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NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 666-6911

September 10, 1982
AEC-MP3-287
B10560

Mr. Ronald C. Haynes, Director
Region 1
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Gentlemen:

Millstone Nuclear Power Station, Unit No. 3
Reporting of Potential Significant Deficiencies
in Design and Construction: Solid State Protection
System - Undetectable Failure (SD-26)

As required by Title 10, Code of Federal Regulations Part 50, Paragraph 55(e), Northeast Nuclear Energy Company (NNECO) reported a potential significant deficiency in the design of Millstone Unit No. 3 in a August 4, 1982 telephone conversation between your L. Briggs and our R. Lefebvre.

Our notification to you was made under the advice of Westinghouse, who besides notifying affected customers on August 4, 1982, provided an initial notification of a potential problem to the NRC on the same day.

Attached is the letter from Mr. R. L. Hofer, Westinghouse, to Mr. S. Orefice, NUSCO, providing a written confirmation of the significant deficiency, a description of it and a minor revision to test procedures conducted from the Safeguards Test Cabinets where operation of the SSPS output relays is verified. At present, we are implementing the recommended test procedure revision. As such, it is our position that this commitment, in addition to the attached documentation, constitutes our final report on this significant deficiency.

We trust this satisfies any concerns you may have.

Very truly yours,

W. G. Counsil

W. G. Counsil
Senior Vice President

J. P. Cagnetta

By: J. P. Cagnetta
Vice President Nuclear and
Environmental Engineering

IE27

Westinghouse
Electric Corporation

Water Reactor
Divisions

Nuclear Commercial
Operations Division

Box 355
Pittsburgh Pennsylvania 15230

August 16, 1982

S.O. NEU-7.35.28

Mr. S. Orefice
Project Engineer
NORTHEAST UTILITIES SERVICE COMPANY
P. O. Box 270
Hartford, Connecticut 06101

NORTHEAST UTILITIES SERVICE COMPANY
MILLSTONE NUCLEAR POWER STATION
UNIT NO. 3

Solid State Protection System - Undetectable Failure

Dear Mr. Orefice:

On August 4, 1982, Westinghouse provided initial notification of a potential problem in the Westinghouse I&C protection system to its NSSS customers utilizing the Solid State Protection System (SSPS) and the NRC. This letter provides a written confirmation of that initial notification.

During review of a schematic diagram of the SSPS, redrawn for purposes of consolidation, Westinghouse engineers uncovered an undetectable failure which could exist in on-line testing circuits for relays in the system.

Periodic testing of the SSPS includes actuation of master relays which actuate Safeguards systems. When a preselected master relay is energized, a proving lamp in series with the output (slave) relay coil confirms electrical continuity. Operation of the relay is prevented by reducing the circuit voltage from 120VAC to 15VDC during test. (Refer to the sketch attached to the enclosed copy of the notification letter which has been sent to the NRC). Subsequent tests from the Safeguards Test Cabinets energize (120VAC) each output relay to confirm actuation of the Safeguards device. In those instances where actuation of the final device cannot be tolerated, a proving lamp in the Safeguards test circuits verifies relay contact movement, field wiring and electrical continuity through the final device.

As mentioned above, output relay coil continuity is confirmed at the SSPS, without operating the relay, by reducing the circuit voltage to 15VDC from 120VAC. As shown in the sketch, operation of the master relay by means of the pushbutton test switch also removes the shunt from the SSPS proving lamp and allows the 15VDC to energize it to confirm the continuity of the output relay coil.

Upon completion of the master relay and output relay coil continuity tests, 120VAC circuit voltage is restored. However, if the switch contacts which shunt the proving lamp should fail to reclose as expected, 120VAC would be applied to the lamp in event the system were called upon to operate. Depending on the output relay coil impedance and the number of output relays being operated by the master relay contacts, the current through the lamp could cause it to burn open before the output relay(s) energized. In such an instance associated Safeguards devices in the affected train would not actuate. Since, during circuit analysis, all identified nondetectable failures must be assumed to have occurred, the redundant Safeguards actuation train must be assumed to be similarly, if not identically, failed.

On August 3, 1982, the Westinghouse Water Reactor Division Safety Review Committee concluded that the potential for undetectable loss of any Safeguards actuation function constituted an Unreviewed Safety Question under 10CFR50.59 and a Potential Significant Deficiency under 10CFR50.55(e).

