



**FILTER TECHNOLOGY**

cleaner fluids mean better business

**CASE STUDY**



**Transport**

Case No : 3 - 6 - 4

**Cummins M11 Engine, Oil Filtration : Howard Haulage, New South Wales**

**Howard Haulage**

Howard Haulage employs a Cummins M11 pulling a tautliner throughout New South Wales. They were experiencing high soot levels of 4.66% after 20,000km and, as would be expected, an increase in viscosity.

It was decided to fit 2 x FMO3 filters. Normally we would recommend 1 x FMO3 and change elements every 10,000km. As it could not be assured that the vehicle would be near the depot at this period we decided to install 2 x FMO3s. Initial soot levels, as per sample 311182, were 4.66% and viscosity was 20.6.

The next four samples from 322368 to 18080 show levels are still acceptable. The oil was changed at 80,000km. A reduction in soot of 59% and viscosity was within specification at 80,000km compared with sample 21182 which had only done 20,000km.

Sample 10 was done on 21 May 2001 with the vehicle recording 663,691km doing oil changes every 80,000km. Soot levels have shown a steady 50% reduction and viscosity has remained within specification.



**Shell Care**  
MACHINE AND LUBRICANT ANALYTICAL SERVICE

**TEC Check**  
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CUSTOMER DETAILS		EQUIPMENT DETAILS		OPERATION DETAILS		RESULTS	
Client: HOWARD HAULAGE	NAME: CUMMINS	REG. NO: M21400	REG. STATE: VIC	DATE: 21-May-01	RESULT: SATISFACTORY	<p><b>REPORT NUMBER: 378274</b> 24-May-01</p>	
Model: NEW ENGLAND LINV	MAKE: HOWARD HAULAGE	ENGINE: ISB600	TYPE: TRUCK	DATE: 21-May-01			
Address: WILLOW TREE NEW 2338	MAKE: HOWARD HAULAGE	REG. NO: M21400	REG. STATE: VIC	DATE: 21-May-01	<p>Attention of: IAN WOOD (SVE MGR) Phone: 0267471223</p> <p>Fax No: 0267471188 Printed: 28/06/99 11:34AM</p> <p>Customer/Company: HOWARD HAULAGE Site: HOWARD HAULAGE</p> <p>Reg No/Plate No: 094DKL Compartment: ENGINE</p> <p>Make: CUMMINS Model: M11 400</p> <p>Lubricant Brand: RIMULA SUPER Grade: 15W/40</p> <p>Sample No: 18080 Received: 25/06/99 9:50</p>		

  

