



## SUPPLEMENTARY INFORMATION

REPORT NO.: 50-302/83-023/01X-2

FACILITY: Crystal River Unit 3

REPORT DATE: October 3, 1983

OCCURRENCE DATE: June 13, 1983

### IDENTIFICATION OF OCCURRENCE:

A fire damper (FD-86) required to protect a ventilation duct penetration through a 3 hour fire barrier into a safety-related area was discovered to be missing. Technical Specification 3.7.12 requires that all penetration fire barriers protecting safety-related areas be functional at all times.

### CONDITIONS PRIOR TO OCCURRENCE:

Defueled.

### DESCRIPTION OF OCCURRENCE:

On June 13, 1983, while moving duct work to accommodate a plant modification, personnel discovered fire damper (FD-86) was missing from the duct work between the Auxiliary Building and the Control Complex.

While processing the Purchase Order for a 3 hour rated fire damper (FD-86), it was discovered that the original fire damper procurement specifications in 1972 and 1974 specified 1-1/2 hour rated fire dampers. Subsequent investigation by Florida Power Corporation (FPC) revealed that 55 fire dampers protecting safety-related areas have the 1-1/2 hour fire rating, rather than the 3 hour fire rating stated in the Fire Protection Program Review (FPPR) performed for FPC by NUS in 1977.

Further investigation also revealed that 21 of the 55 fire dampers were installed in the duct work (see Figure 1, attached). The 1977 FPPR implied that the fire dampers were located in the fire barriers.

While performing the engineering to replace the 1-1/2 hour fire dampers with 3 hour fire dampers, FPC also discovered that the vertical air conditioning duct chase which connects the 108' and 165' elevations in the Control Complex was enclosed with walls that were not 3 hour rated fire barriers as implied in the 1977 FPPR.

### DESIGNATION OF APPARENT CAUSE:

Background - The initial design of the Crystal River Unit 3 (CR-3) heating, ventilating, and air conditioning (HVAC) system was performed in the late 1960's by Gilbert Associates (GAI). CR-3 was designed with a single train HVAC system thus, the ventilation system did not allow backfitting fire protection features later imposed by the insurance company (i.e., fire dampers placed in fire barriers). If all of the fire dampers were placed in the fire barriers, a fire in one room would close the dampers in that room and shut off the air supply to all unaffected rooms downstream of the fire. To place all the fire dampers in the fire barriers would, per GAI, require

redesigning the entire HVAC system. Therefore, in 1971, GAI suggested enclosing the duct work with a fire resistant covering in an attempt to meet the fire codes. By enclosing the duct work with a fire resistant covering the duct could be considered an extension of the fire barrier; thus, the fire dampers installed in the duct work would in effect be installed in the fire barrier. GAI fire protection engineers and architects selected plaster walls for vertical duct risers and Albi Clad 89S intumescent mastic fireproofing for horizontal duct work as the materials in which the Control Complex duct work would be enclosed. This resulted in the following HVAC fire protection features:

1. The specification of 1-1/2 hour rated fire dampers.
2. The placement of some fire dampers in or at the fire barrier.
3. The placement of some fire dampers in the duct work (not in or at fire barrier) with a fire resistant covering.

At the time the fire dampers were originally purchased, there were no NRC guidelines pertaining to the rating or placement of fire dampers nor was there an NRC requirement to meet applicable National Fire Protection Association (NFPA) codes until the NRC issued Branch Technical Position (BTP) APCSB 9.5-1 in 1976. Consequently, the only fire protection requirements FPC was required to meet were those imposed by the insurance company, Marsh & McLennan, and the Nuclear Energy Property Insurance Association (NEPIA).

During construction, FPC sent GAI drawings to Marsh & McLennan who in turn forwarded them to NEPIA for review and approval. Furthermore, a NEPIA approved inspector conducted frequent site inspections from 1971-1976 to verify that NEPIA general conditions and recommendations for all fire protection systems were met by FPC. The NEPIA inspection reports do not list any objections to the rating and location of the fire dampers or to enclosing the duct work with a fire resistant covering.

