

Florida Power

CORPORATION

Crystal River Unit 3
Docket No. FD-302

July 6, 1993
3F0793-03

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

Subject: Generic Letter 89-19, Unresolved Safety Issue A-47,
"Safety Implication of Control Systems in LWR Nuclear
Plants" - Supplemental Response

Reference: 1. NRC to FPC letter, 3N0693-03, dated June 2, 1993
2. FPC to NRC letter, 3F0390-09, dated March 19, 1990

Dear Sir:

Florida Power Corporation (FPC) is submitting this supplemental response to Generic Letter (GL) 89-19 as requested by Reference 1 to state FPC's position on the issue of steam generator overfill and to withdraw our previous commitment to install some type of overfill prevention system in Crystal River Unit 3 (CR-3). This letter discusses the basis for FPC's position.

BACKGROUND

Reference 2 is FPC's initial response to GL 89-19 which stated FPC's concerns with the NRC's overfill recommendations in the Generic Letter for B&W plants. Since the March 1990 FPC letter, the B&W Owners Group (B&WOG) has held several discussions with the NRC staff. Originally, the B&WOG intended to develop a generic analytical solution to the overfill issue for B&W plants. As a result of B&WOG/NRC discussions, the B&WOG agreed to withdraw its generic position paper on steam generator overfill protection and each licensee agreed to submit a letter providing their basis for concluding that steam generator overfill protection was not necessary.

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FPC POSITION

Generic Letter 89-19 recommendations to provide an automatic overflow protection system, plant procedures, and technical specifications are based on a probabilistic risk analysis (PRA) performed by Pacific Northwest Laboratory (PNL) and documented in NUREG/CR-4386. B&WOG and FPC personnel reviewed the assumptions and other information used in the PNL PRA. FPC agrees with the methodology used in the PRA, but key elements of the assessment are outdated or unsupported, and an evaluation assessing the negative impact on safety of the proposed modification was not performed. FPC has examined the major core damage scenario, the assumptions used in the PNL PRA, and performed a safety benefit/value impact analysis of the recommended plant changes for CR-3.

The principal GL 89-19 accident scenarios of concern for a B&W plant are the following:

1. steam generator overflow,
2. steamline break (SLB) upstream of the MSIVs caused by the overflow,
3. steam generator tube ruptures caused by the SLB,
4. and eventual core melt.

The following sections discuss why the elements of the PNL PRA are incorrect and what the proper values are for CR-3. Attachment 1 uses the correct values to calculate the public risk for CR-3.

A. Steam Generator Overflow Initiating Event Frequency

NUREG/CR-4386 determined that a steam generator overflow event has an initiating frequency of 0.006/yr. This frequency is based on an estimated probability that the operator fails to terminate the overflow of 0.7. PNL stated that this probability was their upper bound for operator error. They also recognized that for plants with simulator programs stressing proper diagnosis of failures this value could be reduced. FPC has a simulator and special attention is paid to main feedwater overfeed due to control system malfunctions during operator training and operator requalification. Therefore, it is appropriate for FPC to reduce the operator error value by a factor of 10 to 0.07. This in turn reduces the initiating event frequency by a factor of 10 to 0.0006/yr for CR-3.

B. Probability of a MSLB

Reference 2 discusses why FPC and the B&WOG believe NUREG/CR-4386 contains conclusions based upon insufficient data on MSLBs. Simply stated, the PNL PRA did not consider dynamic loading. The PNL PRA determined the probability of a MSLB to be 0.95. After publication of the PNL PRA, the NRC issued NUREG-0844 to resolve Unresolved Safety Issues A-3, A-4, and A-5. NUREG-0844, Section 3.4.1 (page 3-10) determined that a reduction in the probability from 0.95 to 0.001 was acceptable. FPC agrees with NUREG-0844 that the lower value of 0.001 is appropriate and justified.

C. Probability of a MSLB between the Reactor Building and the MSIVs

The PNL PRA used a value of 1.0 because Oconee has no MSIVs. The PRA recognized that other B&W plants, such as CR-3, have MSIVs and the value to use was 0.5 times the ratio of the Main Steam piping from the building wall to the MSIVs to the total length of piping from the steam generators to the MSIVs. For CR-3, the piping ratio is 0.23. Therefore, the probability for CR-3 is 0.155.

D. Probability of a SGTR given a MSLB

The PNL PRA used a value of 0.034 which came from an early draft version of NUREG-0844. The final version of NUREG-0844 determined this probability to be 0.0505. Although the overall SGTR probability increased in NUREG-0844, the probability of rupturing greater than 10 tubes was decreased by nearly an order of magnitude. The NUREG/CR-4386 was particularly sensitive to the value assumed for $p(>10 \text{ SGTRs})$ in the calculation of core melt probability. FPC considers the value of 0.0505 to be bounding for CR-3.

