UC Berkeley

As part of a study conducted in San Francisco by Biodiesel Industries Inc for the Bay Area Air Quality Management District on a Biodiesel Pilot Project, Filter Technology was asked to supply fuel and bypass oil filters to be fitted to a Cummins 5.9 litre Diesel engine that was being used for the Emission Tests carried out at the Combustion Analysis Lab engine dynamometer at the University of California Berkeley

Also a FTA FM 440 bulk fuel filter system was installed as part of the filter process on the Mini MPU Biodiesel fuel processor.

Fuels used in the testing at Berkeley were CARB Ultra Low Sulphur Diesel (ULSD) supplied by British Petroleum in San Jose, and Biodiesel made using the Mini Modular Production Unit from feedstock's acquired in the Bay Area consisting of Virgin Refined Soybean Oil and Used Cooking Fryer Oil. The two blends of Biodiesel used in the testing were B20 and B100.

The test results below and on the next page are an extract from the test report done by UC Berkeley (Bay Area Air Quality Management Professional Services Contract; Contract NO.2003-004 Biodiesel Pilot Project). FTA fuel and engine oil bypass systems results are highlighted in blue in both reports.

Biodiesel had rises in NOx in all cases, but when connected to FTA's fuel and oil filter systems lower NOx readings were recorded.

Based on these results FTA's fuel and bypass oil filters have overcome the issue with Biodiesel of a rise in NOx and also significantly lowering emissions in CARB Ultra Low Sulphur Diesel.

Engine Use 5.9L 6 Cylinder Cummins
Test Below are on ULSD and 20% Bio Diesel made using Used Vegetable Oil

Bio Diesel Blend %	FTA Fuel & Oil Filter	Speed (RPM)	Load (%)	HC (ppm)	CO (ppm)	PM (filters) (mg/m3)	NOx (ppm)
ULSD	No	1800	80	16.2	42.8	3	636
ULSD	Yes	1800	80	12.2	39.2	2.5	510
Result	% + or -			-24.7	-8.4	-26.7	-19.8
B20	No	1800	80	12.8	39.2	2.7	646
B20	Yes	1800	80	11.1	35.1	1.6	530
				- 13.2	-10.45	- 40.7	-17.9

Fuels-Run in 5.9L, 6 Cylinder Cummins	Bio Die-sel Blend %	FTA Fuel & Oil Filter	Speed (RPM)	Load (%)	HC (ppm)	CO (ppm)	PM (filters) (mg/m3)	NOx (ppm)
CARB Ultra Low Sulpher	ULSD	No	1800	80	16.2	42.8	3	636
CARB Ultra Low Sulpher	ULSD	Yes	1800	80	12.2	39.2	2.5	510
Percentage + or -					-24.7	-8.4	-26.7	-19.8
Bio Used Vegetable Oil	B20	No	1800	80	12.8	39.2	2.7	646
Bio Used Vegetable Oil	B20	Yes	1800	80	11.1	35.1	1.6	530
Percentage + or -					- 13.2	-10.45	- 40.7	-17.9
Bio Produced from Virgin Soy Oil	B20	No	1800	80	10.8	37.9	1.9	645
Bio Produced from Virgin Soy Oil	B20	Yes	1800	80	12.8	40.9	1.5	528
Percentage + or -					+ 1.8	+ 7.9	- 21.0	-18.1
Bio Produced from Virgin Soy Oil	B100	No	1800	80	10.0	36.3	2.3	720
Bio Produced from Virgin Soy Oil	B100	Yes	1800	80	8.4	34.5	1.7	591
Percentage + or -					- 16.0	- 4.9	- 26.0	- 17.9
Bio Used Vegetable Oil	B100	No	1800	80	7.7	33.3	2.2	656
Bio Used Vegetable Oil	B100	Yes	1800	80	6.8	31.7	2.1	601
Percentage + or -					- 11.6	- 4.8	- 4.5	- 8.5