

MEMO TO: DOCUMENT CONTROL DESK

FROM: TOM ALEXION

50-313/356

SUBJECT: ARKANSAS-1&2 RESPONSE TO NRC QUESTIONS ON TESTING
PROGRAM FOR THE ALTERNATE AC MACHINE (TACS M85956 &
M85957)

Please ensure that this document gets placed in the PDR and in
Central Files. Thank you.

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**ENTERGY**

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TELECOPY REQUEST

SEND BY: September 17, 1993 12:00 noon (DATE/TIME)

TO: Tom Alexion
COMPANY or LOCATION: U. S. Nuclear Regulatory Commission
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VERIFICATION NUMBER: 301-504-1302

FROM: Dennis Boyd
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LOCATION: ARKANSAS NUCLEAR ONE - GENERATION SUPPORT BUILDING - 1C
OUR FAX NUMBER: 501-964-8685
OUR VERIFICATION NUMBER: 501-964-5000
OUR MACHINE TYPE: RICOH FAX 3100L
NUMBER OF PAGES INCLUDING COVER: 5

COMMENTS:

Tom,

Per our discussion, attached are the responses to the three (3) questions regarding the alternate AC generator. Call if you have questions. I plan to be out of the office this afternoon until next Tuesday, September 21.

Dennis

NRC Questions on Testing Program For the Alternate Ac Machine

Question 1

Describe the worst case 30 minute delay from the initiation of a blackout and the energization of a 4160 volt safety bus.

The declaration of a station blackout will typically occur around the 10 minute point depending upon the symptoms being displayed. For example, if neither of the engines started a station blackout would be quickly determined. However, if the engines were running but the electrical buses were not energized, or the voltage was present but low and/or erratic, or the frequency was out of acceptable bounds, simple corrective actions could be attempted or considered which could delay the declaration of a station blackout.

Based upon discussions with the Operations Department member of the project team it is expected to take 15 to 20 minutes to declare a station blackout as a worst case. This worst case plus the 10 minute NUMARC allowance results in a total worst case time of 30 minutes between the occurrence of a station blackout and the completion of the response. These times are estimates for trained operator responses considering human consultation and decision making activities to events of unknown causes and are being provided as a worst case for illustrative purposes.

Typical Sequence of Events:

T=0:00	Unit trips due to loss of offsite power event (LOOP).
T=0:10	Control room operators begin post trip immediate actions.
T=5:00	Control room operators complete required post trip actions
T=6:00	Control room operators diagnose LOOP.
T=7:30	Control room operators begin emergency operating procedure (EOP) required actions consistent with a LOOP.
T=10:00	Control room operators complete EOP required actions and determine that both safety-related 4160 volt buses are de energized for unknown reasons.
T=15:00	
-20:00 Min.	Operators determine that both emergency diesel generators are inoperable and that quick simple corrective actions are not available or have been attempted and failed to restore power.
T=20:00	Control Room declares a Station Blackout.
T=22:30	Initiate starting of the alternate AC generator.
T=23:00	Alternate AC generator running and able to accept load (2A9 Energized)
T=25:00	Control room operators complete system reviews and determine which safety bus will be re energized.
T=25:30	Appropriate breaker on 2A9 is closed.
T=26:00	Appropriate breaker on the selected safety bus is closed.

At this point the operators begin to take necessary actions to stabilize the Unit and carry out normal post trip actions.

Question 2

Define the acceptance criteria that will be used to determine a successful response to the initial testing.

For the initial test to be successful, the following conditions must be met within 10 minutes:

1. Voltage on the selected safety bus greater than 4000 volts (1 per unit motor base).
2. Frequency greater than 59 Hz and less than 61 Hz. (60 Hz $\pm$ 1.667%)

The actual load on the 4160 volt bus will vary depending on what was running prior to the LOOP. Under normal conditions for Unit 1, the associated 480 volt distribution system, a service water pump, and potentially a primary make-up pump will be energized. On Unit 2 the associated 480 volt system and a service water pump will be the only loads present.

Question 3.

Define the required operator actions and automatic actions in response to a declared Station Blackout.

The required operator actions vary slightly for Unit 1 and Unit 2. A brief description is provided below. All manual actions can be taken from the control room. Attached is a simplified single line diagram.

Unit 1

- | | |
|-------------|---|
| 1 Manual | Notify Unit 2 control room and request that the alternate AC generator be started and aligned to Unit 1. |
| 2 Manual | Unit 2 operators start the alternate AC generator by issuing the engine start command to the PC/Programmable Logic Controller. |
| 3 Automatic | Engine starts and 2A1001 closes automatically when voltage and frequency are within limits. |
| 4 Manual | Unit two operator closes 2A901 and notifies Unit 1 that the A3 / A4 safety bus inter-tie is energized. |
| 5 Manual | Unit 1 operator closes A310 or A410 to energize A3 or A4 as desired (this action will re energize the associated 480 volt distribution system). |
| 6 Automatic | Primary make-up pump starts* (Approximately 5 sec after action 5). |
| 7 Automatic | Service water pump starts (Approximately 15 sec after action 5). |
| 8 Automatic | Emergency feedwater pump starts * (Approximately 20 sec after action 5). |

Unit 2

- | | |
|-------------|--|
| 1 Manual | Operators start the alternate AC generator by issuing the engine start command to the Programmable Logic Controller. |
| 2 Automatic | Engine starts and 2A1001 closes automatically when voltage and frequency are within limits. |
| 3 Manual | Operator closes 2A902 (energizes the 2A3 / 2A4 safety bus inter-tie is energized). |
| 4 Manual | Closes 2A310 or 2A410 to energize 2A3 or 2A4 as desired (this action will reenergize the associated 480 volt distribution system). |
| 5 Automatic | Service water pump starts (approximately 5 sec after action 4). |
| 6 Automatic | Emergency feedwater pump starts* (approx. 85 sec after action 4). |

* Only if running prior to the LOOP

* Only if bus A3 is selected

* Only if bus 2A3 is selected

