Florida Power
CORPORATION

Crystal River Unit 3
Docket No. 50-302

April 13, 1992
3F0492-04

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

Subject: Licensee Event Report (LER) 89-011-02

Dear Sir:

Enclosed is Licensee Event Report (LER) 89-011-02 which is submitted in accordance with 10 CFR 50.73.

This supplement provides a revised schedule for the corrective action.

Sincerely,

Gary Boldt

G. L. Boldt
Vice President
Nuclear Production

EEF:mag

Enclosure

xc: Regional Administrator, Region II
NRR Project Manager
Senior Resident Inspector

NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES 4/30/92
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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	1 OF 0 4

TITLE (4): Personnel Error Results in Operation Outside the Design Basis as Failure of Circulating Water System Expansion Joints Would Affect Safety Related Equipment

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)
									N/A	0 5 0 0 0
1 2	0 4	0 6	8 9	0 1 1	0 2	0 4	1 3	9 2	N/A	0 5 0 0 0

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
5	0 0 0	20.402(b)	20.406(c)	50.73(a)(2)(iv)	73.71(b)
		20.406(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		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)	X 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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
W. A. Stephenson, Nuclear Safety Supervisor	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	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

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

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

In February 1989, FPC suspected a FSAR statement about failure or rupture of a Circulating Water System expansion joint affecting safety-related equipment was incorrect. On April 6, 1989, the FSAR statement was confirmed to be incorrect and it was determined CR-3 was operating outside its design basis. Failure or rupture of a Circulating Water System expansion joint would flood the Turbine Building and affect safety-related equipment located in the auxiliary room adjacent to the turbine room basement.

The cause of this incorrect statement is assumed to be personnel error.

At 1400 on April 6, 1989, the Shift Supervisor was notified of this condition. A watch was immediately stationed on the 95' elevation of the Turbine Building to observe the CW expansion joints and report any abnormalities to the Control Room.

Nuclear Operations Engineering has initiated a modification to the circulating water system to encapsulate the bellows thus restricting the potential flow from a postulated rupture. Procedural guidance has been provided to the operators for a flooding event through a revision of an existing annunciator response procedure and by creation of an emergency operations response procedure.

EVENT DESCRIPTION

FSAR Section 9.5.2.3.2 (page 9-37) states "A failure in one of the four circulating water conduits, such as an expansion joint rupture with resulting flooding, will be detected first by a sump pit level alarm. In addition to local operator verification at this time, a following low discharge pressure at the circulating water pump will be alarmed in the Control Room, and the respective circulating water pump will be tripped. The time elapsed from the instant of a failure to the low discharge pressure alarm is less than one second. This time, including the pump coast down time and the drop out time of the control circuit is six seconds. Flooding caused during the foregoing time will be controlled by two high capacity sump pumps and will not reach a level which may impair the function of safety-related equipment located in the auxiliary room adjacent to the turbine room basement." The FSAR further states "Potential turbine room basement flooding will be contained by large recessed flood paths which are short and lead to the nearby turbine room basement sump pit."

In October 1988, a study was completed to address a part of INPO Significant Operating Experience Report (SOER) 85-05. The conclusions of this study did not agree with the statements in the Final Safety Analysis Report (FSAR). If a circulating water expansion joint [NN,EXJ] were to fail completely, the break would release approximately 231,000 gpm of water into the Turbine Building [NM]. The results of the study indicate approximately 3 minutes can expire from the time of CW expansion joint failure until the first piece of safety-related equipment located on the 95' elevation of the Auxiliary Building [NF] is compromised.

Following this study, FPC began an investigation of the origin of the FSAR statements. As a result of this investigation, it was determined the design basis substantiating the FSAR statements were in question and possibly in error. The FSAR statement apparently assumed a failure in the discharge piping would cause a pressure drop which could be sensed by instrumentation. This is not the case since the pumps during the event would operate in a region of flow near normal operating flow and a break would be accompanied by a very small decrease in pressure. The existing pressure instrumentation will not detect the rupture. For this reason, FPC does not believe the FSAR is correct. We have determined from a review of Crystal River Unit 3's Docket File that internal flooding as a result of a CW expansion joint failure was initially addressed in 1972 to the Atomic Energy Commission as a result of a failure which occurred at Quad Cities, Unit 1. A final response was sent to the Atomic Energy Commission in the form of Amendment 29 to the FSAR. That response is the same statement that appears in FSAR Section 9.5.2.3.2.

