

AMSOIL Proves Superior in Clark County Field Test

In order to demonstrate the effectiveness of AMSOIL 15W-40 Synthetic Heavy Duty Diesel and Marine Motor Oil and the AMSOIL Dual-Gard filtration system in reducing operating expenses, AMSOIL and Direct Dealer Bill Andes began an ongoing field test in October 1998 with the bus fleet of the Clark County Board of Mental Retardation & Developmental Disabilities (MR/DD) in Springfield, Ohio.

Participating in the field test are three 1997 International 3800 school buses, two equipped with International 466 diesel engines and one with an International 466E diesel engine. Each had previously been running a conventional petroleum-based oil.



Prior to starting the field test, four goals were set:

1. The reduction of fuel consumption through the superior lubricity and reduced viscometric drag provided by [AMSOIL 15W-40 Synthetic Heavy Duty Diesel and Marine Motor Oil](#). Verification of this goal will be obtained by comparing previously documented fuel mileage reports using petroleum oils with fuel mileage reports of the same vehicles now using AMSOIL diesel oil.
2. The extension of fluid drain intervals due to the superior synthetic chemistry and additive system of AMSOIL Synthetic Heavy Duty Diesel and Marine Motor Oil, along with the additional efficiency provided by the AMSOIL Dual-Gard filtration system.
3. The reduction of maintenance costs due to the superior wear protection and extended drain intervals provided by AMSOIL Synthetic Heavy Duty Diesel and Marine Motor Oil and the AMSOIL Dual-Gard filtration system.
4. Provide the above-mentioned benefits without compromising the mechanical integrity of the equipment.

Baseline samples of the petroleum oil already in the crankcase were obtained, tested and documented. Next, the oil was drained and the engines flushed with AMSOIL Engine Flush. AMSOIL BMK-12 Filter Mounts, two BE-110 By-pass Filtration elements and AMSOIL 15W-40 Synthetic Heavy Duty Diesel and Marine Motor Oil were installed in each vehicle.

Oil samples from each bus are drawn and tested at 4000-mile intervals, the normal oil drain interval practiced by MR/DD when using conventional lubricants. Data obtained from the oil samples serves to determine the following:

1. Fluid and vehicle baselines
2. The mechanical condition of the vehicles

3. Ability of the equipment to continue functioning as a demonstration vehicle
4. Rate of internal equipment wear
5. Serviceability of fluids and filters

Once drawn, each oil sample is reviewed in the areas of elemental analysis (including wear metals, contaminants and additives), physical properties (including viscosity, total acid number and total base number) and contamination (including water, solids, glycol, oxidation, fuel soot and fuel dilution). Oil condemnation limits vary due to individual engine idiosyncrasies, operating conditions and time the fluid has been in service.

Bus Number	Miles on AMSOIL without being changed	# of Petroleum oil changes (based on 4,000-mile interval)	# of AMSOIL oil changes (based on <i>proposed</i> 10,000-mile interval)
4	45,465	12	5
7	71,185	18	8
22	65,776	17	7

OBSERVATIONS

As of May 1, 2001, the buses had accumulated a total of 182,426 miles without oil changes, and several benefits associated with running the AMSOIL products have been realized. First, both labor and vehicle downtime have been reduced. While using the previous petroleum-based motor oil, the Clark County Board of MR/DD was accustomed to changing oil at 4,000-mile intervals. They now plan to extend their intervals to 10,000 miles and beyond if supported by oil analysis results. The chart below shows the comparison figures.

As for the aftermarket full flow oil filters, the original intention was to change them every 6,000 to 10,000 miles, but after careful review of oil analysis results, it was determined that because of the efficiency of the AMSOIL Dual-Gard filtration system, 10,000- to 12,000-mile intervals were easily obtainable on the full-flow filters.

For demonstration purposes, the BE-110 filter elements remained unchanged for a 2-year period. However, after review, it was determined that under normal conditions it would be beneficial to change them after a 40,000- to 50,000-mile interval.

Engine wear rates have decreased significantly since changing to AMSOIL 15W-40 Synthetic Heavy Duty Diesel and Marine Motor Oil. High temperature operating conditions have also been reduced. This leads to enhanced engine protection, and ultimately, to longer engine life. Because the engines have been operating more efficiently, three to five percent gains in fuel economy have also been realized. The chart below compares the levels of wear particles present in the previous conventional oil with the levels present in the AMSOIL as of May 2001. The condition of the AMSOIL at various testing intervals is documented below.

