



July 24, 1992

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Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 & 50-368
License Nos. DPR-51 & NPS-6
Followup Actions on Regulatory Guide 1.97

Gentlemen:

This letter is being provided to address three separate initiatives that impact the Arkansas Nuclear One, Units 1 and 2 (ANO-1/-2) Regulatory Guide 1.97 position statements as contained in our responses to Generic Letter 82-33.

Attachment 1 provides the results of a further review performed by ANO on the remaining design and qualification criteria contained in Table 1 of Regulatory Guide 1.97, Revision 3, but not previously addressed in our response to Generic Letter 82-33 (NUREG-0737, Supplement 1). This action resulted from NRC Inspection Report 40-11 dated May 14, 1990 (OCNA059014) which identified a deviation to Regulatory Guide 1.97 regarding failure to properly label certain post accident monitoring instrumentation on ANO. As a supplemental action in our response to the inspection report dated June 13, 1990, Entergy Operations committed to provide the results of an evaluation on ANO's approach for compliance to Generic Letter 82-33. The result of our evaluation, which provided the basis for ANO's position on Generic Letter 82-33 for Reg. Guide 1.97, was contained in Entergy Operations' letter dated August 16, 1991 (OCAN089107). However, based on subsequent discussions with the NRC Staff, Entergy Operations agreed to evaluate the remainder of Table 1 to Reg. Guide 1.97, Revision 3, for ANO compliance. The results of our review concludes that based on the clarification provided in Attachment 1, ANO-1 and ANO-2 meet the additional design and qualification guidance of RG 1.97, Table 1. However, as also discussed in Attachment 1, Entergy Operations will be providing additional ANO-1 and ANO-2 testing and calibration for certain Reg. Guide 1.97 instruments.

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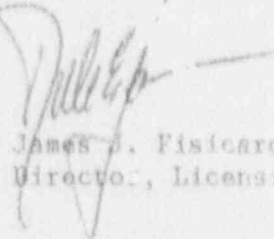
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Attachment 2 provides the ANO clarification and justification for the power supply requirements on the temperature to saturation instruments for compliance to the Reg. Guide 1.97 "degrees of subcooling" variable. During the ANO-2 Electrical Distribution System Functional Inspection conducted from September 10 through October 18, 1991, the inspectors noted that certain inverters were shed at approximately 2 hours into the duty cycle of the batteries which may effect Reg. Guide 1.97 instrumentation, such as the saturation temperature monitors. This concern was addressed as an unresolved item in ANO Inspection Report 1-02, dated November 2, 1991 (OCNA119111).

Attachment 3 provides the proposed ANO actions with regards to relaxing the qualification requirements for the pressurized water reactor accumulator levels and pressures. This action is a result of further NRR Staff evaluation of the Reg. Guide 1.97 accumulator instrumentation safety functions which concluded that accumulator level and pressure can be relaxed from Category 2 to Category 3. The NRC's safety evaluation on this position was provided to Entergy Operations in NRC letter dated April 28, 1992 (OCNA049224).

Please contact me if you require any additional information on this matter.

Very truly yours,



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JJF/SAB/sjf
Attachments

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ATTACHMENT 1

ANO COMPLIANCE TO REG. GUIDE 1.97 TABLE 1
DESIGN AND QUALIFICATION CRITERIA
NOT COVERED BY NUREG-0737, SUPPLEMENT 1

Category 1

Reg. Guide 1.97 Criteria

4. Channel Availability

The instrumentation channel should be available prior to an accident except as provided in paragraph 4.11, "Exception," as defined in IEEE Std 279-197, "Criteria for Protection Systems for Nuclear Power Generating Stations,"² or as specified in the technical specifications.

ANO Compliance

The only out-of-service interval applied to the ANO Category 1 Reg. Guide 1.97 variables are those specifically dictated by the ANO Technical Specifications. Unless specified by the ANO Technical Specifications, Reg. Guide 1.97 instrumentation will normally be returned to service by the following refueling outage or at shorter intervals given instrumentation availability and accessibility. Based on the above, ANO is believed to meet the intent of Reg. Guide 1.97.

