

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

February 18, 1993

NRC INFORMATION NOTICE 93-15: FAILURE TO VERIFY THE CONTINUITY OF SHUNT TRIP ATTACHMENT CONTACTS IN MANUAL SAFETY INJECTION AND REACTOR TRIP SWITCHES

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a surveillance test method that is not adequate to verify the operability of the contacts in manually operated safety injection and reactor trip switches. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On May 19, 1992, the Houston Lighting and Power Company, the licensee for the South Texas Project, issued a notification of an unusual event and began a technical specification-required shutdown of both units. The licensee had discovered that it was not conducting adequate testing of the switch contacts that directly actuate the shunt trip attachment of the reactor trip circuit breakers. These initiation contacts are actuated by either the manual safety injection or reactor trip switches and are the means by which operator action directly actuates the shunt trip, one of two means by which the breaker is tripped, the other being the undervoltage trip.

The licensee had been performing surveillance tests of the safety injection switches and the reactor trip switches without opening the associated block switch (see attached simplified diagram of the manual reactor trip circuitry). If not opened, the block switch allows the same manual switch contacts that actuate the undervoltage attachment to indirectly actuate the shunt trip attachment. Therefore, the manual switch contacts which directly actuate the shunt trip attachment are not necessary for actuation of the shunt trip and, therefore, not independently verified as operable. This surveillance inadequacy has also been identified at the Callaway Plant, the Seabrook Nuclear Station, and the Wolf Creek Generating Station. The above mentioned licensees have since properly verified the operability of the manual switch contacts.

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Discussion

There are two manually operated safety injection switches and two manually operated reactor trip switches. Each switch contains circuitry which is designed to initiate a reactor trip. The attached diagram illustrates the manner by which a reactor trip breaker is opened when any of the manual switches is engaged. When a switch is operated, moveable contacts in that switch change state. For example, when safety injection switch designated S11 is engaged, the S11 contacts in the 48 Vdc circuit open and S11 contacts in the 125 Vdc circuit close. The opened 48 Vdc S11 contacts interrupt power to the undervoltage trip coil (UV) of the undervoltage trip attachment. Concurrently, the closed S11 contacts in the 125 Vdc circuit allow the shunt trip coil (STC) of the shunt trip attachment to become energized.

De-energizing the UV causes the armature of the undervoltage trip attachment to make contact with and lift the trip lever of the associated reactor trip breaker. Energizing the STC causes the shunt trip attachment armature to also make contact with and lift the trip bar of the associated reactor trip breaker. As a result of either of these actions, the circuit breaker opens to initiate a reactor trip.

Opening of the S11 contacts in the 48 Vdc circuit also de-energizes the auto shunt trip relay (STA) causing the associated STA contacts in the 125 Vdc circuit to close. The closed STA contacts provide an electrical path by which the STC is energized, thus actuating the shunt trip attachment. This path is in parallel to the electrical path provided by the closed 125 Vdc S11 contacts when the switches are actuated.

The licensee corrected their procedure as follows:

During continuity tests of the 125 Vdc S11 contacts, the block switch that is shown in series with the STA contacts is held in the open position. This action assures that the voltage measured at the terminal block of the reactor trip breaker results solely from the closure of the 125 Vdc S11 contacts and not from the closed STA contacts. If the "block switch" is not held in the open position, it is not possible to independently verify the continuity of the 125 Vdc S11 contacts. Continuity checks of the 125 Vdc contacts in the other manually operated switches are made in the same way.

Related Generic Communication

On May 23, 1985, the NRC issued Generic Letter 85-09 which described an appropriate methodology for verifying the operability of moveable contacts in the manual switches.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.



