

February 18, 1986

Dr. Thomas E. Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
SPECIAL REPORT - 'B' DIESEL
CRANKCASE OVERPRESSURIZATION
ER 100450 FILE 841-23
PLAS-147

Docket No. 50-387
License No. NPF-14

Dear Dr. Murley:

All Diesel Generator failures, valid or invalid, are to be reported as required by Regulatory Guide 1.108, Section C.3.b, and Technical Specification 4.8.1.1.3

On January 18, 1986 the 'B' Diesel Generator was being run to demonstrate operability prior to taking a startup transformer out of service. At 1407 the 'B' Diesel was unloaded after running loaded for ten minutes. At 1409 the 'B' Diesel was manually tripped when a crankcase explosion occurred. The 'B' Diesel was declared inoperable and an LCO entered in accordance with Technical Specification 3.8.1.1.

The crankcase doors were removed to investigate the problem, and severe scoring of the 5L piston and liner was found. The tin coating on the bottom of the piston showed signs of having become molten and probably provided the ignition source for the crankcase explosion. Inspection of the piston pin, which attaches the connecting rod to the piston, revealed that the pin bolting was loose although the Drake lock nuts and lock tab were still tight. Disassembly of the connecting rod/piston/piston pin assembly also revealed that the connecting rod to piston pin locating dowel had broken. This dowel orients the piston pin to the connecting rod to ensure the oil supply ports are aligned for proper oil distribution. The broken dowel appeared to be the result of repeated bending and eventual fatigue failure caused by the loose piston pin bolts.

Based on the above findings, the following is suspected: The 'B' Diesel 5L cylinder piston pin bolts were not initially torqued to the specified 690 ft-lbs. The piston pin bolts eventually loosened and allowed the piston pin to 'rock' with respect to the connecting rod. Eventually the connecting rod to piston pin locating dowel fatigued and broke off. The loose bolting allowed the oil supply fed up through the connecting rod to escape between the

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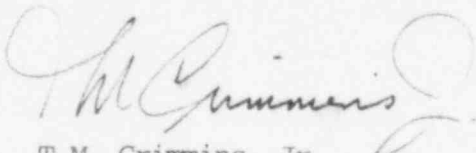
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connecting rod and piston pin, instead of through the oil distribution channels to lubricate the pin. The lack of lubrication to the piston pin caused it to heat up and expand, pushing the piston pin covers against the cylinder liner, and causing severe scoring. The heat generated by the piston to liner interface caused the tin coating on the piston to melt and provided the ignition source to explode the crankcase gases.

The piston, cylinder liner, piston pin, piston pin bushing, piston pin bolts, piston rings and connecting rod for the 5L cylinder were replaced. The lube oil, lube oil filters and jacket water were also replaced. The other cylinder liners on the 'B' Diesel were inspected. Nothing abnormal was found. All the piston pin bolts on the left cylinder bank of the 'B' Diesel were torqued to the specified 690 ft-lbs, but none of the bolts moved. The 'B' Diesel was started for a maintenance run at 2130 on January 20, 1986, and declared operable at 0128 on January 21, 1986. Present plans are to torque all the 'B' Diesel right bank piston pin bolts after 24 hours of operation.

During a subsequent outage of the 'A' Diesel Generator, all the piston pin bolts were retorqued in 50 ft-lb increments. Two bolts out of the 32 checked moved slightly at 690 ft-lbs, but not at 640 ft-lbs. This was considered acceptable since it was within 10% of the specified torque. The need to check the torque on the 'C' and 'D' Diesel Generator piston pin bolts will be evaluated after the right bank of the 'B' Diesel is checked.

The 'B' Diesel Generator run during which the crankcase explosion occurred was considered a valid failure. The Diesel Generator Start Log indicates there are two (2) diesel failures in the last one hundred (100) starts. The diesel test interval is one start every fourteen (14) days, per Regulatory Guide 1.108, Section C.2.d.



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TNC/pjg

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