5302

Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

September 9, 1994
3F0994-01

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Emergency Diesel Generator Maintenance and Testing

References: 1. FPC to NRC letter, 3F0993-03, dated September 10, 1993
2. FPC to NRC letter, 3F1289-13, dated December 22, 1989

Dear Sir:

This letter summarizes the results of recently completed maintenance and testing by Florida Power Corporation (FPC) on the diesel generators at Crystal River 3 (CR-3). This information supplements the information provided in Reference 1 and in other discussions. As discussed in the Background section, this has been a follow-up item to our EDG upgrade efforts. The most recent testing, produced voltage responses within the standard Regulatory Guide acceptance criteria. The balance of the letter discusses this follow-up item and provides justification to close this item out.

BACKGROUND

In 1990, the CR-3 emergency diesel generators were upgraded to increase their capacity. The continuous rating was increased from 2700 to 2850 kw. A new 200 hour rating of 3250 kw was added to augment the 2000 hour rating of 3000 kw, which did not change as a result of the upgrade. The 30 minute rating was increased from 3300 to 3500 kw.

Following completion of the modification, the diesels were subjected to an augmented testing program requested by the NRC Staff. This test program is described in detail in Attachment 1 to Reference 2. The program was completed as planned and, while all of the test acceptance criteria were met, the results did not meet all of the acceptance limits of Regulatory Guide 1.9. FPC

9409190372 940909
PDR ADOCK 05000302
P PDR

A001
1/0

understands that the NRC Staff did not find this satisfactory. We also, were not entirely satisfied with those results. Achievement of results within the limits of Regulatory Guide 1.9 continues to be a goal of our diesel maintenance program.

RECENT RESULTS

Crystal River 3 recently completed its ninth refueling outage. During that outage maintenance was performed on both emergency diesel generators. In addition, the "B" 4160/480 volt engineered safeguards transformer was replaced. Following the maintenance and transformer replacement, post-maintenance testing was conducted along with that required by plant Technical Specifications. The voltage response results conducted in conjunction with the Combined Safety Injection Actuation Signal and Loss of Offsite Power Test indicated significantly improved performance over previous tests. All of the voltage and frequency responses were within the guidelines specified by Regulatory Guide 1.9.

TESTING CHANGES

Part of the improved diesel performance is due to a change in the way the testing was conducted. Previously the diesels had been started on an engineered safety features actuation and allowed to come up to rated speed and voltage before actuation of the undervoltage on the engineered safeguards bus. In addition, prior to the start of the test a UV/ES timer bypass circuit was disabled to force an additional 13 seconds of dead bus prior to the closure of the diesel output breaker. This resulted in a very large instantaneous demand on the generator when the actuation took place. Under the modified test, the engineered safety features are actuated simultaneously with the simulation of an undervoltage on the engineered safeguards bus. Because of time delays in the undervoltage circuitry, the block loading proceeds normally for five seconds before the bus is deenergized. The UV/ES timer bypass circuit then only allows 3 seconds of dead bus prior to actuating the diesel output breaker close permissive. The block loading is then reinitiated following closure of the diesel output breaker. The modified test is more representative of the way FPC's grid would respond if it were to fail following a large break loss of coolant accident (LOCA). This is based on two factors. First, CR-3's main generator is connected to the 500 kv switchyard, while off-site power for the engineered safeguards buses comes from the 230 kv switchyard. Since the two are not connected locally, they are somewhat independent and the 230 kv switchyard is not directly affected by the tripping of the CR-3 main generator. Second, in addition to five transmission lines, there are normally three large generators (Units 1, 2, and 4) directly feeding the 230 kv switchyard. These three generators would not be expected to be simultaneously unavailable if a LOCA occurred at CR-3.

EDG POWERED COMPONENTS PERFORMANCE

In Attachment 2 to Reference 1 FPC explained our basis for concluding that the motors, control devices, and protective devices powered by the diesels would function properly in response to the diesel generator voltage and frequency measured at that time. Because the most recent testing showed no degradation in the measured voltages and frequency compared to the previous test, that basis is still valid. Thus, FPC concludes that the equipment powered by the diesels will perform properly under emergency conditions if challenged to do so.

FPC is aware of the concerns of the NRC staff for the voltage peaks experienced during the block loading of the diesels. We do not believe that any significant adverse consequences can result from such peaks. Any damage would likely be of one of two types. The first would be a immediate failure due to flash-over or insulation breakdown. Any damage of this type would be detected by the prompt failure of the associated component. The second type of damage would be shortened component life due to increased voltage stress. This type of damage is considered very unlikely due to the short duration of the voltage transient and the fact that the testing is performed only once every 24 months. Most industrial equipment is routinely tested at voltages well in excess of the rating. For example, National Electrical Manufacturers Association (NEMA) standards for motors and molded case circuit breakers typically require HyPot testing at twice the rated voltage plus 1000 volts. At CR-3, 120 volt circuits and equipment are routinely "Megger" tested at 500 volts, and 480 volt equipment is tested at 1000 volts. These common practices demonstrate that industrial equipment is not damaged by the short term application of voltages in the range of those measured during the block loading of the CR-3 diesels.

Future monitoring of the diesel generator output will continue to be performed by the revised procedure. Tracking and tending of important parameters is performed by the system engineer in accordance with the Nuclear Plant Systems Engineering Manual. This program will be enhanced as necessary to assure compliance with 10 CFR 50.65 (the maintenance rule). This trending assures any long term degradation of diesel performance will be detected.

CONCLUSION

In conclusion, FPC believes that the most recent diesel generator testing demonstrates the capability of the machines to deliver power to the emergency loads at a voltage and frequency which assures the proper functioning of the equipment. This should bring to final closure any remaining concerns over the test results associated with the diesel upgrade. The tests performed also conform to the Improved Technical Specification surveillance requirements for demonstrating the OPERABILITY of the diesels.

Sincerely,

P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

Attachment

PMB\AEF:ff

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector