

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

|  |   |                      |
|--|---|----------------------|
| Facility Name (1)<br>Dresden Nuclear Power Station, Unit 3 | Docket Number (2)<br>0 15 10 10 10 12 14 19 | Page (3)<br>1 of 1 0 |
|--|---|----------------------|

Title (4)  
Reactor Scram Due to the Failure of an Electrical Protection Assembly Breaker

| Event Date (5) |     |      | LER Number (6) |                   |                 | Report Date (7) |     |      | Other Facilities Involved (8) |                  |    |   |   |     |                     |
|----------------|-----|------|----------------|-------------------|-----------------|-----------------|-----|------|-------------------------------|------------------|----|---|---|-----|---------------------|
| Month          | Day | Year | Year           | Sequential Number | Revision Number | Month           | Day | Year | Facility Names                | Docket Number(s) |    |   |   |     |                     |
| 0              | 3   | 3    | 0              | 8                 | 9               | 8               | 9   | 0    | 5                             | 0                | 11 | 8 | 9 | N/A | 0 15 10 10 10 1 1 1 |
|                |     |      |                |                   |                 |                 |     |      |                               |                  |    |   |   | N/A | 0 15 10 10 10 1 1 1 |

OPERATING MODE (9)  N

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

|                   |                  |                                     |                      |   |
|-------------------|------------------|-------------------------------------|----------------------|---|
| 20.402(b)         | 20.405(c)        | <input checked="" type="checkbox"/> | 50.73(a)(2)(iv)      | 73.71(b)                                      |
| 20.405(a)(1)(i)   | 50.36(c)(1)      | <input type="checkbox"/>            | 50.73(a)(2)(v)       | 73.71(c)                                      |
| 20.405(a)(1)(ii)  | 50.36(c)(2)      | <input type="checkbox"/>            | 50.73(a)(2)(vii)     | Other (Specify in Abstract below and in Text) |
| 20.405(a)(1)(iii) | 50.73(a)(2)(i)   | <input type="checkbox"/>            | 50.73(a)(2)(viii)(A) |   |
| 20.405(a)(1)(iv)  | 50.73(a)(2)(ii)  | <input type="checkbox"/>            | 50.73(a)(2)(viii)(B) |   |
| 20.405(a)(1)(v)   | 50.73(a)(2)(iii) | <input type="checkbox"/>            | 50.73(a)(2)(x)       |   |

LICENSEE CONTACT FOR THIS LER (12)

| Name                                     | TELEPHONE NUMBER                                  |
|--|---|
| Ronald Jackson, Technical Staff Engineer | AREA CODE: 8 1 5 9 4 2 1 -2 19 12 10<br>Ext. 2483 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER  | REPORTABLE TO NPRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|-------|--------|-----------|---------------|---------------------|-------|--------|-----------|--------------|---------------------|
| X     | J   C  | B   K   R | G   0   B   0 |                     |       |        |           |              |                     |
| X     | I   L  | M   0   N | G   0   B   0 |                     |       |        |           |              |                     |

SUPPLEMENTAL REPORT EXPECTED (14)