CONCLUSION

Overall, this field demonstration was highly successful for AMSOIL. The oil analysis data indicate that AMSOIL products deliver uncompromising protection and performance. AMSOIL provides longer equipment life and reduced downtime, longer drain intervals, significant decreases in wear rates and operating temperatures and dramatic improvement in engine performance when compared to conventional petroleum oils.

Oil Analysis - Bus #4								
		Percent (%) of the amount allowable			Parts Per Million (ppm)			
Mileage	Viscosity (100°C)	OXD	NOX	TBN	Fe (Iron)	Pb (Lead)	Cu (Copper)	Al (Aluminum)
0	15.2	0.0	0.0	12.0	0	0	0	0
3883	11.6	7.8	4.3	12.7	17	1	2	7
5378	12.3	23.3	8.6	9.9	20	3	4	8
9700	14.0	4.4	7.1	13.0	40	2	4	8
22885	12.0	7.8	15.7	12.1	89	3	11	7
34059	12.4	21.1	15.7	12.4	134	5	30	12
45465	12.2	20.0	18.6	11.9	146	7	35	16

Oil Analysis - Bus #7								
		Percent (%) of the amount allowable			Parts Per Million (ppm)			
Mileage	Viscosity (100°C)	OXD	NOX	TBN	Fe (Iron)	Pb (Lead)	Cu (Copper)	Al (Aluminum)
0	15.2	0.0	0.0	12.0	0	0	0	0
3614	12.8	1.0	2.8	12.9	5	1	1	6
4126	13.6	3.3	4.3	9.8	9	3	3	7
10607	13.9	2.2	10.0	11.9	12	2	2	6
22428	12.9	10.0	10.0	12.2	30	5	27	8
31569	13.2	15.6	14.3	11.0	28	1	12	5
42647	13.6	25.6	18.6	10.6	61	12	38	9
58055	14.0	27.8	21.4	10.5	73	20	30	10
71185	14.2	17.8	20.0	10.7	53	16	14	6

Oil Analysis - Bus #22								
		Percent (%) of the amount allowable			Parts Per Million (ppm)			
Mileage	Viscosity (100°C)	OXD	NOX	TBN	Fe (Iron)	Pb (Lead)	Cu (Copper)	Al (Aluminum)
0	15.2	0.0	0.0	12.0	0	0	0	0
2732	13.4	1.1	2.8	7.8	7	2	12	6
3680	12.3	7.8	4.3	12.8	8	1	1	8
14329	12.5	5.6	10.0	12.9	14	4	3	6

20905	13.4	11.1	10.0	12.3	26	7	5	8
30671	12.8	6.7	11.4	9.1	28	6	6	7
41196	13.1	16.7	14.3	11.7	36	6	11	7
52983	13.7	21.1	15.7	11.2	44	7	19	7
65776	13.8	12.2	14.3	11.0	49	0	10	8

Oil Analysis Comparison: Petroleum Oil at 4,000 miles vs. AMSOIL Motor Oil at 45,465 miles to 71,185 miles

Vehicle	Metal	Type of Oil	Parts Per Million	Type of Oil	Parts Per Million	% Reduction
Bus #4	Iron (Fe)	Rotella	170	AMSOIL	146	-14%
	Copper (Cu)		34		35	+3%
	Aluminum (Al)		68		16	-76%
	Lead (Pb)		26		7	-73%
Average						- 44%

Vehicle	Metal	Type of Oil	Parts Per Million	Type of Oil	Parts Per Million	% Reduction
Bus #7	Iron (Fe)	Rotella	126	AMSOIL	53	-58%
	Copper (Cu)		42		14	-67%
	Aluminum (Al)		98		6	-94%
	Lead (Pb)		42		16	-62%
Average						- 70%

Vehicle	Metal	Type of Oil	Parts Per Million	Type of Oil	Parts Per Million	% Reduction
Bus #22	Iron (Fe)	Rotella	136	AMSOIL	49	-64%
	Copper (Cu)		234		10	-96%
	Aluminum (Al)		117		8	-93%
	Lead (Pb)		39		0	-100%
Average						- 88%