Entergy

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2CAN010201

January 14, 2002

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT:

Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6
Submittal of Tracer Gas Test Results and Action Plan for ANO-2 Control Room Habitability for Power Uprate

REFERENCES:

1. Entergy Letter to NRC dated December 19, 2000, "Application for License Amendment to Increase Authorized Power Level" (2CAN120001)
2. Entergy Letter to NRC dated August 21, 2001, "Response to Request for Additional Information Regarding Radiological Dose Assessment Related to the ANO-2 Power Uprate License Application (0CAN080108)
3. NEI 99-03, "Control Room Habitability Assessment Guidance", dated June 2001
4. Entergy Letter to NRC dated July 3, 2001, "Radiological Dose Consequence Calculations to Support ANO-2 Power Uprate" (2CAN070103)

Dear Sir or Madam:

Entergy Operations, Inc. submitted a license application on December 19, 2000 (Ref. 1), for Arkansas Nuclear One, Unit 2 (ANO-2) to increase the authorized power level by 7.5%. On August 21, 2001 (Ref. 2), Entergy responded to a request for additional information (RAI) regarding radiological dose assessment. In addition to providing a response to the NRC RAI, additional information was provided regarding confirmation of control room habitability for the ANO-2 proposed power uprate. In the August 21, 2001 letter, Entergy committed to conduct a control room envelope tracer gas test in the fall of 2001 for determining the amount of inleakage that would be estimated post accident.

As a result, Entergy conducted a tracer gas test in early November 2001 with the support of NCS Corporation and Lagus Applied Technology, Inc. The results of these tests are discussed in Attachment 1 of this letter.

During a telephone conference on June 22, 2001, the NRC staff outlined a six-step plan for the resolution of control room habitability issues. These steps were documented in our letter of August 21, 2001 (Ref. 2). In response to this six-step plan, the proposed actions to resolve the outstanding conditions from our tracer gas test are also provided in Attachment 1.

The current design and licensing bases for inleakage into the control room is 10 scfm. Entergy proposes to increase the allowable inleakage to 61 scfm. This action will still maintain the calculated operator thyroid doses less than 30 rem, consistent with the General Design Criterion (GDC) 19 limits. However, this will result in a dose increase greater than 10% of the remaining margin to the GDC 19 limits. Since the case with the control room dose analysis was provided to the NRC staff in Reference 4, Entergy requests that the original ANO-2 Power Uprate license amendment request (Ref. 1) include the acceptance of 61 scfm inleakage as the new design bases for ANO-2. The original no significant hazards consideration for the ANO-2 Power Uprate license amendment request is not impacted by this additional change for the control room design bases inleakage limit change.

These actions are considered sufficient to bring ANO-2 into compliance with GDC 19 limits with no further credit for compensatory actions. Entergy is providing these actions to the NRC as commitments (Attachment 2), which will be tracked to resolution through our corrective action program and commitment management system. Therefore, Entergy believes that these commitments will satisfy the actions necessary for the NRC to issue the Safety Evaluation Report for the ANO-2 Power Uprate license amendment request as it relates to control room habitability. A follow-up letter will be provided to the NRC confirming the completion of these actions.

If you have any questions or require additional information, please contact Steve Bennett at 501-858-4626.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 14, 2002.

Sincerely,

Glenn R. Ashley
Manager, ANO Licensing

GRA/sab

Attachments:
1. Action Plan for ANO-2 Control Room Habitability for Power Uprate
2. List of Regulatory Commitments

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Action Plan for ANO-2 Control Room Habitability for Power Uprate

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

Tracer gas air inleakage tests (TGT) were performed on the ANO Control Room (CR) in the first week of November 2001 by a team of test engineers from Entergy, NCS Corporation (NCS) and Lagus Applied Technology, Inc. (LAT). An initial setup and four consecutive tracer gas air inleakage tests were performed. Air inleakage into the control room envelope was measured with the control room emergency ventilation systems operating in various pressurization modes. The tests conducted were with the following ventilation system configurations in operation.