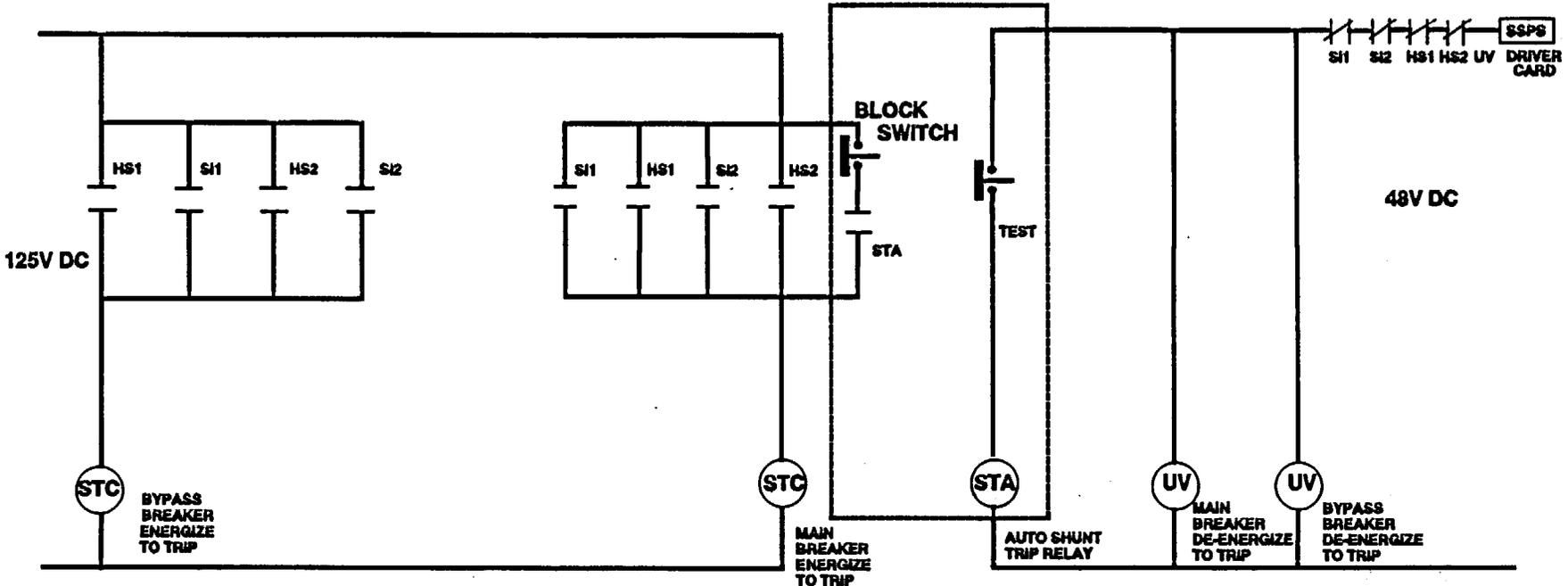
Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contact: N. Fields, NRR
(301) 504-1173

Attachments:

1. Auto/Manual Reactor Trip Circuit Typical Train
2. List of Recently Issued NRC Information Notices

AUTO/MANUAL REACTOR TRIP CIRCUIT TYPICAL TRAIN



NOTE:

UV: UNDERVOLTAGE TRIP COIL
STC: SHUNT TRIP COIL

ALL SI1 CONTACTS OPERATE SIMULTANEOUSLY
ALL SI2 CONTACTS OPERATE SIMULTANEOUSLY
ALL HS1 CONTACTS OPERATE SIMULTANEOUSLY
ALL HS2 CONTACTS OPERATE SIMULTANEOUSLY

CONTACT 'STA' CLOSSES WHEN RELAY 'STA' DE-ENERGIZES

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
93-14	Clarification of 10 CFR 40.22, Small Quantities of Source Material	02/18/93	All licensees who possess source material.
93-13	Undetected Modification of Flow Characteristics in the High Pressure Safety Injection System	02/16/93	All holders of OLs or CPs for nuclear power reactors.
93-12	Off-Gassing in Auxiliary Feedwater System Raw Water Sources	02/11/93	All holders of OLs or CPs for nuclear power reactors.
93-11	Single Failure Vulnerability of Engineered Safety Features Actuation Systems	02/04/93	All holders of OLs or CPs for nuclear power reactors.
93-10	Dose Calibrator Quality Control	02/02/93	All Nuclear Regulatory Commission medical licensees.
93-09	Failure of Undervoltage Trip Attachment on Westinghouse Model DB-50 Reactor Trip Breaker	02/02/93	All holders of OLs or CPs for nuclear power reactors.
93-08	Failure of Residual Heat Removal Pump Bearings due to High Thrust Loading	02/01/93	All holders of OLs or CPs for nuclear power reactors.
93-07	Classification of Transportation Emergencies	02/01/93	All Licensees required to have an emergency plan.
93-06	Potential Bypass Leakage Paths Around Filters Installed in Ventilation Systems	01/22/93	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Original signed by
Brian K. Grimes

Brian K. Grimes, Director
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Office of Nuclear Reactor Regulation

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(301) 504-1173

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***SEE PREVIOUS CONCURRENCE**

