



FPL Energy.

Duane Arnold Energy Center

FPL Energy Duane Arnold, LLC
3277 DAEC Road
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June 16, 2006

NG-06-0427
10 CFR 50.90

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

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Response to Request for Additional Information Related to the Proposed Amendment to Revise the Surveillance Requirements for the Emergency Diesel Generators to Provide More Margin to the Acceptance Criterion (TAC NO. MC8343)

- References:
- 1) G. Van Middlesworth (FPL Energy Duane Arnold) to USNRC, "Technical Specification Change Request (TSCR-076): 'Relaxation of Emergency Diesel Generator Testing Criterion'," dated September 16, 2005.
 - 2) D. Spaulding (USNRC) to G. Van Middlesworth (FPL Energy Duane Arnold), "Duane Arnold Energy Center - Request for Additional Information Related to the Proposed Amendment to Revise the Surveillance Requirements for the Emergency Diesel Generators to Provide More Margin to the Acceptance Criterion (TAC NO. MC8343)," dated May 24, 2006.

In Reference 1, FPL Energy Duane Arnold requested an amendment to the Duane Arnold Energy Center (DAEC) Technical Specifications (TS) to revise the surveillance testing acceptance criterion for the Emergency Diesel Generators (EDGs) allowable range on generator frequency. Subsequent to that application, the Staff has determined that additional information is needed in order to review this application (Reference 2). The enclosure to this letter contains the requested information.

This letter makes no new commitments or changes to any existing commitments.

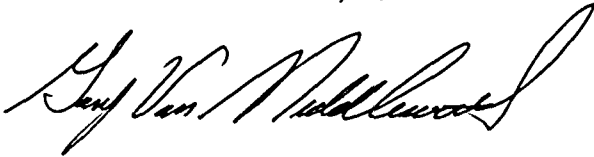
If you have any questions or require additional information, please contact Mr. Tony Browning at (319) 851-7750.

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

Executed on June 16, 2006.

A handwritten signature in black ink, appearing to read "Gary Van Middlesworth". The signature is fluid and cursive, with a large, sweeping initial "G".

Gary Van Middlesworth
Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC
D. McGhee (State of Iowa)

Enclosure to
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June 16, 2006

FPL Energy Duane Arnold

Response to NRC Request for Additional Information

Related to the Proposed Amendment to Revise the Surveillance Requirements

for the Emergency Diesel Generators

to Provide More Margin to the Acceptance Criterion

(TAC NO. MC8343)

3 Pages Follow

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
RELATED TO THE PROPOSED AMENDMENT TO REVISE
THE SURVEILLANCE REQUIREMENTS
FOR THE EMERGENCY DIESEL GENERATORS
TO PROVIDE MORE MARGIN TO THE ACCEPTANCE CRITERION
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NRC Questions

Your letter of September 16, 2005, submitted a proposed amendment to revise the surveillance requirements for the emergency diesel generators (EDGs) to provide more margin to the acceptance criterion. You stated that the proposed change in EDG testing acceptance criteria is fully consistent with Safety Guide 9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies." Updated Final Safety Analysis Report, Section 1.8.9, states that "the voltage will recover to 90 percent of rated voltage after each step-load change in 1.3 sec (26.0 percent of load sequence time interval) or less and to 98 percent of rated frequency within 3.91 second (78.2 percent of load sequence time interval)." However, Safety Guide 9 recommends that "voltage should be restored to within 10 percent of nominal and frequency should be restored to within 2 percent of nominal in less than 40 percent of each load-sequence time interval." Thus, the frequency is not restored to within 2 percent of nominal until the motors have almost accelerated to rated speed.

To complete its review of the submittal, the Nuclear Regulatory Commission staff requests the following additional information.

- 1) Please provide justification for using a greater percentage of the time interval to restore the proposed frequency within 2 percent of nominal (60 Hz).

FPL Energy – Duane Arnold Response:

It is acknowledged that this constitutes a deviation from the Safety Guide 9 recovery time. From the original Safety Evaluation for the Operating License:

The diesel generator units for the Duane Arnold plant are identical to units provided on some presently operating plants. The assignment of electrical loads during sequencing for this plant is expected to exceed the voltage and frequency recovery time limits expressed in Safety Guide 9.²⁸

The applicant will demonstrate the adequacy of this system by including margin tests as part of the one hundred in-plant starting and loading verification preoperational tests. These margin tests will include adding an additional 10% load of similar electrical characteristics to the initial load *increment during their testing*. Secondly, sequencing intervals will be reduced a small amount in each succeeding test until the ability of the diesel generator to pick up the designated loads fails to occur. We conclude that this test program will verify that margin exists in this system and the reliability will not be degraded. We will evaluate the results of the test program upon its completion. {emphasis added}

²⁸ Safety Guide #9, Selection of Diesel Generator Set Capacity for Standby Power Supplies.

