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March 11, 2001

SVP-02-021

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

Quad Cities Nuclear Power Station, Unit 1
Facility Operating License No. DPR-29
NRC Docket No. 50-254

Subject: Licensee Event Report 254/02-001, "Reactor Shutdown due to Failure of Reactor Recirculation Jet Pump"

Enclosed is Licensee Event Report (LER) 254/02-001, "Reactor Shutdown Due to Failure of Reactor Recirculation Jet Pump," for Quad Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(i)(A), which requires reporting of the completion of any nuclear plant shutdown required by the plant's Technical Specifications, and Part 50.73(a)(2)(v)(D), which requires the reporting of any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

Any actions described in the submittal represent intended or planned actions by Exelon Generation Company (EGC), LLC. They are described for the NRC's information and are not regulatory commitments.

Should you have any questions concerning this report, please contact Mr. W. J. Beck at (309) 227-2800.

Respectfully,



Timothy J. Tulon
Site Vice President
Quad Cities Nuclear Power Station

Attachment

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

IE 22

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and by internet e:mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NOEB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

| | | |
|---|--------------------------------------|---------------------------|
| FACILITY NAME (1): Quad Cities Nuclear Power Station, Unit 1 | DOCKET NUMBER (2) 05000254 | PAGE (3) 1 of 4 |
|---|--------------------------------------|---------------------------|

TITLE (4) Reactor Shutdown due to Failure of Reactor Recirculation Jet Pump

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|----------------|-----|------|----------------|-------------------|--------|-----------------|-----|------|-------------------------------|---------------|
| MO | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO | MO | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 01 | 09 | 02 | 02 | 001 | 00 | 03 | 11 | 02 | N/A | N/A |
| | | | | | | | | | N/A | N/A |

| | |
|--------------------------------|---|
| OPERATING MODE (9) 1 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11) |
| POWER LEVEL (10) 100 | |

| | | | |
|---|---|---|---|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | Specify in Abstract below or in NRC Form 366A |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input checked="" type="checkbox"/> 50.73(a)(2)(i)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(v)(D) | |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(vii) | |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) | |
| <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) | |

LICENSEE CONTACT FOR THIS LER (12)

| | |
|---|---|
| NAME Wally Beck, Regulatory Assurance Manager | TELEPHONE NUMBER (Include Area Code) (309) 227-2800 |
|---|---|

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

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|---------------|--------------------|
| X | AD | P | G080 | Yes | | | | | |

| | | | | | | |
|---|---|----|--|--------------------------------------|-----|------|
| SUPPLEMENTAL REPORT EXPECTED (14) | | | | EXPECTED SUBMISSION DATE (15) | | |
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | MONTH | DAY | YEAR |

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

On January 9, 2002, at 1416 hours, with the reactor at 100% power, Quad Cities Nuclear Power Station Unit 1 jet pump #20 hold-down beam failed, causing a trip of the "B" recirculation pump motor and a high main steamline (MSL) radiation alarm. Per Technical Specifications, the reactor was taken to Mode 3 (shutdown).

The preliminary root cause of the failure of the jet pump #20 hold-down beam was intergranular stress corrosion cracking in the transition portion of the beam. The "B" recirculation pump motor tripped due to the introduction into the recirculation pump impeller of a piece of the failed beam. The MSL high radiation alarm was due to the changes in flow dynamics and mixing in the annulus region of the vessel due to the jet pump failure, which caused increased carryover of Nitrogen-16 into the MSLs.

The safety significance of this event was minimal. All emergency core cooling systems were operable during this event. The failure of the jet pump was readily detected from diverse plant parameters displayed in the control room, and the reactor was shut down within eight hours of initial indications.

Corrective actions included replacing all of the original-style BWR/3 jet pump hold-down beams with BWR/4 beams on Units 1 and 2, replacing the "B" recirculation pump impeller and repairing jet pump #20.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Inspection and Flow Evaluation Guidelines." Therefore, although Quad Cities Nuclear Power Station implemented the requirements of BWRVIP-41, including periodic inspections of the required areas of the jet pump hold-down beams, the transition area of the beam was not required to be inspected and the crack was not identified prior to failure.

The "B" recirculation pump motor trip and the MSL high radiation alarm were also a result of the failure of the jet pump hold-down beam. The "B" recirculation pump motor tripped due to the introduction into the recirculation pump impeller of a piece of the jet pump hold-down beam.

The MSL high radiation alarm was due to the changes in flow dynamics and mixing in the annulus region of the vessel due to the jet pump failure, and the resultant increase in ammonia levels. The redirected flow of the ammonia, which includes Nitrogen-16 as a component, and the resulting decrease in efficiency of the steam dryer, caused elevated levels of the ammonia to be carried over into the main steam lines, causing the increased radiation levels.

D. SAFETY ANALYSIS

The safety significance of this event was minimal. Although the reactor shutdown and cooldown were accomplished with normal means, all emergency core cooling systems were operable during this event. The failure of the jet pump was readily detected from diverse plant parameters displayed in the control room, and the reactor was shut down within eight hours of the initial indications.

The structural integrity of the jet pump supports the capability of reflooding the core to two-thirds core height during a design basis loss-of-coolant accident (LOCA) (i.e., a double-ended guillotine break of a 28" reactor recirculation pipe). Had the jet pump failed during a LOCA with no other single failure, the total ECCS inventory delivered to the core would be well in excess of the licensing basis case with the worst single ECCS failure.

Additionally, the containment response during a LOCA with a failed jet pump was determined to be within the UFSAR-assumed response, because the UFSAR assumes that the equalizer valves are in the abnormal open position.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(A) as "the completion of any nuclear plant shutdown required by the plant's Technical Specifications," and in accordance with 10 CFR 50.73(a)(2)(v)(D) as an "event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident."

E. CORRECTIVE ACTIONS

Immediate Corrective Actions:

The unit was shut down, the failed jet pump was repaired, and all of the original-style BWR/3 jet pump hold-down beams were replaced with BWR/4 jet pump hold-down beams.

The Unit 1 "B" recirculation pump impeller was replaced.

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An operability evaluation was performed to support operation of Unit 2 from the time of the jet pump failure until the start of the next Unit 2 refueling outage (about 34 days).

Completed Corrective Actions:

All of the original-style BWR/3 jet pump hold-down beams on Unit 2 were replaced with BWR/4 jet pump hold-down beams.

F. PREVIOUS OCCURRENCES

No previous occurrences of jet pump hold-down beam failures at Quad Cities Nuclear Power Station were identified.

G. COMPONENT FAILURE DATA

The jet pump hold-down beam was an original design (BWR/3) beam made of Inconel X-750, by Willamette Iron and Steel Co. and forged by Berkeley Forge and Tool, Inc.