



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, ILLINOIS 60137

PDR

JUN 28 1979

Docket No. 50-484

Northern States Power Company  
ATTN: Mr. A. V. Dienhart  
Vice President - Tyrone  
Energy Park  
100 North Barstow Street  
Eau Claire, WI 54701

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,

*James G. Keppler*  
James G. Keppler  
Director

Enclosure: IE Circular  
No. 79-12

cc w/encl:  
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Director, NRR/DPM  
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U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

June 28, 1979

IE Circular No. 79-12  
(7906210065)

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 this time frame after a hot shutdown, lack of oil will cause engine damage. In the worst case of engine damage, the engine may not actually reach operating speed, 900 RPM, as established at the turbocharger thrust limit of the bearing metal so that cumulative damage would result in a turbocharger failure.

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