



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

Enclosure

SAFETY EVALUATION  
FOR THE  
QUALIFICATION TESTING OF  
NEW EMERGENCY DIESEL GENERATORS FOR  
TURKEY POINT UNITS 3 AND 4

INTRODUCTION

As a part of the project to enhance the emergency power system at Turkey Point, two new emergency diesel generators (EDGs) are being added. These will supplement the existing two EDGs, such that there will then be two EDGs for each unit.

The existing EDGs are rated at 2500kw, and have General Motors EMD Model 20-645E4, 900 rpm engines. The proposed new EDGs are rated at 2865kw and have General Motors EMD Model 20-645F4B, 900 rpm engines. The new EDGs have the same number of cylinders (20), with the same cubic inch displacement (645) and the same speed (900 rpm). However, they have been upgraded from the previous model to enhance their durability and capability. In particular, in addition to the higher kw rating, the new EDGs have a higher compression ratio (16:1 versus 14.5:1), a higher brake horsepower (4000 versus 3600) and a higher brake mean effective pressure (136 psi versus 123 psi). In addition, the proposed new EDGs will have a 12 row turbocharger versus the 10 row turbocharger used for the older model. The new model has higher intake air, a higher exhaust volume, and a lower exhaust temperature.

The EDG supplier (Morrison-Knudsen Company, Power Systems Division) has proposed a 30 Start and Load Acceptance Test for the new EDGs in lieu of a 300 Start and Load Acceptance Test specified in IEEE Standard 387-1984. All other qualification testing, both at the factory and the site, would be performed in accordance with IEEE Standard 387-1984 and Regulatory Guide 1.9. These tests would include Load Capability Qualification Tests and the Margin Qualification Tests. In addition, the complete set of preoperation testing requirements contained in Regulatory Guide 1.108 would be performed, including the 69 in-situ start and load tests to demonstrate the reliability of the installed units.

DISCUSSION

It is noted that the 300 Start and Load Acceptance Test specified in IEEE Standard 387-1984 is a type qualification test and is not intended to be conducted on each diesel generator. The purpose of this test is to assure adequacy

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of the design of the prototype to perform in a reliable manner. Problems with individual diesel generators are expected to show up during the in-situ tests.

The licensee states that the 300 Start and Load Acceptance Test has been performed on E4 models similar to the new proposed F4B model. In a submittal to the NRC dated October 19, 1988, the licensee provided detailed comparisons of the component and functional characteristics of the E4 and F4B models. These comparisons illustrated the similarities of E4 and F4B components, and the auxiliary systems such as the air start, lube oil, cooling water, and fuel oil systems. The NRC staff's only remaining concern was with possible stress failure of various components such as the pistons, piston bearings, connecting rods or crankshaft due to the higher compression ratio and BHP of the F4B model. Therefore, the NRC staff sought further information.

By submittal dated March 20, 1989, the licensee submitted further information pertaining to staff's stress failure concerns and pertaining to the relevance of the extensive locomotive experience with the F4B model. Review by the staff of this information was followed by a telephone conversation with the licensee on April 27, 1989 and a visit to the General Motors EMD plant in LaGrange, Illinois on June 30, 1989. Based on the information received, the NRC staff concludes that adequate stress margins have been designed into the critical components.

#### SUMMARY AND CONCLUSION

Two new EDGs to be installed for Turkey Point 4 will be an upgraded model as compared to the existing EDGs that are to be used for Turkey Point 3. It is proposed that the new model will undergo a 30 Start and Load Acceptance Test, as compared to the 300 Start and Load Acceptance Test specified in IEEE Standard 387-1984 for a new type EDG that has not been previously type tested. The NRC staff concludes the proposed new EDGs are similar to previous EDGs that were type tested, except that the new EDGs have a higher compression ratio and brake horsepower, thus raising stress concerns.

Information received by the staff at the General Motors Electromotive Division Plant in LaGrange, Illinois has satisfied the staff that adequate stress margins have been designed into the new EDG model. Thus, staff finds the 30 Start and Load Acceptance Test in lieu of the 300 Start and Load Acceptance Test to be acceptable.

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