



Laboratory Service Report









EcoSafe[®] Revive – Case Study on Fluid in a GE 6B

OBJECTIVE:

A site with a 1998 GE 6B currently uses Mobil DTE 832 turbine oil that has been cited as being in critical condition for varnish. The addition of EcoSafe[®] Revive reduces the amount of varnish in the system. There are many methods that analytical labs use to determine the varnish potential for a fluid: pentane insolubles, ultracentrifuge, filter patch color, and Ruler%. Varnish potential can be evaluated with the addition of EcoSafe[®] Revive using the modern conventional varnish potential techniques recommended by the equipment manufacturer for turbine oils.

TESTING/RESULTS:

The oil samples came from the GE 6B was used in an extensive study of varnish formation in hydrocarbon based turbine fluids. The results reported as 10% EcoSafe[®] Revived Mobil DTE 832 is actual data obtained from Insight Services on varnish potential testing.

	Used Mobil DTE 832	10% Revive 15-day operation	10% Revive 23-day operation	10% Revive 75-day operation
				
Ultra-Centrifuge Sediment Rating	6	2	2	1
				
Filter patch colorimetry	68	33	61	78
Aminic Antioxidant %	34	26	22	23
Phenolic Antioxidant %	0	8	7	5
Varnish Potential rating	Critical	At-Risk	Critical	Critical
Varnish present in the system	High	Medium	Medium	Low

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After 15 days of operation, the varnish potential rating dropped from CRITICAL to an AT-RISK varnish potential rating as the varnish in the reservoir was dissolved. Between 15 days and 75 days, EcoSafe[®] Revive dissolves the solid varnish present in the system and brings the colored bodies that have formed over 14 years of operation back into solution. This darkens the fluid.

The MPC patch color is now a measure of the amount of dissolved varnish present in the system rather than the amount of particulate solids present in the sample. Usually, a high MPC value results in the gumming up of the pencil filters ahead of the servo-valves. However when EcoSafe[®] Revive is in the system, the pencil filters are completely clean and clear of all varnish as shown to the right. This is because the materials that would form varnish in a straight mineral oil system are kept in solution by EcoSafe[®] Revive.



The technology that eliminates varnish is based upon matching the solubility of the materials that form the varnish with the polarity of the base oil. The pentane (petroleum ether) used to conduct the MPC test shifts the polarity of the base oil mixture to a less polar condition and precipitates everything that has been dissolved by EcoSafe[®] Revive. Standard analysis shows the effects of EcoSafe[®] Revive in ways that Varnish Potential testing cannot.

	Used Mobil DTE 832	10% Revive 15-day operation	10% Revive 75-day operation
Total Acid Number ASTM D664	0.48	0.33	0.32
Viscosity	35.1 cSt	32.9 cSt	32.2 cSt
Specific Gravity	0.856	0.863	0.867
Water (ppm)	185	254	207

Whereas the sample darkens to a clear dark brown, the TAN is essentially unchanged as the varnish continues to dissolve into the lubricant. Because the viscosity increase is a measure of pre-varnish in the system, a critical state is not reached until the viscosity increases back to pre-addition levels (i.e. 32 cSt → 35 cSt).

CONCLUSION:

The presence of varnish has long been associated with shortened fluid life. Removal of varnish is problematic. Reincorporating the materials into the lubricant that have turned into the varnish is expected to bring the lubricant back to a like new condition for extended life. EcoSafe[®] Revive is a patent pending technology.

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