Yes (If yes, complete EXPECTED SUBMISSION DATE)  NO

Expected Submission Date (15) 1 1 0 1 18 19

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

On March 30, 1989 at 1253 hours with Unit 3 operating at 70% rated core thermal power, a reactor scram occurred while the Technical Staff was performing Dresden Technical Surveillance (DTS) 500-2, Functional Testing of RPS MG Set and RPS Reserve Power Supply. The cause of the scram was due to a spurious trip of Electrical Protection Assembly (EPA) breaker 3A-1 on Reactor Protection System (RPS) Bus B with a concurrent lock-up condition of the 3A Main Steam Line (MSL) radiation monitor. The RPS Bus B trip occurred at the same time attempts to reset the half scram on RPS Channel A were taking place. The Nuclear Station Operator (NSO) was unable to reset the RPS Channel A half scram due to the lock-up condition on the 3A MSL radiation monitor. The lock-up condition has the potential of occurring upon re-energizing the monitor following a momentary (less than approximately one second) power interruption. During the lock-up condition the radiation monitor remains in a tripped condition. The condition is corrected by de-energizing the monitor for approximately ten seconds after which time the monitor is re-energized. A second and third reactor scram occurred at 1338 hours and 1742 hours respectively. The second scram was caused by Operations Department personnel transferring over power supplies to RPS Bus A in an attempt to clear the radiation monitor lock-up condition. The third scram was caused by another spurious trip of EPA breaker 3A-1. Corrective actions for this event included shipping the 3A-1 EPA breaker to the manufacturer for determination of the failure mode, evaluation of a potential modification to the logic card for the MSL radiation monitors and revisions to the RPS testing procedures regarding this potential radiation monitor lock-up condition. The safety significance was minimal since the RPS System operated as designed. This was the first occurrence of its type at Dresden.

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|                               |                               | Year           | /// | Sequential Number | /// | Revision Number |       |          |       |  |
| Dresden Nuclear Power Station | 0   5   0   0   0   2   4   9 | 8   9          | -   | 0   0   2         | -   | 0   0           | 0   3 | OF       | 1   0 |  |

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While conducting the shutdown in accordance with Dresden General Procedure (DGP) 2-1, Unit 2(3) Normal Unit Shutdown, a third reactor scram occurred at 1742 hours. Subsequently, it was determined that EPA breaker 3A-1 had spuriously tripped again thus causing a trip of the RPS Bus B. Since reactor pressure was less than 600 psig and the main condenser vacuum was lower than the scram setpoint at the time of the EPA breaker trip, a reactor scram occurred when RPS Bus B de-energized due to the de-energization of the low condenser vacuum bypass relays. These relays bypass the low condenser vacuum and MSIV closure scrams when reactor pressure is less than 600 psig. Immediately following the reactor scram, RPS Bus B was realigned to the reserve power supply and jumpers were installed across the low condenser vacuum and Main Steam Line closure bypass relays. This action was taken to prevent additional unexpected scrams due to any further spurious trips or transfers of the RPS Busses.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with Title 10 of the Code of Federal Regulations Part 50 Section 73(a)(2)(iv), which requires the reporting of any event that results in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System.

The cause of the initial reactor scram was due to a spurious trip of the EPA breaker 3A-1 (RPS Bus B) and the concurrent lock-up of the 3A MSL radiation monitor (RPS Bus A). Tripping of EPA breaker 3A-1 was also the root cause for the third reactor scram. To determine if any abnormalities existed with the EPA breaker, a calibration check was performed in accordance with DTS 500-3, Calibration of RPS MG Set and RPS Reserve Power Supply EPAs. However, no problems found during the calibration. Consequently, the cause of the breaker failure is currently unknown but it is expected to be determined following inspection of the EPA breaker by the General Electric Company.

The lock-up of the 3A MSL radiation monitor is a characteristic of the monitor which has the potential of occurring when the monitor is powered up after de-energization. In discussing this problem with the manufacturer (General Electric), it was recognized that this condition only occurs during short momentary power interruptions (less than one second).

The second reactor scram that occurred during this event was caused by a lack of awareness of system configuration on the part of the HVO.

Following the initial reactor scram a manual trip of the main generator output breakers was required. It was initially believed that the secondary reverse power relay failed to operate since the output breakers remain closed. However, it was later suspected that the NSO did not allow the secondary reverse power relay sufficient time to react. This conclusion proved to be incorrect, however, when manual action was again required to trip the main generator following a subsequent Unit 3 scram on April 15, 1989 (LER 88-006-0, Docket 050249). After the April 15, 1989 scram occurred, the NSO waited approximately three minutes for the main generator output breakers to open on reverse power. At this time, a main turbine trip was manually initiated and the main generator was isolated from the grid by the primary reverse power relay. Since the secondary reverse power relay failed during the April 15, 1989 event, it is believed the relay also failed during the scram caused by the spurious trip of EPA breaker 3A-1. The Operation Analysis Department (OAD) inspected the relay per Work Request 84140 and found dirt between the bearing and contact pivot arm on the directional unit of the relay. See Figure 2. The dirt caused mechanical binding of the contact pivot arm which prevented the contact from closing thereby causing the failure of the relay to operate.