Although failure of the subject test switch contacts is highly improbable, Westinghouse is recommending that operating plants implement a minor revision to test procedures conducted from the Safeguards Test Cabinets where operation of the SSPS output relays is verified. The revision will ensure that the relay test circuits in the SSPS operated properly when the system was returned to its normal operating mode. The procedure changes are described in Attachment III of the attached NRC notification letter. These procedural changes are recommended until Westinghouse completes a review of its consideration of design changes.

If you have any questions or comments please feel free to contact the undersigned.

Very truly yours,

WESTINGHOUSE ELECTRIC CORPORATION

/mmc

Attachment

cc: S. Orefice 4L, 4A
R. W. Ackley 6L, 3A

D. R. Breza

for R. L. Hofer
NUSCO Project Manager

Westinghouse Electric Corporation
Water Reactor Divisions
Box 355
Pittsburgh Pennsylvania 15230

August 6, 1982

NS-EPR-2638

Mr. Richard DeYoung, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Mr. DeYoung:

On August 4, 1982, Mr. Ed Flack of your staff was notified by Westinghouse via telephone of a potential problem in its I and C protection system.

During review of a schematic diagram of the Solid State Protection System (SSPS), redrawn for purposes of consolidation, Westinghouse engineers uncovered an undetectable failure which could exist in on-line testing circuits for relays in the system.

Periodic testing of the SSPS includes actuation of master relays which actuate Safeguards systems. When a preselected master relay is energized, a proving lamp in series with the output (slave) relay coil confirms electrical continuity. Operation of the relay is prevented by reducing the circuit voltage from 120VAC to 15VDC during test. [Refer to the sketch in Attachment I] Subsequent tests from the Safeguards Test Cabinets energize (120VAC) each output relay to confirm actuation of the Safeguards device. In those instances where actuation of the final device cannot be tolerated, a proving lamp in the Safeguards test circuits verifies relay contact movement, field wiring and electrical continuity through the final device.

As mentioned above, output relay coil continuity is confirmed at the SSPS, without operating the relay, by reducing the circuit voltage to 15VDC from 120VAC. As shown in the sketch, operation of the master relay by means of the pushbutton test switch also removes the shunt from the SSPS proving lamp and allows the 15VDC to energize it to confirm the continuity of the output relay coil.

Upon completion of the master relay and output relay coil continuity tests, 120VAC circuit voltage is restored. However, if the switch contacts which shunt the proving lamp should fail to reclose as expected, 120VAC would be applied to the lamp in event the system were called upon to operate. Depending on the output relay coil impedance and the number

DIPE

of output relays being operated by the master relay contacts, the current through the lamp could cause it to burn open before the output relay(s) energized. In such an instance associated Safeguards devices in the affected train would not actuate. Since, during circuit analysis, all identified nondetectable failures must be assumed to have occurred, the redundant Safeguards actuation train must be assumed to be similarly, if not identically, failed.

On August 3, 1982, the WRD Safety Review Committee concluded that the potential for undetectable loss of any Safeguards actuation function constituted an Unreviewed Safety Question under 10CFR50.59 and a Potential Significant Deficiency under 10CFR50.55(e). The affected Westinghouse domestic plants notified are listed in Attachment II.

Although failure of the subject test switch contacts is highly improbable, Westinghouse is recommending a minor revision to test procedures conducted from the Safeguards Test Cabinets where operation of the SSPS output relays is verified. The revision will ensure that the relay test circuits in the SSPS operated properly when the system was returned to its normal operating mode. The procedure changes are described in Attachment III and are recommended until Westinghouse completes a review of its consideration of design changes.

For additional information please contact my cognizant staff manager, Mr. George Butterworth, 412-373-5761.

