

Cat 777B in Surface Coal



**Use of MDEP Exhaust
Gas Testing to Improve**

***Fuel Efficiency**

***Engine Life**

777B MDEP Exhaust Gas
Test Results
Before Tune-up

Carbon Monoxide is higher
than Carbon Dioxide –
Indicates Poor Combustion.

Before Tune Up

Diesel Particulate Matter is
Very High – Black Smoke –
Wasted Fuel.

Equipment # 4YCO

Equipment Reference # 4YCO

Year: 2000
Vehicle type: Haul truck
Vehicle model: 777B
OEM SN:
Stack position: Single

Evaluation Date: 10/13/2010

Evaluation Type: Baseline

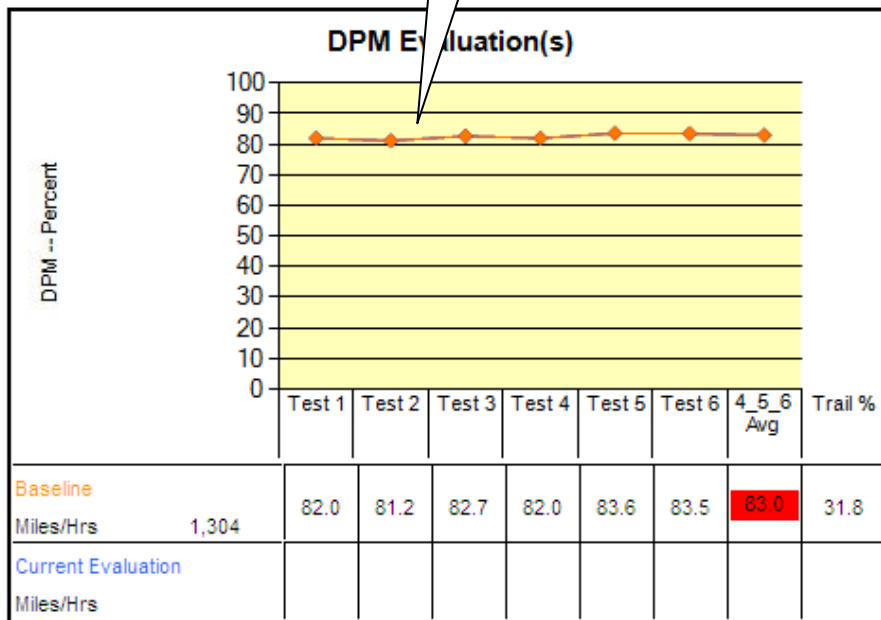
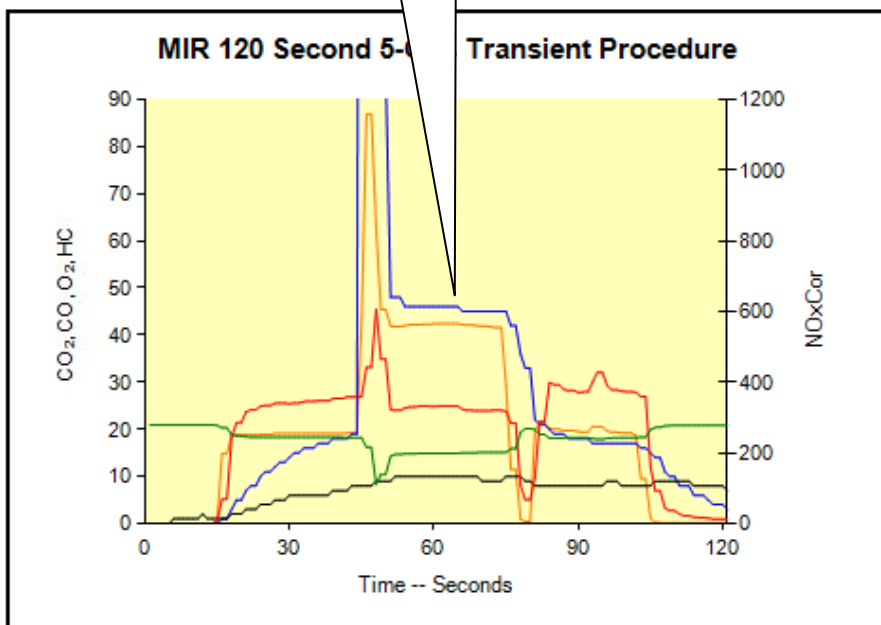
Engine mfr: Caterpillar
Engine model: 3508
Injection type: M
Fuel type: No data
Engine position: Single

Annual fuel consumption (gal):
Average DPM Density (%):
Calculated fuel loss (gal):
Calculated DPM produced (lbs.):
Average DPM Density (%):
Calculated fuel loss (gal):
Calculated DPM produced (lbs.):

RENCO
Manage What You Cannot Measure

	75,000
Baseline	83.0
10/13/2010	12,451
	5,043
Current Evaluation	83.0
10/13/2010	12,451
	5,043

CO₂ % X 10
CO % X 1000
HC ppm
NO_xCor ppm
O₂ %



Recommendations:

Evaluation results indicate the engine is injecting more fuel than it can burn during engine acceleration and at full power. Recommend replacing and adjusting the engine's air/fuel control to reduce fuel loss during engine accelerations. Adjust the engine fuel injection to match the engine real-time ability to burn fuel at full power.
NOTE -- CO and HC should measure closer to normal after engine over-fueling is reduced.

777B MDEP Exhaust Gas
Test Results
After Tune-Up

Carbon Monoxide is lower
than Carbon Dioxide – Much
Better Combustion.