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During this event, both recirculation pumps tripped following the de-energization RPS Busses A and B. As indicated in Figure 3, de-energizing RPS Busses A and B caused relays 595-107A and 595-107B in the Primary Containment Isolation logic to dropout thereby causing the closure of the appropriate relay contacts. Consequently, the trip coil of both recirculation pump MG sets energized which resulted in tripping of the recirculation pumps. The power loss to both RPS Busses also caused the Primary Containment Group II and III Isolations due to de-energization of the Primary Containment Isolation relays.

Following the first reactor scram, it was discovered that Recirculation System sample valves 3-220-44 and 45 and Isolation Condenser valves 3-1301-17 and 20 had closed. In addition, the HVO noted that the MSIV AC pilot solenoid lights were no longer illuminated. These abnormalities are believed to be caused by a momentary loss of power to the auxiliary relays associated with the above equipment. The relays are supplied by the Instrument Bus [EC] which is powered by the Unit Auxiliary Transformer 31 through 4 KV Bus 33, 480 Volt Bus 38 and Motor Control Center (MCC) 38-2 as shown in Figure 4. After a scram, an automatic transfer of power occurs between the Unit Auxillary Transformer 31 and the Reserve Auxiliary Transformer 32 which results in a momentary loss of power to the Instrument Bus. The momentary loss of power to the Instrument Bus occurs because Air Circuit Breaker (ACB) 3312 must open prior to ACB 3303 automatically closing. This is accomplished by means of an ACB 3312 "b" auxiliary contact ("b" contact is closed when the ACB is open) installed in the auto close circuit of ACB 3303. The automatic transfer occurs in cycles, however lasts long enough for the relays to dropout causing the above equipment to de-energize. The relay dropout does not always occur under this condition and is dependent upon the speed of the auto transfer. Since seal-in logic circuits are used, the de-energized equipment remains de-energized until the circuitry is reset by the NSO.

D. SAFETY ANALYSIS OF EVENT:

The Reactor Protection System is designed to initiate a reactor scram upon loss of power to both RPS Busses. During all three instances in which the loss of power to both RPS Busses occurred, the Reactor Protection System fully met this design function. During the initial scram, the reactor water level dropped to -3.1 inches which resulted in the Primary Containment Group II and III Isolations, also as designed. The safety of the reactor and fuel was maintained at all times since the water level was always maintained above the low low water level setpoint of -59 inches at which point initiation of the Emergency Core Cooling Systems (ECCS) occurs. In addition, if an alternate means for reactor water make-up and reactor cooling was needed during this event, all the ECCS Systems, such as Low Pressure Coolant Injection [BO], Core Spray [BM], High Pressure Coolant Injection [BJ] and Automatic Depressurization System [BS], were operable and available for use.

The main generator protective relaying is designed whereby two circuits will independently trip the generator on reverse power. The first circuit, associated with a primary reverse power relay, is initiated subsequent to a turbine trip signal and is designed to trip the generator at -1.3 MWe after a five second time delay. The second trip circuit is a secondary reverse power relay which is designed to trip the main generator at -1.3 MWe with a 15 second time delay in the absence of a turbine trip signal. Thus, the secondary reverse power relay should have initiated the generator trip since there were no turbine trip signals present. Although the secondary reverse power relay failed during this event, the primary reverse power relay was operable and available in the event of a turbine trip. Also, the manual capability of tripping the turbine operated successfully thereby preventing damage to the generator.

Based on the reasons mentioned above, the safety significance of this event was considered minimal.