Category 2

4. Channel Availability

The out-of-service interval should be based on normal technical specification requirements on out-of-service for the system it serves where applicable or where specified by other requirements.

See Category 1 compliance.

N/A

Category 3

4. Channel Availability

No specific provision

Reg. Guide 1.97 Criteria

8. Equipment Identification

Types A, B, and C instruments designated as Categories 1 and 2 should be specifically identified with a common designation on the control panels so that the operator can easily discern that they are intended for use under accident conditions.

ANO Compliance

Category 1 and 2 analog indicators are labeled appropriately to identify them as post accident instruments. The Category 1 and 2 instruments which are not analog type indication (i.e. CRT displays or open/close indicators) are not labeled due to the nature of their control room display.

Reg. Guide 1.97 Criteria

9. Interfaces

The transmission of signals for other use should be through isolation devices that are designated as part of the monitoring instrumentation and that meet the provisions of this document.

8. Equipment Identification

Same as Category 1

Same as Category 1

N/A

9. Interfaces

Same as Category 1

9. Interfaces

No specific provision

ANQ Compliance

Generally, IEEE 279-1971 is the guiding standard for electrical isolation which has been applied to the Reg. Guide 1.97 instrument loops. Where an enclosure loop is Class 1E including the indication device, no isolation is necessary. In cases where Class 1E loops are interfaced to non-Class 1E devices (indicators, recorders, SPDS computers, etc.), appropriate isolation is provided. The 1E to non-1E interfaces, such as the non-Q SPDS, was specifically reviewed against the isolation criteria of NUREG-1342 and found to be acceptable. (This review resulted in two NRC SE's: one dated July 31, 1989 and Supplement 1 dated August 17, 1990). (Note 1)

See Category 1

N/A

Category 1

Reg. Guide 1.97 Criteria

10. Servicing, Testing, and Calibration

(a) Servicing, testing, and calibration programs should be specified to maintain the capability of the monitoring instrumentation. If the required interval between testing is less than the normal time interval between plant shutdowns, a capability for testing during power operation should be provided.

(b) Whenever means for removing channels from service are included in the design, the design should facilitate administrative control of the access to such removal means.

(c) The design should facilitate administrative control of the access to all setpoint adjustments, module calibration adjustments, and test points.

(d) Periodic checking, testing, calibration, and calibration verification should be in accordance with the applicable portions of Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems," pertaining to testing of instrument channels. (Note: Response time testing not usually needed.)

Category 2

10. Servicing, Testing, and Calibration

Same as Category 1

Same as Category 1

Same as Category 1

Same as Category 1

Category 3

10. Servicing, Testing, and Calibration

Same as Category 1

Same as Category 1

Same as Category 1

Same as Category 1

Category 1

Reg. Guide 1.97 Criteria

10. Servicing, Testing, and Calibration

(e) The location of the isolation device should be such that it would be accessible for maintenance during accident conditions.

ANO Compliance

The design considerations for (a) service, testing, and calibration, (b) removing channels from service, and (c) setpoint access control follow the guidance of IEEE-279 for protective systems. Where applicable, these design considerations are also utilized for other ANO safety related circuits for proper testing. (Note 1)

(d) Regarding specific service, testing, and calibration of Reg. Guide 1.97 instruments, a review of the Reg. Guide 1.97 variable list was performed for channel checks, functional tests and calibration testing. Most Reg. Guide 1.97 instruments undergo a periodic channel check (generally 1/shift or 1/week) and either a functional test or calibration test (generally each refueling outage or shorter interval as directed by component function or Tech. Specs.)

Category 2

10. Servicing, Testing, and Calibration

Same as Category 1

See Category 1

See Category 1

Category 3

10. Servicing, Testing, and Calibration

Same as Category 1

Since Category 3 variables are not safety-related, IEEE-279 was not specifically applied to these instruments. However, as is other control room instrumentation, the instruments are typically designed to allow service, testing, and calibration capability. (Note 1)

See Category 1

AND Compliance

10. Servicing, Testing, and Calibration

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10. Servicing, Testing, and Calibration

Procedural actions will be provided for channel checks and functional tests or calibration tests where practical on the remainder of the Reg. Guide 1.97 variables.

