

LICENSEE EVENT REPORT (LER)

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------|--|----------------|---------------------|-----------------|------------------|-----------------|-----------|----------------|---|---|--|------------------|--|----------------------|------|---|----------|-----|---|---|---|---|---|
| FACILITY NAME (1) CRYSTAL RIVER UNIT 3 | | | | | | | | | | DOCKET NUMBER (2) 0 5 0 0 0 3 0 2 1 OF 0 5 | | | | | PAGE (3) 1 OF 0 5 | | | | | | | | | |
| TITLE (4) Reactor Trip on High Reactor Coolant Pressure Following Loss of Non-Nuclear Instrumentation | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 4 | 2 | 6 | 8 | 4 | 8 | 4 | 0 | 1 | 0 | 0 | 1 | 0 | 8 | 0 | 8 | 8 | 4 | N/A | 0 | 5 | 0 | 0 | 0 |
| OPERATING MODE (9) | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | 20.402(b) | | | | 20.406(c) | | | | <input checked="" type="checkbox"/> 50.73(a)(2)(iv) | | | | 73.71(b) | | | | | | | | | | |
| POWER LEVEL (10) | | 0 1 9 1 7 | | | | 20.406(a)(1)(i) | | | | 50.36(c)(1) | | | | 50.73(a)(2)(v) | | | | 73.71(a) | | | | | | |
| | | 20.406(a)(1)(ii) | | | | 50.36(c)(2) | | | | 50.73(a)(2)(vii) | | | | OTHER (Specify in Abstract below and in Text, NRC Form 366A) | | | | | | | | | | |
| | | 20.406(a)(1)(iii) | | | | 50.73(a)(2)(i) | | | | 50.73(a)(2)(viii)(A) | | | | | | | | | | | | | | |
| | | 20.406(a)(1)(iv) | | | | 50.73(a)(2)(ii) | | | | 50.73(a)(2)(viii)(B) | | | | | | | | | | | | | | |
| | | 20.406(a)(1)(v) | | | | 50.73(a)(2)(iii) | | | | 50.73(a)(2)(ix) | | | | | | | | | | | | | | |
| LICENSEE CONTACT FOR THIS LER (12) | | | | | | | | | | | | | | | | | | | | | | | | |
| NAME William K. Bandhauer, Nuclear Safety Supervisor | | | | | | | | | | TELEPHONE NUMBER | | | | | | | | | | | | | | |
| | | | | | | | | | | AREA CODE 9 0 4 7 9 5 - 6 4 8 6 | | | | | | | | | | | | | | |
| COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13) | | | | | | | | | | | | | | | | | | | | | | | | |
| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPDOS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPDOS | | | | | | | | | | | | | | |
| B | EIE | RJIX | L1045 | N | | E | SIB | RVI | D1243 | Y | | | | | | | | | | | | | | |
| E | SIB | PICV | 130 | Y | | | | | | | | | | | | | | | | | | | | |
| SUPPLEMENTAL REPORT EXPECTED (14) | | | | | | | | | | | | EXPECTED SUBMISSION DATE (15) | | MONTH | DAY | YEAR | | | | | | | | |
| <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) | | | | | | | | | | | | <input checked="" type="checkbox"/> NO | | | | | | | | | | | | |

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

On April 26, 1984, at 1039, while Crystal River Unit 3 was operating at 97% reactor power (862 MWE), the "Y" non-nuclear instrumentation (NNI-Y) power supply failed, thus causing erroneous signals to be sent to the Integrated Control System (ICS). The ICS rapidly reduced main feedwater flow to the "B" steam generator causing an undercooling transient. The reactor tripped on high reactor coolant system pressure. The main steam atmospheric dump valves (ADV) and main steam safety valves (MSSV) subsequently opened. One ADV and several MSSV's failed to reseal following the reactor trip. Due to existing small steam generator tube leakage, a radioactive release was made when the ADV's and MSSV's opened. Nevertheless, no radioactive limits were exceeded. The ADV was manually isolated. The MSSV's did not reseal until steam generator pressure was reduced slightly. The NNI-Y +24 VDC power supply failed due to the failure of a capacitor with the wrong ratings installed by the manufacturer. Corrective action included replacement of the failed capacitor, inspection of the -24 VDC NNI-Y power supply capacitor and the spare NNI-X power supply capacitors, repair of the failed ADV, adjustment of the setpoint of the MSSV's that failed to reseal, and installation of a redundant 24 VDC power supply by no later than Refuel V. The capacitors for the installed redundant NNI-X power supplies will be inspected during the next outage of sufficient duration.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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| FACILITY NAME (1) CRYSTAL RIVER UNIT 3 | DOCKET NUMBER (2) 0 5 0 0 0 3 0 2 | LER NUMBER (6) | | | PAGE (3) | | |
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

