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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING APPEAL BOARD

'89 JUN 23 A11:24

In the Matter of:	)	
	)	Docket No.: 50-335-OLA
FLORIDA POWER AND LIGHT COMPANY	)	
	)	ASLBP No.: 88-560-01-LA
(St. Lucie Plant, Unit No. 1)	)	

INTERVENOR'S APPEAL OF INITIAL DECISION
(Authorizing Spent Fuel Pool Reracking)

I. Introduction

Intervenor sees no point in reiterating the chronology of this case or the detailed description of the spent fuel pool and the storage racks. This was done very concisely by the Board in their Decision of 9 May 1989.

II. The use of Boraflex in high-density storage racks.

Intervenor is appealing the Board's Decision as regards the issues surrounding the integrity of Boraflex as suggested by Contention 3 and Contention 6.

> Contention 3: The possible materials degradation and failure that might occur in Boraflex panels due to heat and radioactivity generated in the spent fuel pool have not been adequately considered or analyzed.
>
> Contention 6: The proposed use of Boraflex in the high density spent fuel storage racks, designed and fabricated by the Jospeh Oat Corporation is essentially a new and unproven technology.

A. The effect of exposure to elevated temperatures on Boraflex.

The Board, in its decision, notes that tests were performed on the Boraflex to determine its ability to withstand heat. Initial Decision, p. 15. They then cite the analysis of Dr. Wing of this study to confirm the applicability of this study to the case at hand. Intervenor finds this very confusing as Dr. Wing's testimony was deemed as essentially irrelevant

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at the hearing by the Presiding Judge Cotter due to his obvious lack of presentation. Judge Cotter himself stated:

> Your motion will be denied, Mr. Rich. I sympathize with your frustration with this witness, but the testimony will remain in for the weight to which it will be accorded. It seems to me that the lack of responsiveness of this witness and the apparent gaps in this witness' information indicate that the testimony should be accorded very little weight at this point unless something remarkable happens. (Cotter at Tr. 476)

Judge Cotter made these remarks in response to Intervenor's request that Dr. Wing's testimony be stricken due to his lack of knowledge of those conditions under which the test was conducted or the conditions to be encountered in the spent fuel pool. Rich at Tr. 476.

The Board, in its decision on this matter, also relied upon the representations of Dr. Singh, who was Licensee's witness. Dr. Singh, under examination, admitted that he was, in fact, a metallurgical specialist and not a chemist and so must rely upon the work and knowledge of others with regards to the integrity and suitability of the polymer, Boraflex. Singh at Tr. 146-7. Dr. Singh agreed that the information he was relying upon in making his statements as to the suitability of Boralfex under prolonged exposure to heat was a BISCO study of heat aging upon unirradiated Boraflex Singh at Tr. 337. This is the same study that Dr. Wing relied upon in the preparation of his testimony. Wing at Tr. 435. This study is identified at this hearing as Exhibit #4.

The only othe analysis of this study made available is presented in a document entitled, 'An Assessment of Boraflex Performance in Spent Nuclear Fuel Storage racks', prepared by the Electric Power Research Institute. This document was identified at this hearing as Exhibit #1.

The EPRI study characterizes this same study as:

> In any case, the test is not particularly meaningful since the material tested was unirradiated. Exhibit #1 at p. 4-9

Thus, the Board in its decision on this particular matter relies upon the testimony of a Staff witness that is discredited at the hearing and the evaluation of a witness for the Licensee that is relying upon the work of others. The only independent study of that same work characterizes it as meaningless.

B. The effects of radiation exposure on Boraflex

The effects of radiation upon the polymer, Boraflex, were made clear by testimony of Staff, Licensee and submitted materials. For sake of clarity, I will consider the effects of radiation exposure in two respects.

The first is the effect of irradiation in producing dimensional changes in the in-service Boraflex material. Intervenor agrees with the Board that shrinkage of 3-4% is to be anticipated during the normal, service life of the material. Exhibit #1 at p. 4-21, Initial Decision at p. 18.