On April 5, 1989, a Suspected Design Basis Issue was initiated as a result of initiation of Engineering Problem Report (EPR) 89-015, addressing the failure or rupture of a CW expansion joint as a possible Design Basis Issue. On April 6, 1989, a Risk Assessment Team (RAT) meeting was held to review this concern as a

possible Design Basis Issue. As a result of the RAT meeting, NCOR 89-61 was initiated and identified a rupture or failure of a CW expansion joint as a Design Basis Issue which does not provide the plant with adequate assurance that vital equipment can be protected against flooding from the Turbine Building.

At 1400 on April 6, 1989, the Shift Supervisor was notified of this condition. The plant was in MODE V (COLD SHUTDOWN). A watch was immediately stationed on the 95 elevation of the Turbine Building to observe the CW expansion joints and report any abnormalities in the Control Room [NA].

CAUSE

No technical basis can be found to substantiate the FSAR statements concerning flooding of the Turbine Building. The cause is assumed to be personnel error. The current engineering analysis and study provide a basis that these statements, accepted by the Atomic Energy Commission in 1972, are in error for a full rupture of a CW expansion joint at Crystal River Unit 3.

EVENT ANALYSIS:

The current study and additional preliminary analysis conclude the existing FSAR is incorrect. The anticipated flow during a complete expansion joint rupture would provide CW pump flow near normal operating conditions flow. This would result in Turbine Building flooding which would fail the doors [DR] between the Turbine Building and the Control Complex [NA] and, in turn, the doors between the Control Complex and Auxiliary Building in approximately two and one-half minutes, at which time the flood level in the Auxiliary Building would reach approximately ten inches in depth. At this depth essential safe shutdown equipment would begin to be affected (i.e., Essential Services Motor Control Centers [BI,MCC]).

A Probabilistic Risk Assessment (PRA) has also been performed for a rupture of a CW expansion joint. The PRA is based upon the Oconee PRA, specifically "Oconee PRA, a Probabilistic Risk Assessment of Oconee Unit 3," and concludes that the probability of a CW expansion joint rupture is 2×10^{-3}/year. This value is conservative for CR-3 since Oconee has CW system isolation valves (butterfly type) on the inlet and outlet of the condenser and CR-3 does not have isolation valves or isolation capability which could induce water hammer. The uncertainty associated with assigning probabilities to rare events, such as the total rupture of an expansion joint of the CW system, is large.

During the initial review of data available concerning expansion joint ruptures, it became apparent that plants with CW system isolation capabilities (i.e., isolation valves [NN,ISV]) or other capabilities which may introduce water hammer into CW systems as a result of dead heading the CW pumps [NN,P], etc., are at a higher risk of inducing forces which normally do not occur on CW system expansion joints. CR-3 does not have isolation capability which could result in inducing

severe water hammer into the CW system as a result of dead heading CW pumps. As a result of this incapability to induce severe water hammer, the previous PRA, known CW expansion joint ruptures and their causes, and the recent inspection of the expansion joints during the installation of the Amertap Condenser Tube Cleaning System [SI] during Refuel V, a CW expansion joint rupture at Crystal River Unit 3 is unlikely.

CORRECTIVE ACTIONS:

Interim corrective actions have been implemented as follows:

1. A compensatory flood watch, stationed on the 95' elevation of the Turbine Building to alert the Control Room of a flooding event, has been secured. This was determined to be appropriate following completion of the actions listed below.

2. An analysis has been completed which provided recommendations to resolve the potential to affect essential equipment necessary for plant safe shutdown. The actions taken are:

   a) Flood warning alarms have been installed.

   b) An Abnormal Operating Procedure (AP) on "FLOODING" provides the control room Nuclear Operators with immediate and follow-up actions to be taken in specific situations to prevent flooding of essential equipment.

Long term corrective action has been initiated with the development of a plant modification to encapsulate the circulating water system expansion joints. This encapsulation will sufficiently restrict the potential flow of water from a postulated joint rupture to allow securing of the circulating water system pumps before vital equipment is affected. This modification does not require shut down conditions for installation. The installation has been started; however due to the retubing of the condenser waterbox in the same area during the refueling outage, all the joints may not be completed by the end of the outage. It is expected that this work will be completed by July 31, 199 .

PREVIOUS SIMILAR EVENTS

This is the seventeenth report of operation outside the plant design basis since 1984.