

**Florida
Power**
CORPORATION

November 29, 1984
3F1184-21

Director of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Response to Generic Letter 84-15

Dear Sir:

Your Generic Letter 84-15, dated July 2, 1984, requesting data and commentary related to Emergency Diesel Generator Reliability was reviewed by Florida Power Corporation (FPC). Responses to the three areas covered follow.

I. REDUCTION IN NUMBER OF COLD FAST START SURVEILLANCE TESTS FOR DIESEL GENERATORS

REQUEST: Describe current program to avoid cold fast start surveillance testing.

RESPONSE: FPC diesel generators are not subjected to cold fast starts for surveillance testing. Operability of the diesel generators is demonstrated in accordance with Crystal River Unit 3 (CR-3) Technical Specification 4.8.1.1.2.a.4. That is, verifying that the diesel starts from ambient conditions and accelerates to at least 900RPM in less than 10 seconds. However, the diesel engine coolant is continuously circulated and maintained at a temperature between 123°F and 152°F. The oil temperature is maintained at 110°F. Prior to surveillance, the oil prelube pump is run for 2 minutes. This program was previously described in FPC's response to Generic Letter 85-14, dated January 13, 1984. The EDG capability to perform a cold fast start is demonstrated (except for timing to rated speed) through actual demands. If an actual demand shows an inability to cold fast start (start without prelubrication), the EDG would be declared inoperable and corrective actions would be initiated. FPC contends that this approach reduces cold fast starts while maintaining demonstration of cold fast start capability.

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2. DIESEL GENERATOR RELIABILITY DATA

REQUEST: Report the reliability of each diesel generator for its last 20 and 100 demands.

RESPONSE: Significant effort was expended in the attempt to reformat EDG records into the framework of the Regulatory Guide 1.108, position C.2.e definitions of valid tests and failures. CR-3, a pre-1978 plant, has not committed to Regulatory Guide 1.108, and does not record diesel generator demands, failures, and successes in accordance with the Regulatory Guide Position C.2.e.

In that the reformatting could not be accomplished, the following quantitative reliability factors and the supporting data does not question the validity of the start or failure per Regulatory Guide 1.108. All start attempts and failures are assessed as valid. Undoubtedly, in the chronology of demands/tests for each EDG, there are attempted starts classified as valid which would be invalid, and failures noted which would be successes per the Regulatory Guide. The data is more conservative than would be the case if validity were as defined by the Regulatory Guide. The assessment quantified below resulted from a review of Non-Conforming Operations Reports (NCOR's).

EDG 3A Data and Assessment

The last 20 demands started February 12, 1984 and ended August 14, 1984. There was one failure documented by NCOR 84-181 dated August 14, 1984. The last 100 demands started April 16, 1981 and ended August 14, 1984. There were three (3) failures documented by NCOR 82-019 dated January 25, 1982, NCOR 82-057 dated February 26, 1982, and NCOR 84-181 dated August 14, 1984.

The failure, documented by NCOR 84-181 is probably not a failure in terms of the validity definitions of the Regulatory Guide. With this test reclassified as a success, the quantified reliability is:

For the last 20 demands, reliability is 1.00/demand.
For the last 100 demands, reliability is .98/demand.

EDG 3B Data and Assessment

The last 20 demands started February 28, 1984 and ended August 15, 1984. There was one failure documented by NCOR 84-103, dated April 23, 1984. The last 100 demands started July 2, 1981 and ended August 15, 1984. There were six (6) failures documented by NCOR 82-053 dated February 24, 1982, NCOR 82-115 dated April 12, 1982, NCOR 82-161 dated June 9, 1982, NCOR 82-188 dated July 12, 1982, NCOR 83-314 dated November 7, 1983, and NCOR 84-103 dated April 23, 1984. The failures documented by NCOR's 82-115, 82-161, 82-188, and 84-103 are probably not failures in terms of the validity definitions of the Regulatory Guide. With these tests reclassified as successes, the quantified reliability is:

For the last 20 demands, reliability is 1.00/demand.
For the last 100 demands, reliability is .98/demand.

