



**US Army Corps
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Engineer Research and
Development Center

Lubricants in Hydro-Turbines

Description	Some of the new Group 2 turbine oils have been found to be incompatible with existing Group 1 oils. This work will develop tests to determine the compatibility of potential replacement oils by observing their physical properties under controlled laboratory conditions.
Issue	The turbine oils historically used in Corps hydropower facilities were formulated with solvent refined – naphthenic-type base oils (Group-1). The oil industry has replaced these oils with paraffinic-type (Group-2) oils. The Group 2 oils provide superior performance in steam and gas turbines due to improved thermal stability and purity. However, in hydroturbines the additives may precipitate out due to low temperature, minimal agitation, or other solubility characteristics. The additive problems have resulted in significant costs associated with complete replacement of oil, cleaning of equipment, and associated down time of hydropower units. The composition and quantity of additives is considered proprietary and confidential and varies from manufacturer to manufacturer (as it did with the Group 1 oils) thus adding to the complexity of the problem.
Users	Users include Corps of Engineers as well as other hydropower installations requiring the addition of new make-up oil or needing to completely replace existing oil in hydropower units.
Products	The research will develop a test procedure to determine the compatibility of new oil to be used in hydroturbine units with oils currently in use.
Benefits	Mixing new make-up turbine oil with existing oil can produce plugged filters and sludge resulting in the need to shut down, drain and clean an entire hydropower unit and completely replace the old oil with new. The ability to evaluate oil compatibility prior to mixing will eliminate this problem and save considerable costs.
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