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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

JUN 28 1979

In Reply Refer To:
RII:JPO
50-395

South Carolina Electric and Gas Company
Attn: M. C. Johnson, Vice President
Special Services and Purchasing
Post Office Box 764
Columbia, South Carolina 29218

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 P. O'Reilly
Director

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

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NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

JUN 2 8 1979

In Reply Refer To:
RII:JPO

South Carolina Electric and Gas Company
Attn: T. C. Nichols, Jr., Vice President
Power Production and System Operations
Post Office Box 764
Columbia, South Carolina 29218

Gentlemen:

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Sincerely,

James P. O'Reilly
Director

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

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 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 bearing. This may cause some smearing of the bearing metal so that cumulative damage from several similar starts would result in a turbocharger failure.

EMD is currently developing a modification to improve the lube oil system. It is planned that this modification will be available for installation in approximately 6 months. In the interim, the following actions are recommended for those having EMD diesel engines:

1. Repeated fast hot starts within a minimum 15 minute to 3 hour time frame after shutdown should be avoided. Allow the engine to cool at least 3 hours after it has been operated in the "loaded" mode, or otherwise a restart should be performed within 15 minutes of shutdown.

2. After changing oil filter elements or draining the accessory oil system for any reason and upon refilling of the system make sure that the circulating oil pump is in operation for at least 30 minutes and that the strainer box is full before starting engine. The engine should then be brought to an idling condition to assure complete filling of accessories before any subsequent fast start is made.

3. Any small leak at the top of the oil cooler should be corrected. A leak at this location allows air to be drawn into the cooler during shutdown, which will cause the drain back to be more rapid.

4. Avoid testing of the redundant diesel engines concurrently. Where it is necessary to run the redundant diesels concurrently, maintain one diesel in the running mode for a minimum of 3 hours following the shutdown of the other.

No written response to this Circular is required. If you require additional information regarding this subject, contact the Director of the appropriate NRC Regional Office.

LISTING OF IE CIRCULARS ISSUED IN
LAST TWELVE MONTHS

Circular No.	Subject	Date of Issue	Issued To
78-12	HPCI Turbine Control Valve Lift Rod Bending	6/30/78	All Holders of BWR OLs or CPs for plants with HPCI Terry Turbine
78-13	Inoperability of Multiple Service Water Pumps	7/10/78	All Holders of Reactor OLs and CPs except for plants located in: AL, AK, CA, FL, GA, LA, MS, SC
78-14	HPCI Turbine Reversing Chamber Hold Down Bolting	7/12/78	All Holders of BWR OLs or CPs for plants with a HPCI Terry Turbine excepting Duane Arnold and Monticello
78-15	Checkvalves Fail to Close In Vertical Position	7/20/78	All Holders of Reactor OLs or CPs
78-16	Limitorque Valve Actuators	7/26/78	All Holders of Reactor OLs or CPs
78-17	Inadequate Guard Training/ Qualification and Falsified Training Records	10/13/78	All Holders of and applicants for Reactor OLs
78-18	UL Fire Test	11/6/78	All Holders of Reactor OLs or CPs
78-19	Manual Overrride (Bypass) of Safety Actuation Signals	12/28/78	All Holders of CPs

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LAST TWELVE MONTHS

Circular No.	Subject	Date of Issue	Issued to
79-01	Administration of Unauthorized Byproduct Material to Humans	1/12/79	All Holders of Licensees except Teletherapy Medical Licensees and each Radiopharmaceutical Suppliers
79-02	Failure of 120 Volt Vital AC Power Supplies	2/16/79	All Holders of Reactor OLs and CPs
79-03	Inadequate Guard Training-Qualification and Falsified Training Records	2/23/79	All Holders of and applicants for Special Nuclear Material Licenses in Safeguards Group I
79-04	Loose Locking Nut On Limitorque Valve Operators	3/16/79	All Holders of Reactor OLs or CPs
79-05	Moisture Leakage In Stranded Wire Conductors	3/20/79	All Holders of Reactor OLs or CPs
79-06	Failure to Use Syringe and Battle Shields in Nuclear Medicine	4/19/79	All Holders of Medical Licensees except teletherapy licensees
79-07	Unexpected Speed Increase of Reactor Recirculation MG Set Resulted in Reactor Power Increase	5/2/79	All Holders of BWR OL's or CP's
79-08	Attempted Extortion - Low Enriched Uranium	5/18/79	All Fuel Facilities Licensed by NRC
79-09	Occurrences of Split or Punctured Regulator Diaphragms In Certain Self Contained Breathing Apparatus	6/22/79	All Materials Priority I, Fuel Cycle and Operating Reactor Licensees

LISTING OF IE CIRCULARS ISSUED IN
LAST TWELVE MONTHS

Circular No.	Subject	Date of Issued	Issued to
79-10	Pipefittings Manufactured from Unacceptable Material	6/26/79	All Power Reactor Licensees with a CP and/or OL
79-11	Design/Construction Interface Problem	6/27/79	All Applicants for, and Holders of Power Reactor CPs