Licensee's own witness, Dr. Turner, provided data that showed shrinkage of 4% and even greater at radiation levels that will be encountered by the material in service. Turner at Tr. 387.

This fact alone, confirmed by all data presented and contradicted by none, is grounds to deny this License Amendment. One of the Staff's acceptance criteria for continued use of the Boraflex is a dimensional change of no more than 2.5% from the original. Amendment No. 91, License No. DPR-67 at p. 5. Obviously, this condition will be violated.

The second effect of gamma irradiation relevant to this case is in the promotion of gaps developing in the Boraflex. Gaps will form when the material shrinks upon irradiation and is restrained by some means. To quote the Board in its decision of 10 May 1989, "The controlled gap system is unique and has not been tested." Initial Decision at pg. 37. Obviously, the following discussion will address the concerns of Contention 6. Intervenor does not contest any decision rendered as to the suitability of the region II rack design. The rack design of concern here is region I racks, where the most reactive fuel will be stored.

Licensee admits that the intention of the region I rack design is to mechanically restrain the Boraflex in precise, axial locations in order that gaps will form. Singh at Tr. 560. Licensee's own experts fully expect that gaps will form in the Boraflex in region I. Turner at Tr. 358, Singh at Tr. 311. Dr. Singh, in fact, guarantees it. We are, therefore, relieved of the burden of having to determine what was the previous cause of gap formation in earlier designs.

This design system is so new that the testimony revealed the NRC Staff was not even aware of the this critical aspect of the design. Initial Decision at 36. In fact, the Staff had a total misunderstanding of the intention of the rack design in region I. The project manager, Mr. Tourigny, never did seem to understand what the intent of the design was in the region I racks. Tourigny at Tr. 526, Singh at Tr. 556.

In light of this testimony by staff witnesses and the characterization by the Board of the design as, "...unique and has not been tested.", Intervenor cannot see how the Staff was able to render a No Significant Hazards Consideration in its Safety Evaluation of 11 March 1988. One of the conditions of satisfying

the second standard of a No Significant Hazards Consideration is that: "No unproven techniques and methodologies were utilized in the analysis and design of the proposed high density racks." Safety Evaluation Report as Related to Amendment no. 91 to Unit 1 Facility Operating License no. DPR-67 at p. 20. (Also identified at this hearing as Staff Exhibit #1) Obviously, the Staff was in no position to make this assertion since they were not even aware of the correct nature of this new rack design.

At this point, it is important to note that after examining all data currently available concerning Boraflex, the Electric Power Research Institute makes only two recommendations. One of them is:

> No means of mechanical or adhesive restraint should be used so that the material can undergo shrinkage in a stress free condition thereby precluding the potential for gap formation. Exhibit #1 at p. 6-4.

Thus we have an untested system utilizing a design that goes against one of only two recommendations by the only independent study of Boraflex up to this point in time.

The Board, in its decision, tries to skirt the issue of so-called, 'controlled gap formation', by stating that, "Because of the normal use of Region I, shrinking and subsequent gap formation should thus be nonexistent or minimal in the Region I racks." Initial Decision at p. 37. This is a completely, incorrect characterization of Licensee's testimony on this point. The opposite is, in fact, the case. Licensee states that it is expected and normal that there will be fuel stored in Region I as it comes out of the reactor core. Turner at Tr. 550. In fact, Region I will regularly receive spent fuel of such low burnup that it is not able to be stored in Region II due to the excessively high reactivity levels.

This spent fuel of inadequate burnup that will be stored in Region I emits the greatest amount gamma radiation during this initial, storage period. This is clear from his prefiled testimony. Turner on 3 & 6 at Figure 1. We can also notice from the other graph in Figure 1 on that same page that the maximum, anticipated gamma dose of 10^{10} rads will be accumulated by the Boraflex in just one year in residence in the pool. Turner on 3 & 6 at p. 12. Dr. Turner does not differentiate in these graphs nor in his testimony between exposure levels of Region I and Region II. Turner on 3 & 6 at p. 12. Licensee further states that maximum, dimensional changes of 4% in the Boraflex will be attained at exposure levels of 1×10^{10} rads gamma or a one-year cumulative dose. Turner on 3 & 6 at p. 15. Licensee has further testified that shrinkage of only 2% is necessary to produce gaps in the Boraflex in Region I. Singh at Tr. 567.