SEQUENCE OF EVENTS - April 26, 1984

| <u>TIME</u> | <u>EVENT</u> |
|-------------|--|
| 10:38:46 | "Y" Non-Nuclear Instrumentation (NNI-Y) Power Supply (EE, RJX) fails. |
| 10:38:46 | Integrated Control System (ICS, JA) reduces main feedwater (JB) flow to "B" steam generator (SB, SG). |
| 10:39:04 | Reactor (AC, RCT) automatically trips on high reactor coolant system pressure. Main Steam Atmospheric Dump Valve (SB-PCV) opens and fails to reseal. |
| 10:46:00 | Plant is stabilized using backup instrumentation and manual control of condensate pumps (SD, P). |
| 10:58:00 | Leaking main steam atmospheric dump valve is manually isolated. |
| 14:30:00 | Failed input high frequency capacitor (EF, CAP) is found in 24 Volt DC NNI-Y power supply. |
| 16:30:00 | NNI-Y power supply is repaired and returned to service. |

PLANT PERFORMANCE1. Pre-Trip Review

On April 26, 1984, Crystal River Unit 3 was operating at 97% reactor power while generating 862 electrical megawatts. All safety systems were operable.

2. Initiating Event

At 1039, the NNI-Y Power Supply failed which caused erroneous signals to be input to the ICS. The ICS responded by reducing main feedwater flow to the "B" steam generator and hence heat removal from the Reactor Coolant System (AB). This resulted in an automatic reactor trip on high reactor coolant system pressure. The NNI-Y failure was due to a shorted high frequency filter capacitor in the 120 VAC input to the + 24 VDC Power Supply (Lambda Electronics Corporation Model LM-E24). The failed capacitor was found to have incorrect voltage and capacitance ratings. The incorrect capacitor was installed by the manufacturer.

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3. Post-Trip Response

Although the NNI-Y failure caused erroneous indications and prevented the automatic control of some non-safety related systems, no Engineered Safety Feature (JE) (other than the Reactor Protection System (RPS)(JC)) was challenged or manually initiated. Plant operators were able to identify the erroneous indications and control the plant by using the redundant set of instrumentation (powered from the NNI-X power supply) for vital plant parameters to control the plant.

Other systems affected by the loss of NNI-Y included the condensate system (SD), the plant computer (ID, ALM) and the annunciator event alarms (IB, ALM). Significant erroneous indications on the plant computer and annunciator event alarms were detected by use of redundant instrumentation powered from NNI-X. The condensate pumps (SD, P) were controlled manually to balance flows in the secondary system.

Slightly low steam generator pressure (990 psig versus 1010 psig) and visual observation of valve tailpipes revealed that several main steam safety valves (SB, RV), and the "B" atmospheric dump valves had failed to fully reseal. The "B" atmospheric dump valve was isolated by an upstream valve, while the main steam safety valves were fully reseated by lowering main steam pressure to 900 psig.

4. Safety Considerations

The Reactor Protection System responded as designed by automatically tripping the control rods (AA, ROD) when the Reactor Coolant System High Pressure Trip Setpoint was sensed.

The reactor core was cooled normally through the secondary plant. Use of engineered safety features other than RPS was not required.

Due to the already existing small amount of steam generator tube leakage, a radioactive release was made via the main steam safety and atmospheric dump valves. This release did not cause any radioactive limits to be exceeded.