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The results of this augmented testing are described in UFSAR Section 8.3.1.4:

A test program was conducted increasing the load beyond the initial load increment and reducing the load sequence time intervals shown in Table 8.3-1. The object of these tests was to determine that adequate margin is included in the design.

The initial test was run with the loads and intervals indicated in Table 8.3-1. The voltage, frequency, and load time increments were recorded and used as a base for a following series of tests. In the series of tests that followed, the load was increased beyond the initial load increment and the load sequence test was repeated. The results of this test were compared to the base with respect to the load response interval times. From the resulting data, shorter load interval times were determined and the test was repeated. The load interval times were reduced and the test was continued until it was determined that the voltage and frequency perturbations did, in fact, degrade the ability of the system to pick up the designated loads in accordance with Table 8.3-1. The results of this series of tests were analyzed to determine the margin inherent in the design.

The frequency does not return to within 2% of nominal within 40% of the load sequence time interval as required by Safety Guide 9 acceptable limits. However, it is concluded from the above that the recovery time shown in Table 8.3-1 has no detrimental effect on system reliability or performance. (See Section 1.8, Safety Guide 9.)

In addition, DAEC Technical Specification Surveillance (SR) 3.8.1.12 confirms that the time interval between load additions on the EDG is sufficient to allow recovery before the next load is applied. From the Bases for SR 3.8.1.12:

Under either LOCA conditions or during a loss of offsite power, loads are sequentially connected to the bus by a timed logic sequence using individual time delay relays. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the EDGs due to high motor starting currents. Verifying the load sequence time interval is greater than or equal to 2 seconds ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load.

- 2) Also, please confirm that problems regarding meeting the EDG testing acceptance criteria have not been observed in past EDG performance.

FPL Energy – Duane Arnold Response:

In March 2005, failures to meet the acceptance criterion caused an investigation to be conducted under the DAEC Corrective Action Program (Ref. ACE001440). The failure of the "A" EDG to meet the steady-state frequency tolerance band of $\pm 1\%$ (60 Hz ± 0.5 Hz) was attributed to problems in the Woodward governor assembly on the EDG. This assembly was replaced and the EDG was tested satisfactorily. Noteworthy is the "A" EDG frequency would have been acceptable if the 2% tolerance band had been in place as the test criterion.

As part of this investigation, maintenance records were reviewed to search for previous failures to meet the frequency recovery requirement in the TS Surveillance. No prior actual failures were found. In September 2004, a problem with the control room indication of EDG frequency was

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found that initially caused the EDGs to fail the surveillance requirement. However, subsequent investigation (OPR00272) found that the control room indication had a 0.1 Hz bias, when compared to a standard 60 Hz signal. When the test data was corrected to account for this bias in indication, the EDGs were within the acceptable tolerance band on the frequency.

A recent review of EDG testing practices, which went beyond the TS requirements, was conducted. Corrective Action Items CAP40658 and CAP41089 document that during LOOP/LOCA testing (SR 3.8.1.13), at various times, each EDG has not always performed consistent with the UFSAR 1.8.9.4 statements relative to Safety Guide 9. For instance, during the last test conducted during refueling outage (RFO) 19, the frequency did not completely recover between load sets on the "B" EDG. However, as stated in UFSAR 1.8.9.4, failure to recover frequency during the acceleration period of the motors is not a major concern. In addition, low bus voltages (~73% - 74%) have been observed during the load sequences during these tests, after the initial load is applied. These conditions are of potential concern and were formally evaluated (Corrective Action Item CAP40648) to ensure that these momentary voltage dips would not lead to performance problems with either the EDGs or the supported load groups. The results of this evaluation concluded that the major load groups (4160V and 480V) would pick up and load onto their respective busses, but could experience a momentary delay in their response time as a result of the observed voltage dips. The evaluation concluded that, even with these short time delays (on the order of one to three seconds), all low pressure ECCS initiation times will continue to satisfy their UFSAR accident assumptions.

While this evaluation determined that the EDGs are Operable, they are considered to be non-conforming (Corrective Action Item OBD00258) and require corrective actions. Initial corrective actions included replacement of the electrical and mechanical Woodward governor assemblies and monitoring of governor signals during EDG surveillance testing (Corrective Action Items CAP35425/ACE1436). The long-term corrective action (Corrective Action Item CA39990) is to replace the obsolete Woodward governors with a newer model. This action is planned to take place during the next two RFOs (spring 2007 and 2009) on a staggered basis.