



Commonwealth Edison

One First National Plaza Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

September 14, 1982

Mr. James G. Keppler, Regional Administrator
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Undetectable Failure in Solid
State Protection System
NRC Docket Nos. 50-454, 50-455,
50-456, and 50-457

Dear Mr. Keppler:

On August 12, 1982, Commonwealth Edison Company notified Mr. Harvey Wescott of your office of a potential deficiency reportable pursuant to 10 CFR 50.55(e) regarding the solid state protection system at Byron and Braidwood stations. This letter fulfills the 30-day reporting requirement. For your tracking purposes this deficiency is numbered 82-05 for Byron and 82-04 for Braidwood.

Description of Deficiency

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 Engineered 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 coil voltage from 120VAC to 15VDC during test. Refer to sketch in Figure I. Subsequent tests from the Safeguards Test Cabinets energize 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 verifies relay contact movement, field wiring, and electrical continuity thru the final device.

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As mentioned above, output relay coil continuity is confirmed 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 proving lamp and allows the 15VDC to energize it to confirm continuity through 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 proving lamp in event the system were called upon to operate.

Analysis of Safety Implications

Depending on the output relay coil impedance and the number of output relays being operated by the master relay contacts, the current through the proving lamp could cause it to burn open before the output relays energized. In such an instance, associated Safeguards devices in the affected train would not actuate. During circuit analysis all identified nondetectable failures are assumed to have occurred so the redundant safeguards actuation train must be assumed to be similarly, if not identically, failed.

Corrective Action

Westinghouse is reviewing alternative circuit designs. A final report describing the corrective action to be taken will be provided within ninety days.

Please address questions regarding this matter to this office.

Very truly yours,

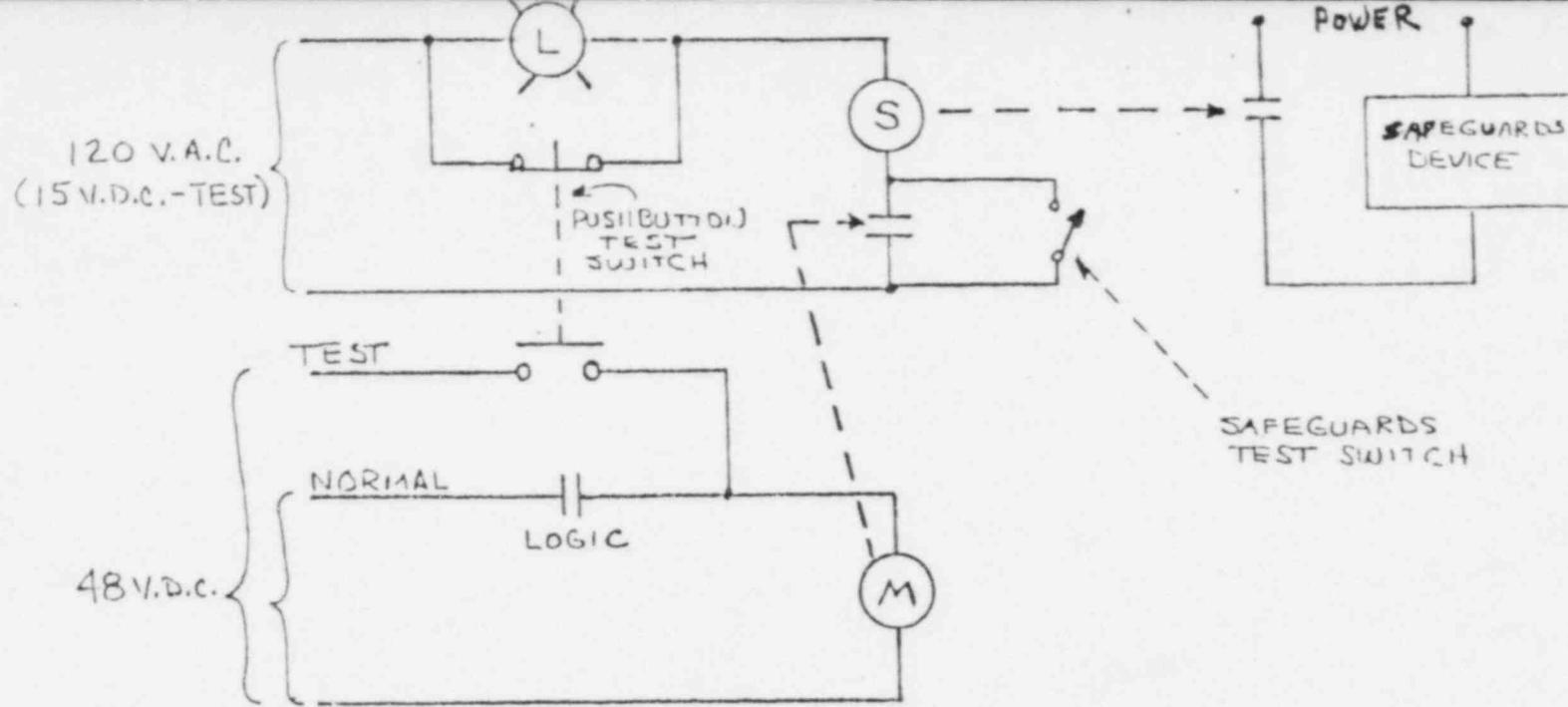
F. D. Lentine

for T. R. Tramm
Nuclear Licensing Administrator

lm

cc: Director of Inspection and
Enforcement

5012N



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

During Testing: Relay mode selector switch (not shown) to "Test" position switches 120VAC to 15VDC.
 Pushbutton test switch picks up Master relay M and applies 15VDC to Slave relay coil thru proving lamp L.
 Slave relay is not energized because of reduced voltage of 15VDC.

Problem: If contacts shunting the proving lamp do not reclose when pushbutton is released and system is return to Normal, then 120VAC would be applied thru the proving lamp if Safeguards actuation were called for.

SIMPLIFIED SKETCH OF SAFEGUARDS ACTUATION RELAY TESTING IN THE SSPS

FIGURE I