



Cat Powered Western Star, Engine Fuel and Oil Filters : Willow Tree Gravels, New South Wales

Willow Tree Gravels

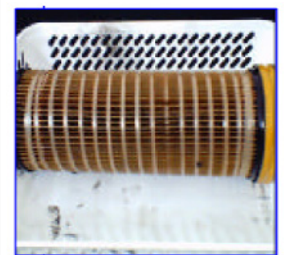
Willow Tree Gravels operates a Western Star powered by a C12 Caterpillar hauling grain and fertilizer in the north-west of New South Wales.

The Truck is fitted with an FMF3 on fuel and an FMO3 on oil. The truck was fitted from new and as indicated by the oil analysis below, it has had an ongoing problem with high copper and sodium levels. This report answers one question - "will filtering oil to this level mask any wear issues within plant and equipment?" This proves that it will not.



The problem in this case was a faulty head gasket and since this has been rectified the truck has settled down and in running 60,000km oil drains. The attached report indicates, at 60,000km, that the oil is at ISO 16/12 and is back on track. Soot is low at 0.6%, wear metal are at acceptable levles, the TBN is depleted and this is the reason the oil has been changed.

The other report attached is a filtergram done on the OEM 2 micron secondary fuel filter, which, at 60,000km, indicates 90% life remaining. FTA's FMF3 elements are changed every 40,000km. WTG now plans to change its OEM elements every 240,000km or 12 months resulting in significant monthly savings.



OEM fuel filter condition - 10% contamination penetration. Estimated 90% useful element life remaining. At 40,000km it was decided to change the element at 250,000km.

	Sample Number	37971	36557	34830	33070	31788	31649	31344	Indicative Levels
	Date	12/11/2002	17/09/2002	17/06/2002	20/03/2002	04/02/2002	24/01/2002	20/12/2001	
	Total Hours/Km	320,000	297,000	260,000	228960	209000	205000	195337	
	Hours/Km on Oil	60,000	37,000	25,000	18000	29000	25000	15000	
	Oil Changed	NO	NO	YES	NO	NO	NO	NO	
	Oil Added			Nil			4 ltrs		
Condition Tests	Fuel Dilution (%)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	>4%
	WT Solids (%)	0.6	1.0	2.0	3.0	2.5	3.5	4.2	>4%
	Volume Water (%)	ND	<0.5	ND	ND	ND	ND	ND	0.10
	Water PPM								
	Viscosity @ 40C (cST)	88	83	93	104	97	93	112	>10%
	TAN (mg/KOH/g)								
	TBN (mg/KOH/g)	3.5	6.0	7.5	4.0	3.5	1.0	7.0	
	ApH								
Wear Metals	PQ90 Index				+1	+4			
	Aluminum (Al)	<1	3	<1	<1	5	<1	1	20
	Silicon (Si)	8	14	10	1	1	<1	7	15
	Tin (Sn)	<1	1	<1	4	<1	9	<1	20
	Iron (Fe)	52	17	16	18	35	36	18	100
	Lead (Pb)	7	3	2	8	6	7	3	40
	Copper (Cu)	40	10	33	209	80	78	14	45
	Chromium (Cr)	<1	2	<1	<1	<1	<1	<1	15
	Sodium (Na)	<1	1	7	39	27	37	24	30
	Zinc (Zn)	1174	1241	1100	349				
Cleanliness	Others								
	ISO4406	16/14	18/15	22/19	17/13	17/14	16/13	18/15	19/16
	Gravi-Metric								
	>2 micron	1821	5892	89007	1900	2559	1698	6108	
	>5 micron	673	2179	32922	702	946	627	2257	
>15 micron	72	232	3519	75	101	67	241		
Contamination	Moderate	Elevated	Very High	Moderate	Moderate	Moderate	Moderate		