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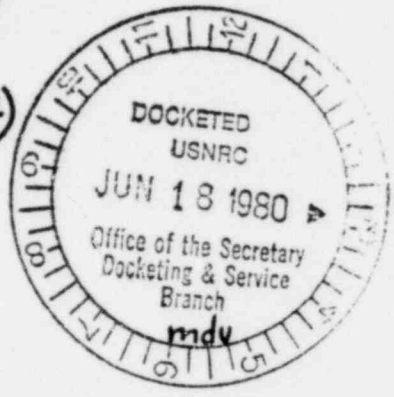

1-060-10
Secretary of the Commission
Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Docket and Service Branch

Subject: Docket No. PRM-51-6

Dear Sir:

Pursuant to the notice of proposed rulemaking set forth in Vol. 45, No. 74, page 25557 of the Federal Register dated April 15, 1980, Arkansas Power and Light (AP&L) submits the following comments and information.

Ms. Quigg's first statement in her petition indicates that she does not fully understand the primary objective of the various extended burnup programs underway at this time. The utilities do not "want to use more uranium in existing nuclear fuel," as she states, but instead are working to reduce the amount of uranium feed needed to generate a given amount of power. This increase in uranium utilization efficiency is necessary since in the absence of reprocessing the unused uranium and bred plutonium in the spent fuel is disposed of. Simply stated, the objective of the extended burnup program is to conserve uranium, not use more. In fact, the DOE/AP&L/Duke project cited by Ms. Quigg is expected to improve uranium utilization by 15 to 20% when fully implemented. This very significant reduction in uranium feed requirements will reduce the mining and milling of uranium ore necessary to fuel present and future power plants. In addition to this positive effect on the environment, higher burnups should reduce the amount of heavy metal to be disposed of as high level waste.

The bases for Ms. Quigg's petition consisted of five items. These are found on pages 2 through 4 of her petition and are addressed below:

1) Greater fission gas releases from nuclear reactors - Ms. Quigg did not document in this item evidence of greater fission gas releases from nuclear reactors. Her remarks instead were directed towards demonstrating greater fission gas releases from nuclear fuels at high burnup. Of course fission gas releases from the fuel are contained within the fuel cladding and the amount of fission gases contained therein is not directly related to fission gas releases from the reactor. The incidence of fuel clad failure is the prime determining

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factor as to the amount of fission gases released from the reactor. Accordingly, design modifications have been proposed which should improve fuel rod integrity.

2) Increased fission gas releases from spent fuel pools - Ms. Quigg's comments concerning fuel clad corrosion describe a well known if not precisely modeled phenomena. The DOE/AP&L/B&W experimental fuel assemblies will be examined for crud deposits after the second and subsequent irradiation cycles. It would be impractical for AP&L to take the chance of damaging equipment or having to shutdown due to primary system activity caused by heavily corroded fuel cladding. As important as AP&L feels these experiments are, safety and plant reliablity come first. If corrosion problems do arise, they will be solved and not ignored. In any case, fuel clad corrosion is more a function of primary system chemistry than of burnup.

   We consider Ms. Quigg's allegations as to the possibility and consequences of increased fuel clad corrosion to be completely without merit. She ignores the past, present, and future work completed or planned by the Babcock and Wilcox Company (B&W) and other researchers in this area.

3) Production of inferior grade nuclear spent fuel - Again Ms. Quigg ignores the rather extensive efforts of B&W and others directed at insuring the mechanical integrity of the experimental fuel assemblies.

   The last paragraph of item 3 in Ms. Quigg's petition indicates that she is unaware of both the previous analytic work performed (much of which is in he public domain) and earlier experimental work (a small portion of which is described in the Arkansas Nuclear One - Unit 1 FSAR page 3-65) which address her concerns. Research has advanced as far as it can in the laboratory setting. We are at the stage now where incore experiments are called for so as to verify our earlier predictions and experimental results.

   We also take exception to Ms. Quigg's inference that the proposed irraditions will take place in the human environment. We feel the combined barriers which include the fuel cladding, reactor vessel, containment building, and extremely strict radiological controls remove this work from the human environment adequately.

4) Potential for greater radiological impact in reactor and spent fuel accidents - The Nuclear Regulatory Commission staff has addressed the radiological consequences of high burnup fuels in the Safety Evaluation supporting Amendment Nos. 44 and 41 to the Units 1 and 2 Zion Station Operating Licenses. Quoting from the subject Safety Evaluation, "Irradiating fuel to extended burnups will increase the amount of long-lived fission products in the core. The short-lived fission products

will have reached equilibrium levels at lower burnups and will not be affected. The potential consequences of the postulated design basis accidents are determined by the short-lived fission products. Therefore, the potential consequences of the postulated design basis accidents given in the Safety Evaluation Report (SER) dated October 1972, for Zion Station Units 1 and 2 will not change due to four fuel assemblies in the core being irradiated to burnups up to 55,000 MWD/MTU."

Once the fuel is discharged to the spent fuel pool, any changes in the environmental impact of extended burnup fuel as compared to standard fuel will be even harder to detect. Irradiating experimental fuel assemblies to extended burnups should not change the total number of fission products generated, therefore the amount of fission gases contained in the spent fuel assemblies stored in the pool should be the same regardless of burnup. If there is any environmental impact at all related to storage of high burnup spent fuel it is that the long-lived fission gases created in the extended burnup fuel will have decayed more prior to discharge due to their longer residence time in the reactor.

5) Increased radioactive releases during reprocessing - As stated above, for a given amount of power produced a given amount of fission products (some of which will be gases) will be produced. In reprocessing, the question of gas migration from the fuel to the gap between the fuel and cladding does not come into play. All of the fission product gases will be released when the fuel rods are disassembled. Again, extended burnup fuel will allow for more fission gas decay prior to reprocessing due to longer core residence times. In fact, using Ms. Quigg's numbers (which we can't vouch for as being accurate) it appears that at 20,000 MWD/MTU burnup 0.3 curies of krypton-85 per MWD/MTU are contained in the fuel while at the higher burnup of 40,000 MWD/MTU only 0.227 curies of krypton-85 per MWD/MTU are contained in the fuel. This, if her numbers can be substantiated, would appear to be a positive environmental effect.

In conclusion, we would like to stress the following points.

1) We can think of no mechanism where the small number of experimental assemblies could possibly cause significant and widespread, long and short-term effects on the human environment. Even assuming a disasterous accident, the curie content of the major dose contributors vary little from high burnup to standard fuel.

2) Better uranium utilization (less mining and milling) will have a positive effect on the environment.

3) The technical problems mentioned by Ms. Quigg are widely recognized and are the subject of considerable research and experimentation. Several good solutions (design modifica-

tions) are scheduled to be tested. None of the problems appear to be unsolvable. It is quite likely improved assembly designs (in terms of fuel clad failures and integrity) will result from the current extended burnup programs.

Thank you for the opportunity to review Ms. Quigg's petition and make comments.

Very truly yours,

William Cavanaugh, III

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