(e) Isolation devices are typically located in mild environments and are designed to be accessible during an accident. (Note 1)

See Category 1

N/A

Reg. Guide 1.97 Criteria

11. Human Factors

11. Human Factors

11. Human Factors

The instrumentation should be designed to facilitate the recognition, location, replacement, repair, or adjustment of malfunctioning components or modules.

Same as Category 1

Same as Category 1

The monitoring instrumentation design should minimize the development of conditions that would cause meters, annunciators, recorders, alarms, etc., to give anomalous indications potentially confusing to the operator. Human factors analysis should be used in determining type and location of displays.

Same as Category 1

Same as Category 1

Category 1

Reg. Guide 1.97 Criteria

11. Human Factors

To the extent possible, the same instruments should be used for accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations, instruments with which they are most familiar.

ANO Compliance

The ANO Control Room Design Review (CRDR) program included evaluation of the control room workspace, instrumentation, controls, and other equipment from the human factors engineering perspective using the guidance of NUREG-0700. The CRDR was in itself part of a coordinated program which addressed each of the NUREG-0737, Supplement 1 initiatives. A human factors review program was developed at ANO for post-CRDR modifications to the control room. This program uses NUREG-0700 as its basis for reviews. (Note 1)

See Category 1

See Category 1

Category 2

11. Human Factors

Same as Category 1

Category 3

11. Human Factors

Same as Category 1

Category 1	Category 2	Category 3
<p><u>Reg. Guide 1.97 Criteria</u></p> <p>12. Direct Measurement</p> <p>To the extent practicable, monitoring instrumentation inputs should be from sensors that directly measure the desired variables. An indirect measurement should be made only when it can be shown by analysis to provide unambiguous information.</p>	<p>12. Direct Measurement</p> <p>Same as Category 1</p>	<p>12. Direct Measurement</p> <p>Same as Category 1</p>

ANO Compliance

The extent of conformance to the direct measurement design criteria can be best determined by comparison of the recommended units provided in Reg. Guide 1.97 Table 3 to those reported by ANO in our Reg. Guide 1.97 submissions [ref.: ICAN068402 (06/25/84) and 2CAN948404 (04/13/84)]. There is any deviations from measurement of the recommended parameter (i.e., pressure, flow, etc.) would have been identified and justified along with range deviations.

See Category 1

See Category 1

ANO Compliance

A recent review of the range units requirements for 1.97 variables revealed no new discrepancies. This review consisted of (1) a comparison of the Reg. Guide 1.97 required range units against the SAR tables for Reg. Guide 1.97 post accident monitoring variables and of (2) a review of a computerized listing of the Reg. Guide 1.97 instrumentation to verify that detection devices directly measured range units corresponding to displayed units.

ANO is in compliance with Table 1 of Reg. Guide 1.97 with the following exception: Type D Cooling Water System variable for Component Cooling Water Flow to ESF System. ANO measures service water header pressure and monitors service water valve position rather than measuring flow rate. This has been previously reviewed and accepted by the NRC.

Note 1: ANO compliance to the Reg. Guide 1.97 criteria is considered to be met based on design approaches where application has been verified under normal day-to-day reviews or previous design review programs where reviews or sampling were conducted.

ATTACHMENT 2

CLARIFICATION OF ANO-2 POWER SUPPLY FOR REG. GUIDE 1.97 VARIABLE ON "DEGREES OF SUBCOOLING"

ANO Commitment

The "degrees to subcooling" variable is designated as a Category 2 Reg. Guide 1.97 variable. This variable for ANO as indicated in the ANO-2 Reg. Guide 1.97 position report submittal of April 13, 1984, is also designated as Category 2, having 1E power supplies. (1E power for this variable indicates that the instrumentation is powered by a qualified 1E power source and that battery backup is available for momentary interruption.)

Potential Concern

The power to instrumentation provided by inverters 2Y13 and 2Y24 could be potentially shed under a loss of all AC power or station blackout conditions (Note 1). This could preclude the availability of certain Reg. Guide 1.97 indications powered by these inverters due to momentary interruption.

