

February 20, 2001

Mr. Craig G. Anderson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 - REQUEST FOR ADDITIONAL
INFORMATION ON PROPOSED TECHNICAL SPECIFICATIONS REGARDING
STEAM GENERATOR OUTER DIAMETER INTERGRANULAR ATTACK
WITHIN THE UPPER TUBE SHEET (TAC NO. MA9879)

Dear Mr. Anderson:

By letter dated August 29, 2000 (1CAN080005), you submitted an amendment request to change the requirements within the technical specifications for Arkansas Nuclear One, Unit 1 to address steam generator tubes with indications of outer diameter intergranular attack (ODIGA) within the upper tube sheets. The staff has several questions regarding the proposed changes. The staff's questions are provided in the enclosed request for additional information (RAI).

The contents of this RAI have been discussed with Mr. Steve Bennett of your staff, and a response by February 23, 2001, was agreed to. If circumstances result in the need to revise the target date, please call at the earliest opportunity.

If there are questions regarding this request, I may be reached at 301-415-1323.

Sincerely,

/RA/

William Reckley, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosure: As stated

cc: See next page

REQUEST FOR ADDITIONAL INFORMATION ON THE PROPOSED RISK INFORMED
TECHNICAL SPECIFICATION CHANGE REGARDING STEAM GENERATOR OUTER
DIAMETER INTERGRANULAR ATTACK WITHIN THE UPPER TUBESHEET
TAC NUMBER: MA9879

- 1) What was the population size for outer diameter intergranular attack (ODIGA) detected in the upper tubesheet in each steam generator (SG) for 1R14 (and 1R13), compared with 1R15?
- 2) The Nuclear Regulatory Commission (NRC) safety evaluation (SE) dated October 4, 1999, for License Amendment 202, approving the one-cycle alternate repair criteria for flawed tubes that have experienced ODIGA, included the following statement:

“The staff notes that the leakage through ODIGA degradation is calculated using a computer code that has not been reviewed and approved for use by the NRC. In particular, the code needs to be benchmarked against actual leakage data for flawed test specimens representative of the ODIGA flaws at ANO-1 [Arkansas Nuclear One, Unit 1]...Therefore, uncertainties associated with the leak rate estimates need to be quantified and taken into consideration to ensure they are conservative.”

How was the computer code used for calculating leakage benchmarked against actual leakage data for ODIGA flaws, and how are associated uncertainties treated?

- 3) In the SE dated October 4, 1999, for License Amendment 202, the staff stated that the licensee had evaluated the data per the proposed growth rate criteria and concluded that growth was not occurring. If small intergranular attack (IGA) patches not detected by eddy current testing are present in the areas of the tube selected for possible rerolls, how will the growth of the IGA patches be affected by reroll operations?
- 4) Page 25 of the Entergy Operations, Inc. (Entergy) submittal dated August 29, 2000 (Proposed Risk Informed Technical Specification Change Regarding Steam Generator Outer Diameter Intergranular Attack within the Upper Tubesheet), stated that “... and any patch of IGA with crack-like characteristics are repaired.” Please provide details of ANO-1 experience with crack-like characteristics in ODIGA patches.
- 5) On page 6 of the report dated October 4, 1999, 1CAN109905, Entergy discussed their 1R15 inspection findings in the rerolls performed during 1R14. Both volumetric and axial/mixed mode indications were detected. The report stated that the volumetric indications were likely small IGA patches. Please discuss your ability to detect ODIGA in areas of the tube selected for possible rerolls, post-reroll inspection methodology, and disposition of tubes with ODIGA found in the rerolls during post-reroll inspections.
- 6) In the Entergy submittal dated August 29, 2000, 1CAN080005, a probability of detection (POD) curve for ODIGA is provided as Figure 25 on page 56. It appears that this is the same POD curve presented in the Entergy submittal dated September 7, 1999, 1CAN099901 (BAW-10235P, Rev. 1). The report dated September 7, 1999, states that the POD is based solely on ODIGA defects in tubes removed from various once-through SG (OTSG) plants. How does the POD for ODIGA detected at ANO-1 compare with that from the other OTSG plants represented in this analysis?

Re: Generalized t-test on page 50 of 1CAN080005

- 7) Because the indications in the first and second inspections used in the t-test are matched, the sample sizes n_1 and n_2 should be equal. Why are the sample sizes denoted by n_1 and n_2 instead of a common n ?
- 8) Why is the t-test used instead of the paired t-test or the sign test to test for differences between the first and second inspections? In particular, the sign test does not assume that the data is normally distributed and it should be more sensitive to small differences which may be masked by the estimated variances used in the t-test.

Re: Table 4-1 in 1CAN099901 (page 6 of 12)

- 9) What is the basis for using a second sample size of 13 if one leaker is found in the initial sample of 22? Although not explicitly stated, the decision rule for accepting the population of 130 as having no more than 15 leakers is apparently the following:
 - (i) Take an initial sample of 22. If no leakers are found, accept the population.
 - (ii) If one leaker is found, take a second sample of 13. Accept the population if no leakers are found in the second sample.

If the population has 15 leakers, then the probability of acceptance using this decision rule is 0.079. Hence the confidence level is 92%, not 95% as claimed.

- 10) Columns 1 and 2 in Table 4-1 indicate that there are 15 leakers in the population for the initial sample, while Column 3 indicates that there are 21 leakers for the second sample. How can the assumed number of leakers increase from the first to the second sample?

DATE NAME OFFICE

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2/7/01 T Smith

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Russell, D. (1998). *Principles of Mathematics*. New York: W. H. Freeman and Company.

Jackson, D. B. 1965. *Principles of operations*.