Very truly yours,

WESTINGHOUSE ELECTRIC CORPORATION

for E. P. Rahe, Manager
NTD Nuclear Safety

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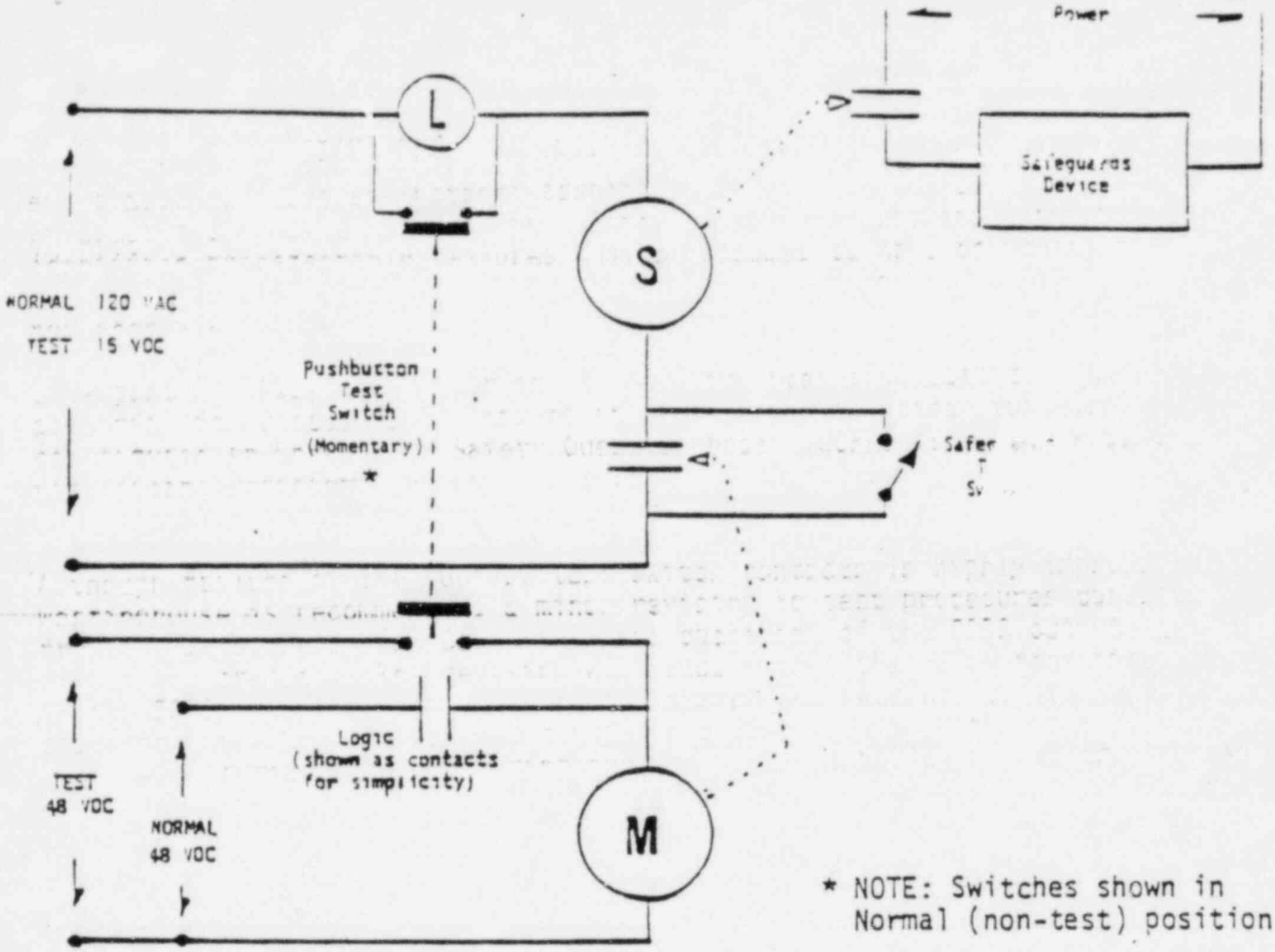
Attachments



* NOTE: Switches shown in Normal (non-test) position

NORMAL OPERATION: Logic "contacts" close to pick up Master relay M. Master relay contacts close to apply 120 VAC to Slave relay S. Slave relay contacts close to power the Safeguards device.

TEST OPERATION:
- Relay mode selector switch (not shown) to TEST position switches slave relay power from 120 VAC to 15 VDC. Master relay power remains 48 VDC.
- Pushbutton test switch contacts (1) pick up Master relay M (2) removes lamp shunt so that 15 VDC is applied to Slave relay coil thru proving lamp L.
- Slave relay is not picked up because of reduced voltage of 15 VDC.

