

# PETZON PLUS™ =0Rmul∧ 7







# PETRON PLUS<sup>TM</sup> FORMULA 7

**TESTS on Part No. 20310** 

# PREMIUM ALL-SEASON MULTI-PURPOSE DIESEL FUEL CONDITIONER w/LUBRICITY

### WINTER DIESEL PERFORMANCE ADDITIVE

#### **PERFORMANCE FEATURES:**

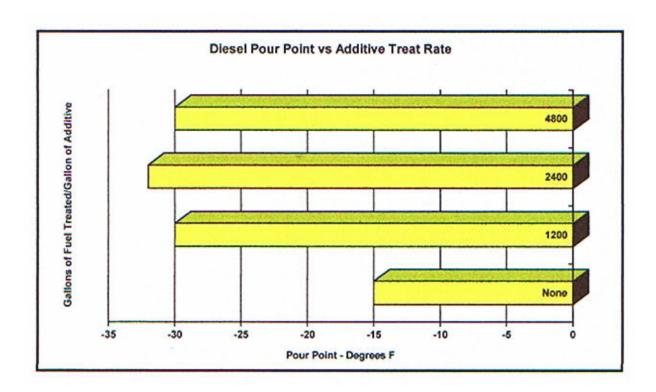
- PROVIDES EXCELLENT LOW TEMPERATURE FUEL OPERABILITY
- SUBATANTIALLY REDUCES COLD FILTER PLUG POINT (CFPP)
- REDUCES OR ELIMINATES THE USE OF COSTLY KEROSENE BLENDING
- CONTAINS AN EFFECTIVE LEVEL OF DETERGENT ADDITIVE
- IMPROVES FUEL ECONOMY
- HELPS REDUCE SMOKE AND PARTICULATE EMISSIONS
- HELPS REDUCE HYDROCARBON AND CARBON MONOXIDE EMISSIONS
- IMPROVES FUEL LUBRICITY FOR ADDED INJECTOR PUMP PROTECTION
- ENHANCES FUEL STABILITY DURING STORAGE
- HELPS PREVENT FUEL SYSTEM CORROSION

PETRON PLUSTM GLOBAL, INC.

# WINTER DIESEL PERFORMANCE ADDITIVE

### **POUR POINT REDUCTION: ASTM D97**

FUEL TESTED	TREAT RATE	POUR POINT (°F)
Base Fuel	0	-15
Base Fuel + 20310	8 oz/300 gallons	-30
Base Fuel + 20310	8 oz/150 gallons	-32
<b>Base Fuel + 20310</b>	8 oz/75 gallons	-30

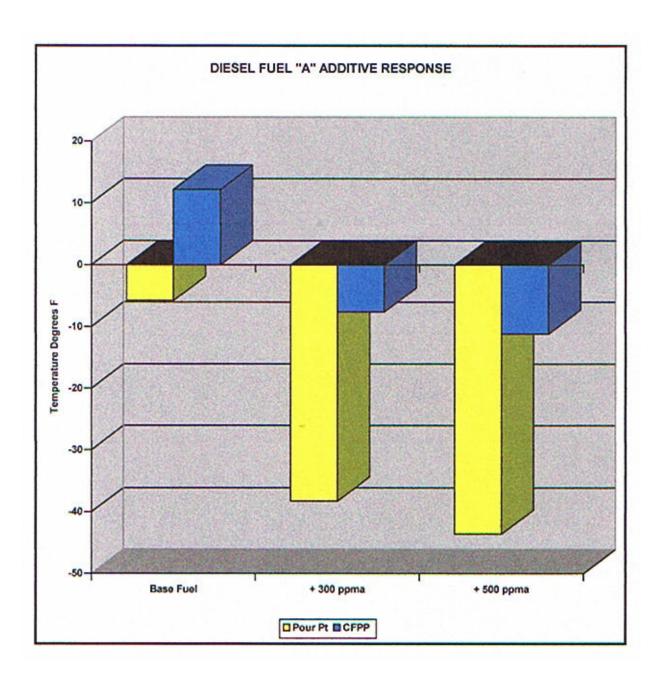




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# WINTER DIESEL PERFORMANCE ADDITIVE

