coils are energized only during a manual reactor trip operation since no credit is taken for their operation in a reactor trip in present safety analyses. A manual reactor trip simultaneously de-energizes all the UV trip coils and energizes all the shunt trip coils. An automatic reactor trip signal from the Train A (RTA) and Reactor Trip Bypass Breaker B (BYB). The Train B RPS de-energizes the UV trip coils of Reactor Trip Breaker B (RTB) and Reactor Trip Bypass Breaker A (BYA). The cross-train tripping of the bypass breakers is required to ensure a reactor trip when the RTS is in test and there is a single failure.

4.3 Description of Modification

The proposed design to add automatic reactor trip signals to the shunt trip devices covers the main reactor trip breakers only. Adding automatic trip signals to the bypass breakers introduces physical separation problems in the train-related wiring of the RTS, because of the cross-train tripping for the bypass breakers. The bypass breakers are normally tripped and withdrawn from the power circuit except for approximately one hour per month during the testing of the reactor trip breakers. The complexity and cost of adding automatic shunt trip to the bypass breakers outweighs the benefits, and they are not included in the proposed change.

The attached sketches show the modification for breaker RTA. The same modification is required for RTB. A logic matrix, which is the energize-to-trip equivalent to the ladder matrix used on the undervoltage trip, is developed using spare contacts on the reactor protection relays. No additional relays are installed for this design. Two test pushbuttons and a monitor light are installed on the reactor protection test panel. When an anticipated transient occurs, contacts open in the ladder matrix to deenergize the undervoltage coil. Simultaneously contacts close in the new logic matrix to energize the shunt trip coil. Thus the trip bar of RTA will be actuated by both the UV and shunt trip devices. The two test pushbuttons are used during testing to individually confirm the operability of the UV trip and shunt trip (see the following test procedure).

The shunt test pushbutton switch is used to energize the shunt trip coil while the undervoltage trip coil remains energized. The shunt block pushbutton switch is used to prevent the shunt trip coil from energizing when the UV trip is being tested.

The 125 VDC train-related source for the shunt trip coil is provided in the reactor protection system racks.

4.4 Procedure for On-Line Testing the Automatic Shunt Trip and Undervoltage Trip of the Reactor Trip Switchgear

4.4.1 Purpose

The purpose of this procedure is to provide a method for independently verifying the ability of the shunt trip and undervoltage trip mechanisms to trip the reactor trip breakers. This test, which is to be performed on-line, also confirms the operation of the circuitry for the automatic trip through the shunt trip device.

4.4.2 Introduction

The Reactor Protection System at Prairie Island is based on trip logic formed on electromechanical relay contacts. Since spare contacts are available on these relays, the automatic trip of the shunt coil can be achieved without the addition of a new relay. The testing of this system will be achieved such that changes and additions to the existing test procedure can be minimized.

4.4.3 Criteria

In order to satisfy the requirements of GDC 23, the operability of the undervoltage and shunt trip functions of the reactor trip breakers shall be independently verified by surveillance testing.

4.4.4 Assumptions

1. Automatic reactor trips actuate both the UV and shunt trip mechanisms.
2. The breakers will be tested using strict plant administrative controls.
3. This test is to be performed on the reactor trip main breakers only.
4. This test is to be performed periodically on-line.

4.4.5 Precautions

1. This test is to be performed on one trip breaker at a time, since only one bypass breaker may be closed at a time.

4.4.6 Procedure

The following is a general description of the procedure sequence used to test both reactor trip main breakers.