OEAB:DORS
NFields*
02/08/93

ASC/OEAB:DORS
AGautam*
09/24/92

ADM:RPB
JMain*
09/18/92

SICB:DST
SNewberry*
10/05/92

SC/OEAB:DORS
EGoodwin*
01/15/93

C/OEAB:DORS
AChaffee*
11/10/92

C/OGCB:DORS
GMarcus*
11/19/92
02/05/93

D/DRCH
BBoger*
01/21/93


D/DORS
BGrimes
02/12/93

DOCUMENT NAME: 93-15.IN

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*SEE PREVIOUS CONCURRENCE

OEAB:DORS
NFields *NT*
2/8/93

ASC/OEAB:DORS
AGautam*
09/24/92

ADM:RPB
JMain*
09/18/92

SICB:DST
SNewberry*
10/05/92

SC/OEAB:DORS
EGoodwin*
01/15/93

C/OEAB:DORS
AChaffee*
11/10/92

C/OGCB:DORS
GMarcus*
11/19/92
02/05/93

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*SEE PREVIOUS CONCURRENCE

OEAB:DORS NFields <i>SS</i> 1 15 / 15 / 93 <i>SS</i>	ASC/OEAB:DORS AGautam* 09/24/92	ADM:RPB JMain* 09/18/92	SICB:DST SNewberry* 10/05/92		
SC/OEAB:DORS EGoodwin <i>S</i> 1 15 / 93 <i>S</i>	C/OEAB:DORS AChaffee* 11/10/92	<i>pcw</i> C/OGCB:DORS GMarcus* <i>for</i> 11/19/92 2/5/92	D/DRA <i>for</i> BBoger 1/21/93	D/DORS BGrimes 1 / 93 <i>mkw</i>	
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contacts to close and automatically energize the coil of the shunt trip attachment in the 125 Vdc circuit.

When either the manual SI (HS1) or reactor trip switch (HS2) is engaged, all respective contacts in each switch change state. When voltage measurements are taken at the terminal block of the RTB to verify the continuity of the 125 Vdc contacts in the manual switches, the "block switch" must be held in the open position when either switch is engaged to the trip position. If the "block switch" is not held in the open position, it is not possible to independently verify the continuity of the switch contacts since the "STA" contacts will close and provide a parallel path to energize the shunt trip attachment.

On May 23, 1985, the NRC issued Generic Letter 85-09 which described the appropriate methodology for verifying the operability of contacts in the manual switches.

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Attachments:

1. Auto/Manual Reactor Trip Circuit Typical Train S Diagram
2. List of Recently Issued NRC Information Notices

See File Jacket

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SNewberry*
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safety injection switches de-energize the undervoltage trip attachment and the auto shunt trip relay. De-energizing the auto shunt trip relay causes the STA contacts to close and automatically energize the coil of the shunt trip attachment.

When either the manual SI (HS1) or reactor trip switch (HS2) is engaged, all respective contacts in each switch change state. When voltage measurements are taken at the terminal block of the RTB to verify the continuity of the 125 Vdc contacts in the manual switches, the "block switch" must be held in the open position when either switch is engaged to the trip position. If the "block switch" is not held in the open position, it is not possible to independently verify the continuity of the switch contacts since the "STA" contacts will close and provide a parallel path to energize the shunt trip attachment.

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OEAB:DORS NFields* 09/22/92	ASC/OEAB:DORS AGautam* 09/24/92	ADM:RPB JMain* 09/18/92	SICB:DST SNewberry* 10/05/92
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safety injection switches deenergize the undervoltage trip attachment and the auto shunt trip relay. Deenergizing the auto shunt trip relay causes the STA contacts to close and automatically energize the coil of the shunt trip attachment.

When either the manual SI or reactor trip switch is engaged, all respective contacts in each switch change state. When voltage measurements are taken at the terminal block of the RTB to verify the continuity of the 125 Vdc contacts in the manual switches, the "block switch" must be held in the open position when either switch is engaged, ~~to the trip position~~. If the "block switch" is not held in the open position, it is not possible to independently verify the continuity of the contacts since the "STA" contacts will close and provide a parallel path to energize the shunt trip attachment.

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safety injection switches deenergize the undervoltage trip attachment and the auto shunt trip relay. Deenergizing the auto shunt trip relay causes the STA contacts to close and automatically energize the coil of the shunt trip attachment.

When either manual SI or reactor trip switch is engaged, all respective contacts in each switch change state. HS1, HS2, and SI represent contacts in the manual reactor trip switches and safety injection switches respectively. Engaging either manual reactor trip or SI switches to the trip position interrupts power to both the coil of the undervoltage trip attachment and to the automatic shunt trip relay. If the "block switch" is not in an open position during surveillance testing of the switches, it is not possible to verify the continuity of the switch (HS1, HS2, SI) contacts since these contacts are in parallel with the STA contacts.

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OEAB:DOEA
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ADM:RPB
JMain*
09/18/92

SICB/DST
SNewberry *with brief comment*
10/5/92

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AChaffee
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C/OGCB:DOEA
GMarcus
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CRossi Brimes
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