REQUEST: Licensees are requested to indicate whether they maintain a record which itemizes the demands and failures by each diesel generator unit in the manner outlined in Regulatory Guide 1.108 position C.3.a for each diesel generator unit.

RESPONSE: FPC maintains data on file for the demands on the EDG's and failures, but it is not in the form outlined in Regulatory Guide 1.108. Evaluation and analysis is for failures, not of current quantified reliability factors.

REQUEST: Licensees should also indicate whether a yearly data report is maintained for each diesel generator's reliability.

RESPONSE: No report is maintained, but data for such a report is available.

3. DIESEL GENERATOR RELIABILITY

REQUEST: Describe the current EDG reliability program, if any, for attaining and maintaining a reliability goal for the EDG's.

RESPONSE: Florida Power Corporation does not have a "specified" reliability program for attaining an EDG reliability goal. Florida Power does have a corrective action program and a number of procedures that, when combined together, do form an effective program that maintains the diesel generators in a reliable as reasonably achievable manner. The corrective action program was developed in accordance with 10 CFR 50, Appendix B, and does include the diesel generators. A description of this is provided in the discussion of our evaluation of the NRC Example Performance Program. The plant procedures that comprise the EDG reliability program include:

1. Surveillance Procedures
 - a. Emergency diesel generator fuel oil quality and monthly functional test.
 - b. Refueling interval engine inspection and maintenance per manufacturer's recommendations.
 - c. Refueling interval engineered safeguards integrated plant response test (for concurrent RB high pressure signals and loss of offsite power).
2. Preventative Maintenance Procedures
 - a. Semi-annual electrical checks.
 - Check and clean stator windings
 - Check brushes
 - Check slip rings
 - Stator insulation check
 - Rotor insulation check
 - b. Variable frequency (shiftly to annually) diesel generator and diesel generator support equipment lubrication checks (verify level) and lubrication replacement.
 - c. Annual diesel breaker and breaker relay checks.
 - d. Periodic inspection and cleaning the EDG air receivers for the starting air.
3. Maintenance Procedures:
 - a. Diesel generator governor and servo-booster cleaning, inspection, removal and installation.
 - b. Diesel generator radiator inlet piping disassembly and reassembly.
 - c. Diesel generator cooling water pumps disassembly and reassembly.
 - d. Diesel generator turbo-charger disassembly and reassembly.

- e. Maintenance of diesel generator switchboard meters and transducers.
- f. Diesel Generator special mounted pump disassembly and reassembly.

Following completion of Surveillance or Preventative Maintenance Procedures, the results are reviewed by the Shift Supervisor and the responsible Shop Superintendent. This review is intended to:

- a. Identify any deficiencies.
- b. Determine if a Work Request should be initiated for corrective actions or maintenance.
- c. Determine if a Non-Conforming Operations Report (NCOR) should be initiated for discrepancies.
- d. Verify proper disposition of all discrepancies noted during the performance of the activity.
- e. Verify post-activity tests are complete so the equipment can be considered operable.
- f. Verify removal of clearance tagging.

When scheduling performance of the tests and preventative maintenance, as many tasks as reasonably possible are performed concurrently. This practice minimizes diesel tag-outs and, therefore, reduces the potential for human error during restoration to service, reduces the number of EDG restoration starts and ultimately maximizes diesel generator availability.

A significant percentage of the EDG failures are attributed to either a failure to come to rated speed in the required time or, more probably, a failure to detect time elapsed to attain rated speed and voltage. Florida Power is upgrading relay schemes and providing an elapsed time counter to provide more accurate assessment of time to attain rated speed and voltage for use during surveillance testing.

As requested, Florida Power has compared the recommendations of NUREG/CR-0660, "Enhancement of On-site Emergency Diesel Generator Reliability", with current plant practices. Our review indicates that appropriate recommendations of the NUREG are incorporated in designs and practices.

