

REGION II MORNING REPORT
1994

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NOVEMBER 30,

Licensee/Facility:

Tennessee Valley Authority
Sequoyah 1
Soddy-Daisy, Tennessee

Notification:

MR Number: 2-94-0103
Date: 11/30/94

Dockets: 50-327
PWR/W-4-LP

Subject: CONTROL/LUBRICATION OIL PERTURBATIONS ON DRESSER-RAND STEAM
DRIVEN PUMPS

Reportable Event Number: N/A

Discussion:

On November 6, 1994 Sequoyah personnel were conducting final MODE 3 testing of the turbine driven auxiliary feedwater (TDAFW) pump after completing a refueling outage. The TDAFW pump is manufactured by Dresser Rand (Terry Turbine). After the pump was shut down a condition was identified where turbine bearing/control oil was found on the pump skid after the pump was shut down. Additional pump operation identified that the oil was coming out of the turbine oil system near the turbine outboard bearing housing. In addition, the inboard bearing sight glass level was decreasing below the minimum level indicator mark.

Troubleshooting evolutions, including ultrasonic testing, concluded that air voids were forming in the outboard bearing drain line, preventing adequate oil return from the outboard housing and resulting in the oil level fluctuations between the two bearing housings. The accumulation of air voids caused enough restriction of drain flow to cause the outboard

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housing oil level to exceed its capacity and overflow, simultaneous with
the inboard housing losing level due to the oil pump predominantly taking
suction from that housing.

Initial reviews indicated that the phenomenon of air voiding in the oil
system was time dependent, which raises questions regarding previous test
conditions for the pump turbine. Factors such as pump speed, oil system
configuration, and oil system pressure each could potentially affect
operation when this adverse condition occurs.

The TDAFW turbine oil system provides cooling/lubricating oil to the
turbine bearings and other internal components, as well as acting as the
control oil for the turbine EHC system. The turbine oil system is skid
mounted and consists of a shaft driven, gear-type pump, separate inboard
and outboard bearing housings, each installed with a one inch drain
leading to a reservoir, which also acts as an equalizing line between
the two bearing housings. A relief/bypass line is installed on the oil pump
discharge piping, which allows for bypassing flow back to the oil pump's
suction, which provides system pressure and flow control. The outboard
bearing housing also served as an oil return for the EHC and other oil
functions in addition to the normal bearing flows; whereas the inboard
bearing housing only served to collect the inboard bearing expended oil
capacities. Corrective actions for the problem were to install an
atmospheric vent at the top of the outboard bearing drain line. This

allowed the air voids to vent off, rather than restrict drain flow. In addition, a portion of the one inch outboard bearing housing drain line was replaced with 1.5 inch diameter piping. Testing verified these

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modifications appeared to have corrected the problem. On November 27, Browns Ferry Unit 2 was shut down due to similar pump oil perturbation on the reactor core isolation cooling (RCIC) pump, also a steam driven pump manufactured by Dresser Rand. Similar modifications were performed on the Browns Ferry pump and testing is currently in progress to verify the corrective actions have resolved the problem.

Regional Action:

The Resident Inspectors at Sequoyah and Browns Ferry are monitoring the licensees corrective actions for the identified problem and are evaluating previous pump testing. A draft information notice is also being prepared on the subject based on possible generic implications.

Contact: Mark S. Lesser

(404)331-0342