E. Probability of Core Melt given MSLB inboard of the MSIV

The final version of NUREG-0844 changed this probability from 0.00166 to 0.000525. The smaller probability results from the reduction in $p(>10 \text{ SGTRs})$ by an order of magnitude. Further reduction in the core melt probability can be justified as discussed in Reference 2, however for the purposes of this submittal a value of 0.000525 is bounding for CR-3 and is acceptable to FPC.

CONCLUSIONS

As shown in Attachment 1, the calculation of Public Risk for CR-3 using probabilities described above yields a value of 2.34×10^{-4} man-rem/yr. The total Public Risk for 30 years is 7.03×10^{-3} man-rem. When compared to the NUREG/CR-4386 30-year Public Risk value of 1360 man-rem, FPC has concluded that a potential steam generator overfill event at CR-3 is not a significant risk to the public. FPC estimates that a safety-related automatic overfill protection system for CR-3 will cost in excess of \$3 million. Based on the public benefit and the projected costs, FPC concludes that automatic steam generator overfill protection is not warranted for CR-3.

This letter should allow the NRC to close GL 89-19 for CR-3.

Sincerely,



P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

PMB/JWT/CMC:ff

Attachments

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

ATTACHMENT 1

CALCULATION OF PUBLIC RISK - CRYSTAL RIVER UNIT 3

I. Definition of Terms

FOE:	Frequency of an Overfeeding Event
POF:	Probability of an Operator Failing to terminate the event
PEBWST:	Probability of Loss of BWST before RCS Depressurization (Attachment 2)
IE:	Steam Generator Overfill Initiating Event Frequency
PMSLB:	Probability of a MSLB given Overfill And Spillover
PMSLBL:	Probability of a MSLB Located outside the Reactor Building and inboard of the MSIV's given a MSLB
PSGTR:	Probability of SGTR given MSLB (Attachment 2)
PCM:	Probability of Core Melt given MSLB inboard of the MSIV and outside the Reactor Building

II. Formula for Public Risk

$$IE = FOE * POF$$

$$PCM = \sum_{j=1}^j (PSGTR_j * PEBWST_j)$$

$$PR = IE * PMSLB * PMSLBL * PSGTR * PCM/PSGTR * 4.8 \times 10^6 \frac{\text{man-rem}}{\text{core melt}}$$

III. Public Risk Utilizing Values Applicable for CR-3

$$POF = 0.07 \quad IE = 0.0006/\text{yr} \quad PMSLB = 0.001$$

$$PMSLBL = 0.155 \quad PSGTR = 0.0505 \quad PCM = 5.25 \times 10^{-4}$$

$$PR = 0.0006/\text{yr} * 0.001 * 0.155 * 0.0505 * 5.25 \times 10^{-4} / 0.0505 * 4.8 \times 10^6$$

$$PR = 2.34 \times 10^{-4} \text{ man-rem/yr}$$

$$\text{Total Public Risk for 30 years} = 7.03 \times 10^{-3} \text{ man-rem}$$

IV. Cost Benefit of Overfill Protection

Assumption: \$1000/man-rem benefit and \$3,000,000 modification cost

Given: Total Public Risk = 7.03×10^{-3} man-rem

Conclusion: Benefit of \$7 over 30 years opposed to a \$3,000,000 cost provides justification for not implementing the modification.

ATTACHMENT 2

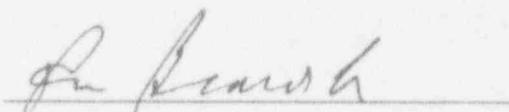
CORE MELT PROBABILITIES GIVEN MSLB CONSIDERING SGTR

Values from NUREG-0844 Final Report

Number of SGTRs	Probability of Rupture	Probability of Loss of BWST Before RCS Depressurization	Probability of Failure to Isolate SG	Net Core Melt Probability
1	0.025	0.001	1	2.5×10^{-5}
2 to 10	0.025	0.01	1	2.5×10^{-4}
>10	0.0005	0.5	1	2.5×10^{-4}
Probability of Core Melt				5.25×10^{-4}

STATE OF FLORIDA
COUNTY OF CITRUS

P. M. Beard, Jr. states that he is the Senior Vice President, Nuclear Operations for Florida Power Corporation; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

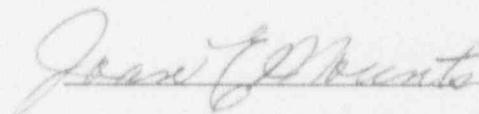


P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 6th day of July, 1993.



Notary Public (print)



Notary Public (signature)

Notary Public, State of Florida at Large,
Notary Public, State of Florida
My Commission Expires: ~~My~~ Commission Expires Oct. 17, 1994
Boundo Thru Tray Print - Insurance Inc.