Action:	Purpose:
1. Rack in and close bypass breaker which is in parallel with trip breaker to be tested.	Permits on-line testing of trip breaker.
NOTE: Only one bypass breaker is to be closed at one time.	
2. Depress "Shunt Trip Block" pushbutton and hold.	Prevents automatic trip through shunt trip device.
3. Depress "Shunt Trip Test" pushbutton and verify that the breaker does not trip.	Indicates that automatic shunt trip is blocked to permit independent testing of UV coil trip.
4. Release "Shunt Trip Test" pushbutton <u>only</u>. Maintain "Auto Shunt Trip Block" pushbutton in depressed position.	
5. From the Reactor Protection System cabinet which corresponds to the trip breaker which is in test, initiate a trip of the breaker by momentarily making up a reactor trip matrix with the test cabinet pushbuttons.	Initiates breaker trip from protection system through UV coil only.
6. Verify that the trip breaker opens by observing the breaker position lamps on the Relay Protection System test cabinet, or on the Main Control Board (MCB) or a flag locally at the breaker.	Confirms operation of the breaker through the UV coil.
7. Release the "Shunt Trip Block" pushbutton.	Removes block of breaker trip through the shunt trip device.

Action:	Purpose:
8. Reclose the trip breaker.	Permits breaker test.
9. Depress "Shunt Trip Test" pushbutton momentarily. Verify that the shunt trip monitor light comes on when the shunt trip test pushbutton is pushed.	Initiates breaker trip through shunt trip device only.
10. Verify that the trip breaker opens by observing the breaker position lamps on the Relay Protection System test cabinet, or on the MCB or a flag locally at the breaker.	Confirms operation of the breaker through the shunt trip device.
11. Proceed with testing the RPS logic per procedure verifying that both UV and shunt receive trip signals by monitoring the event recorder and shunt trip monitor light.	
12. Reclose the trip breaker.	Permits opening of bypass breaker.
13. Open and rack out the bypass breaker which was closed during trip breaker testing.	Restores Reactor Protection System to normal conditions.

NOTE: This completes the test of one reactor trip breaker for operation through both the UV coil and shunt trip device. This procedure should be repeated for the opposite train trip breaker.

5.0 DISCUSSION OF LICENSING ISSUES

5.1 Introduction

The method used to consider licensing issues for the automatic shunt trip proposed design modification has been to review the design description and sketches of the conceptual design, and compare them to the Westinghouse generic design and generic licensing discussion.

5.1.1 Conformance to General Functional Requirements (Paragraph 4.1 of IEEE 279-1971)

The shunt trip attachment on the Reactor Trip (RT) circuit breaker initiates a reactor trip from the same automatic protection system signals that cause the undervoltage trip attachment of the RT circuit breaker to initiate a reactor trip. Although the undervoltage trip attachment continues to furnish the primary protective function, the shunt trip is being incorporated into the protection system in order to provide an automatic backup protective function. It meets all of the same criteria that the undervoltage trip attachment meets except for the deviation from the preferred failure mode identified by GDC 23 (protection system failure modes), which is implementation of a deenergize to trip principle. The shunt trip attachment trips on an energize trip principle, that is, energization of the shunt coil from a nominal 125 VDC bus will result in reactor trip. This is acceptable because the primary protective function from the undervoltage trip attachment operates on a deenergize to trip principle and will generate a reactor trip should its energy source fail.

5.1.2 Conformance to the Single Failure Criterion (Paragraph 4.2 of IEEE 279-1971, Regulatory Guide 1.53)

All existing Westinghouse NSSS reactor trip Protection Systems in nuclear plants operating and under construction meet the single failure criterion requirements of IEEE 279. Analyses and evaluations in accordance with R.G. 1.53 that attest to this compliance have been documented in the Safety Analysis Reports (SARs). This documentation shows that any single random failure within a channel or train will not prevent protective action at the system level when required. Conformance to the single failure criterion is not sensitive to the addition of the automatic shunt trip modification.

5.1.3 Conformance to the Requirements for Quality Components and Modules (Paragraph 4.3 of IEEE 279-1971, GDC 1)

Components and wiring will be of a quality that is consistent with use if a Nuclear Generating Station Protection System.

5.1.4 Conformance to the Requirements for Equipment Qualification

The reactor trip switchgear is not mounted in a harsh environment. No new devices are being mounted in the switchgear, so that its seismic response is unchanged.

