

TERRY NUCLEAR TURBINES TYPES ZS-4, GS2N, CS, & CCS

LUBE OIL SAMPLE ACCEPTANCE CRITERIA

- Moisture** - Moisture content shall be less than 0.5%.
- Acidity** - Acidity as measured by Neutralization Number Test (ASTM D974) shall be less than 0.5%.
- Viscosity** - Viscosity change from baseline shall be less than 10%.
- Particle Count** - Particle count shall be less than TABLE 1 (SAE 5 or ISO 17/14).

TABLE 1

Particle Size (Micron)	Allowable Number / 100 ml
5-10	87,000
10-25	42,000
25-50	6,500
50-100	1,000
Over 100	41

MAINTENANCE RECOMMENDATIONS:

- 1) Monthly oil samples should be taken to check moisture content.
- 2) Quarterly oil samples should be taken for analysis to the above criteria.
- 3) Change oil and flush turbine lubricating system (isolating governor) and governor lube oil system at 18-24 month intervals or sooner as dictated by sample results.
- 4) Replenish with oil filtered to SAE 3 or ISO 15/12 (or better) cleanliness.
- 5) Oil should always be changed if its appearance is different than when new, oil smells different than when new, or if the viscosity changes.

ORIGINAL K-15212
(2) 2/1/05

thereby not only negating the effects of the oil change but also allowing further accumulation of particulate in the governor.

It is also important to filter new oil before refilling the oil system. The new oil should be filtered to a cleanliness better than the expected operating cleanliness of the unit. This will remove any contaminants in the new oil and help ensure that the new oil will meet the cleanliness acceptance criteria in operation.

Terry/Dresser-Rand previously recommended an oil acceptance criteria of SAE 3 (ISO 15/12) for turbines with forced feed oil systems. D-R also recommended a maximum of SAE 5 (ISO 17/14) for turbines with oil ring lubrication and no oil filter. The governors on these ring lube units do not run on the turbine oil supply.

The previously established limits on oil were based on the requirement of maintaining an oil quality sufficient to protect the Woodward governor components from excessive contamination. The problems reported in the industry with sticking governors, clogged orifices, and damaged bearings indicate oil contamination levels much higher than those recommended by either D-R or Woodward/ESI.

Dresser-Rand's position on the TTUG recommendation is as follows:

Due to the criticality of this service, and based on the previous Terry/D-R recommendations for oil cleanliness on the ring lube units D-R cannot directly concur with the TTUG cleanliness recommendations. However, because the oil cleanliness limits have been specified by Woodward/ESI at a level greater than that specified for the turbine itself, we will revise our recommendation to the following levels:

- A criteria of SAE 3 – ISO 15/12 or better should be met for lube oil flushing
- Expected operating criteria is SAE 4 – ISO 16/13
- The marginal operable range requiring action is SAE 5 – ISO 17/14

The attached acceptance criteria sheet should replace the original in the turbine instruction manuals.

Regards,

