

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/86

FACILITY NAME (1):

DOCKET NUMBER (2):

LER NUMBER (6):

PAGE (3):

CRYSTAL RIVER UNIT 3

0 5 0 0 0 3 0 2 8 5 - 0 2 3 - 0 0 0 2 of 0 4

TEXT (If more space is required, use additional NRC Form 365A 2/117)

EVENT DESCRIPTION

On October 26, 1985, Crystal River Unit 3 was operating at 95% reactor power. At 1404 an unplanned turbine/reactor trip occurred following the (undervoltage) failure of "A" 120 VAC vital bus inverter (VBIT) (EF, INVT). The failure of the inverter caused numerous alarms to occur as well as the loss of various "A" Reactor Protective System (RPS) (JC) powered instrument indications. The "A" Main Feedwater Pump (SJ, P) tripped resulting in initiation of an Integrated Control System (ICS) (JA) Reactor/Turbine Runback to 60% power. A partial trip of the RPS, Engineered Safeguards Actuation System (JE) and the Emergency Feedwater Initiation and Control System (JE) also occurred.

As the Runback progressed, one of the operators observed the Control Rod Drive (CRD) Position Indicators (AA, ZI) showing all rods "fully inserted". This indicated that the Reactor had tripped. (Investigation later determined that the indicated trip was an erroneous signal). He promptly announced that the reactor had tripped. A second Control Board Operator, noticing that the turbine control valves (TA, FCV) were not closed, manually tripped the Main Turbine (TA) approximately 19 seconds after the inverter failed. This resulted in an actual anticipatory reactor trip. During the event there was the smell and sight of smoke in the Control Room. Immediate investigation of the smoke proved that the origin was the Radiation Monitoring panels (IL). They were deenergized immediately.

Following the turbine trip, a spurious Emergency Feedwater Initiation and Control System (EFIC) actuation of Emergency Feedwater (BA) occurred. (A similar earlier EFIC actuation was reported under LER 85-020.) The overcooling caused pressurizer level to decrease the manual opening of one High Pressure Injection Valve maintained pressurizer level at or above 29 inches. One Main Steam Safety Valve failed to reseal properly and required lowering of the Main Steam pressure to 990 psig to assist in reseating the valve. There was no significant adverse affect on Reactor Coolant System temperature. The "B" Main Feedwater Block Valve did not go shut automatically. This led to a slight overcooling of the Reactor Coolant System (AB). The Control Board Operator manually closed the valve.

Approximately 14 minutes after the reactor trip, the "A" inverter failed to zero voltage and vital bus distribution panel VBDB-3 (EF, PL) switched to the alternate power source. The bus returned to normal voltage condition and the various associated alarms and indications returned to normal.

CAUSE

The actual cause of the reactor trip was operator action. The operator believed he had a tripped reactor and announced it as such. Observation of the Main Turbine control panel by another operator showed that the Main Turbine had not tripped. The second operator tripped the Main Turbine which in turn led to an anticipatory reactor trip. In retrospect, the operator tripped the turbine prematurely. However, the actions taken were conservative for the indications which he saw and were in keeping with the training and procedures provided.

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There were two causes of erroneous control board indication. The causes are only indirectly related. The primary cause was that some instruments were powered from the failed "A" inverter. They include such items as RC Flow and narrow range RCS pressure. The sustained low voltage condition is attributed to an improper undervoltage transfer setpoint in the static switch (EF, ASV). The second cause of erroneous indication was that the Control Rod Drive position indication logic failed. This was apparently caused by low voltage settings on both auctioneered power supplies. The increased demands placed on the power supplies by the runback situation combined with the low settings resulted in logic failure.

The sustained low voltage condition on the vital bus also caused relays (including these in the radiation monitoring panel in the main control board) to overheat. This overheating was the root cause of the smoke in the Control Room.

The "B" Main Feedwater Block Valve was investigated and it was determined that the "A" side inverter feeds the ICS control for the "B" Main Feedwater Block Valve.

SAFETY CONSIDERATIONS

The RPS, ESAS, EFIC system and Control Rod Drive trip breakers performed as expected. The relays which overheated in the Radiation Monitoring cabinets have no safety functions. Vital busses B, C, and D and associated safety systems were in service and available at the time of the event.

During the pressure/temperature transient on the Reactor Coolant System, adequate core cooling was maintained and RCS parameters remained within the normal operating envelope. This event had no effect on the health and safety of the general public.

CORRECTIVE ACTIONS

Investigative maintenance determined that a defective oscillator board caused the low voltage failure of the inverter and it was replaced. The three failed alarm relays in the Radiation Monitoring panels were also replaced.

Nuclear Engineering is developing recommendations for verifying the vital bus Static Switch undervoltage transfer setpoints. In addition, the inverter/bus voltage and current alarms are being reviewed. Possible changes to setpoints will be considered based on the information gained from the review.

The current limited power supplies for the Control Rod Drive system were readjusted to proper setpoints. These power supplies will be included in the Preventative Maintenance program to periodically verify the setpoints.

Engineering is investigating the need for a modification to the "B" Main Feedwater Block Valve control circuit.

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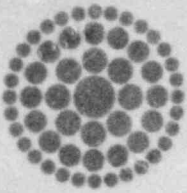
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TEXT (if more space is required, use additional NRC Form 366A 2) (17)

Corrective action has been previously initiated to resolve the spurious EFIC actuations which occur when the Main Turbine trips. That action is described in LER 85-020.

PREVIOUS SIMILAR EVENTS

There have been six (6) previous occurrences of a loss of vital bus voltage during Mode 1, Power operations. This is the third occurrence which resulted in a reactor trip.



**Florida
Power**
CORPORATION

November 25, 1985
3F1185-28

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

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Licensee Event Report No. 85-023-00

Dear Sir:

Enclosed is Licensee Event Report (LER) No. 85-023-00 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Sincerely,

G. R. Westafer
Manager, Nuclear Operations
Licensing and Fuel Management

SCP/feb

Enclosure

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