The TEST and BLOCK pushbutton in the proposed design are identical to those already installed in the reactor protection system racks performing similar functions. Therefore no new or additional environmental and seismic qualification program will be necessary for this modification.

NSP is continuing to support and participate in WOG testing and study of the UV and shunt trip devices.

5.1.5 Conformance to the Requirements to Maintain Channel Integrity (Paragraph 4.5 of IEEE 279-1971, GDC 2, GDC 3, GDC 4)

The automatic shunt trip function implementation will be designed to maintain its capability to initiate a reactor trip during and following natural phenomena credible to the plant site, such as earthquakes, tornadoes, hurricanes, floods, winds, etc. Functional capability will be maintained despite degraded conditions that may exist in the plant due to credible events such as fires, flooding, vehicular crashes, explosions, missiles, electrical faults, toxic or corrosive gaseous releases, pipe whip, etc. Redundancy of equipment will ensure the reactor trip on demand despite loss of one of the redundant RT circuit breaker trip means.

5.1.6 Conformance to the Requirements to Maintain Channel Independence (Paragraph 4.6 of IEEE 279-1971, GDC 22, IEEE 384-1974)

Wiring and component location for the redundant sets of automatic shunt trip additions will employ physical separation or barriers to ensure independence of the circuits to the extent that is equivalent to the existing independent measures employed by the RPS and RT switchgear. The separation provisions of the presently existing RPS cabinets and RT switchgear can be maintained.

5.1.7 Conformance to the Requirements concerning Control and Protection System Interaction (Paragraph 4.7 of IEEE 279-1971, GDC 24)

The shunt trip attachment of the RT circuit breaker initiates a reactor trip from the same automatic protection system signals that cause the undervoltage trip attachment of the RT circuit breaker to initiate a reactor trip. The reactor trip occurs when the circuit breaker interrupts the rod control motor generator power source to the Control Rod Drive Mechanism (CRDM) magnetic jack coils, thus decoupling the control rod assemblies drive lines from the magnetic jacks. The rods will then insert into the core by gravity fall. The only interface between the RT protection system and the rod control system is the power supply bus bar arrangement whose circuit is interrupted by the RT circuit breaker. The automatic shunt trip modifications do not compromise this interface and therefore control protection interaction considerations are not sensitive to this modification. For the evaluation of control rod system sensitivity to potential interactive failures, refer to Section 7.4 of the Prairie Island USAR.

5.1.8 Conformance to the Requirements concerning the Deviation of System Inputs (Paragraph 4.8 of IEEE 279-1971)

To the extent feasible and practical, protection system inputs will be derived from signals that are direct measures of the desired variables. Compliance with this objective is not sensitive to the automatic shunt trip modification.

5.1.9 Conformance to the Requirements to Provide Capability for Sensor Checks (Paragraph 4.9 of IEEE 279-1971)

Compliance with this objective is not sensitive to the automatic shunt trip modification.

5.1.10 Conformance to the Requirements to Provide Capability for Test and Calibration (Paragraph 4.10 of IEEE 279-1971, GDC 17, GDC 21)

The automatic shunt trip modification makes use of and shares on-line testing provisions which are already available as part of in-place installations, as well as adding features necessary to assure independent verification of the ability of the shunt trip and the undervoltage trip attachments to trip the RT breakers. These features provides testability during full power operation while the plant is at power. These provisions do not interfere with the normally provided in-place capability for testing and calibrating channels and devices used to derive the final system reactor trip initiation signal from the various channel signals. Capability is provided to overlap the tests to be made for the automatic shunt trip with existing tests of the reactor trip function and shared equipment, signals, circuitry, and electrical power sources.

The method whereby independent verification of the reactor trip capabilities of both the shunt trip and the undervoltage (UV) trip is achieved can be described by referring to the attached sketches. The interfacing circuitry is typical of the Westinghouse RPS. The manual reactor trip switches are tested under a separate procedure while shutdown. When the RT breaker in a given train is tested on-line, only the parallel connected bypass breaker is racked in and closed.

