SOUTH CAROLINA ELECTRIC & GAS COMPANY
POST OFFICE 764
COLUMBIA, SOUTH CAROLINA 29218

O. W. DIXON, JR.
VICE PRESIDENT
NUCLEAR OPERATIONS

August 31, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License No. NPF-12
Reactor Trip Breakers
Automatic Shunt Trip Modification

Dear Mr. Denton:

Attached please find specific design details for the automatic shunt trip modification to the reactor trip switchgear at Virgil C. Summer Nuclear Station. This information is supplemental to the "Generic Design Package for Incorporation of an Automatic Shunt Trip Feature into Westinghouse Reactor Protection Systems," developed by the Westinghouse Owners Group and submitted to the NRC on June 14, 1983 (OG-101). This information is intended to answer plant specific concerns outlined in the preliminary Safety Evaluation Report for the generic design.

The following drawings and sketches are included:

Drawing No.	Revision	Description
7022D93	3A	RTS Schematic Diagram
7022D94	3A	RTS Connection Diagram - Unit 1
7022D95	3A	RTS Connection Diagram - Unit 2
SKWLM-62783-1	2	Auto Shunt Trip Panel Assy.
SKWLM-62783-2	1	Outline and Inst. Diagram - Auto Shunt Trip Panel
B-208-020 Sht. CR56	2	Alarms - CR System

A001 1/A0 Apertures Card Dist Extra Drawings To: PR

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If you have any questions concerning this information, please contact us.

Very truly yours,

O. W. Dixon, Jr.

RBC:OWD/fjc
Attachment:

cc: V. C. Summer
T. C. Nichols, Jr./O. W. Dixon, Jr.
E. H. Crews, Jr.
E. C. Roberts
H. N. Cyrus
J. P. O'Reilly
Group/General Managers
O. S. Bradham
R. B. Clary
C. A. Price
A. R. Koon
C. L. Ligon (NSRC)
G. J. Braddick
J. C. Miller
J. L. Skolds
J. B. Knotts, Jr.
NPCF
File (Lic./Eng.)

ATTACHMENT I

DETAILED DESIGN FOR AUTOMATIC SHUNT TRIP AND TIME RESPONSE TESTING OF THE REACTOR TRIP BREAKERS

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 present Reactor Protection System (RPS) design, automatic reactor trip signals actuate the undervoltage trip devices of all the circuit breakers in the RTS. This design also incorporates test points in the RTS for performing time response testing of the main circuit breakers.

AUTOMATIC SHUNT TRIP MODIFICATION

The design to add automatic reactor trip signals to the shunt trip devices applies to 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 during the testing of the reactor trip breakers.

Drawing 7022D93 shows the modification for both breaker RTA and breaker RTB. An electromechanical relay (STA or STB) and two test pushbuttons are mounted in the RTS and wired to the existing UV trip and shunt trip circuit terminals at the field terminal blocks. The relay (STA) is energized from the Solid State Protection System (SSPS) voltage to the UV trip coil of RTA. When the voltage is removed by an automatic reactor trip signal, the relay (STA) will de-energize, closing its contact to energize the shunt trip coil of RTA. Thus, the trip shaft 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 the shunt trip. Details of the testing are identical to the procedure submitted by the Westinghouse Owners Group to the NRC in letter No. OG-101, dated 6/14/83.

Details of the hardware design for this portion of the modification are shown on the attached engineering sketches SKWLM-62783-1 and SKWLM-62783-2.

ATTACHMENT I

TIME RESPONSE TEST POINTS

This portion of the design adds test points for measuring the main circuit breaker response times utilizing portable test instruments. Test points are added to permit comparison of the UV coil voltage to the state of an auxiliary switch contact of the breaker. This measurement will provide indication of the breaker operating time. Details of the modification are shown on Drawings 7022D93, 7022D94 and 7022D95. A revision to these drawings is required to relocate test point TP-1 to the relay side of the "Test Auto Shunt Trip" switch. This modification is required in order to initiate timing of the breaker operation when the "Test Auto Shunt Trip" switch is opened. Although this modification is not shown on these drawings, Westinghouse has concurred with this change and is processing the modification. Resistors have been incorporated in the circuitry for the UV coil voltage test points in order to protect the UV coil and SSPS UV Driver Card components against inadvertent short circuits which might be introduced during testing.