After Tune Up

Diesel Particulate Matter
reduced by more than 50%.
Much better Fuel Efficiency.

Equipment # 4YCO

Equipment Reference # 4YCO

Year: 2000
Vehicle type: Haul truck
Vehicle model: 777B
OEM SN:
Stack position: Single

Engine mfr: Caterpillar
Engine model: 3508
Injection type: M
Fuel type: No data
Engine position: Single

Evaluation Date: 10/21/2010

Evaluation Type: A/F Adjusted

RENCO
Manage What You Cannot Measure

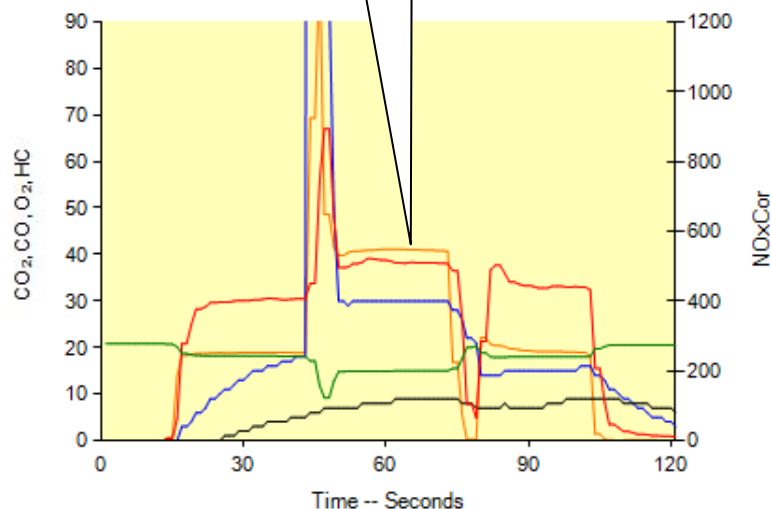
Annual fuel consumption (gal):
Average DPM Density (%):
Calculated fuel loss (gal):
Calculated DPM produced (lbs.):
Average DPM Density (%):
Calculated fuel loss (gal):
Calculated DPM produced (lbs.):

	75,000
Baseline	83.0
10/13/2010	12,451
	5,043
Current Evaluation	37.2
10/21/2010	5,583
	2,261

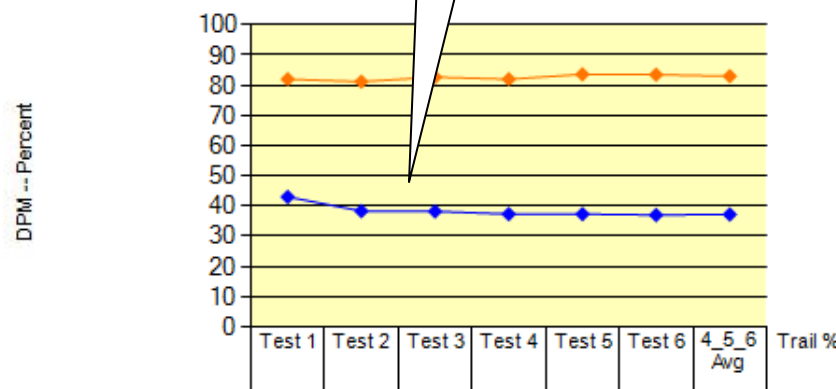
CO₂ % X 10
CO % X 1000
HC ppm
NO_xCor ppm
O₂ %

MIR 120 Second 5-

Transient Procedure



DPM Evaluation(s)



Baseline		82.0	81.2	82.7	82.0	83.6	83.5	83.0	31.8
Miles/Hrs	1,304								
Current Evaluation		43.0	38.3	38.2	37.3	37.3	37.0	37.2	5.4
Miles/Hrs	1,401								

Recommendations:

Evaluation results indicate the engine is injecting more fuel than it can burn during engine acceleration. Recommend adjusting the engine's air/fuel control a bit more during the next MDEP evaluation to reduce fuel loss during engine accelerations If combustion has not improved from this test results. Note - Engine combustion should improve over the next 100 hours from this tune-up

777B

Fuel Savings Analysis

	GALLONS	EST.COST / GAL	TOTAL \$ WASTED FUEL
BASLINE CALCULATED FUEL LOSS (gal)	12,451	\$3.50	\$ 43,579
CURRENT CALCULATED FUEL LOSS (gal)	5,583	\$3.50	\$ 19,541
TOTAL SAVED AFTER TUNE-UP PER YEAR	6,868		\$ 24,038
	TOTAL SAVED / MONTH		\$ 2,003
TUNE-UP W/ INJECTOR REPLACEMENT			\$ 7,500
TUNE-UP W/ INJECTOR REPLACEMENT PAYBACK			3.74 months
MONEY SAVED 1ST YEAR AFTER TUNE-UP COSTS			\$ 16,538

777B

Oil Sample Analysis

777B Oil Sample Benefits

Note decrease in Iron and Soot

After Tune Up

Component	Sample Dte	Oil Hrs	Filter Change	Al	Si	Fe	Soot
ENGINE	1-Jun-10		Yes	1	3	46	209
ENGINE	29-Jun-10	302	Yes	1	2	38	204
ENGINE	5-Aug-10	337	Yes	1	3	42	230
ENGINE	28-Sep-10	313	Yes	1	3	24	124
TUNE -UP							
ENGINE	22-Nov-10	351	Yes	1	3	21	36
ENGINE	3-Jan-11	328	Yes	2	2	19	24

Thank You