REPORT NUMBER:	PREVIOUS READINGS ON THIS SAMPLE						LIMIT FOR DIESEL ON OIL
	5	8	7	6	5	3	
378274	363071	342089	343829	325844	299121		
10	5	8	7	6	5		
13-May-01	13-Feb-01	13-Nov-00	29-Aug-00	15-May-00	15-Feb-00		
21-May-01	16-Feb-01	15-Nov-00	11-Sep-00	17-May-00	28-Feb-00		
<b>RMS ON OIL</b>							
WGC @ 400 cSt (ASTM D445)	115.60	103.30	118.20	111.40	105.80	111.70	
WGC @ 100 cSt (ASTM D445)	14.57	13.35	14.30	14.35	13.99	14.30	
WGC @ 50 cSt (ASTM D445)	129	130	132	131	134	133	
SECURATOR (SHELL)	53.5	23.6	48.1	25.8	34.3	45.3	<30
STRUCTURE (SHELL)	28.8	18.5	16.4	10.7	14.1	18.2	<25
PENTABENZOL Nucle (CATERPILLAR)	0.182	0.021	0.110	0.049	0.083	0.130	<0.25
TELA ROSE (SHELL)							
PERFORMANCE (SHELL)	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
ACTV INDEX (SHELL)	3	3	3	3	3	3	
T. A. N. (mg KOH/g LUBRIL DERM)	4.36	6.28	6.87	6.23	6.78	6.60	-8
WATER CONTENT % w/w (SHELL)	0.073	0.002	0.042	0.044	0.036	0.048	<0.15
SULFOX. % w/w (SHELL)	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.2
T. A. N. (mg KOH/g LUBRIL DERM)							
PER. SELLER % w/w (SHELL)	1.1	0.3	0.7	0.5	0.4	<0.1	<3.5
% SUL. ARSENIC 2 (SHELL)							>30%
% SUL. ARSENIC 2 (SHELL)							>30%
% SUL. ARSENIC 2 (SHELL)							>25
<b>PHYSICAL</b>							
IRON as Fe (PPM)	65	40	42	22	35	80	<70
CHROMIUM as Cr (PPM)	4	3	3	2	3	6	<10
COPPER as Cu (PPM)	34	00	6	2	5	16	<20
LEAD as Pb (PPM)	38	5	7	1	0	25	<20
ALUMINIUM as Al (PPM)	3	2	3	2	3	7	<15
SILICON as Si (PPM)	0	0	0	0	0	0	<15
SULPHUR as S (PPM)	5	3	8	4	9	16	<15
SODIUM as Na (PPM)	20	11	42	21	55	188	<30
POTASSIUM as K (PPM)	0	0	0	0	0	1	<30
CARBON as C (PPM)	0	0	0	0	0	0	<5
SILVER as Ag (PPM)	0	0	0	0	0	0	<5
ZINC as Zn (PPM)	0	0	0	0	0	0	<5
PHOSPHORUS as P (PPM)	11	10	9	1	11	31	<5
ANTHRACENE as AN (PPM)	20	26	258	92	182	2	<5
METHYLENE as M (PPM)	2	3	23	9	24	52	
BARBITURIC as B (PPM)	0	0	3	0	0	0	
ZINC as Zn (PPM)	1115	1110	1326	1018	1153	1573	ADDITIVE
CALCIUM as Ca (PPM)	2754	2382	3110	2554	2969	3804	ADDITIVE
PHOSPHORUS as P (PPM)	879	878	1158	866	1087	1452	
SULPHUR as S (PPM)	11	15	19	11	19	45	

  

Reason For Test - Routine Sample						
	Current	Prev#1	Prev#2	Prev#3	Prev#4	Prev#5
Sample No	18080	32666	32133	31200	322368	311182
Sample Date	19/04/99	29/03/99	4/02/99	12/12/98	14/11/98	21/08/98
Equipment location	421801	384836	378153	360394	388950	318043
Oil location	80627	88682	47979	32121	18877	24166
Top up litres	0	0	0	0	0	0

  

Physical Test & FTIR						
	14.08	14.20	13.85	13.81	14.19	20.6
Viscosity @ 100°C	14.08	14.20	13.85	13.81	14.19	20.6
TBN (ASTM D2896)	5.5	8.4	8.7	7.7	8.1	6.2
Soot Index	1.88	1.62	1.19	0.89	0.9	4.66
Dispensancy	84	87	86	86	86	84
Water (%)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fuel Dilution	<3	<3	<3	<3	<3	<3
Oxidation	15	12	11	8	4	15
Acid Value	13	11	10	9	7	13
Alkalinity	Alkaline	Alkaline	Alkaline	Alkaline	Alkaline	Alkaline
PD Index	1	0	0	0	0	4

  

Metal Concentration - ppm						
	3	3	2	2	2	2
Aluminium	3	3	2	2	2	2
Iron	63	52	46	42	31	55
Chromium	5	4	3	3	2	4
Copper	7	6	5	4	3	4
Lead	11	9	8	6	4	<1
Tin	2	2	2	1	1	1
Silicon	0	4	4	4	6	7
Sodium	12	8	10	7	4	<1

  

* - Caution ** - Action						
Diagnosis	Normal	Caution	Normal	Normal	Normal	Action