Apparent Cause - The following is an explanation of the apparent cause for each occurrence:

- A. The inconsistency between the 3 hour fire damper rating in the 1977 FPPR and 1-1/2 hour rating in the procurement specifications was apparently caused by a 1970 design drawing erroneously specifying a 3 hour rating.

At the time the fire dampers were originally purchased for Crystal River Unit 3, NFPA-90A was the fire protection guideline. NFPA-90A requires a 1-1/2 hour fire rating for fire barriers; thus the dampers procured had that rating and the procurement specifications reflected that rating. The same HVAC engineer that specified and approved the purchase of 1-1/2 hour rated fire dampers in 1972 and 1974 also approved in 1970 the "Ventilation Details, Symbols, Notes, and Schedules" drawing which erroneously stated that all fire dampers would be 3 hour rated unless otherwise noted (none of the other HVAC drawings state fire ratings).

In 1977, NUS Corporation was selected to conduct a review of the CR-3 Fire Protection Program against the guidelines in Appendix A of BTP APCSB 9.5-1. The method of review and analysis employed by NUS in preparing the FPPR was:

1. Thorough in-plant inspections by their fire protection consultant.
2. Document review.
3. System analyses.
4. Review and evaluation of the design and construction of CR-3 as required by Appendix A.

The review did not identify the discrepancy between the 3 hour fire damper rating stated on the GAI drawing and the actual 1-1/2 hour fire rating of the fire dampers installed in the plant. Hence, the 1977 FPPR incorrectly stated:

1. Ventilation openings and ventilation ducts which pass through rated fire walls are equipped with approved 3 hour fire dampers.
2. The Control Complex is equipped with UL-approved, 3 hour rated fire dampers to isolate the various areas.

FPC did not detect the erroneous statements in the FPPR.

- B. The 3 hour fire rating implied in the 1977 FPPR for the duct chase walls was caused by personnel error during the walkdown for the FPPR.

The Fire Hazards Analysis section of the FPPR stated that the fire zones penetrated by the vertical air conditioning duct chase connecting elevations 108' and 165' in the Control Complex were bordered by 3 hour rated fire barriers, thus implying that the chase walls were 3 hour barriers. FPC did not detect the erroneous statements in the FPPR.

- C. Failure to detect that fire damper FD-86 was missing was caused by personnel failing to verify the installation during construction.

A Field Change Notice (FCN) was issued on May 18, 1976 to install:

1. Fire doors.
2. Wall sections.
3. A fire damper in the duct work.

The HVAC drawing was revised on July 6, 1977 to show fire damper FD-86 installed per the FCN issued in May. Installation of the fire damper was apparently not verified before issuing the revised drawing. The FPPR was performed from April-June 1977. The review did not note that the HVAC duct penetrated a 3 hour fire barrier and there was no fire damper to seal off the penetration (the HVAC drawing did not indicate a fire damper there until it was revised by GAI on July 7, 1977).

- D. The fire damper location implied in the FPPR was caused by personnel error during the walkdown for the FPPR.

The FPPR stated that ventilation openings and ventilation ducts which pass through rated fire walls are equipped with approved 3 hour fire dampers, thus implying the fire dampers are located in the fire barriers. FPC did not detect the erroneous statements in the FPPR.

#### ANALYSIS OF OCCURRENCE:

Table I summarizes the calculated fire loadings from the 1977 FPPR for various areas of the plant.

Per the NFPA Fire Protection Handbook, it is reasonable to assume that unprotected duct work, if properly hung and adequately fire stopped, has a fire rating of 1 hour. Based on this assumption, only the case of fire loadings in excess of 1 hour in safety related areas need be analyzed.