Details of the hardware design for this portion of the modification are shown on the attached engineering sketches SKWLM-62783-1 and SKWLM-62783-2.

PLANT SPECIFIC DESIGN INFORMATION REQUIRED FOR WESTINGHOUSE PLANTS INCORPORATING THE AUTOMATIC SHUNT TRIP MODIFICATION

The following information is in response to the Staff's specific concerns as outlined in the enclosure to the preliminary Safety Evaluation Report on the generic Westinghouse design. For convenience, the Staff's concern is listed before the response:

1. Provide the electrical schematic/elementary diagrams for the reactor trip and bypass breakers showing the undervoltage and shunt coil actuation circuits as well as the breaker control (e.g., closing) circuits, and circuits providing breaker status information/alarms to the control room.

   Response: The attached Westinghouse drawing number 7022D93 Revision 3A, "RTS Schematic Diagram," and Gilbert Commonwealth drawing number B-208-020, sheet CR56, revision 2, "Alarms - CR System" provide the requested information.

2. Identify the power sources for the shunt trip coils. Verify that they are Class 1E and that all components providing power to the shunt trip circuitry are Class 1E and that any faults within non-class 1E circuitry will not degrade the shunt trip function. Describe the annunciation/indication provided in the control room upon loss of power to the shunt trip circuits. Also describe the overvoltage protection and/or alarms provided to prevent or alert the operator(s) to an overvoltage condition that could affect both the UV coil and the parallel shunt trip actuation relay.

   Response: The power source for the shunt trip is Class 1E, 125 volts DC powered from the Class 1E station batteries. There is one A train circuit for the A train reactor trip breaker and the bypass breaker and one B train circuit for the B train reactor trip breaker and the bypass breaker. There are separate fuses for the reactor trip breakers and the bypass breakers.

   The closing circuit and the shunt trip for each breaker are not separately fused. This is acceptable since the breakers have been qualified not to degrade the system under accident conditions, although they have not been tested to operate in accident conditions. The shunt trip coil will be qualified by Westinghouse to operate under accident conditions and be upgraded to full Class 1E. This will not be complete when the automatic shunt trip is installed.

   Indication of power availability to the shunt trip circuit is provided by the indicating lights on the main control board. Also, loss of power would be detected during testing. In the event of a loss of power, backup diverse protection would be provided by the undervoltage trip device and the redundant breakers.

   The most likely cause of a blown fuse would be a short in the breaker spring motor which rewinds after a trip. If the fuse were blown, the operator would be unable to close the breaker and the green indicating lamp would not be energized

   An overvoltage alarm is provided that annunciates in the control room when DC voltage reaches 140 volts. This alarm is described in the FSAR, Section 8.3.2.1.

3. Verify that the relays added for the automatic shunt trip function are within the capacity of their associated power supplies and that the relay contacts are adequately sized to accomplish the shunt trip function. If the added relays are other than the Potter and Brumfield MDR series relays (P/N 2383A38 or P/N 955655) recommended by Westinghouse, provide a description of the relays and their design specifications.

   Response: The automatic shunt trip modification will be installed as designed by Westinghouse, and the materials will be procured from Westinghouse as a modification kit. The adequate sizing and capacity of the components is addressed in the Westinghouse generic design package, section 5.1.4. The relays being provided are the Potter and Brumfield MDR series as recommended by Westinghouse.

4. State whether the test procedure/sequence used to independently verify operability of the undervoltage and shunt trip devices in response to an automatic reactor trip signal is identical to the test procedure proposed by the Westinghouse Owners Group (WOG). Identify any differences between the WOG test procedure and the test procedure to be used and provide the rationale/justification for these differences.