Test 1 2VSF-9 (ANO-2 CR Emergency Ventilation Recirculation and Makeup) Only Running

Test 2 VSF-9 (ANO-1 CR Emergency Ventilation Recirculation and Makeup) Only Running

Test 3 VSF-9 & both 2VEF-56s (ANO-2 Switchgear Room Exhaust Fans) Running

Test 4 VSF-9 Only Running (w/ temporary sealing of VSF-9 doors, hatches, windows and threaded penetrations)

Concentration buildup/steady state tests were undertaken to infer inleakage rates into the control room envelope with VSF-9 or 2VSF-9 operating. In a concentration buildup/steady state test, tracer gas was continuously injected into the makeup air stream of the control room emergency ventilation system at a constant rate and was dispersed throughout the control room envelope. After concentration equilibrium occurred, measurement of the tracer concentration in the return duct of the control room emergency ventilation systems allowed determination of the total inleakage into the envelope. During each tracer gas air inleakage test, differential pressure between the control room and various surrounding rooms was measured with two digital barometers. Differential pressures were then calculated between various locations by comparing the drift corrected values of the two digital barometers.

The raw results of the test are indicated in the "Results" column below. Based on these test results, adjustments were made to account for ingress and egress and for filtered leakage paths. The resulting unfiltered inleakage rates are reflected in the "Adjusted Results" column. The normal non-safety CR supply fans that also supply the Control Element Drive Mechanism Instrumentation Room (2VSF-8) and the CR recirculation fans (2VEF-43) were not tested. These fans are verified to be shutdown on a control room supply vent high radiation signal.

Test	TGT Test Lineup	Results [1]	Adjusted Results[2]	Notes
1	2VSF-9 Only Running	27 scfm	10 scfm	3
2	VSF-9 Only Running	75 scfm	85 scfm	4
3	VSF-9 & both 2VEF-56s Running	124 scfm	134 scfm	4, 5
4	Test 2 Configuration (temporary sealing)	30 scfm	40 scfm	

Notes:

1. Results are from nominal recorded flow rates, excluding uncertainties from the tracer gas test. These values do not include inleakage assumptions for ingress and egress.
2. The adjusted results represent the nominal values of the unfiltered inleakage and include a 10 scfm addition for ingress and egress.
3. Inleakage was from fan shaft leakage in 2VSF-9. This represents filtered inleakage since the charcoal filter is on the discharge of the fans.
4. Approximately 45 scfm was through the middle door and associated seals on the VSF-9 housing per Test 4.
5. Approximately 49 scfm was determined to be coming through the north wall of the control room where the 2VEF-56 fans discharge into the neighboring room. [The 2VEF-56 fans only actuate to provide cooling when aligned to the Emergency Cooling Pond and the pond reaches 120°F (about 4.5 hours into worst case event].

Task 2: Perform applicable analyses using the established value

The original design basis analysis for ANO-2 was established assuming 10 scfm unfiltered inleakage into the control room. The 10 scfm assumed that the control room is sufficiently pressurized following the event such that there is no inleakage except from ingress and egress through the control room. The MHA control room dose has been updated to account for the 7.5% power uprated conditions. In performing this analysis, a case was run with the original design basis inleakage assumption of 10 scfm. The results of this analysis are presented in the ANO-2 power uprate submittal dated December 19, 2000 (Ref. 1). The control room operator thyroid dose under MHA conditions with an assumed 10 scfm inleakage results in 6.3 rem.

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 to the limits of General Design Criterion (GDC) 19. This GDC 19 limiting case allows a maximum unfiltered leakage into the control room of 61 scfm. This case results in a control room operator thyroid dose of just less than 30 rem. The MHA calculation transmitted to the NRC in ANO letter dated July 3, 2001 (Ref. 4) contains a discussion of this analysis.

Task 3: Demonstrate compliance with GDC-19

10CFR50, Appendix A, GDC 19 requires, in part, that:

> "A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident.