In order to verify that the RT breaker will not trip when the shunt trip is blocked, the "Block Shunt Trip" switch is held in the depressed state followed by a depression of the "Test Shunt Trip" switch, which would energize the shunt trip coil if it were not blocked. With the "Shunt Trip Test" pushbutton now released while maintaining the depressed position of the "Block Shunt Trip" switch, the trip of the main RT breaker is initiated from the RPS. This involves a manual operation at an existing test panel which simulates a "making up" of the required-for-trip coincidence logic of a protection system process monitoring parameter. Since the shunt coil trip is blocked, a reactor trip from the UV trip is verified. After reclosing the breaker, the verification of reactor trip from the shunt coil is verified by release of the "Block Shunt Trip" switch, and depression of the "Test Shunt Trip" switch. Whenever the main RT breaker is tripped, this condition is verified by observing the breaker position indicators such as the flag locally at the breaker or lights at Main Control Board or RPS test cabinet.

5.1.11 Conformance to the Requirements on Channel Bypass or Removal from Operation (Paragraph 4.11 of IEEE 279-1971)

Provisions are made at Prairie Island to apply a bypass of one of the redundant trains, i.e., a block of the reactor trip function which causes deenergization of CRDM coils from that train so that at full power on-line operation the final actuated equipment (in this case the breakers) can be tested. The reactor trip initiation is a "one-out-of-two" system, that is, it has two-way redundancy in order to meet the single failure criterion. During a short period of time, approximately one hour, a bypass breaker that is in parallel to the RT breaker being tested is racked in and closed so that benefit is taken of the exemption in Section 4.11 for one our of two systems in regards to the single failure criterion. Since this exemption is based on the shortness of time the RT breaker is bypassed, there is some sensitivity of conformance to this requirement when it is considered that additional tests are now performed to verify independent reactor trip from two diverse trip attachment. This sensitivity is held to a minimum by strict administrative procedures that assure that personnel participating in the test are stationed at the RPS test cabinet and at the Main Control Board and that they are in communication with each other. During this short test time duration, should a demand for a reactor trip be initiated, the demand signal trips the redundant RT breaker and also trips the bypass breaker that is in parallel with the main RT breaker being tested.

5.1.12 Conformance to Requirements Governing Access to Setpoint Adjustments, Calibration, and Test Points (Paragraph 4.18 of IEEE 279-1971)

Redundant sets of two test switches will be added at the RPS racks as a result of the Automatic Shunt Trip modification. These two switches are:

a. "Block Shunt Trip" switch
b. "Test Shunt Trip" switch

Compliance to the requirement that access to and use of these switches assumes that strict administrative control will govern their use.

5.1.13 Conformance to the remaining requirements of IEEE 279-1971 listed as follows is not sensitive to the automatic shunt trip modification:

a. Operating Bypasses (Paragraph 4.12)
b. Indication of Bypasses (Paragraph 4.13)
c. Access to Means for Bypassing (Paragraph 4.14)
d. Multiple Set Points (Paragraph 4.15)
e. Completion of Protection Action Once It Is Initiated (Paragraph 4.16)
f. Manual Initiation (Paragraph 4.17)
g. Identification of Protective Actions (Paragraph 4.19)
h. Information Readout (Paragraph 4.20)
i. System Repair (Paragraph 4.21)
j. Identification (Paragraph 4.22)

5.1.14 Concerning conformance to 10 CFR 50 GDC's 20, (Protection System Functions), GDC 25 (Protection System Requirements for Reactivity Control Malfunctions), and GDC 29 (Protection Against Anticipated Operational Occurrences as well as conformance to the two ANS documents (ANS 18.2 and 18.8) cited in the functional requirements, compliance with these criteria is not sensitive to the automatic shunt trip modification.