#### **POUR POINT AND CFPP COMPARISON:**

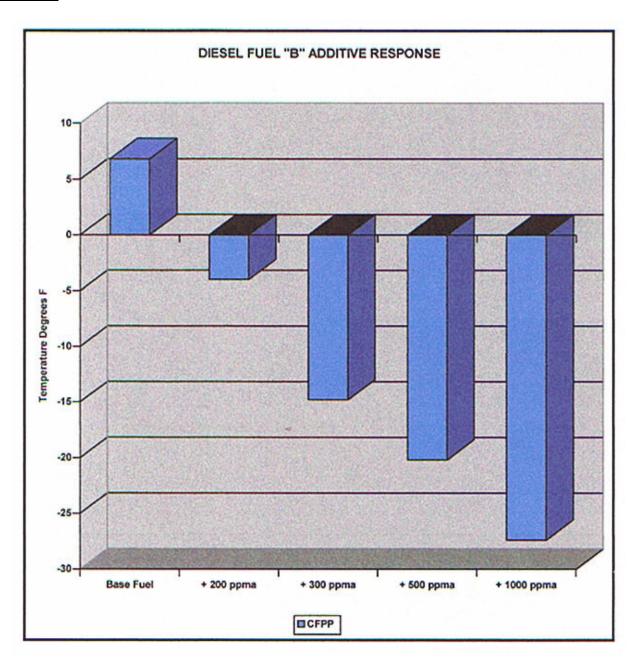




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# WINTER DIESEL PERFORMANCE ADDITIVE

#### **CFPP DATA:**





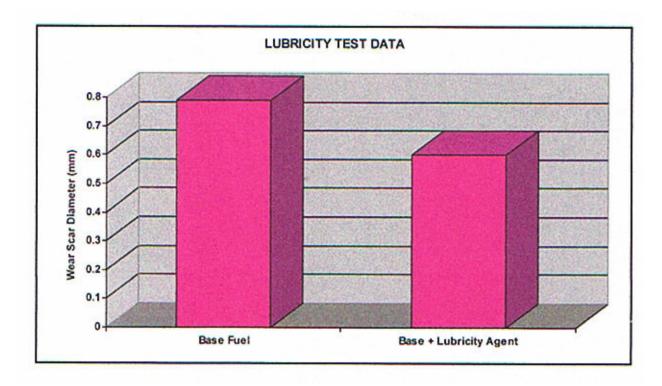
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### WINTER DIESEL PERFORMANCE ADDITIVE

#### **LUBRICITY DATA: ASTM D-5001**

The results shown below were obtained on the Ball-on-Cylinder-Lubricant-Evaluator (BOCLE) test with the lubricity agent used in 20310. The treatment rate was equivalent to 8 ounces of 20310 per 300 gallons of diesel fuel. The test was designed to measure the lubricity characteristics of low sulfur diesel fuels. Test conditions were 1 kg load at 25° C, and the results are reported as the Wear Scar Diameter (WSD), measured in millimeters.

FUEL TESTED	WSD (MM)	% REDUCTION
Base Fuel	0.79	
Base Fuel + Lubricity Agent	0.60	24%





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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### PERFORMANCE FEATURES

- KEEPS INJECTORS CLEAN
- SUPERIOR PERFORMANCE IN THE CUMMINS L-10 INJECTOR DEPOSIT TEST. CRC RATING <10</li>
- REMOVES AND PREVENTS DEPOSITS WHICH CAN DETERIORATE FUEL ECONOMY AND EMISSIONS
- PASSES CLASS 8 TRUCK FUEL FILTER PLUGGING TEST
- ENHANCES THERMAL STABILITY
- ENHANCES FUEL STABILITY DURING STORAGE
- CONTAINS DEMULSIFIERS FOR WATER INTERACTION CONTROL
- MEETS OR EXCEEDS THE JOINT EMA/TMC PUMP GRADE SPECIFICATION FOR DETERGENCY AND ACCELERATED THERMAL STABILITY
- MEETS OR EXCEEDS THE NCWM PREMIUM DIESEL FUEL SPECIFICATION FOR INJECTOR CLEANLINESS AND THERMAL STABILITY
- MEETS OR EXCEEDS CUMMINS CES 60032 REQUIREMENTS



