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

May 24, 1995
3F0595-09

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

Subject: Response to Request for Additional Information
Fuel Enrichment Increase
Technical Specification Change Request 201

References: A. FPC to NRC Letter dated January 26, 1995 (3F0195-05)
B. NRC to FPC Letter dated April 10, 1995 (3N0495-11)

Dear Sir:

Florida Power Corporation submitted Technical Specification Change Request (TSCRN) 201, Fuel Enrichment Increase, January 26, 1995 (Reference A). TSCRN 201 proposed Technical Specification changes to increase the allowable U-235 enrichment of fuel to be stored in the new and existing spent fuel storage facilities of Crystal River Unit 3. NRC requested, (Reference B), additional information be submitted in order to complete their review. Attachment 1 to this letter provides the requested additional information. Revised proposed Technical Specification pages are included, as applicable.

Sincerely,

Gary Boldt

G. L. Boldt
Vice President,
Nuclear Production

Attachment

JBC/ff

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

9505310632 950524
PDR ADOCK 05000302
P PDR

A001
1/1

U. S. Nuclear Regulatory Commission
3F0595-09

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER)
) DOCKET NO. 50-302
FLORIDA POWER CORPORATION)

CERTIFICATE OF SERVICE

G. L. Boldt, deposes and says that the following has been served on the Designated State Representative and Chief Executive of Citrus County, Florida, by deposit in the United States mail, addressed as follows:

Chairman, Board of County Commissioners of Citrus County Citrus County Courthouse Inverness, FL 34450	Administrator, Radiological Health Services Department of Health and Rehabilitative Services 1323 Winewood Blvd. Tallahassee, FL 32301

A copy of Additional Information - Technical Specification Change Request No. 201.

FLORIDA POWER CORPORATION

G. L. Boldt
Vice President
Nuclear Production

G. L. BOLDT, PERSONALLY KNOWN TO ME. SWORN TO AND SUBSCRIBED

BEFORE ME THIS 24th DAY OF MAY 1995.

JOAN BUFE CARR
Notary Public (print)

Notary Public (signature)

Notary Public, State of Florida at Large
My Commission Expires:
6/21/95

NOTARY PUBLIC, STATE OF FLORIDA.
MY COMMISSION EXPIRES: June 21, 1995.
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

STATE OF FLORIDA
COUNTY OF CITRUS

G. L. Boldt states that he is the Vice President, Nuclear Production 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. (Additional Information - TSCRN 201, Fuel Enrichment Increase)

G. L. Boldt
Vice President
Nuclear Production

G. L. Boldt, personally known to me. Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 24th day of May 1995.

JOAN BUFE CARR
Notary Public (print)

Notary Public (signature)

Notary Public, State of Florida at Large,

My Commission Expires: 6-21-95

NOTARY PUBLIC, STATE OF FLORIDA.
MY COMMISSION EXPIRES: June 21, 1995.
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

ATTACHMENT 1

NRC Question:

1) Since the maximum enrichment limit of 5 wt% U-235 is actually a nominal value, Figs. 3.7.15-1 thru 3.7.15-3 should be labeled initial nominal enrichment.

FPC Response:

Yes, we agree. Figure 3.7.15-1, Minimum Burnup Required for "A" Pool Storage, Figure 3.7.15-2, Minimum Burnup Required for Region 1 of "B" Pool, and Figure 3.7.15-3, Minimum Burnup Required for Region 2 of "B" Pool, will be labeled as "Initial Nominal Enrichment." Revised proposed pages 3.7-32, 3.7-33 and 3.7-33A are attached.

NRC Question:

2) Would a more appropriate Required Action for TS 3.7.15 be to move the noncomplying fuel assembly to an acceptable configuration rather than moving it from Pool A or B?

FPC Response:

Yes, we agree. Required Action A.1 will be revised to read, "Initiate action to move the noncomplying fuel assembly to an acceptable configuration." A revised proposed page 3.7-30 is attached.

NRC Question:

3) Proposed TS Figure 3.7.15-3 should not extend beyond an initial enrichment of 5.0 wt% U-235 since this is the maximum analyzed for in the amendment request.

FPC Response:

Figure 3.7.15-3 reflects the analysis which was actually performed, namely fresh fuel of enrichment 5.05% U-235 which was surrounded by burned fuel of 45 GWD/MTU with an initial enrichment of 5.20% U-235. The amendment request for a nominal enrichment of 5.0% U-235 is within the bounds of the analysis performed. The Figure has been revised for clarification. A revised proposed page 3.7-33A is attached.

NRC Question:

4) What mechanism is in place to prevent inadvertent placement of fresh assemblies in the two rows of storage locations in the new fuel vault which must remain vacant? The staff would prefer physical restraints which prevent this type of misloading.

FPC Response:

The two rows of storage cells in the new fuel storage racks are physically blocked by bolted stainless steel plates which cover the restricted locations.

NRC Question:

5) Please note that the statistical combination of uncertainties for the new fuel vault under optimum moderation conditions given in Table 1 of Attachment 1 should be $\pm$ 0.0032 resulting in a maximum reactivity of 0.9783.