Section 6.4 of the Standard Review Plans (NUREG-0800) establishes a dose guideline of 30 rem to the thyroid as an equivalent dose to the 5 rem whole body. For ANO-2 operator thyroid doses to remain below 30 rem, control room inleakage must remain below 61 scfm (including a 10 scfm inleakage for ingress and egress). The thyroid dose is the limiting MHA dose to the control room operators for establishing control room inleakage. The GDC 19 whole body dose for the MHA is still within the 5 rem limit.

The results of the tracer gas test as described under Task 1 above, results in a maximum unfiltered inleakage of 134 scfm including ingress and egress. Therefore, based on the current results, ANO-2 is unable to remain within the GDC 19 limits for operator dose to the thyroid.

Task 4: Establish compensatory measures if GDC-19 is not met

Condition Report ANO-C-2001-0607 was written on November 1, 2001 to document that inleakage values being reported from the tracer gas test exceeded the GDC 19 allowable dose equivalent inleakage values for ANO. As a result, the compensatory action for issuing potassium iodide (KI) to the control room operators was credited in the condition report's operability evaluation. Entergy calculations demonstrate that GDC-19 limits would be met for unfiltered in-leakage $\leq$ 900 scfm for the most limiting ANO-2 design basis loss of coolant accident fission product release while using KI.

The provision of KI thyroid blocking tablets has been employed at several nuclear power plants as an interim compensatory measure. The NRC has acknowledged the use of KI as an interim compensatory measure having a protection factor of 10 (SER for Amendment No. 183 for the NPPD Cooper Nuclear Station, dated April 7, 2000). The protection factor of 10 is also consistent with the industry guidance found in NEI 99-03 (Ref 3), Appendix F, "Compensatory Measures Allowable on an Interim Bases".

The guidance of NEI 99-03 Appendix F states that plant procedures should be in place to direct administration of KI to control room personnel. ANO Emergency Planning procedure 1903.035, "Administration of Potassium Iodide" allows the Shift Manager to administer KI as determined necessary to protect the operators from iodine intake in excess of GDC 19 limits. In addition, Emergency Planning procedure 1903.060, "Emergency Supplies and Equipment" ensures that adequate supplies of KI are available in the control room area.

Therefore, the provisions for administration of KI to the control room operators will ensure interim compliance with the provisions of GDC 19 until design bases resolution is reached.

Task 5: Develop a comprehensive corrective action plan to restore compliance with GDC-19

The ANO-1 and ANO-2 control rooms are located adjacent to each other within a common control room envelope. As discussed in our August 21, 2001 letter (Ref. 2), ANO has taken actions to improve the integrity of the ANO control room boundary. However, as a result of the tracer gas test, it was recognized that additional areas of the control room boundary require further enhancement to reduce inleakage.

As noted in Task 1 above, approximately 45 scfm inleakage was through the VSF-9 ventilation system access door and housing as determined from the difference between Tests #2 and #4 where temporary seals were installed in the latter test. Entergy is scheduled to perform the needed maintenance/repair of the VSF-9 ventilation system by February 28, 2002. A confirmatory test of the VSF-9 housing will be performed to validate the corrected condition.

Following the tracer gas test in 2001, Entergy also performed additional testing of the 2VEF-56 fans discharge to better determine the impact on the control room envelope. These fans take suction on the switchgear rooms and discharge into the controlled access 2 (CA-2) room which pressurizes the area north of the ANO-2 control. There are no suction sources to the 2VEF-56 fans that interface with or pass through the control room envelope which would cause the tracer gas test results to be impacted. Additional pressure sweeps were conducted with the 2VEF-56 fans running for cases with and without the door(s) open to the turbine building. As shown in Test Case #D below, with the double doors leading out of CA-2 open, the pressure dropped below the control room pressure. Based on these pressure sweeps, it is reasonable to conclude that with these doors open, there will be no inleakage through the control room north wall.

