Entergy

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 501 858 5000

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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Response to Request for Additional Information Regarding Radiological Dose Assessment Related to the ANO-2 Power Uprate License Application

Gentlemen:

Entergy Operations, Inc. submitted a license application on December 19, 2000 (2CAN120001), for Arkansas Nuclear One, Unit 2 (ANO-2) to increase the authorized power level by 7.5%. On July 6, 2001, the NRC requested additional information related to radiological dose assessment. Attachment 1 to this letter contains the responses to the staff's questions. Attachment 2 lists one regulatory commitment contained in this submittal.

In addition to providing a response to NRC question 2, additional information is provided regarding the subject of control room habitability as discussed during the telephone conference with members of the NRC staff on June 22, 2001. Consistent with that discussion, Entergy commits to conduct a tracer gas test in the fall of 2001 to establish a single value for unfiltered control room inleakage.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

Dale E. James
Acting Director, Nuclear Safety Assurance

DEJ/dwb
Attachments

A001

cc: Mr. Ellis W. Merschoff
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Mr. William Reckley
NRR Project Manager Region IV/ANO-1
U. S. Nuclear Regulatory Commission
NRR Mail Stop O-7 D1
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. Thomas W. Alexion
NRR Project Manager Region IV/ANO-2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 04-D-03
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Attachment 1

Responses to NRC Questions Regarding Radiological Dose Assessment Related to the ANO-2 Power Uprate License Application

NRC Question 1

Please provide the calculations for the four events with dose increases (loss-of coolant accident, steam generator tube rupture, control-element-assembly ejection, and fuel handling accident).

ANO Response

The requested calculations were submitted to the NRC in a letter dated July 3, 2001 (2CAN070103). Attachment 4 of the letter, "ANO-2 Radiological Dose Analysis for RSG and Power Uprate," contained proprietary information. A non-proprietary version was provided in a letter dated August 13, 2001 (2CAN080103).

NRC Question 2

For those events with postulated dose increases in the replacement steam generator amendment request, the assumed control room envelope inleakage was 5000 cubic feet per minute (cfm). For those events (which are different events from those in the preceding sentence) with postulated dose increases for the power uprate amendment request, the assumed inleakage was 10 cfm. What is the basis for assuming different inleakage values for the same control room? If the value is to remain at 10 cfm for certain events, what is the basis for assuming that the Arkansas Nuclear One, Unit 2, control room envelope has such an integrity when, of the 25% of the plants that have tested their envelopes for integrity, none have demonstrated a value of 10 cfm and most have had values ranging from several hundred to several thousand cfm?

ANO Response

The original design basis analysis for ANO-2 was established assuming 10 cfm unfiltered inleakage into the control room. This original design basis assumption has been used acceptably in submittals to the NRC as late as December 23, 1998 (Amendment 194) for the limiting control room habitability analysis, the maximum hypothetical analysis (MHA). As part of the replacement steam generator project (Amendment 222 dated October 2, 2000), the NRC questioned the use of 10 cfm for control room radiological doses. This question was based on industry experience indicating the potential for inleakage values greater than the 10 cfm assumption. Although the limiting control room dose analysis was not affected by the replacement steam generator project, other events, such as the Main Steam Line Break (MSLB) analyses, were affected. These other affected events, although not limiting, did result in an increase in consequences. In

response to the NRC questions, ANO provided confirmatory analyses for the events affected by the replacement steam generator project. These confirmatory analyses used inleakage values of 5000 cfm and demonstrated acceptable control room doses.

The MHA control room dose has been updated to account for power uprated conditions. In performing this analysis, a case was run with the original design basis inleakage assumption of 10 cfm. The results of this analysis are presented in the ANO-2 power uprate submittal dated December 19, 2000 (2CAN120001). In addition to this case, a limiting analysis was performed for the ANO-2 MHA in which the maximum allowable inleakage value was back-calculated and still ensures General Design Criterion (GDC) 19, "Control Room," limits are maintained. This limiting case determined the maximum allowable unfiltered leakage into the control room is 61 cfm. The MHA calculation transmitted to the NRC in ANO letter dated July 3, 2001 (2CAN070103), contains this case.

ANO has taken significant actions to improve and verify the integrity of the ANO-1 and ANO-2 control rooms. The ANO-1 and ANO-2 control rooms are located adjacent to each other within a common control room envelope. Therefore, although the power uprate license amendment request concerns ANO-2 only, consideration regarding the issue of control room habitability must be given for its impact on ANO-1. Previously, consistent with the licensing basis, ANO has utilized pressurization testing to confirm the adequacy of the control room envelope. The following information summarizes the improvements Entergy has made to ensure the integrity of the control room envelope.

Actions to Improve the Integrity of the Control Room Envelope

In the 1999/2000 timeframe, ANO personnel identified and repaired several inadequacies in the sealing of electrical cable bundles, and fire barrier seals. ANO personnel also identified and corrected a potential problem with excessive pressure in the ANO-2 Cable Spreading Room, a room adjacent to the control room envelope.

In October 2000, during the last ANO-2 refueling outage (2R14), ANO personnel performed a walkdown of 67 ANO-2 floor penetrations. Improvements were made to 18 blockouts to address air sealing deficiencies. The remaining 49 blockouts were determined to require no air sealing improvements as a result of the walkdowns.