With respect to Recommendation A.2 concerning air quality in the Diesel Generator Room: the relays and contactors which are located in the EDG area are enclosed inside gasketed cabinets. Those cabinets which require cooling are louvered.

As recommended by Item B.1 concerning EDG prelube: the non-emergency EDG starts pre-lubing prior to starting.

Per Recommendation B.3 which discusses testing, test loading, and preventative maintenance: to prevent incomplete combustion, the EDG is run at greater than or equal to 50 percent full load for four hours. Additionally, Florida Power Corporation performs an EDG start, run, and load prior to returning the system to service. This assures tests leads have been removed, breakers correctly aligned, etc.

As recommended by Item C.1, EDG room ventilation and combustion air inlet: the engine exhaust gas is removed from the building by the exhaust stack to the atmosphere.

Pursuant to Recommendation C.2, fuel storage and handling: Florida Power has two pumps (per EDG) to transfer fuel from the fuel oil storage tank to the day tank. One pump is AC powered and the other is DC powered. Additionally, we have an engine driven pump and a DC powered pump to transfer fuel from the day tank to the engine.

As recommended by C.5, concrete floors: Florida Power recently painted the floors in the EDG rooms.

In addition, FPC has reviewed more recent publications for recommendations to enhance EDG reliability. Included in our review was INPO's SOER 83-01, Diesel Generator Failures.

FPC's design organization's program that responds to corrective action requirements also provides for potential problems or deficiencies to be identified and processed. The design organization continuously reviews various forms of technical information in order to identify potential design problems and take required action. The process goal is early problem identification and resolution, regarding any plant system or equipment. Of ten (10) EDG related projects presently in progress in the design organization, five (5) appear to have reliability considerations.

REQUEST: Comment on and compare the existing program, or any proposed program, with the example performance specification.

RESPONSE: Florida Power Corporation has compared and evaluated our reliability program against the Example Performance Program. The following is a discussion of our evaluation:

1. Reliability Goals

While Florida Power does not have a quantified Reliability Goal (such as the recommended 0.95 level), we do strive to maintain the diesels as reliable as reasonably achievable. This type of approach to reliability has the advantage of continuing improvements if reliability can still be reasonably improved even after attaining 95% reliability. As described in Response 2, this approach has resulted in a quantified reliability, when conservatively assessed, very close to the NRC recommended goal. When further analyzed and more reasonably assessed, the quantified reliability is significantly better than a .95 reliability goal. Thus, Florida Power Corporation has determined that this approach should continue to be utilized.

2. Reliability Level Remedial Actions

3. Surveillance Test Frequency

4. Remedial Action Criteria

5. Requalification Criteria

6. Failure to Requalify an EDG

Items (2) through (6) describe a corrective action program intended to determine whether major degradation has occurred and to require additional corrective actions for degraded diesel generators. These corrective actions include:

- a. Maintain a report that implements NUREG/CR-0660 recommendations and requires an assessment of combined off-site and on-site power reliability.
- b. "Requalify" the degraded diesel generator through extensive testing.

Florida Power Corporation, in accordance with 10 CFR 50, Appendix B, has a corrective action program that encompasses the diesel generators. This program starts with the Test Requirements (per Technical Specification and manufacturer's recommendations). If an EDG fails to meet the acceptance criteria of the appropriate requirement, a "Non-Conforming Operations Report" (NCOR) is written that includes a brief description of the event, the discovery method, the apparent cause and immediate corrective actions.

The NCOR is then reviewed by various plant personnel to determine appropriate actions, per the Technical Specifications, and reporting requirements. If the event was significant, the event or inoperability is evaluated to determine:

- a. The cause.
- b. The safety implications.
- c. The failure history (i.e., has this equipment been failing frequently for the same reason).
- d. The equipment manufacturer.
- e. The corrective action, which may include actions to prevent recurrence of the failure.