Case A: CR on Recirc with VSF-9 running

Case B: CR on Recirc with VSF-9 running, 2VEF-56A/B running

Case C: CR on Recirc with VSF-9 running, 2VEF-56A/B running, one CA-2 door open

Case D: CR on Recirc with VSF-9 running, 2VEF-56A/B running, two CA-2 doors open

Results of Pressure Sweep Tests:

Test Case	Measured CR Pressure	Measured CA-2 Pressure	Corrected CA-2 Pressure	CR vs. CA-2 dP
A	402.860	402.739	402.695	0.165
B	402.890	403.422	403.371	-0.481
C	402.820	402.892	402.839	-0.019
D	**402.800**	**402.787**	**402.732**	**0.068**

[All pressures measurements are in inches of water]

Administrative controls will be established to have an operator open the double doors leading out to the turbine building prior to having a condition where the 2VEF-56 fans are to actuate with a concurrent radiological release. Entergy is scheduled to have these administrative controls in place by February 28, 2002.

The current design and licensing bases for inleakage into the control room is 10 scfm. Entergy proposes to increase the allowable inleakage to 61 scfm. This action will still maintain the calculated operator thyroid doses less than 30 rem, consistent with the GDC 19 limits. However, this will result in a dose increase greater than 10% of the remaining margin to the GDC 19 limits. Since the case with the control room dose analysis was provided to the NRC staff in Reference 4, Entergy requests that the original ANO-2 Power Uprate license amendment request (Ref. 1) include the acceptance of 61 scfm inleakage as the new design basis for ANO-2. The ANO-2 Safety Analysis Report will be updated to reflect the new design basis inleakage upon NRC approval.

Entergy intends to maintain the control room boundary for continued compliance with GDC 19 limits. Performance criteria under the Maintenance Rule (10CFR50.65) have been established for the control room boundary and emergency ventilation systems. The Maintenance Rule (MR) System Performance Criteria for control room ventilation include the following functions:

- Less than 3 functional failures per rolling 18 months to provide control room pressurization (VSF-9 and 2VSF-9)
- Less than 3 functional failures per rolling 18 months to provide control room isolation (isolation dampers)

ANO currently considers these functions to include control room boundary integrity. For example, a condition report was written against an undocumented breach of the Control Room boundary (a cable penetration that had not been repaired after cables where removed) and a MR functional failure was documented against that condition. The MR Performance Criteria will be further reviewed and likely modified to consider the ANO TGT results, forthcoming industry practices/guidelines and our boundary integrity program.

The current limiting tracer gas test case resulted in a maximum inleakage of 134 scfm as discussed in Task 1 above. However, as shown below, all tests can be effectively reduced to approximately 40 scfm inleakage or less. The above described actions will allow the resulting control room doses to be within the maximum design basis value of 61 scfm for ANO-2.

Test	TGT Test Lineup	Adjusted Results	Results with Inleakage Enhancements	Notes
1	2VSF-9 Only Running	10 scfm	10 scfm	
2	VSF-9 Only Running	85 scfm	~ 40 scfm	1
3	VSF-9 & both 2VEF-56s Running	134 scfm	~ 40 scfm	1, 2
4	Test 2 Configuration (temporary sealing)	40 scfm	40 scfm	

Notes:

1. With the confirmed sealing of the VSF-9 door/housing, this test should result in a 45 scfm reduction as was performed in Test 4
2. With the removal of the CA-2 pressure on the north control room wall, approximately 49 scfm of additional inleakage reduction is expected

Task 6: Submit an action plan and schedule for NRC inclusion in the Power Uprate Safety Evaluation Report (SER)

The above actions are considered sufficient to bring ANO-2 into compliance with GDC 19 limits with no further credit for compensatory actions. Entergy is providing these actions to the NRC as commitments (Attachment 2) and will be tracked for resolution through our Entergy corrective action program.

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Further actions are being taken to repair seals on the doors and housing of VSF-9, which will remove the 45 scfm source of inleakage. This will include a confirmatory test of the VSF-9 housing to confirm the latter corrected condition.	X		2/28/02
Administrative controls will be established to have an operator open the double doors leading out to the turbine building prior to having a condition where the 2VEF-56 fans are to actuate under a radiological event.		X	2/28/02
A follow-up letter will be provided to the NRC confirming the completion of these actions.	X		After completion of above actions