PROBLEM: If contacts shunting proving lamp L do not reclose when pushbutton is released and system is return to Normal, then 120 VAC would be applied to Slave relay coil thru the proving lamp if Safeguards actuation were called for by the Logic "contacts".

SIMPLIFIED SKETCH OF TYPICAL SAFEGUARDS ACTUATION RELAY TESTING IN THE SSPS

FWM 8-5-82

PLANTS WITH STANDARD 2-TRAIN SSPS

Salem 1* and 2*
Cook 1* and 2*
\+ Ringhals 2*, 3, and 4
Farley 1* and 2*
Beaver Valley 1* and 2
Diablo Canyon 1 and 2
Trojan*
\+ Angra 1*
Byron 1 and 2
Braidwood 1 and 2
Marble Hill 1 and 2
Sequoyah 1* and 2*
Watts Bar 1 and 2
\+ Almaraz 1* and 2
\+ Lemoniz 1 and 2
\+ Asco 1 and 2
Virgil Summer
\+ Ohi 1* and 2*
McGuire 1* and 2
Catawba 1 and 2

PLANTS WITH "NEW" 2-TRAIN SSPS

Millstone 3
Seabrook 1 and 2
Comanche Peak 1 and 2
Wolfcreek 1
Callaway 1
Shearon Harris 1 and 2
\+ Krsko*
\+ Ko-Ri 2
\+ Maanshan 1 and 2
Vogtle 1 and 2
\+ Korea 5, 6, 7, and 8
\+ Vandellos 2

PLANTS WITH 3-TRAIN SSPS

South Texas 1 and 2
\+ Sayago 1

* Operating Plant
\+ International Plant

APPLICABLE DOMESTIC AND INTERNATIONAL PLANTS

ATTACHMENT II

SOLID STATE PROTECTION SYSTEM MASTER RELAY AND OUTPUT RELAY TEST

Perform the test described below immediately following completion of the Solid State Protection System (SSPS) Output Relay Testing.

This test will ensure that the pushbutton or relay contacts used to shunt the output relay continuity lamps located on the Output Relay Test Panel have returned to the closed position.

To check the output relay continuity lamp shunts on the Output Relay Test Panel, utilize the Safeguards Test Cabinets as described below:

1. For each of the output relay continuity lamps, select an output (slave) relay which has its continuity checked through the lamp. For plants with the standard 2-train SSPS this will be eight relays per train and for plants with the "new" 2-train SSPS or the 3-train SSPS this will be sixteen relays per train. This selection can easily be performed by using the Output Relay Test Panel Selections table located in the System Maintenance section of each SSPS Technical Manual.

2. Using the Engineered Safeguards System Final Devise or Actuator Test Procedure select the sections of the test which pertain to the output relays selected above. This can easily be done by referring to the table of contents.

3. Before proceeding with the selected test sections, verify that all instructions pertaining to precautions, limitations and initial conditions have been followed.

4. Ensure that the Mode selector switch on the SSPS logic train Output Relay Test Panel is placed in the Operate position.

5. From the Safeguards Test Cabinet (STC) proceed with the selected sections of the Engineered Safeguards System Final Device or Actuator Test Procedure. For each of the test sections verify that the output relay continuity lamps on the associated SSPS Output Relay Test Panel do not illuminate while rotating and depressing the STC test switches. If the SSPS output relay continuity lamps do not illuminate and the selected sections of the STC tests are successfully completed, all of the continuity lamp shunt contacts have properly returned to the closed position.

6. If an output relay continuity lamp illuminates during testing from the STC it is an indication that the lamp's shunting contact is open. Should this occur, remove the associated SSPS logic train from service and replace the Output Relay Test pushbutton (for "new" 2-train and 3-train SSPS, replace the relay whose contacts used for shunting the lamps failed to close). After replacement, retest the master and output relays from the Output Relay Test Panel and perform the tests listed above.

7. If an output relay continuity lamp does not illuminate during testing from the STC and the STC test is unsuccessful it may be an indication that the continuity lamp shunt contact is open and that the continuity lamp itself has opened. If this is the case, replace the Output Relay Test pushbutton and the continuity lamp and retest. If the continuity lamp and its associated shunting contact are found operational, this is an indication of a failure in the Final Device or its Actuation circuit.