Table 2 shows that per the 1977 FPPR, only three (3) safety related areas have HVAC duct penetrations and a calculated fire loading in excess of 1 hour - the 3A and 3B HVAC Emergency Equipment Rooms and the Cable Spreading Room. All of these three rooms have fire detection and suppression systems; therefore, the probability of a fire of maximum duration in these areas is low. Hence, it is reasonable to assume that unprotected duct work with 1-1/2 hour rated fire dampers provided adequate fire protection for CR-3.

#### CORRECTIVE ACTION:

While the CR-3 fire protection design was considered to provide adequate fire protection during initial installation, it is being revised to include the later requirements imposed by 10CFR Part 50, Appendix R and FPC license commitments.

The following actions are being taken by FPC:

1. A continuous Fire Watch was immediately established in or adjacent to the fourteen (14) affected areas. Technical Specifications have been modified to allow an hourly roving Fire Watch.
2. Of the 35 fire dampers that have a 1-1/2 hour fire rating and are located in or at a fire barrier:
  - a. One 3 hour rated fire damper has been installed in the location of the missing fire damper (FD-86).
  - b. Twenty-five (25) fire dampers will be replaced with 3 hour fire dampers.
  - c. Two (2) fire dampers will be replaced with 3 hour fire dampers during the Emergency Feedwater Initiation and Control (EFIC) system upgrade. These fire dampers are in the EFIC Room.
  - d. Seven (7) fire dampers will be replaced with 3 hour fire dampers during the Appendix R upgrade. These seven (7) fire dampers are located in the duct chase walls.

Of the 21 remaining fire dampers that are 1-1/2 hour rated and are not located in or at a fire barrier:

- a. All twenty-one (21) fire dampers will be deleted from the Fire Protection Program but wired open and allowed to remain in place.
- b. Newly located, 3 hour rated fire dampers will be installed in the fire barriers to protect the areas initially protected by the 21 above. An engineering evaluation is being conducted to determine the location of the new 3 hour fire dampers. This evaluation is expected to be completed by October 31, 1983.

Table 3 shows the status of the modifications listed above.

3. An engineering evaluation is being conducted to determine what action will be taken with regard to the Control Complex air conditioning duct chase walls. The evaluation is expected to be completed on March 31, 1984.

4. Surveillance Procedure SP-607, Fire Damper Inspection, will be revised by the end of Refuel V to incorporate FD-86, all of the new fire dampers installed, and the deletion of the 21 1-1/2 hour fire dampers as a result of (2) above.
5. GAI HVAC drawings will be revised by end of Refuel V to correctly indicate the fire rating of the installed fire dampers and the location of the fire dampers added as a result of (2) above.
6. An independent review of the CR-3 fire protection program will be performed to assure that no design or installation deviations exist in the CR-3 fire protection systems and to comply with the applicable portions of Appendix R. This review is expected to be completed by the end of Refuel V.

FAILURE DATA:

This is the third event reported under Technical Specification 3.7.12.

