

# Case Study 5

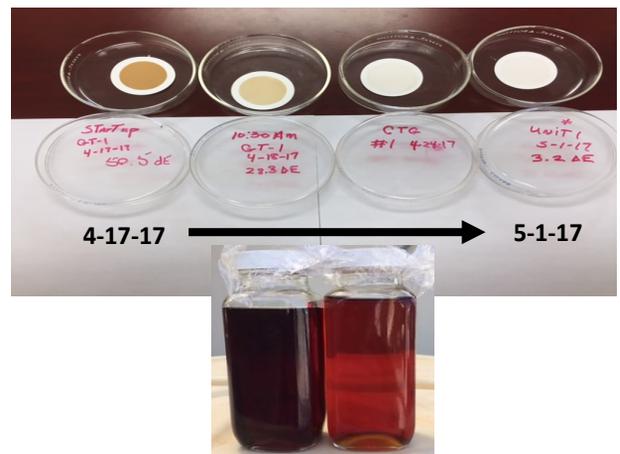
## Turbine Lube Oil Varnish Mitigation

### Background

Acid and varnish formation are a common problem for hydraulic and lube oil systems in combined cycle gas turbine (CCGT) power plants. Fluid degradation from thermal exposure (static discharge, micro-dieseling, friction and system combustion), hydrolysis from moisture, oxidation, mechanical shear and autocatalytic reactions from salts all contribute to acid and varnish formation. If left unchecked, varnish deposits will form on system components and eventually cause a catastrophic system failure (turbine trip). Northeast Filter was contacted by one of our CCGT plants with concerns that their servo valves were sticking and caused a turbine trip. Their standard fluid analysis indicated high acid level, so they performed a fluid displacement with new fluid. After only one month, the acid was creeping up again, so they called Northeast Filter to investigate and assist.

### Solution

Northeast Filter VAS services took fluid samples and performed a colorimetric fluid analysis. We found a high incidence of varnish formation in the oil. NFC recommended varnish mitigation with an ionic dry resin cartridge filter system installed as a kidney loop off their main reservoir. Electro-kinetic forces in the filter media attract acid and varnish molecules to the media surface and ionic transport carries these molecules into the macro-porous structure without ionic exchange or liberating any moisture back to the fluid system. Fluid analysis demonstrated improvement after 2 weeks and the system was back to normal in 30 days. Inspection of system components at the next scheduled outage showed that the varnish deposits had been removed and all internal surfaces were clean and free of varnish.



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