In January 2001, TRANSCO Products Inc. provided a preliminary walkdown of the accessible areas of the ANO-1 and ANO-2 control room envelope. TRANSCO specializes in the identification and repair of vulnerabilities to help plants meet their goals for reducing unfiltered control room inleakage and/or for attaining envelope pressure. They have performed such work for eight other commercial nuclear power plants. The purpose of this walkdown was to identify potential vulnerabilities that contribute to unfiltered inleakage and possibly impact the envelope's ability to meet desired pressure differential goals. This walkdown identified vulnerabilities that, once corrected, will improve the control room envelope integrity.

In March 2001, during the last ANO-1 refueling outage (1R16), ANO personnel performed a walkdown of the floor penetrations of the control room floor and the computer room floor (ceiling to the control room). The walkdown identified a small hole in a penetration into the computer room floor. The penetration was sealed.

In June 2001, loop seals were installed on the two drain lines from the ANO-2 emergency control room air conditioning units.

In May 2001, based on recommendations from earlier evaluations, ANO contracted with TRANSCO to: 1) perform a detailed walkdown including inspection of the accessible control room envelope penetrations, 2) develop a prioritized list of enhancements to improve the integrity of the control room envelope boundary, and 3) oversee craft in the repair of identified vulnerabilities. Some of the more notable enhancements being made as part of this effort include the installation of a boot seal in the construction gap between the ANO-1 and ANO-2 control rooms around the passageway between the rooms, hard casting of ventilation system duct seams, placement of an elastomer covering over foam seals where possible, and rebuilding the ANO-2 Normal Control Room Ventilation Isolation Dampers. This effort is currently in progress and is expected to complete in September 2001.

Actions to Verify the Integrity of the Control Room Envelope Boundary

In order to determine if the actual inleakage into the control room is consistent with the accident analysis, ANO has scheduled a Control Room Envelope Tracer Gas Test for this fall. In March 2001, NCS Corporation/Lagus Applied Technology, Inc. (LAT) performed a walkdown of the ANO control room envelope for the purpose of determining the feasibility and logistical requirements for undertaking control room leakage testing. Results from this walkdown also identified vulnerabilities that were later addressed in the improvements being led by TRANSCO. LAT has conducted tracer gas measurement testing programs at eighteen different nuclear power plants.

ANO has also contracted with LAT to perform control room envelope pressure sweeps and conduct a control room envelope tracer gas test. Pressure sweeps are used to determine the differential pressure between the control room and outside surfaces of the control room boundary. Pressure sweep and tracer gas testing are scheduled for this fall.

Plans for Resolving Issues Associated with Control Room Habitability

During a telephone conference on June 22, 2001, the NRC staff outlined a six-step success path for the resolution of control room habitability issues. Those steps were:

1. Establish a single value for unfiltered inleakage with a basis (tracer gas testing preferred),

2. Perform applicable analyses using the established value,

3. Demonstrate compliance with GDC-19,

4. Establish compensatory measures if GDC-19 is not met,

5. Develop a comprehensive corrective action plan to restore compliance with GDC-19, and

6. Submit an action plan and schedule for NRC inclusion in the Power Uprate Safety Evaluation Report (SER). A license condition was discussed as an option that would allow the NRC to issue the power uprate SER prior to completion of all actions regarding control room envelope integrity.

Regarding items 1 and 2, a tracer gas test will be conducted this fall as previously discussed and applicable analyses will be performed using the established value. In accordance with items 3 and 4, Entergy will identify the margin to GDC-19 limits and implement compensatory measures if GDC-19 is not met. Should the results of the control room pressure sweeps and tracer gas testing show that our design basis inleakage of 10 cfm cannot be met, several contingency actions have been identified to ensure interim acceptability and to restore compliance with GDC 19. To limit the uptake of radioiodine by the control room operators during a postulated accident, Entergy will consider as a minimum:

1. administratively limiting the ANO-1 allowed containment leakage,
2. crediting the use of potassium iodide, and
3. crediting the use of self contained breathing apparatus (SCBAs).

Following the tracer gas test, if GDC-19 is not met, a comprehensive corrective action plan will be developed to restore compliance with GDC-19. Entergy will consider the following actions, as a minimum, to satisfy item 5. Entergy will: 1) seek to incorporate Alternate Source Term Methodology into the design and licensing basis, 2) seek reduction of the technical specification limits for allowed ANO-1 containment leakage, 3) evaluate modifications to depressurize areas adjacent to the control room envelope, and 4) evaluate modifications to relocate the supply duct location for control room emergency air makeup.

In regard to item 6, as discussed during the telephone conference call between Entergy and the NRC on June 22, 2001, Entergy will agree to consider a license condition to ensure the control room habitability issue is satisfactorily resolved. Entergy will work with the staff to determine appropriate long-term actions and to develop appropriate wording for a license condition should one be necessary.

Entergy will remain engaged in the industry-wide effort to address the generic issue of control room habitability. Entergy believes that based on the actions outlined in this letter adequate radiation protection will be provided to operators to limit operator doses in accordance with GDC-19.

Attachment 2

Licensee Identified Commitments for 0CAN080108

COMMITMENT	TYPE	
	One-Time Action	Continuing Compliance
Perform tracer gas testing on the control room envelope which is scheduled for the fall 2001.	✓	