Mr. C. Randy Hutchinson February 7, 2000
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RE: INDIVIDUAL PLANT EXAMINATION OF EXTERNAL EVENTS SUBMITTAL (TAC NOS. M83588 AND M83589)

REFERENCE:

1) Entergy Operations, Inc. letter from Mr. J. D. Vandergrift to the USNRC, dated March 30, 1999 (0CAN039901)

2) USNRC letter from Mr. W. Reckley to Mr. C. R. Hutchinson, Entergy Operations, Inc., dated April 3, 1998

3) Electric Power Research Institute (EPRI) Report “Guidance for Development of Response to Generic Request for Additional Information on Fire Individual Plant Examination for External Events (IPEEE),” dated May 1999

4) EPRI Report No. TR-100370, “Fire Induced Vulnerability Evaluation (FIVE),” Revision 1, September 1993.

Dear Mr. Hutchinson:

The staff has reviewed your response (Reference 1) to our previous request for additional information (RAI) (Reference 2) regarding the Generic Letter (GL) 88-20, “Individual Plant Examination of External Events,” Supplement 4, June 27, 1991. Based upon its review of your response, the staff is unable to conclude at this time that you have met the intent of Supplement 4 to GL 88-20. Therefore, your response to the enclosed follow-up questions is considered necessary in order to complete the staff’s review. This RAI is related to the fire part of the IPEEE. The supplemental RAI was developed by our contractor, Sandia National Laboratories, and reviewed by the “Senior Review Board” (SRB). The SRB is comprised of staff with probabalistic risk assessment expertise in external events that represent the Office of Nuclear Regulatory Research, the Office of Nuclear Reactor Regulation, and Sandia National Laroratories. There are no additional RAIs in the areas of seismic, high winds, floods, and other external events related to your IPEEE submittal. The industry documents listed as References 3 and 4 may provide assistance in responding to the staff’s questions.

It is requested that you provide a response to the enclosed RAI by May 31, 2000. This response date was discussed with Mr. Steve Bennett of your staff on January 11, 2000, who indicated that Entergy will be able to meet this date. The staff appreciates the efforts expended by your staff with respect to this matter.

Sincerely,

/RA/

M. Christopher Nolan, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-313 and 368

Enclosure: As stated

cc w/encl: See next page

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M. Christopher Nolan, Project Manager, Section 1
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ARKANSAS NUCLEAR UNIT 1 & 2 (ANO-1/2) IPEEE
Supplemental Request for Additional Information

Fire

The Entergy Operations, Inc. responses to original RAIs #2, #3, #4, #6, #9 and #11 were not sufficient to allow the staff to conclude their fire review for ANO-1/2. The points raised in the supplemental RAIs below (S1, S2, and S3) are to be considered in aggregate in formulating a response. For example, if the response to Supplemental Question S1 results in a change in a target damage temperature, that change is to be included in any reanalysis performed in response to Supplemental Question S2. The response to these supplemental questions need address only those areas identified in Step 2 of Phase 2 of the EPRI FIVE approach (i.e., the fire zones and compartments surviving through the quantitative screening for the cases assuming that all equipment is damaged).

Supplemental RAI #1 (S1). A necessary step of the fire analysis addresses the vulnerability of safety-related equipment to fire and thermal damage. The response to original RAI #6 cites only the IEEE-383 cable qualification standard as a basis for the assumed thermal damage temperature of 700^{o} F. Neither the submittal nor the RAI response states that IEEE-383 qualified cables comprise the complete set of targets of concern for ANO-1/2. The age of the plant alone makes this unlikely. Also, other safety-related equipment, for example relays and electronics, may be damaged at temperatures considerably less than 700^{o} F. The FIVE guidance recommends a thermal damage temperature of 425^{o} F for unqualified cables (see discussion of Box 1 in FIVE, P. 10.4-11, and Table 1E).

> ***a) Please provide a list by fire zone of the targets (equipment and cables) assumed susceptible to thermal damage in the ANO study. Distinguish between unqualified cable and cable qualified per the IEEE-383 Standard. Include the damage temperature assumed and the basis for this assumption for each target.***
>
> ***b) For those scenarios with target damage occurring at temperatures less than the originally assumed 700^{o}F, please provide a re-analysis of the core damage frequency (CDF) contribution from that zone. Include in any re-analysis the recommended adjustments in the cabinet heat release rate and heat loss factor discussed below.***

S2. The original RAIs #3 and #4 addressed assumptions made in the ANO fire study. These assumptions specifically address areas related to control cabinet heat release rates and the heat loss factor. Also, original RAI #9 was related to the assumed fire duration of 10 minutes. In combination with the assumptions of small fires (small heat release rates) , high heat loss factors, and/or a limited extent of fire propagation, this assumption can lead to optimistic results. New EPRI guidance is available which may be helpful in formulating a response to this supplemental RAI.

Enclosure

a) Please re-evaluate those scenarios affected by new EPRI guidance regarding heat release rates for fires involving electrical cabinets. In particular, for those scenarios where the heat release rate of 65 Btu/s was assumed, provide a description of the cabinets' contents, comparing them to the EPRI guidance for this assumed value.

b) If cases are identified where the 65 Btu/s heat release rate can not be justified, please re-evaluate the CDF contributions resulting from scenarios using the higher heat release rate of 190 Btu/s. For these cases, include the effects of the hot gas layers, and plumes resulting, and use the assumed heat loss factor consistent with the new EPRI guidance.

c) Please identify those fires in which (1) the total heat release, or (2) the extent of propagation and damage, were assumed to be limited by the assumed 10 minute fire duration. For those cases, provide an estimate of the change in the fire CDF if the fire duration is extended to 30 minutes.

S3. The response to original RAI #2 describes a plant shutdown accomplished from numerous remote locations in the plant outside the main control room. The response describes removing power from critical shutdown equipment to avoid damage and inadvertent operation from spurious signals. Also, the response notes that protection of shutdown circuits is provided by "signal conditioning circuitry," but does not describe the circuit protection. No human reliability analysis (HRA) supporting this procedure is described in either the submittal or the RAI response.

a) Please provide a description and location of the signal conditioning circuitry that would be used to isolate control room circuits in the event of a fire-induced control room abandonment.

b) For each unit, please identify the contribution to the control room fire CDF from ex-control room shutdown scenarios.

c) Please describe the HRA supporting the ex-control room shutdown CDF estimate. For each unit, provide the conditional core damage probability for the ex-control room shutdown, with and without human errors included.

S4. The response to original RAI #11 states that it was assumed that manual suppression could be accomplished with the same reliability as an automatic suppression system. This is not consistent with the EPRI guidance in FIVE that suggests the use of a reliability range for manual suppression of 0.1 to 1.0.

Please either provide additional justification for the manual suppression reliabilities for which credit was taken in your analysis, or evaluate the change in CDF contribution if the reliability for manual suppression is assumed to be a value consistent with the EPRI FIVE methodology.

Arkansas Nuclear One

cc:

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