



**Florida  
Power**  
CORPORATION

Crystal River Unit 3  
Docket No. 50-302

October 12, 1990

3F1090-09

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

Subject: Licensee Event Report (LER) 88-007-01

References: FPC to NRC 4/6/88 - LER 88-007  
FPC to NRC 3/28/90 - Supplement Extension

Dear Sir:

Enclosed is a supplement to Licensee Event Report (LER) 88-007 which was previously submitted in accordance with 10 CFR 50.73. This supplement represents the results of the inspection and investigation described in LER 88-007.

Sincerely,

G. L. Boldt  
Vice President  
Nuclear Production

WLR:mag

Enclosure

xc: Regional Administrator, Region II  
Senior Resident Inspector

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**LICENSEE EVENT REPORT (LER)**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P.630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) <b>CRYSTAL RIVER UNIT 3</b>	DOCKET NUMBER (2) <b>0 5 0 0 0 3 0 2 1</b>	PAGE (3) <b>1 OF 0 3</b>
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TITLE (4)  
**Unknown Cause Results in Reactor Building Spray Pump Operating Below Its Design Flow**

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)
01	27	88	88	007	01	10	12	90	N/A	0 5 0 0 0
01	27	88	88	007	01	10	12	90	N/A	0 5 0 0 0

OPERATING MODE (9) **1**

POWER LEVEL (10) **0 9 9**

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

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.38(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.38(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)
<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
<input type="checkbox"/> 20.405(a)(1)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME <b>W. A. STEPHENSON, NUCLEAR SAFETY SUPERVISOR</b>	TELEPHONE NUMBER
	AREA CODE: <b>9 0 4</b> NUMBER: <b>7 9 5 - 6 4 8 6</b>

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

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)     NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

As a result of the reevaluation of the emergency diesel generator loading issue, the utility conducted additional pump flow testing to determine the actual KW load of major engineered safeguards pumps. During a subsequent NRC review, the inspector noted a discrepancy between the manufacturer's pump curve (head-flow) for Building Spray Pump (BSP-1A) and the test data for that pump. At that time, Crystal River Unit 3 was operating in MODE 1 (POWER OPERATIONS) at 99% power. Testing was performed and engineering calculations showed that BSP-1A would provide a flow of 1460 gpm at 375 feet of head, which is below its design rating of 1500 gpm. During the Refuel 7 outage, the pump was disassembled for inspection. At that time, the impeller was discovered to not match the original impeller. It was determined that a manufacturing oversight had caused one fabrication step to be omitted. This changed the operating characteristics of the pump. The impeller has been repaired and the vendor has taken corrective action that is acceptable to FPC.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		8   8	-   0   0   7	-   0   1	0   2	OF	0   3

TEXT (If more space is required, use additional NRC Form 366A's) (17)

**EVENT DESCRIPTION**

As a result of the reevaluation of the emergency diesel generator [EK, DG] loading issue, additional pump flow testing was conducted to determine the actual KW load of major engineered safeguards pumps. During the NRC inspection period of January 11 to January 15, 1988, (NRC inspection report 50-302/88-05) the inspector was reviewing some of the above test data and noted a discrepancy between the manufacturer's pump curve (head-flow) and the test data. This issue was being tracked by Unresolved Item Number 88-05-01. Unresolved Item 88-05-01 was later closed and tracked by violation 89-30-01. The violation response has been submitted, and the package is waiting to be closed.

On January 27, 1988, a Nonconforming Operations Report (NCOR 88-28) was generated to document the apparent low discharge head of the 'A' train Building Spray Pump (BSP-1A), [BE, P]. The initial action was to obtain more accurate test data to evaluate the new data and determine its affect upon the operability of BSP-1A. The reportability of the event was deferred pending the results of engineering evaluation.

In a letter to the NRC dated February 1, 1988, Crystal River Unit 3 (CR-3) responded to a request for additional information regarding emergency diesel generator loading. In response to question number 12, CR-3 stated the applicable surveillance procedure had been re-run and the results confirmed the previous test results (the discrepancy remained). At that time it was thought the location/orientation of the installed instrumentation might not be giving a true indication of the total head developed by the pump. Different instrumentation was installed to more directly measure the pump discharge and suction pressures during subsequent testing conducted on February 11, 1988.

On February 24, 1988 Nuclear Operations Engineering issued a letter summarizing their evaluation based upon the final test data; their engineering calculations show that BSP-1A will provide a flow of 1460 gpm at a head of 375 feet which is below its design rating of 1500 gpm. A further review determined the design rating was part of the design basis. The original analysis and calculations did not specifically identify a minimum flow rate for the Building Spray system. Therefore on March 7, 1988 the event was determined to be reportable in accordance with 50.73.(a)(2)(ii)(B).

**CAUSE**

During the 1990 refueling outage the pump was disassembled for inspection. The vendor was consulted about the impeller, and it was discovered that a final manufacturing step had been omitted in the preparation of the impeller installed in BSP-1A. After the original impeller is fabricated, it is given a final performance test. At this point in manufacture, a procedure called "vane tipping" was required to provide the head-flow characteristics specified. This

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		YEAR 8 8	SEQUENTIAL NUMBER — 0 0 7	REVISION NUMBER — 0 1	0 3	OF 0 3

TEXT (If more space is required, use additional NRC Form 366A's) (17)

was done to the original impeller, but was not documented in the engineering bill of materials. When FPC ordered a replacement impeller, it was made to the engineering bill of materials. The vane tipping process was not included in the specifications, and was therefore not performed on the replacement impeller. This was the cause of the low flow operating conditions observed.

**SAFETY CONSIDERATIONS**

Even though 1460 gpm is below the original design requirement of 1500 gpm, subsequent calculations have shown a minimum flow rate of 1200 gpm will satisfy all design requirements for containment pressure, iodine removal, pH control and equipment qualifications.

A building spray flow rate of 1200 gpm does impact post-accident containment pressure, iodine removal, and equipment qualification in a non-conservative manner. However, the impact is small and is within the bounds of existing analyses. As such, the establishment of a minimum building spray flow of 1200 gpm represents a reduction in over-design rather than a reduction in the margin of safety.

**CORRECTIVE ACTION**

The impeller was returned to the manufacturer for repair and was later reinstalled. The vane tipping instructions have been added to the bill of material and the impeller part number callout on that file has been annotated to reference the specific shop change order involved. This corrective action by the vendor was reviewed by FPC Quality Assurance and found to be acceptable. The review of head flow surveillance data for other engineered safeguards pumps is underway.

**PREVIOUS SIMILAR EVENTS**

A review of previous LERs indicates this is the first event in which an engineered safeguards pump has been reported as operating below its design capacity.