Figure 1 Fire Damper Location Schemes

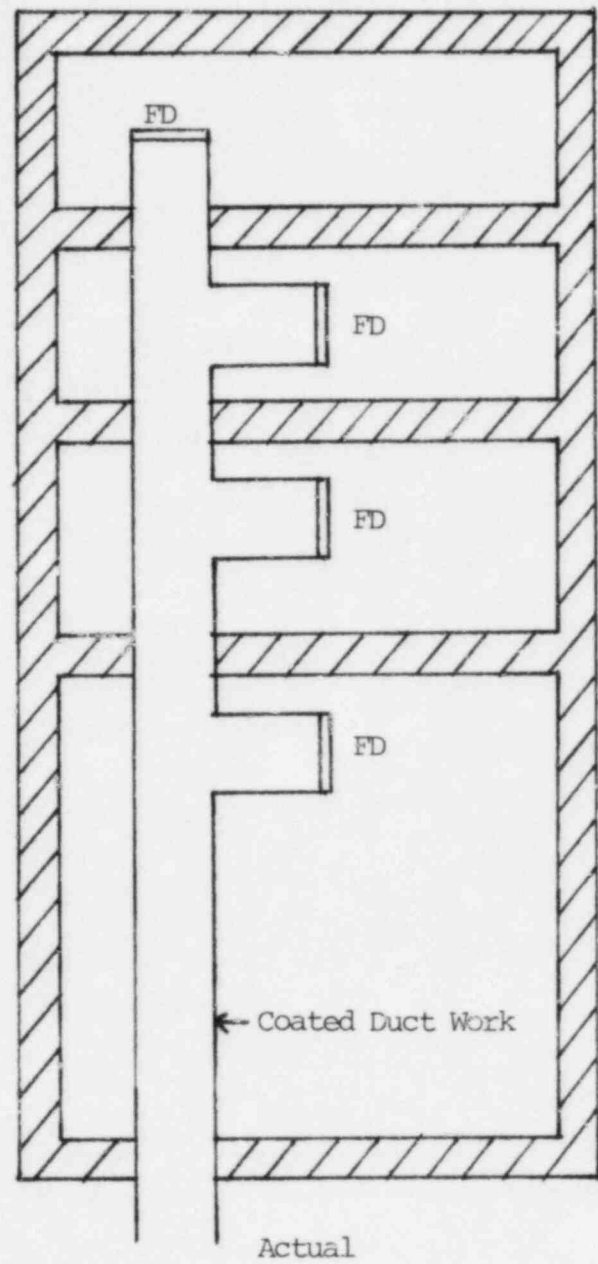
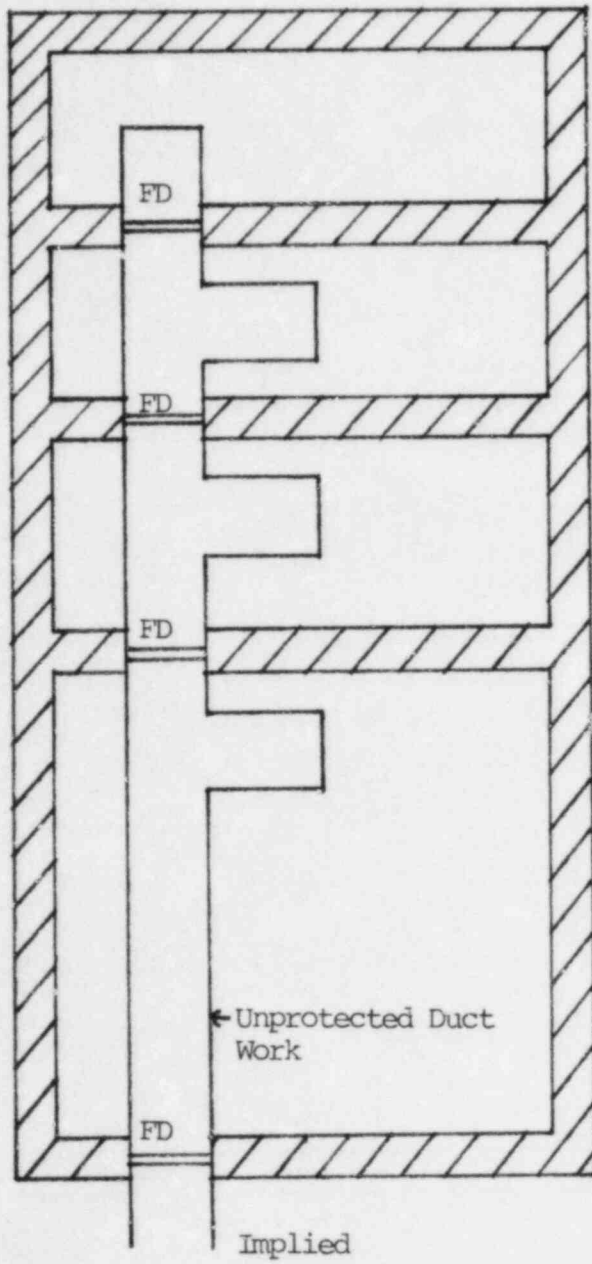


