Florida Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

December 13, 1997
3F1297-05

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Protection Against Dynamic Effects of Loss of Coolant Accident, Evaluation of Jet Impingement Effects of Pressurizer Surge Line, Inspector Followup Item (IFI) 95-15-02 (TAC No. M96604)

References: 1. FPC to NRC letter, 3F1197-29, dated November 7, 1997

2. NRC to FPC letter, 3N1097-09, dated October 9, 1997

3. FPC to NRC letter, 3F0997-01, dated September 29, 1997

4. FPC to NRC letter, 3F0697-13, dated June 5, 1997

5. NRC to FPC letter, 3N0497-12, dated April 10, 1997

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Dear Sir:

Florida Power Corporation (FPC) is hereby submitting this letter in accordance with a commitment in Reference 1 to re-evaluate the conclusions stated in Reference 3 regarding the loss-of-coolant accident (LOCA) effects of jet impingement. Using a 30° jet cone angle for a Crystal River Unit 3 (CR-3) Pressurizer Surge Line circumferential rupture jet impingement, FPC evaluated the effects on the Nuclear Services Closed Cycle Cooling (SW) System lines serving the Reactor Coolant Pumps (RCP). References 2, 4, and 5 are included for correspondence traceability on this issue.

One circumferential rupture location on the pressurizer surge line has the potential to impinge on a segment of SW System piping serving RCP-1A. Reference 3 excluded this segment of piping because it was not within the area of impact using a 20° jet impingement spray cone angle rather than the 30° angle as required by the CR-3 licensing basis. FPC re-evaluated the rupture location with a potential jet impingement spray cone angle of 30°.

In this re-evaluation, a segment of SW System piping serving RCP-1A is within the area of the jet. Due to the impact of the jet spray, the piping stresses were greater than allowable stresses.

FPC performed an inelastic analysis. The worst case elastically calculated stress for the affected SW piping runs was converted to an equivalent effective stress by dividing by the ratio of the plastic section modulus to the elastic section modulus. The ratios of effective stress to material yield stress, and pulse duration to system time period, were then used to derive the system ductility required to absorb the pulse energy using graphical information. In turn, the system ductility and the elastic modulus for the material were used to calculate equivalent strain.

The relationship between the elastic and inelastic properties of the SW piping material was used to calculate the amount of strain energy absorbed during permanent deformation, in comparison to the total strain energy capacity of the piping at failure. The results show negligible permanent deformation, supporting the conclusion that considerable margin exists between the actual deformation and the deformation required to cause pressure boundary failure of the SW piping. Based on the analysis, the piping will experience a maximum strain of less than 0.01 in/in, which is well below the ultimate strain of 0.20 in/in for the pipe material (less than 5% of the ultimate strain). This analysis, FPC Calculation M 97-0121, Revision 0, is provided for information as Attachment B to this letter.

The analysis shows that the SW System piping serving RCP-1A will not lose its structural integrity due to jet impingement from a postulated surge line rupture. Therefore, FPC concludes there are no inoperable systems, structures, or components associated with this nonconformance with the CR-3 licensing basis. The SW System and the Containment are operable. Also, there are no conflicts with the Improved Technical Specifications. FPC has prepared a Deficiency Report (DR 97-8092) in accordance with CR-3's corrective action program and a justification for continued operation (JCO) consistent with the guidelines discussed in Generic Letter 91-18, Revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions." The JCO documents the conclusions presented in this letter. The JCO concludes that a pressurizer surge line LOCA with a jet spray impinging on the SW piping coincident with a postulated single failure of a SW System containment isolation valve will not result in violation of containment integrity. Also, no post-accident SW System safety functions will be impaired.

FPC also reviewed the guidance in NRC Inspection Manual 9900, Operability, Section 6.13, which recommends the use of methodology in ASME III, Appendix F to establish operability for piping. The stress intensities associated with the strains calculated in FPC Calculation M 97-0121 are lower than the allowable stress intensities in Appendix F, Section F-1341.2. Therefore, FPC concludes the SW piping is operable under jet impingement loading associated with a pressurizer surge line LOCA.

Based on the JCO and this letter, FPC will close Restart Issue D-58, "Design Requirements for Dynamic LOCA Effects," to resolve IFI 95-15-02. This issue will not be a restart restraint for CR-3.

FPC is evaluating several approaches to resolve this nonconformance. The approaches under consideration include hardware modifications, such as a jet impingement shield, re-routing of SW piping, or installation of additional isolation valves; or a license amendment request to change the CR-3 licensing basis. FPC will advise the NRC of the planned approach for resolution of this issue by May 29, 1998.

FPC evaluated the extent of condition of possible dynamic interactions with the SW System piping as a result of a LOCA. The circumferential rupture discussed above is the only vulnerability identified. This was verified by plant walkdowns and analyses.

The commitments in this letter are contained in Attachment A. If you have any further questions, please contact Mr. David Kunsemiller, Manager, Nuclear Licensing at (352)563-4566.

Sincerely,

M. W. Rencheck, Director
Nuclear Engineering and Projects

MWR/jwt
Attachments

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

List of Regulatory Commitments

The following table identifies those actions committed to by Florida Power Corporation in this document. Any other actions discussed in the submittal represent intended or planned actions by Florida Power Corporation. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Manager, Nuclear Licensing of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	IMPLEMENTATION
FPC is evaluating several approaches to resolve this nonconformance. The approaches under consideration include hardware modifications, such as a jet impingement shield, re-routing of SW piping, or installation of additional isolation valves; or a license amendment request to change the CR-3 licensing basis. FPC will advise the NRC of the planned approach for resolution of this issue.	May 29, 1998

ATTACHMENT B

FPC CALCULATION M 97-0121, REVISION 0