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October 26, 1984

Director, Office of Nuclear Reactor Regulation
Attention: J. A. Zwolinski, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
Return to Service Requirements Regarding
Transamerica Delaval Emergency Diesel Generator
San Onofre Nuclear Generating Station
Unit 1

- References:
- 1) Letter D. M. Crutchfield (NRC) to K. P. Baskin (SCE), dated September 18, 1984, Request for Additional Information Regarding TDI Emergency Diesel Generators
 - 2) Letter D. M. Crutchfield (NRC) to K. P. Baskin (SCE), dated July 26, 1984, Transamerica Delaval Diesel Inspection Requirements for Restart of San Onofre, Unit 1
 - 3) Letter, M. O. Medford (SCE) to W. A. Paulson (NRC), dated August 28, 1984 Return to Service Requirements Regarding Transamerica Delaval Diesel Generators, San Onofre, Unit 1
 - 4) Letter, M. O. Medford (SCE) to W. A. Paulson (NRC), dated October 9, 1984, Request for Additional Information Regarding TDI Emergency Diesel Generators
 - 5) Letter, M. O. Medford (SCE) to D. M. Crutchfield (NRC), June 29, 1984, Return to Service Requirements Regarding Transamerica Delaval Emergency Diesel Generators

The purpose of this letter is to provide a response to the NRC request (Reference 1) for information related to the results of an inspection requested earlier in Reference 2 of the TDI Emergency Diesel Generators for San Onofre Nuclear Generating Station, Unit 1 (SONGS 1). Reference (3) set forth SCE's commitments to implement NRC requirements related to the diesel generators for the return to service at San Onofre Unit 1. By Reference 4, Southern California Edison Company (SCE) informed the NRC that the requested information would be transmitted to the NRC by October 31, 1984. The inspection found small cracks in some main bearing journal oil holes which were repaired by core drilling, grinding and polishing.

Bob

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The enclosed Response to Request for Additional Information Regarding Transamerica Delaval Emergency Diesel Generators - San Onofre Nuclear Generating Station - Unit No. 1 (SONGS 1) - September 18, 1984 specifically answers a question (Question A) included in the body of Reference 1 and nine enclosed questions (Questions 1-9). In addition, the following information is included which was requested on October 22, 1984 at the meeting in Bethesda, MD. between the Owners Group and NRC Staff and consultants: (1) other crankshaft related components which may see higher stresses during transient conditions, (2) information regarding the fastening between gear and camshaft, (3) a copy of the torisograph data taken on Diesel Generator (DG) #1 on September 26-27, 1984, and (4) verification of firing order.

An evaluation of the cause of the cracks in the crankshaft is being conducted by the TDI Diesel Generator Owners Group. The Owners Group is evaluating the inspection results for both diesel generators as well as the results of a torsigraph and pressure test conducted on diesel generator No. 1 to measure the angular displacement of the forward end of the crankshaft and cylinder pressures. This information is being used in conjunction with a dynamic analysis of the crankshaft torsional dynamic behavior to assess the maximum stresses in the crankshaft under steady state and transient conditions.

The Owners Group has considered a number of potential causes of the cracks, and at this time has focused attention on the fact that the V-20 engine has its most significant torsional criticals in the 200-300 rpm range. It now appears that the fast starting transients and, to a lesser extent, the coastdown transients are responsible for stress conditions that can lead to low-cycle fatigue cracking.

Based on the operating history of the diesel generators, we believe that the inception of fatigue cracking occurred recently on DG #2, on which two small cracks were found, and which has experienced approximately 450 starting transients and 550 hours of running. Furthermore, we can see that the propagation of cracks and/or initiation of additional cracks was associated with the accumulation of more than 740 starting transients and more than 725 hours of running on DG #1.

Based upon the operating history of the SONGS 1 diesel generators over the past 7 years, and the findings described above, we expect to experience significantly fewer transients by the next refueling outage than we believe are necessary to initiate new cracks. However, we will again examine the #9 main journal oil hole of Diesel Generator #1 at the next refueling outage in order to confirm that new crack indications have not reappeared. We anticipate defining a long term resolution to the crankshaft cracking phenomenon in the course of the fuel cycle. To the extent feasible we will implement measures to minimize additional fatigue damage such as

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pre-positioning the crankshaft orientation or reducing engine acceleration loads during periodic surveillance tests. Such actions will be taken once their net benefit is clearly established.

If you have any questions, please call me.

Very truly yours,

A handwritten signature in cursive script, appearing to read "M. J. Medford".

Enclosures

cc: USNRC Document Control Desk, Washington, D.C. 20555
A. E. Chaffee (U.S. NRC Resident Inspector Units 1, 2 and 3)
C. L. Ray, Jr. (TDI Diesel Generator Owners Group)