   Response: The details and sequence of the test procedure will be identical to the test procedure proposed by the Westinghouse Owners Group.

5. Verify that the circuitry used to implement the automatic shunt trip function is Class 1E (safety related), and that the procurement, installation, operation, testing, and maintenance of this circuitry will be in accordance with the quality assurance criteria set forth in Appendix B to 10 CFR Part 50.

   Response: As stated in item 3, the material for the modification will be purchased in kit form from Westinghouse. The purchase documents will be safety related, and installation, testing, operation and maintenance will be performed under safety related procedures that incorporate the quality assurance criteria in appendix B, 10 CFR Part 50. This is addressed in the Westinghouse generic design package, section 5.1.3.

6. Verify that the shunt trip attachments and associated circuitry are/will be seismically qualified (i.e., be demonstrated to be operable during and after a seismic event) in accordance with the provisions of Regulatory Guide 1.100, Revision 1, which endorses IEEE Standard 344, and that all non-safety related circuitry/components in physical proximity to-- or associated with--the automatic shunt trip function will not degrade this function during or after seismic event.

   Response: This is addressed in the Westinghouse generic design package, section 5.1.4. As stated in item 3, the modification material is being procured from Westinghouse in kit form. The switchgear has been tested and qualified not to degrade the trip function. The shunt trip device itself will be qualified later to operate in a seismic event.

7. Verify that the components used to accomplish the automatic shunt trip function are designed for the environment where they were located.

   Response: This is addressed in the Westinghouse generic design package, sections 5.1.4 and 5.1.5.

8. Describe the physical separation provided between the ciruits used to manually initiate the shunt trip attachments of the redundant reactor trip breakers. If physical separation is not maintained between these circuits, demonstrate that faults within these circuits can not degrade both redundant trains.

   Response: Electrical separation is maintained within the switches that are used to manually initiate a shunt trip. The switches are geared dual shafts with barriers between the contacts for each train. The circuits from the switches are routed in separate raceways from the switches to the breakers.

9. Verify that the operability of the control room manual reactor trip switch contacts and wiring will be adequately tested prior to startup after each refueling outage. Verify that the test procedure used will not involve installing jumpers, lifting leads, or pulling fuses and identify any deviations from the WOG procedure. Permanently installed test connections (i.e., to allow connection of a voltmeter) are acceptable.

Response: The operability of the control room manual reactor trip switch is tested prior to startup, if not performed within the previous seven (7) days, by performing a manual reactor trip operational surveillance test. This is done by placing the switch in the trip position and verifying that the breaker opens.

10. Verify that each bypass breaker will be tested to demonstrate its operability prior to placing it into service for reactor trip breaker testing.

    Response: Each bypass breaker is tested prior to placing it into service by manually closing and tripping the breaker, via the shunt trip, using the local pushbutton, thus verifying breaker operation. The UV trip attachment is tested during periodic maintenance.

11. Verify that the test procedure used to determine reactor trip breaker operability will also demonstrate proper operation of the associated control room indication/annunciation.

    Response: The reactor trip breaker operability surveillance test, which is performed prior to startup, does verify the control room indication of the breaker position.

12. Verify that the response time of the automatic shunt trip feature will be tested periodically and shown to be less than or equal to that assumed in the FSAR analyses or that specified in the technical specifications.

    Response: Response time of the breaker automatic shunt trip will be performed periodically by installing a timer on the added test points. The auto shunt trip test push buttons will be used to trigger the timer. The response time will be from the time when the auto shunt trip test pushbutton is depressed to the time when the breaker contact is opened. This time will be verified to be less than the time specified in the FSAR analyses.

13. Propose technical specification changes to require periodic testing of the undervoltage and shunt trip functions and the manual reactor trip switch contacts and wiring.

    No technical specification changes are proposed at this time.