COMPONENTS FOR USE IN AUTOMATIC

SHUNT TRIP MODIFICATION

The following components are proposed for implementing the Automatic Shunt Trip feature for the Reactor Trip Breakers. These pushbuttons are identical to pushbuttons already used on the reactor protection system test panels for the RPS logic test.

For Westinghouse Plants with Relay Protection Systems:

Component	Description
Block and Test Auto Shunt Trip Pushbuttons	Westinghouse Type OT2 snap action pushbutton switch

NSP Northern States Power Company

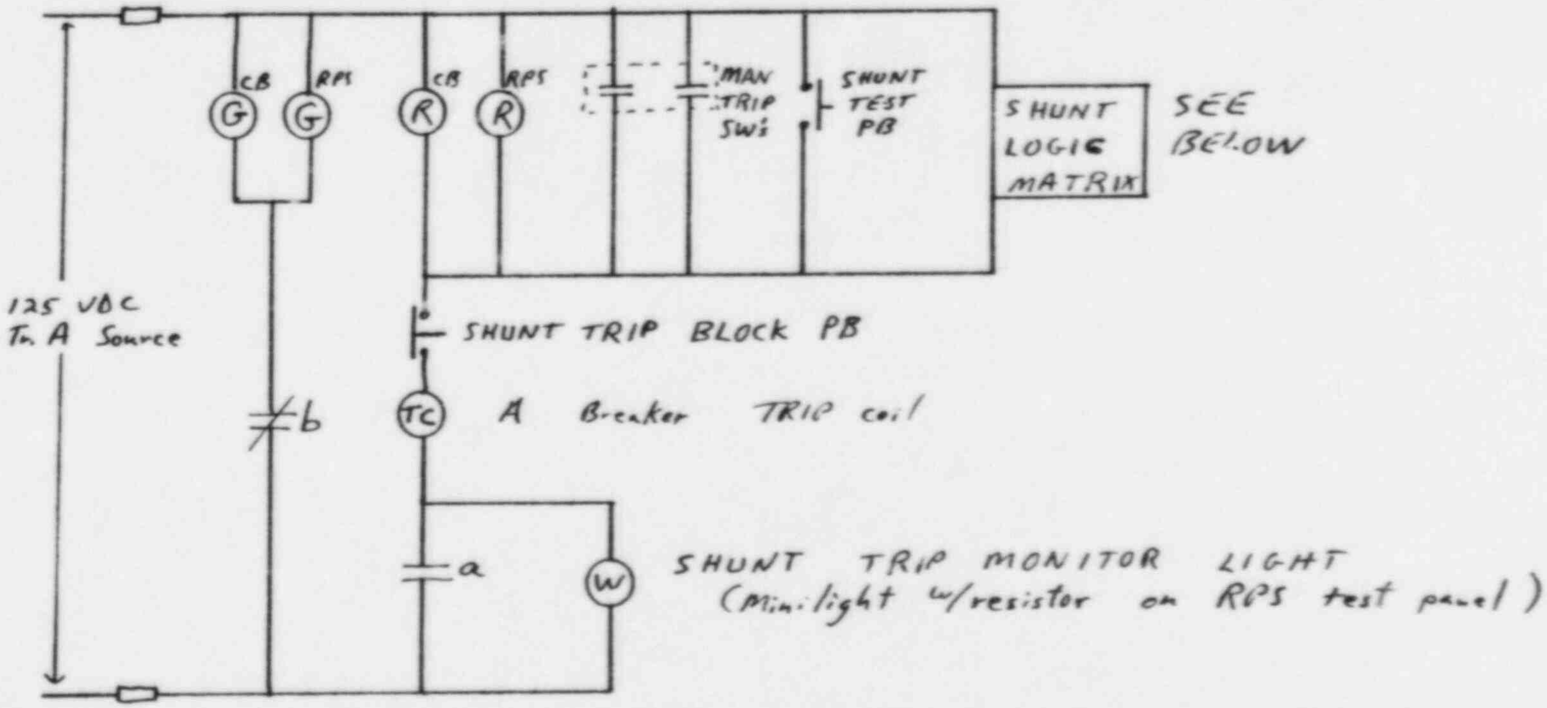