Both channels of Temperature to Saturation (T-Sat) indication which are used for compliance on the Reg. Guide 1.97 variable for "degrees of Subcooling" would be inoperable if 2Y13 and 2Y14 were shed.

Justification for Existing Power Supplies

- 1) The power supply requirements for a Category 2 variable in Reg. Guide 1.97, Rev. 3 state that "instrumentation should be energized from a highly reliable power source, not necessarily standby power, and should be backed by batteries where momentary interruption is not tolerable". Momentary interruption is considered to be the condition during a loss of offsite power coincident with a design basis accident where station power is lost for the short period prior to starting of the 1E diesel generators.
- 2) T-Sat in itself is not a key variable of Reg. Guide 1.97 and does not specifically require that UPS power be available. This is consistent with the design considerations of Reg. Guide 1.97 for a Category 2, Type B variable. T-Sat is a calculated variable which enhances operator actions for determining margin to saturation temperature. The key Reg. Guide 1.97 variables, which are used to calculate T-Sat, are RCS pressure and RCS hot leg temperature. These separate Reg. Guide 1.97 variables are 1E-UPS which are not shed under total loss of static AC power (SBO).

- 3) The ANO-2 T-Sat indication being powered from a 1E bus with battery backup from the 2Y13 and 2Y24 inverters provides additional indication reliability to the operator under Reg. Guide 1.97 accident conditions and this power supply arrangement exceeds the requirement of Supplement 1 for Reg. Guide 1.97.
- 4) The ANO-2 Emergency Operating Procedures (EOPs) do not depend on direct indication of T-Sat. The ANO-2 EOP utilizes a pressure/temperature curve to determine the margin to saturation temperature if the monitor or SPDS is not available. This is determined by use of RCG pressure and RCG hot leg or CET temperature.

AO Conclusion

Based on the guidance of Reg. Guide 1.97 and the ANO-2 Reg. Guide position report, ANO-2 meets or exceeds the power supply needs for this variable without providing UPS power to the T-Sat indication in the control room.

Note 1: The total loss of AC power or station blackout event is not a condition evaluated for Reg. Guide 1.97 and is not taken coincident with a design basis LOCA condition. Under an SBO event, the T-Sat variable is not necessary for a mitigation of an accident and is not required for operator action.

ATTACHMENT 3

ANO-1 AND ANO-2 APPLICATION OF NRC SAFETY EVALUATION ON RELAXATION OF NRC GUIDE 1.97 REQUIREMENTS FOR ACCUMULATOR PRESSURE AND LEVEL INDICATION

I. NRC Safety Evaluation (SE) Conclusions:

The NRC Safety Evaluation dated April 27, 1992 (received by Entergy Operations in NRC letter dated April 2, 1992) relaxed the requirements of Reg. Guide 1.97 for accumulator volume (level) and pressure from Category 2 to Category 3. This conclusion was reached based on the fact that accumulator safety injection does not rely upon any initiation signal or separate external power source to operate and that subsequent isolation of the accumulator by the MOV isolation valve is not a safety function. Performance of core cooling systems can be inferred from other environmentally qualified instrumentation. Therefore, the control room instrumentation for accumulator pressure and level do not perform a safety function and operator actions are not dependent upon this instrumentation.

II. ANO Actions Being Taken Based on NRC SE

The applicable accumulator instrumentation for this variable is the core flood tank pressure and level for ANO-1 and the safety injection tank pressure and level for ANO-2. The instrumentation for the ANO-1 core flood tank and the ANO-2 safety injection tank are designated as Type D variables where tank level is currently maintained as Category 2 and tank pressure is Category 3 (the NRC in the ANO Reg. Guide 1.97 Safety Evaluations dated October 23, 1986 and December 3, 1986 previously approved the tank pressures as Category 3).

ANO has reviewed the ANO-1 and ANO-2 subject accumulator design and operation in light of the NRC SE, and concludes that the ANO tank safety function is consistent with that determined by the NRC. Therefore, ANO intends to downgrade the accumulator tank level instrumentation to Category 3. Entergy Operations will modify the appropriate ANO-1 and ANO-2 Safety Analysis Report sections in the future to reflect the new Reg. Guide 1.97 position.