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E. CORRECTIVE ACTIONS:

Immediate corrective actions included resetting of the 3A MSL radiation monitor and removing from service the normal power supply to the RPS Bus B to prevent additional spurious trips of EPA breaker 3A-1. A calibration check was performed on the EPA breaker 3A-1, however, no abnormalities were found. In order to prevent further spurious trips, EPA breaker 3A-1 was replaced with the existing EPA breaker 3AB-2 from the reserve RPS Bus power supply since a spare was not readily available. An authorized jumper was temporarily installed in the EPA breaker 3AB-2 cubicle until a new EPA breaker could be obtained and installed. This replacement took place on March 31, 1989.

EPA breaker 3A-1 was shipped to General Electric in order to determine the exact failure mode of the breaker. Upon determination of the failure mode, further corrective actions will be evaluated to prevent a recurrence of this event (249-200-89-02001). A supplement to this report will be issued to document the failure mode and list any further corrective actions taken (249-200-89-02002).

Also, the RPS MG Set calibration and functional test procedures, DTS 500-1, 2 and 3 will be revised to include a caution regarding potential lock-up of the MSL radiation monitors and required actions to prevent it from occurring (249-200-89-02003). Also, a potential modification is being evaluated to modify the logic card on the radiation monitors which will eliminate the lock-up condition (249-200-89-02004).

The correction action for the relay problem associated with the Recirculation System sample valves 3-220-44 and 45, the Isolation Condenser valves 3-1301-17 and 20 and the MSIV AC pilot solenoid indicating lights has already been initiated as a result of LER 87-024-0, Docket 050237. This corrective action involves replacing the relays associated with the affected equipment with time delay dropout relays per Modification M12-3-88-60.

In determining the cause of failure with the main generator secondary reverse power relay, OAD inspected the relay and found dirt between the bearing surface and the contact pivot arm surface. After removing the dirt between the surfaces, the relay operated successfully. The reverse power relays are inspected and calibrated on a refueling outage basis in accordance with the OAD Protective Relay Calibration Procedure. There were no problems discovered during the previous inspection. To prevent future failures of this type, the relay calibration procedure will be revised to clarify the physical inspection section such that mechanical binding of the relay pivot arm is specifically addressed (249-200-89-02005).

F. PREVIOUS OCCURRENCES:

This is a first occurrence involving a reactor scram due to a spurious trip of a RPS Bus EPA breaker and concurrent malfunction of the MSL radiation monitor.

G. COMPONENT FAILURE DATA:

| <u>Manufacturer</u> | <u>Nomenclature</u> | <u>Model Number</u> | <u>Mfg. Part Number</u> |
|---------------------|---------------------|---------------------|-------------------------|
| General Electric    | Breaker             | 914E175             | N/A                     |
| General Electric    | Radiation Monitor   | 304A3700            | N/A                     |