GENERAL COMPUTATION SHEET
FORM 17-4103

PROJECT: SHUNT TRIP MODIFICATION - PRAIRIE ISLAND

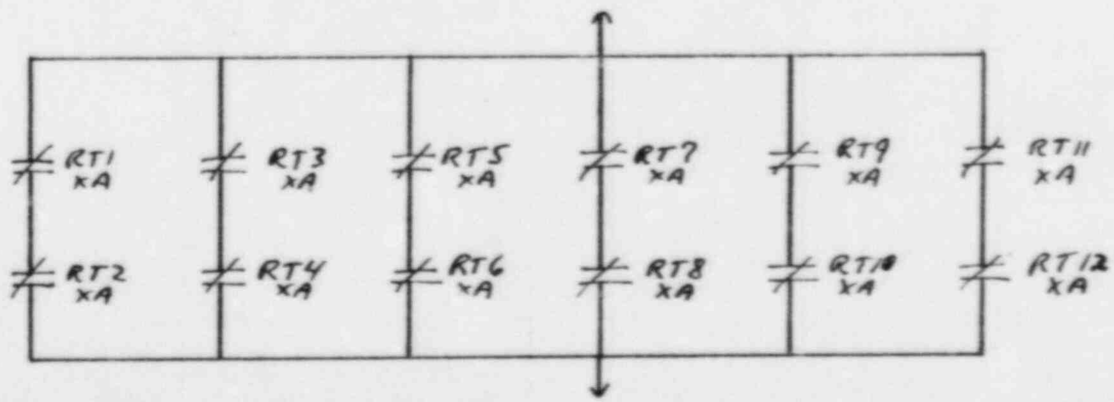
SUBJECT: SKETCHES

E NO. ____ SHEET NO. 1 OF 2
DATE ____ COMP. BY ____ C'K'D BY ____

SHUNT TRIP CIRCUIT



SHUNT LOGIC MATRIX



GENERAL COMPUTATION SHEET
FORM 17-4103

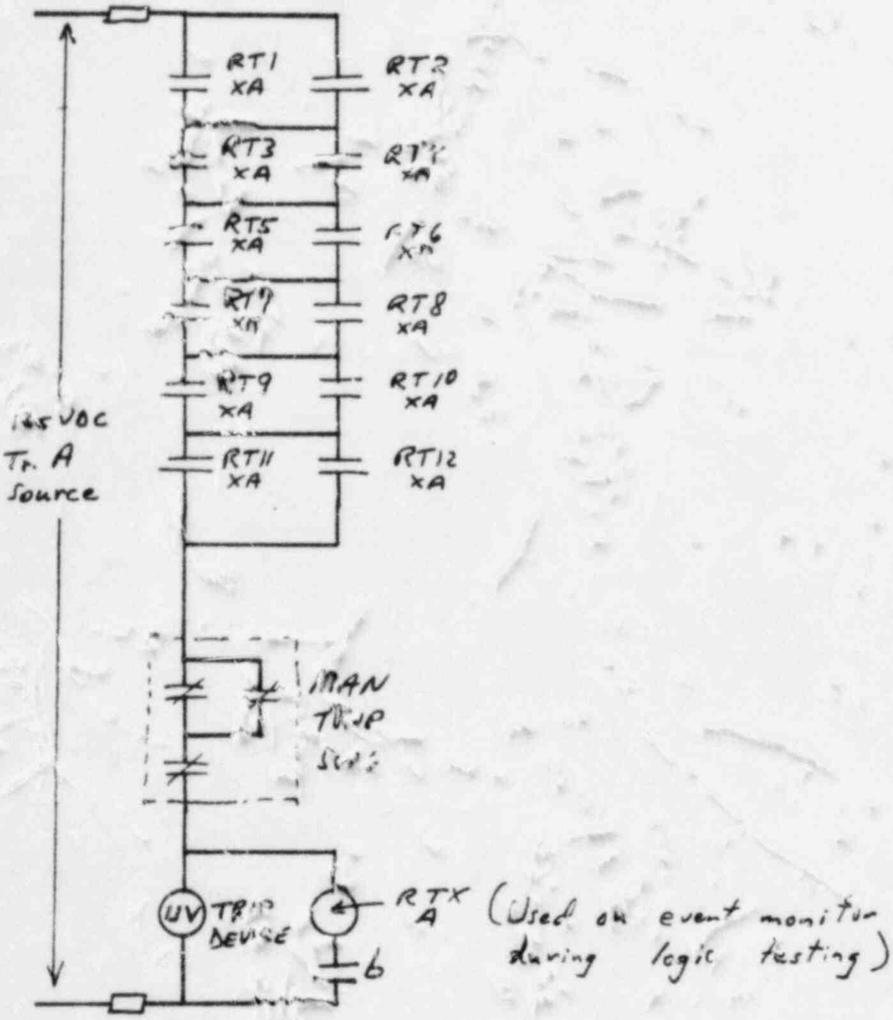
NSP Northern States Power Company

PROJECT: SHUNT TRIP MODIFICATION

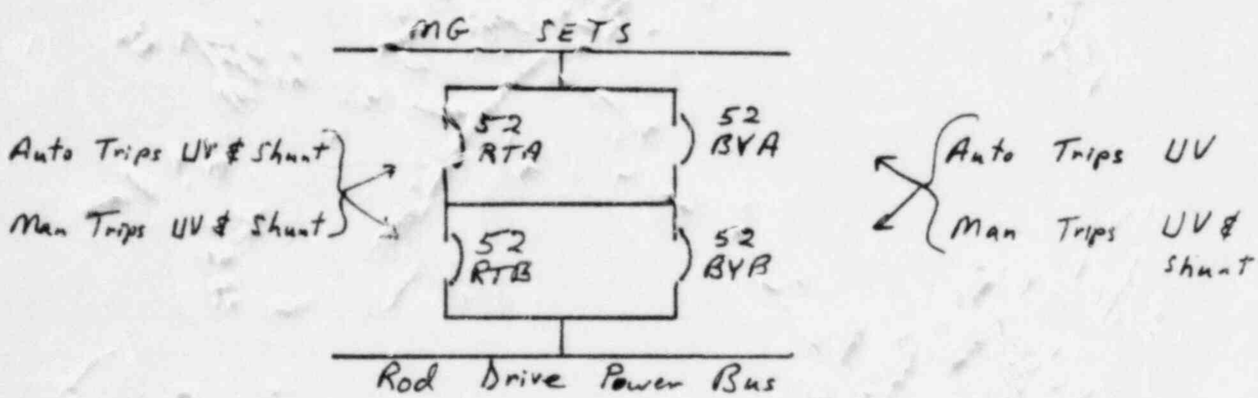
SUBJECT: SKETCHES

E NO. ___
SHEET NO. 2 OF 2
DATE ___
COMP. BY ___ C'K'D BY ___

UV TRIP CKT (unmodified)



TRIP & BYPASS BKR CONFIGURATION



Response to NRC Generic SER Questions -
August 10, 1983 Eisenhut/WOG

1. Schematic diagrams showing the proposed modification are being mailed separately.

2. Power Sources - The reactor trip breakers, including the shunt trip coil, are supplied from 1E safeguard sources. The A Train breaker is fed from the A Train 125 VDC safeguards battery through a DC distribution panel. The B Train circuit is similar. Nonsafeguards circuits are separated from safeguards circuits so that credible non-1E faults will not degrade the shunt trip function.