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **CUMMINS L-10 PROCEDURE:**

▶ Using a 1990 Cummins L-10 engine, the procedure was designed to simulate the severe injector carbonizing problems that were first experienced in 1988 L-10 and NT engines. This field problem caused engines to lose as much as 15% of their maximum power in as little as 40,000 miles. The test cycle is as follows:

Step	Time	RPM	Load
1	15 sec.	2300	55-65 FHP
2	15 sec.	2300	Closed throttle motoring
3	Repeat ste	ps 1 and 2 for a	a total of 125 hours

To pass the L-10 test requires a CRC rating of the plunger of less than 10 and an average injector flow loss of less than 6%.

#### L-10 TEST ENGINE

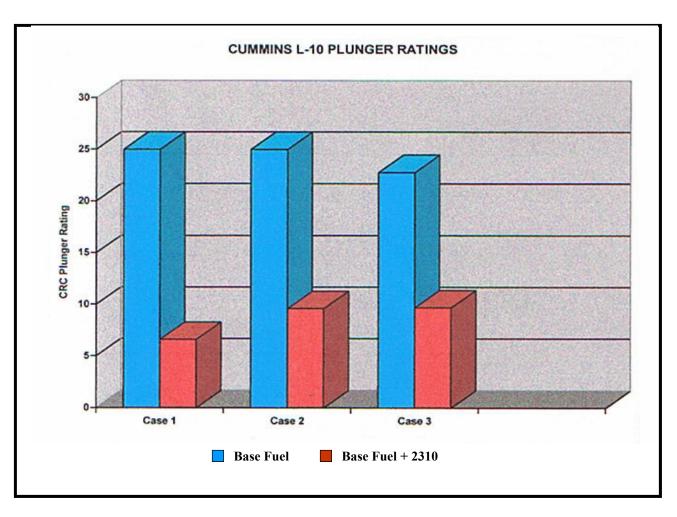




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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **CUMMINS L-10 TEST RESULTS:**

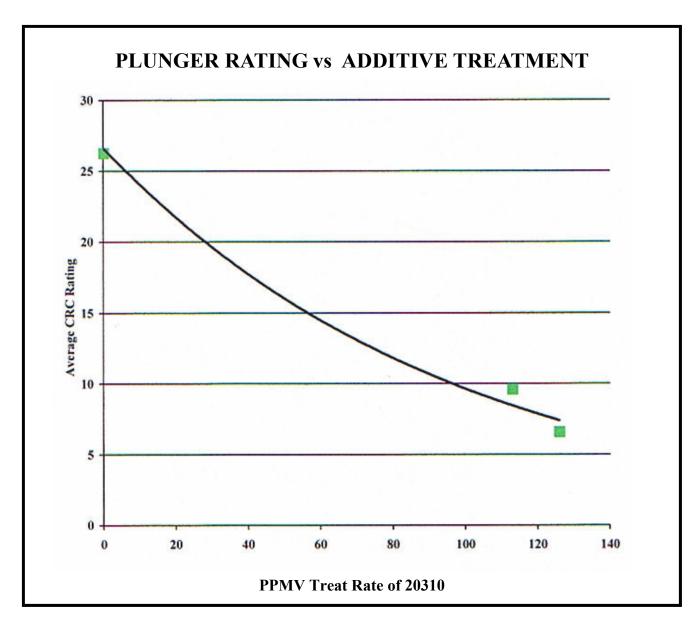


- **▶** BASE FUEL WAS CAT 1K
- ► CASE 1: FRONT ENGINE: ADDITIVE CONCENTRATE WAS 126 PPMV
- ► CASE 2: FRONT ENGINE: ADDITIVE CONCENTRATE WAS 113 PPMV
- ► CASE 3: REAR ENGINE: ADDITIVE CONCENTRATE WAS 333 PPMV
- ► A PLUNGER RATING OF LESS THAN 10 IS A "PASS"

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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **CUMMINS L-10 RESPONSE TO TREAT RATE:**