|                               |                               |                |     |                   |     |                 |       |          |       |  |
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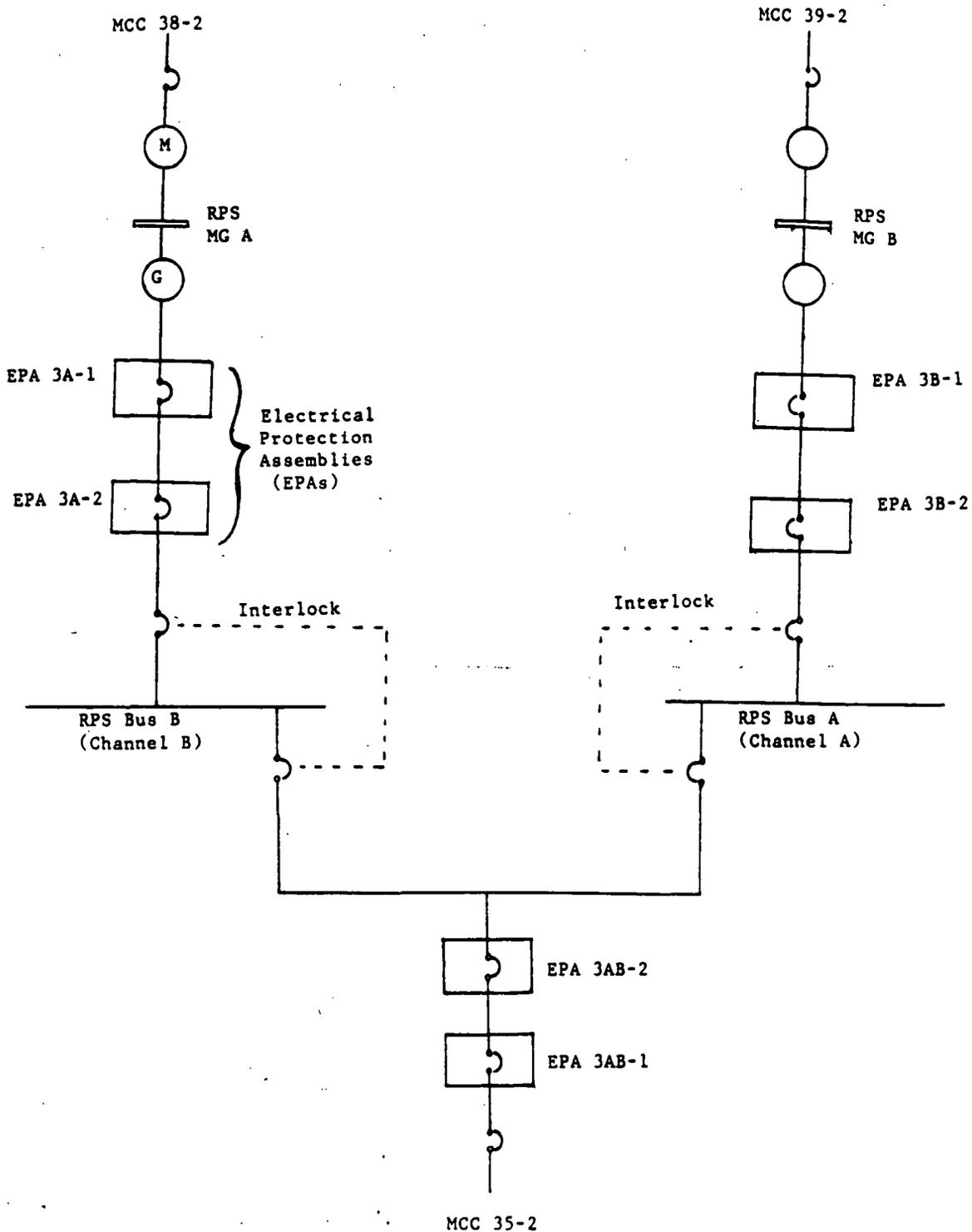
An NPRDS data search was conducted to determine if other component failures have occurred on similar equipment throughout the nuclear industry. In reviewing the data, one failure was found with a RPS EPA breaker. The breaker had failed to close during a surveillance test due to friction and poor alignment of the undervoltage release attachment linkage. The breaker was replaced and retested satisfactorily.

In addition, the data revealed that 26 failures have occurred with General Electric Model 304A3700 radiation monitors. The cause of these failures includes defective analog trip module, loose connections, bad connectors, defective femtoammeter, worn key switch, bad amplifier, instrument setpoint drift, faulty high voltage card and a defective input/output module. There were three failures involving instrument setpoint drift of which all occurred at Dresden Station. There were no failures found regarding a monitor lock-up condition.

A review was also conducted of previous Station Deviation Reports. One failure was found regarding RPS EPA breakers which has been documented under Deviation Report 12-2-84-116. This event occurred during a calibration surveillance on RPS EPA breaker 2A-2. The breaker failed to close electrically upon manual closure. The cause was attributed to misadjustment of the breaker contact wipe.