The design capacity of Region I itself gives us further evidence that spent fuel fresh from the reactor core is expected to be stored there till it achieves minimal, burnup levels. There are 342 assembly cell locations in Region I. Weinkam at Tr. 207. Licensee describes that Region I is to provide adequate space for a full-core off load and for a fresh batch of fuel. A full core load consists of 217 assemblies. A fresh batch of fuel is approximately 72 assemblies. These total 289. There remain 53 spaces for spent fuel to be stored in Region I. Singh at Tr. 206.

Intervenor sees no basis in fact for the Board's conclusion that 'normal' use of Region I will not promote gap formation. This conclusion is clearly false.

C. The potential effects of gap formation on reactivity

Licensee has evaluated only an extremely limited number of scenarios

involving gap formation. If the 'unique and untested', controlled gap formation performs precisely as it is intended, .5-inch gaps will allow a k-eff of .948 in Region I. This according to the Licensee's witness, Dr. Turner.

Unfortunately, we have no verification of any of these calculations. Dr. Kopp, the Staff expert, admitted during examination that he had not reviewed any criticality calculations that took into account the presence of gaps. This was because the Staff had not anticipated that gaps would form, as was discussed earlier, based on their misunderstanding of the . k design. Kopp at Tr. 496. So, the Board had and has only the unverified analysis of Licensee for the crucial, criticality assumptions.

What is the worst case as regards gap formation? Would ten .6-inch gaps exceed a k-eff of 0.95? or eight .7-inch gaps? or two 1-inch gaps? There has been no affirmative testimony on these questions? Gaps will form in the Region I panels. Licensee has admitted this. If his system works as it is designed, gaps will form at several, different locations. Gaps increase the k-eff of the storage array. Singh at Tr. 187. No one contests this fact. How large do how many gaps have to get before k-eff .95 is exceeded? Licensee has no idea. Staff has no idea. Staff has done no analysis of criticality taking into account the presence of gaps. From Licensee's calculations one could assume that if the gaps increase in size just 1/10 of one inch greater than is anticipated in this 'unique and untested' design that k-eff of .95 would be exceeded.

The Board in its Initial Decision cites the testimony of Dr. Kopp in affirming that the limiting k-eff will not be exceeded. Initial Decision at tr. 22. However, in that specific response Dr. Kopp is referring to studies

done that consider gaps of an inch or less in every panel. This system, as stated by the Board, is designed to produce 12 gaps of .5-inch in every panel or a maximum, cumulative gap size of 5.5 inches. This situation would not be included in Dr. Kopp's analysis of the generic studies. So, again we see that Staff has done no analysis, generic or specific, of the criticality calculations for the St. Lucie I spent fuel pool.

The only other point to be made with regards to criticality is in reference to Standard Review Plan 9.1.2 III Section 2.a. which states:

> Criticality information in the SAR must show that the center to center spacing between fuel assemblies in the storage racks is sufficient to maintain the array when fully loaded and flooded with non-borated water in the sub-critical condition.

If the Region I rack design is intended to form gaps in order to operate safely, then does the presence of the gaps become a normal situation and not fall under the Double Contingency principal of ANSI N16.1-1975? If not, then no credit for soluble boron may be taken in the criticality calculations. Then the calculations that Dr. Turner made for a gap size of 5.72 in. corresponding to 4% maximum shrinkage which produced a k-eff of .992 would have to be viewed as exceeding the Standard Review Plan guidelines. Turner at Tr. 366. Licensee himself recognized the confusion that exists on this point due to presence of this rack design which is intended to create gaps in its normal function. Turner at Tr. 358.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Intervenor's Appeal of Initial Decision, dated 16 June 1989, have been served upon the following person by U.S. mail, first class, except as otherwise noted and in accordance with the requirements of 10 C.F.R. Sec. 2.712.

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16 June 1989