ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

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1R-0281-08

Director of Nuclear Reactor Regulation
ATTN: Mr. Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Comm.
Washington, D.C. 20555

SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Cycle 5 Startup with Five
Failed Fuel Assemblies
(File: 1510.5)

Gentlemen:

On February 13, 1981 AP&L received a verbal request from your Mr. Guy Vissing to submit a discussion of the ANO-1 fuel failures that occurred during Cycle 4 operation and to describe the circumstances surrounding the actions we have taken so far.

During the ANO-1 Cycle 4 operation an increase in iodine activity in the reactor coolant system indicated failed fuel was present. Because of this fact fuel sipping was performed during the current refueling outage. Cesium ratios examined prior to the end of the cycle pointed to failures in either Batch 4 or Batch 5 assemblies. Originally, only Batches 4 and 5 were to be sipped; however, since spot checks of Batch 6 assemblies revealed "leakers", it was decided to sip all 177 assemblies. A total of 24 out of 177 assemblies were found to be "leakers". This was divided into nine Batch 4 assemblies, six Batch 5 assemblies and nine Batch 6 assemblies. Based on our calculations it is estimated that an average of about three rods per assembly are leaking. Two Batch 5 assemblies and nine Batch 6 assemblies were to be reinserted for Cycle 5. However, a new core loading plan was devised which allowed two Batch 5 assemblies and four Batch 6 assemblies to be replaced with six Batch 5 assemblies that were originally to be discharged and that were determined to be "non-leakers". Also, we have reshuffled the core such that no leaking assemblies would be placed in high power regions.

The reactor coolant system (RCS) activity levels during Cycle 4 operation, after the fuel failures occurred, varied around 0.3 to 0.4 μCi/gm with a December 31, 1980 level of 0.196 μCi/gm prior to shutdown for refueling. These values were well below the safe limits specified in the ANO-1 Technical Specifications (3.5 μCi/gm). A conservative estimate of RCS activity levels on Cycle 5 startup is < 0.1 μCi/gm, but no definitive values can be calculated from the information available. We are expecting that activity levels will be reduced by an order of magnitude below the Cycle 4 levels.

The criteria AP&L used in making the decisions outlined above include past core performance, ALARA and cost/benefit considerations. The Cycle 4 failed fuel developed at around 40 effective full power days. Continued Cycle 4 operation for approximately 1¼ years (300 EFPD's) at relatively stable iodine levels (post 9-30-79) indicated the defect mechanism was limited to the identified assemblies and was not progressive in nature. ANO has bases, therefore, for confidence that the redesign/reshuffle and visual examinations will effectively reduce reactor coolant activity and permit safe operations. B&W has reviewed the operating conditions around the time of the failed fuel occurrence and have found no conditions that should have led to fuel failure. Also, B&W has reviewed the manufacturing QA records of the identified failed fuel assemblies and have found no correlations that would indicate a generic type problem with respect to manufacturing defects. For Cycle 5 operation, AP&L is reviewing its maneuvering criteria to determine if any revisions are in order. Therefore, it is believed from past experience that no ongoing mechanism is present to cause the failed fuel situation to degrade with time.

With the above knowledge the use of failed fuel in Cycle 5 became an ALARA rather than a safety concern. Because of expected maintenance and operations personnel exposure during Cycle 5 operation, every reasonable effort was made to lower the number of failed fuel assemblies to be used and to mitigate their effects. This resulted in lowering the number of scheduled failed fuel assemblies for reuse from eleven to five. Again, this was done for ALARA considerations even though safety considerations did not require such actions.

The cost/benefit considerations led to the extent of failed fuel assembly reuse being limited to five assemblies. Further reductions in the number of failed fuel assemblies to be used in Cycle 5 operation could have resulted in major Cycle 5 Reload Report changes and associated Technical Specification changes. Based on the current limited review time for the Cycle 5 Reload Report this would have had a strong protential for causing a delay in plant startup. With the present changes in core design only minor changes will be made to the Cycle 5 Reload Report and no Technical Specification changes are expected. Therefore, minimal additional NRC review will be required.

In conclusion, AP&L has taken significant steps to minimize the impact of using failed fuel assemblies during ANO-1 Cycle 5 operation which go well beyond that required for safety reasons.

When further details are available on the evaluation presently underway to determine more definitively the cause of the Cycle 4 failed fuel development, we will pass along that information.

Very truly yours,

David C. Trimble

David C. Trimble
Manager, Licensing

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