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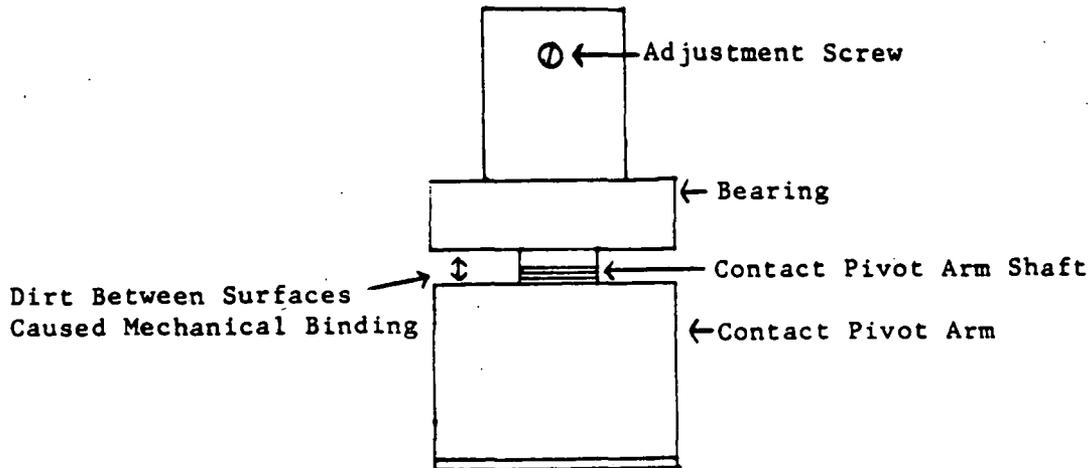
REACTOR PROTECTION SYSTEM POWER SUPPLY

Figure 1

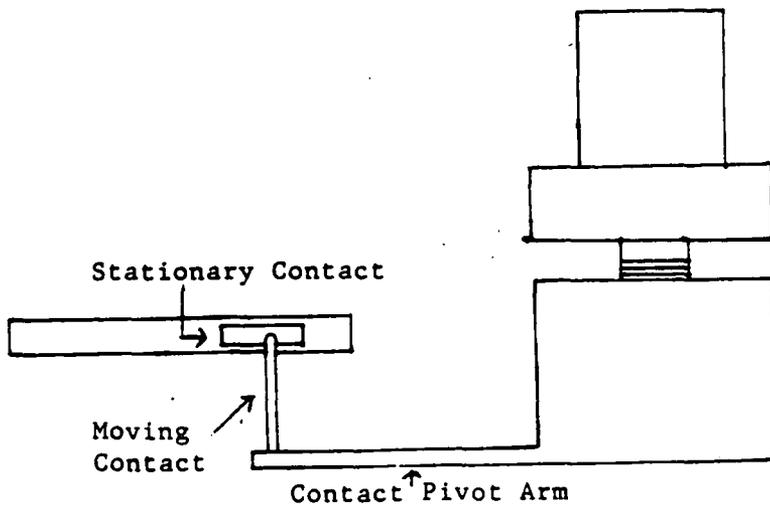
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| Dresden Nuclear Power Station | 0   5   0   0   0   2   4   9 | 8   9          | -   0   0   2     | -   0   0       | 0   8    | 0   F | 1   0 |

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Front View



Side View



SIMPLIFIED VIEW OF REVERSE POWER RELAY

Figure 2

FACILITY NAME (1)

DOC NUMBER (2)

LER NUMBER (6)

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Dresden Nuclear Power Station

