

## PROPER LUBRICATING OIL FOR TERRY TURBINES

On August 31, 1977, the high pressure coolant injection (HPCI) system turbine at Cooper Nuclear Station failed to reach rated speed upon receiving a start signal. The HPCI turbine was manufactured by the Terry Steam Turbine Company. The turbine speed would not increase above 1000 rpm. The licensee determined the cause to be a failed EG-R actuator in the Woodward governor, a sealed component within the governor of the Terry Turbine. The actuator was replaced and the failed part returned to the vendor for failure analysis. The vendor's analysis indicated the actuator failed due to water and rust buildup in the actuator housing from water introduced into the actuator through the lube oil system.

An excerpt from the Terry Turbine Technical Manual (Section 9) indicates:

"Due to adverse operating conditions, environment and infrequent operation, it is recommended that oils containing corrosion inhibitor be used for operation and rust protection of the lube system during the time the turbine sits idle. Oil such as Shell VSI-27 code 65249 or Mobil RL-851, or equal, are recommended."

At the time of the occurrence, the licensee was using Mobil DTE-797 oil. A Mobil representative indicated that this oil is not equivalent to Mobil RL-851 as it does not contain the corrosion inhibitor found in RL-851. Since publication of the Terry Turbine Technical Manual, RL-851 has been renamed Mobil "Vaportec Light."

During plant construction, the licensee received recommendations from a Mobil representative on the type of lubricating oil suitable for all plant equipment. At that time Mobil DTE-797 oil was recommended for the HPCI and reactor core isolation cooling (RCIC) turbines. During preoperational testing, the Mobil representative telephoned the site to inform them that Mobil Vaportec Light was the appropriate oil for use in the HPCI and RCIC turbines. This communication did not reach the appropriate site personnel, and Mobil DTE-797 oil remained in the HPCI and RCIC turbines until the above occurrence.

It is apparent from the above that once the lubrication needs are established for each component and such information is recorded in facility procedures or equipment maintenance instructions, these records become the source document for lubrication specifications in place of

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the technical manual or other design specifications. Any error made at the time lubrication needs are selected can have long-range deleterious effects on safety related equipment.

All holders of operating licenses should be aware of the potential for occurrences of the type indicated above. It is recommended that the following items be considered in your review of this matter:

1. Design records and/or manufacturers' recommendations for similar components should be reviewed to assure that lubrication requirements in facility procedure or maintenance instructions have been properly established. It should be noted that equipment such as the HPCI turbine at BWR's and the auxiliary feedwater pump turbine at PWR's have especially adverse operating climates and the selection of the proper lubricating oils is critical to their continued operability.
2. With changes in technology and manufacturing techniques, it is possible that manufacturers and distributors of lubricating oils and greases may make slight alterations to their lubricating agents from time-to-time. Such changes may or may not be reflected in the specification for the oil or grease but may indeed affect the component in which it is used. Licensees should be aware of this potential and establish some means of assurance that such changes will receive proper review. Such means might include a review of the oil or grease specification for changes on a batch or periodic basis, or notification by the manufacturer or distributor when such changes are made.

This circular is being forwarded to all holders of construction permits for their information with regard to pending preparation of components for subsequent operations.

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

IE Circular 78-02  
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