Corrective actions generally result in a Corrective Action Assignment which involve one or a combination of the following:

- a. Additional preventative maintenance.
- b. An Engineering Evaluation to determine if a redesign and modification is necessary. (As an example, the modification discussed earlier, related to improvement in and assessment of EDG time to attain rated speed, is resultant from NCOR's and the corrective action program.)
- c. Additional performance monitoring.
- d. Revised and/or expanded testing requirements.

The intent of these corrective actions is to address the "root cause" of the failure and thus prevent repeat failures. (This is consistent with NUREG/CR-0660, Recommendation B.4.a and b.)

The current Florida Power Corporation corrective action program does not determine the occurrence of major degradation to the extent that the proposed program does. It is important to note that the determination of degradation, as proposed, is calculated on the basis of additional, extensive diesel testing. Thus, this determination is made at the expense of additional diesel mechanical wear, which appears to be contrary to NUREG-1024, Technical Specifications - Enhancing the Safety Impact¹, and the intent of this Specification. Currently, our determination of diesel degradation is based solely on failure history and does not include unnecessary additional diesel starts. Florida Power Corporation considers the current corrective action program to be adequate.

7. EDG Inoperability Limits

The proposed Technical Specification would allow EDG inoperability in excess of the current 72 hours, and place a yearly limit on the cumulative inoperability time.

While this proposal does allow additional flexibility, Florida Power would not choose, at this time, to adopt it. The yearly limit could cause deferred preventative maintenance or conflicts with Surveillance Requirements if a significant amount of the allowed time has already been used.

8. Valid Demands and Failures

Florida Power Corporation is not committed to Regulatory Guide 1.108 and, therefore, does not determine demands and failures per section C.2.e. Florida Power considers all start attempts (automatic and manual) to be a valid test. Tests that do not indicate conformance with Technical Specification are considered to be failures, including early termination of the tests due to abnormal conditions. Florida Power also considered manufacturer's notifications (10 CFR 21), as appropriate, to indicate diesel inoperability.

9. Reliability Records

Florida Power Corporation does not maintain reliability records as suggested by Regulatory Guide 1.108, position C.3.a. The NCOR's, previously described, and surveillance data are available to determine tests and failures. Additionally, Florida Power Corporation is a participant of INPO's "Nuclear Plant Reliability Data System" (NPRDS). As a participant, EDG failure data is retrievable for CR-3 and for other utilities with similar diesel generators.

10. ADDITIONAL COMMENTS

a. Action Statement Test Frequency

The proposed Specification would lengthen the amount of time from when an A.C. power source is inoperable to when the operability of the diesels must be demonstrated. Additionally, the 8-hour frequency testing thereafter would be deleted.

Florida Power considers the proposed Action Statement time requirements to be an improvement, as it will decrease the required amount of diesel run-time and, therefore, mechanical wear. The current Specification requires testing within one hour of inoperability and every eight hours thereafter. This could cause 1) damage to the redundant system, 2) the system or plant to be in a more vulnerable mode, and 3) failure to return it to an operable condition².

Florida Power Corporation will pursue this portion of the proposed change as an Amendment Request. We feel that such a change can enhance plant safety.

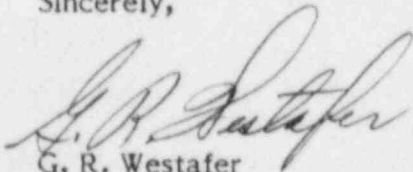
b. Detailed Comments

Florida Power has limited its comments to the portions of the Specification dealing with a reliability program. Our detailed comments on the specifics of the program and the remainder of the Specification are available upon request.

FOOTNOTES TO RESPONSE AREA 3

1. NUREG-1024, Technical Specifications -- "Enhancing the Safety Impact", November 1983, was written by an interdisciplinary NRC Task Group to identify problems with surveillance testing and to develop alternative approaches at the request of the CRGR. The CRGR found that "too frequent testing contributes to the wear of components, unnecessary test downtimes, ..., introduction of human errors and the potential for common cause failures, and added maintenance downtimes resulting from component wear", Pages 1-5.
2. NUREG-1024, Pages 3-4.

Sincerely,



G. R. Westafer
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