TABLE 1

## CR-3 FIRE LOADINGS SUMMARY

Calculated Fire Loading, Min.	0-15	16-30	31-45	46-60	61-75	76-90	>90
Number of Plant Areas	94	18	6	5	3	0	2

TABLE 2

## SAFETY-RELATED AREAS WITH FIRE LOADINGS IN EXCESS OF 1 HOUR

Plant Area	Calculated Fire Loading, Min.
Cable Spreading Room	73
HVAC Emergency Equip. Rm. 3A	109
HVAC Emergency Equip. Rm. 3B	109



TABLE 3

## FIRE DAMPER MODIFICATION SUMMARY

Fire Damper Tag Number	Location	Status	Fire Damper Tag Number	Location	Status
FD-2	W	Rep (7/29/83)	FD-31	W	Rep (12/31/83)
3	W	EFIC	32	W	Rep (9/12/83)
4	W	Rep (7/29/83)	33	W	Rep (9/12/83)
5	D	Del	34	W	Rep (8/17/83)
6	D	Del	35	W	Rep (8/17/83)
7	D	Del	36	W	Rep (8/17/83)
8	D	Del	37	W	Rep (8/17/83)
9	W	Rep (9/21/83)	42	W	Rep (7/29/83)
10	W	Rep (9/21/83)	43	W	Rep (7/29/83)
11	D	Del	44	W	Rep (9/12/83)
12	W	Rep (8/17/83)	45	D	Del
13	D	Del	46	D	Del
14	W	Rep (8/22/83)	47	W	R
15	W	EFIC	51	W	Rep (12/31/83)
16	W	Rep (8/22/83)	55	W	Rep (12/31/83)
17	W	R	56	D	Del
18	W	Rep (8/8/83)	57	D	Del
19	D	Del	58	W	R
20	D	Del	59	W	R
21	W	Rep (8/22/83)	75	D	Del
22	D	Del	76	D	Del
23	W	Rep (8/8/83)	77	D	Del
24	W	Rep (8/5/83)	81	D	Del
25	W	Rep (7/29/83)	82	D	Del
26	W	Rep (8/26/83)	83	D	Del
27	W	R	84	D	Del
28	W	R	85	D	Del
29	W	R	86	W	Rep (7/18/83)

W = At or in a fire barrier.

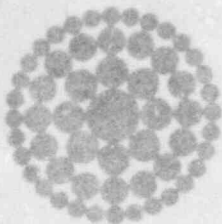
D = In the duct work, not at or in a fire barrier.

Del = Deleted from the CR-3 Fire Protection Program.

EFIC = Will be replaced during the Emergency Feedwater Initiation and Control (EFIC) upgrade scheduled for Refuel V.

R = Will be replaced during the Appendix R upgrade scheduled for Refuel V.

Rep = Replaced with a 3 hour rated fire damper on (date).



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**Florida  
Power**  
CORPORATION

October 3, 1983  
3F-1083-02

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 30303

Subject: Crystal River Unit 3  
Docket No. 50-302  
Operating License No. DPR-72  
Licensee Event Report No. 83-023

Dear Mr. O'Reilly:

Enclosed is Licensee Event Report No. 83-023 and the attached supplementary information sheet, which are submitted in accordance with Technical Specification 6.9.1.8.i. This report supplies supplementary information to our initial reports dated June 27 and July 20, 1983.

Should there be any questions, please contact this office.

Sincerely,

G. R. Westafer  
Manager  
Nuclear Operations Licensing and Fuel Management

AEF:mm

Enclosure

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

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