UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76012

CENTRAL FILES
PDR:HQ
LPDR
TIC
NSIC
TERA

June 28, 1979

Docket Nos. 50-313
50-368

Arkansas Power and Light Company
ATTN: Mr. William Cavanaugh III
Vice President of Generation
and Construction
P. O. Box 551
Little Rock, Arkansas 72203

Gentlemen:

The enclosed IE Circular No. 79-12, is forwarded to you for information. No written response is required. Should you have any questions related to your understanding of this matter, please contact this office.

Sincerely,

Karl V. Seyfrit
Director

Enclosures:
1. IE Circular No. 79-12
2. List of IE Circulars Issued in Last 12 Months

cc: James P. O'Hanlon, Plant Manager
Arkansas Nuclear One
P. O. Box 608
Russellville, Arkansas 72801

L. Alexander, QC Supervisor

(6)

7907180376

364 124

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

IE Circular No. 79-12
Date: June 28, 1979

POTENTIAL DIESEL GENERATOR TURBOCHARGER PROBLEM

Description of Circumstances:

The Electro-Motive Division (EMD) of General Motors Corporation has recently identified a potential failure mode of turbochargers used on EMD diesels in nuclear plant standby service.

When an engine is in the normal standby mode, the lubricating oil temperature is maintained at about 115 degrees F and the circulating oil pump supplies warm oil to the turbocharger bearings at a flow rate of about 2 gpm. Since the total oil pump flow rate is 6 gpm, 4 gpm is also circulated, via a 30 psi relief valve, through the lube oil filter and cooler which serves to keep the entire accessory lubricating oil system primed to support a fast start. If a power outage occurs, the oil circulating pump may stop 5 to 10 seconds before the engine receives a start signal; but the main bearing and piston cooling pump will immediately receive oil from the primed lube oil filter-cooler system, thus providing a rapid buildup of engine lube oil pressure throughout the engine bearing and turbocharger systems.

A potential problem occurs, however, if the diesel engine receives a repeat rapid start within a minimum of 15 minutes and a maximum of 3 hours after a shutdown from a previous run in which the engine has reached full operating temperature. If, for example, the engine had been operated for about 1 hour at full load, the lube oil temperature would be at about 200 degrees F at time of shutdown. Under these circumstances, the full 6 gpm output of the circulating pump will flow only to the turbocharger bearings because of the lower viscosity of the hot lubricant. At this temperature, the circulating pump pressure will not reach 30 psi. Until the lube oil cools to about 160 degrees F, no oil will be supplied via the relief valve to the equipment rack for the first 2 to 3 hours after engine shutdown. During this cooling period, some of the oil contained in the cooler and filter will drain back to the engine sump via the lube oil scavenging pump, and some of the oil from the strainer box will be drawn into the cooler by the system vacuum that develops. The result is that when a repeat fast start occurs within the above 15 minute to 3 hour time frame after a hot shutdown, lack of prime oil system pressure can cause engine damage. In the worst case of a repeat fast start, the engine may actually reach operating speed, 900 RPM, before the required oil pressure is established at the turbocharger thrust b
of the bearing metal so that cumulative
would result in a turbocharger failure.

364 125