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Year

Sequential Number

Revision Number

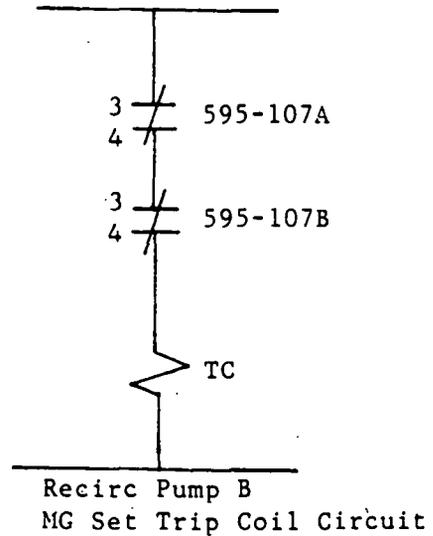
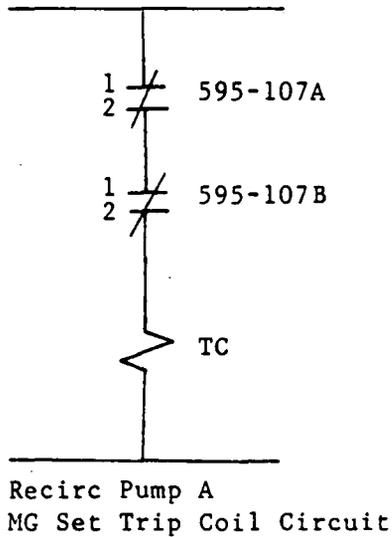
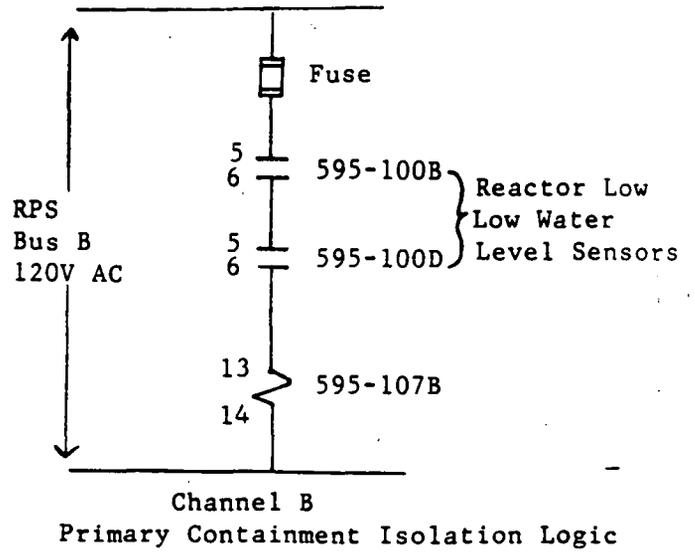
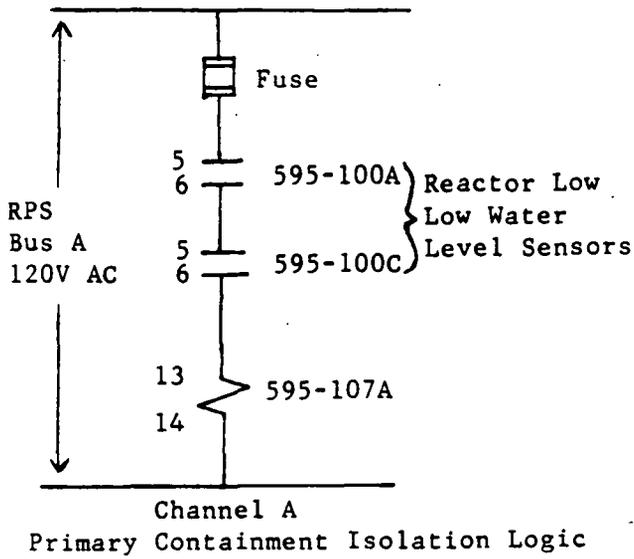
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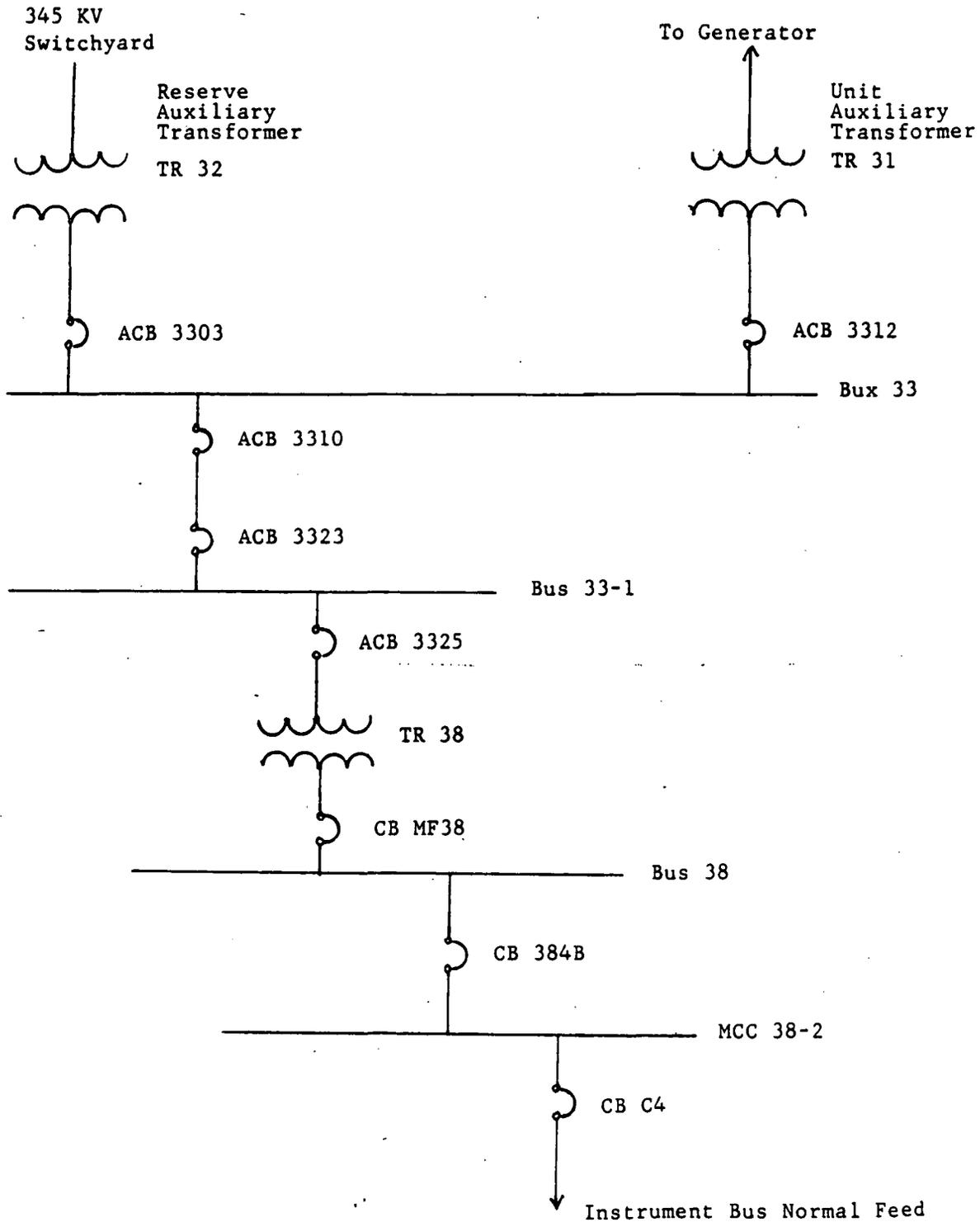
RECIRCULATION PUMP TRIP LOGIC

Figure 3

|                   |                 |                |                   |                 |          |  |  |
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INSTRUMENT BUS POWER SUPPLY

Figure 4



**Commonwealth Edison**  
Dresden Nuclear Power Station  
R.R. #1  
Morris, Illinois 60450  
Telephone 815/942-2920

May 1, 1989

EDE LTR #89-346

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Licensee Event Report #89-002-0, Docket #050249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR50.73(a)(2)(iv).

E.D. Eenigenburg  
Station Manager  
Dresden Nuclear Power Station

EDE/jmt

Enclosure

cc: A. Bert Davis, Regional Administrator, Region III  
File/NRC  
File/Numerical

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