FPC Response:

We agree, this was a typographical error.

NRC Question:

6) Is the B_4C matrix absorber contained in the Pool A storage racks Boraflex? If so, what assumptions were made concerning possible deterioration of the Boraflex material either by shrinkage or contact with the pool water? How are these assumptions validated?

FPC Response:

No, the B_4C matrix absorber contained in the Pool "A" storage racks is not Boraflex. It is a B_4C polymer composite.

NRC Question:

7) Section 3.4.1 of Attachment 2 states that fresh fuel with an enrichment of 3.4 wt% yields the same reactivity in the Pool A storage racks as 5.0 wt% fuel burned to 10.5 MWD/KgU. If so, why is a less conservative (3.5 wt%) value based in TS Figure 3.7.15-1?

FPC Response:

Analyses supporting the current Technical Specifications (Amendment #149) provided the curve of required burnup vs. initial enrichment for enrichments from 3.5 wt% to 4.5 wt%. In the interest in preserving the linear relationship described in Figure 3.7.15-1 in the existing Technical Specifications, the figure was extended to 5.0 wt% enrichment and K_{eff} was verified as being within the acceptance criteria. The noted comment was intended to convey that the additional margin between an intial enrichment of 3.4 wt% and 3.5 wt% with 0 burnup exists at the (5.0 wt % initial, 10.5 MWD/KgU) point on the curve. The analysis for Amendment #149 supported (3.5 wt%, 0) not (3.4 wt%, 0).

NRC Question:

8) Since storage of 5.0 wt% fuel in a checkerboard pattern, alternating with cells filled with water or non-fissile material, has been shown to be acceptable, why is this not included in the spent fuel assembly storage TS?

FPC Response:

The acceptable use of alternating cells filled with water in the checkerboard pattern is described in the Bases for the Technical Specifications. Including as a note on Figures 3.7.15-2 and 3.7.15-3 could add unnecessary complexity.

NRC Question:

9) Please note that the reactivity allowance for the uncertainty in depletion calculations specified in Table 1 of Attachment 2 should be 0.0035 Δk.

FPC Response:

We agree, this was a typographical error in the Table. Value is given correctly in Section 3.3.

NRC Question:

10) From Table 11 of Attachment 3, it appears that Boraflex width shrinkage was not accounted for in the reactivity calculations for Region 2. If this is so, please justify.

FPC Response:

Width shrinkage was conservatively considered in the analysis for both Region 1 and Region 2 of Pool B.

The storage pool absorber material for both Region 1 and Region 2 of Pool B is Boraflex. The evaluation of Boraflex shrinkage was based upon EPRI reports[1] documenting Boraflex performance in storage racks. A summary of the report is provided in Section 2.4.4 of the criticality report (Attachment 3 of the FPC license amendment submittal).

The Region 1 analysis chronologically was the first analysis. A boron width of only 7.384 inches was modeled as a simplification in that only the inner 13 fuel pins cells (0.5679" wide) along the edge of the fuel assembly are adjacent to Boraflex material.

The B-10 content for this material was the minimum specified for the Boraflex, 0.023 gm/cm^2, with no correction for the B-10 in the 0.216 inches of width neglected. Thus, the Region 1 model is conservative, especially considering the later adjustment to k_{max} only to account for Boraflex shrinkage.

Subsequently, the Region 2 analysis modified the Boraflex sheet model so that the shrinkage effects are included in K_{max} only once by the shrinkage uncertainty factor. The nominal 7.60 sheet width was included in the model. Based upon the conclusions of the EPRI report, no B-10 is lost from the sheets from the shrinkage, only an increase in B-10 density in the remaining width. Thus, shrinkage across the width moves B-10 from the edges toward the center. This effectively increases the B-10 density in the central region of the sheet which has a conservative effect on reactivity. Due to uncertainty as to how the shrinkage related B-10 density increase is distributed, the full width of the sheet at the minimum B-10 concentration (0.015 gm/cm$_2$) was modeled. This provides conservatism in the model of the Boraflex sheet. The overall shrinkage effects are considered by an explicit uncertainty factor, 0.00384 $\pm$0.00264 Δk, that was determined in a conservative manner.

---

[1]EPRI NP-6159, "An Assessment of Boraflex Performance in Spent-Nuclear Fuel Storage Racks", EPRI, December, 1988.

EPRI TR-101986, "Boraflex Test Results and Evaluation", EPRI, February, 1993.

Thus while the Region 2 analysis is not as conservative as that for Region 1, the Boraflex shrinkage is conservatively considered.

The width shown in Figure 4 of the report should be 7.6", not 7.5".

NRC Subsequent Question:

What effect does the enrichment increase have on heat load?

FPC Response:

The effect of the enrichment increase on the decay heat generation rate is negligible, and is bounded by analysis described in an SER dated April 16, 1991 which supported Amendment 134 to the Crystal River Unit 3 Operating License.