   Control Room Indication - Indications on the Main Control Board for breaker operation are the red and greed position lights. These lights are powered from the same fused 125 VDC supply used for closing and shunt tripping the circuit breakers. The green light being on indicates that the breaker is open and power is available for closing and tripping the breaker. The red light indicates that the breaker is closed. Since the red light is connected in series with the shunt trip coil and an "a" auxiliary contact, the red light also indicates that power is available to the shunt trip device and that there is circuit continuity in the shunt trip coil, including through the "Block Shunt Trip" pushbutton. This provides an indication that the shunt trip coil is ready to perform its function when required.

   Overvoltage Condition - No new components are being added which are sensitive to overvoltage. The shunt trip coils in the reactor trip breakers are powered from 125 VDC via the station batteries. Normally the shunt trip coils are in a de-energized condition. When the trip breakers are closed, the red lamp current (approx. 50 m.a.) flows through the trip coil to monitor the circuit continuity. This current is not large enough to actuate the trip coil armature. The reactor trip signal applies a nominal voltage of 125 VDC to each shunt trip coil in the redundant trains. As the breaker trips, its auxiliary switch opens to deenergize the shunt trip coil. Since the 125 VDC voltage is supplied from the battery system, it may temporarily rise to the battery equalizing voltage (not exceeding 115% of nominal voltage). The shunt trip coil will cause the breaker to open, despite an overvoltage condition, since it is energized to operate.

3. Information on Added Relays - No new relays are being added. The logic matrix for the shunt coil is being formed using Westinghouse BFD relay contacts rated at 10A.

4. Test Procedure - The test sequence proposed for the Prairie Island shunt modification is the same as for the generic proposal. This test will be incorporated into the existing monthly RPS test. The Prairie Island procedure will include the use of the monitor light to verify that power is reaching the shunt trip coil terminals for logic testing after the initial tripping of the breaker.

5. Class 1E Verification - The added circuitry used to implement the automatic shunt trip function is Class 1E, safety-related. Documentation, procurement, installation, operation, testing, and maintenance of this circuitry will be in accordance with NSP's Nuclear Quality Assurance Program for Class 1E safety-related systems and components. This quality assurance program complies with 10 CFR 50, Appendix B. The existing reactor trip breaker circuitry which interfaces with the new automatic shunt trip circuitry is Class 1E, safety-related.

6. Seismic Qualification Verification - The NSP proposed design does not add new components which would create a new seismic qualification question. NSP is supporting the WOG seismic testing of shunt trip attachment.

7. Environmental Qualification - No new components are being added at the switchgear cabinets. NSP is continuing to monitor the ongoing WOG testing of the shunt trip attachment. Components added at the RPS cabinets are identical to components already there which perform similar functions.

8. Separation Verification - The components, cabling, and panel wiring for the UV and shunt trip circuitry are redundant ("A" and "B" Trains). The circuitry of each redundant safety-related Class 1E train is train aligned and physically separated. Each of the manual reactor trip switches actuates both UV and shunt trip coils for both trains of protection. The wires within each switch enclosure are separated to the maximum extent possible, and full separation of cabling by trains is established upon exiting the switch enclosures.

9. Text of Manual Trip Switches - The manual trip switches are tested at Prairie Island on a refueling interval using an established test procedure. The present test procedure includes the use of jumpers and lifted wires. The procedure will be revised to eliminate the jumpers and lifted leads. Installation of test point wiring is anticipated during installation of the shunt trip modification.

10. Bypass Breaker Testing - The bypass breakers undergo a functional test during the RPS logic test, before use in allowing logic testing. This RPS logic test procedure is the test which will be modified to include automatic shunt trip testing.

11. Control Room Indication - Proper operation of control room indication and annunciation is includeu in the existing RPS logic test.

12. Response Time Testing - NSP is participating in and supporting WOG testing of the shunt trip attachment, including life cycle testing. Period online testing of breaker response time would be considered by NSP if life cycle testing shows that breaker trip response time degrades with operation.

13. Technical Specification Changes - A review of existing testing intervals identified no requirements for changes. Results of the Technical Specification Operational Program being performed by Westinghouse and funded by the Westinghouse Owners Group may be used to justify changes in the future.