UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 30 1982

MEMORANDUM FOR: J. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

FROM: C. H. Berlinger, Chief
Core Performance Branch
Division of Systems Integration

SUBJECT: COMPLETION OF ANO-1 FAILED FUEL INVESTIGATION (TACS 43771)

We have reviewed Arkansas Power & Light's (AP&L) Failed Fuel Evaluation Final Report (submitted via letter from D. C. Trimble to J. F. Stolz, January 15, 1982), which provides information on the fuel failures encountered during Cycle-4 operation of Arkansas Nuclear One-Unit 1 (ANO-1). On March 2, 1982 we met with AP&L and their fuel supplier (B&W) for the purpose of acquiring further information on, and clarification of, subjects discussed in the report. As a result of all the information received, we have reached the following conclusions.

1. No definite cause of the failures has been established. Since most of the failures appear to have occurred at about the same time, everyone involved (including the staff) believes that there must have been an initiating event. A thorough investigation, however, has failed to reveal any power transient, water chemistry anomaly, or other trigger that could have initiated the failures.

2. There is no observable correlation of failures with manufacturing batches or lots of material (Zircaloy tubing or ingots). We believe that this conclusion is unambiguous.

3. It appears that there may have been at least two separate mechanisms of failure, inasmuch as several Batch-6 (1st cycle of operation) rods appeared to have failed early in life (<2000 MWd/t burnup), whereas the other rods (from Batches 4 and 5) failed after appreciable burnup. Thus, it is possible that the Batch-6 failures occurred at random times following a major failure episode that was indicated by a fairly abrupt increase in coolant activity early in Cycle-4.

4. The early-in-life Batch-6 failures may have been due to primary hydriding. Although there is no direct evidence for this, it is plausible in light of the fact that the Batch-6 fuel had a slightly lower density and higher moisture specification than current generations of B&W fuel.

XA

5. If the Batch-6 failures are attributed to a separate failure mechanism from the rest of the failures, the power and burnup correlation is consistant with PCI failures, so this mechanism should not be ruled out as a possible cause.

6. AP&L and B&W agreed with our conclusion that there was little evidence to suggest that the failures were due to a sudden occurrence of (waterside) corrosion.

7. The licensee appears to have made a conscientious effort to determine the cause of the failures and to remove the failures at the earliest practical opportunity. All but 5 known leakers were removed at the last refueling outage, and the remainder will be removed at the next refueling even though the failed fuel has not been completely burned. Considering the fact that B&W fuel assemblies are not reconstitutable, and thus do not lend themselves to easy examination, removal, and replacement of failed rods, we believe that AP&L has acted responsibly.

In summary, although the licensee has been unsuccessful in identifying the cause of the Cycle 4 ANO-1 fuel failures, no further failures have occurred, most of the leakers have been removed (with the remainder to be removed at the next refueling), and activity sampling procedures have been improved to permit quick detection of any further occurrences. We thus believe that the licensee has followed up on this failure episode in an acceptable manner, and we are thus ending our investigation into this matter.

Carl H. Berlinger, Chief
Core Performance Branch
Division of Systems Integration

cc: R. Mattson
L. Rubenstein
G. Vissing
D. Eisenhut
T. Novak