No safety equipment was damaged or otherwise made inoperable during this event. Engineered safety feature system instrumentation is not powered by NNI-Y.

CORRECTIVE ACTIONS

1. The failed capacitor was replaced with one of correct ratings and the NNI-Y + 24VDC power supply was returned to service.
2. Crystal River Unit 3 uses five other 24VDC power supplies similar to the failed power supply. The - 24 VDC power supply for NNI-Y was inspected and found to have the correct capacitor installed.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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CORRECTIVE ACTIONS CONTINUED

3. The capacitors for the installed redundant NNI-X power supplies will be inspected during the next outage of sufficient duration. Spare NNI-X power supplies were withdrawn from stores and found to have correct capacitors installed. The NNI-X power supplies are of slightly different design than NNI-Y.
4. The failed main steam atmospheric dump valve was repaired and returned to service.
5. The main steam safety valves, that did not fully reseal until steam pressure was lowered, were adjusted for proper setpoint.
6. Redundant 24 VDC power supplies in NNI-Y will be installed which will prevent a similar transient from occurring as a result of a single 24 VDC power supply failure. After completion of this action, both NNI-X and NNI-Y will have redundant power supplies. This installation is presently scheduled for the next outage of sufficient duration but no later than Refuel V (Spring 1985).

PREVIOUS SIMILAR EVENTS

On February 26, 1980, Crystal River Unit 3 experienced a loss of the NNI-X power supply. The failure mode in that event was unrelated to this event and was due to an improperly installed circuit card. Significant corrective actions were implemented following the loss of NNI-X transient, including the installation of the redundant instrumentation panel and operator training in mitigation of this type of transient. The success of the corrective actions is demonstrated by the vastly different consequences of the two transients which are listed in Table 1.

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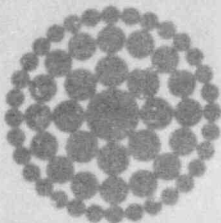
TABLE 1

COMPARISON OF CONSEQUENCES FOR LOSS OF NNI-X AND NNI-Y EVENTS

AT

CRYSTAL RIVER UNIT #3

| <u>Consequence</u> | <u>Loss of NNI-X</u> Feb. 26, 1980 | <u>Loss of NNI-Y</u> April 26, 1984 |
|---|---------------------------------------|--|
| 1. NNI and Safety System Interactions | No | No |
| 2. Valid Vital Plant Parameter Indications Available in Control Room | Yes | Yes |
| 3. Valid Vital Plant Parameter Clearly Identified to Operators in Control Room | No | Yes |
| 4. Integrated Control System Receives Erroneous Input Signals | Yes | Yes |
| 5. Reactor Coolant System Pilot Operator Relief Valve PORV (AB, RV) | Yes | No |
| 6. Reactor Trips on High Reactor Coolant System Pressure | Yes | Yes |
| 7. High Pressure Injection (BQ) Initiated | Yes | No |
| 8. Reactor Coolant Pumps Tripped (AB, P) | Yes | No |
| 9. Reactor Coolant System Safety Valves Opened | Yes | No |
| 10. Emergency Feedwater (BA) Initiated | Yes | No |
| 11. Reactor Cooling System Subcooling Margin Maintain | Yes | Yes |
| 12. Reactor Coolant System Pressurizer (AB, PZR) Level Too High or Low | Yes | No |
| 13. Release of Radioactive Water Into Reactor Containment Building (NH) from the Reactor Coolant System | Yes | No |



**Florida
Power**
CORPORATION

August 8, 1984
3F0884-05

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

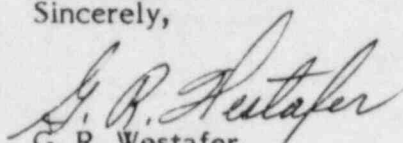
Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Licensee Event Report No. 84-010-01

Dear Sir:

Enclosed is Licensee Event Report (LER) No. 84-010-01 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

AEF/feb

Enclosure

cc: Mr. James P. O'Reilly
Regional Administrator, Region II
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
101 Marietta Street N.W., Suite 2900
Atlanta, GA 30323

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