► THE FUEL USED IN THESE TESTS WAS CATERPILLER IK



# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

### **CUMMINS L-10 INJECTOR PLUNGER**

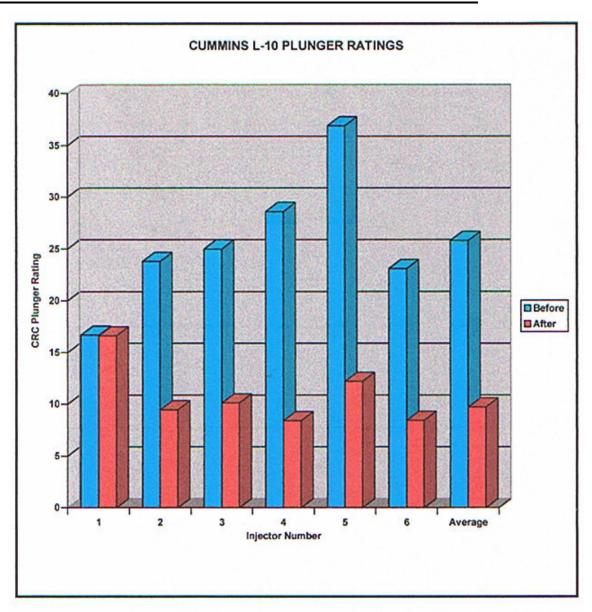




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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **CUMMINS L-10 DETERGENCY - 125 HOUR CLEAN UP RESULTS**



► TREATMENT RATE FOR 20310 IN ABOVE TEST WAS 303 PPM BY VOLUME

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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **LONG TERM DETERGENT EFFECTS**

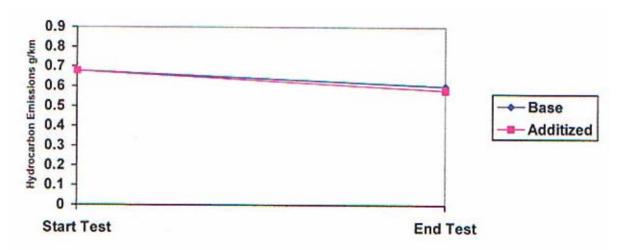
- ► A THREE-YEAR PROGRAM INVOLVING NINE DIESEL VEHICLES WAS CONDUCTED TO QUANTIFY VEHICLE EMMISSION PERFORMANCE.
- ► THE OBJECTIVE WAS TO EVALUTE ABILITY OF 20310 TREATED FUEL TO:
  - ► CONTROL EXHAUST EMISSION
  - ► FUEL CONSUMPTION
- ► A FLEET OF FOUR SMALL DIESEL PASSENGER CARS AND FOUR HEAVY DUTY TRUCKS WAS SELECTED.
- **►** TEST PROTOCOL:
- A, HEAVY DUTY DI VEHICLES: FOUR TRUCKS WITH CUMMINS ENGINES WERE DRIVEN ON ROAD. TWO OF THEM WERE OPERATED WITH EUROPEAN COMMERCIAL DIESEL FUEL AND OTHERS WITH SAME FUEL BUT INCLUDING ADDITIVE 20310 AT THE SELECTED CONCENTRATION. TYPE ONE TRUCKS WERE BRAND NEW TYPE-II TRUCKS WERE TWO YEARS OLD WITH NEW REPLACEMENT INJECTORS. THE TRUCKS TRAVED A COMBINED DISTANCE OF 279,630 MILES (450,000 KM).
- B. LIGHT DUTY PEUGEOT: TWO NEW MATCHED PEUGEOT 306 1.9 LITRE IDI DIESEL PASSENGER VEHICLES WERE RUN 621 MILES (1000 KM) USING A STANDARD DIESEL FUEL. THE CARS WERE THEN TRACK TESTED TO ENABLE A ROA LOAD POWER CURVE TO BE OBTAINED FROM THE COAST-DOWN TIME TO ENSURE ACCURATE SETTING OF THE DYNAMOMETERS. THIS PROCEDURE WAS REPEATED WITH THE VEHICLES FULLY LADEN. NEW FLOWED AND MATCHED INJECTORS WERE INTRODUCED TO BOTH ENGINES AND THESE REMAINED WITH THE SAME VEHICLE THROUGH ALL TESTING. FROM THIS POINT THE VEHICLES WERE DESIGNATED AS A BASE OR AN ADDITIZED CAR AND A STRICT FUELLING REGIME WAS FOLLOWED DURING TESTING.

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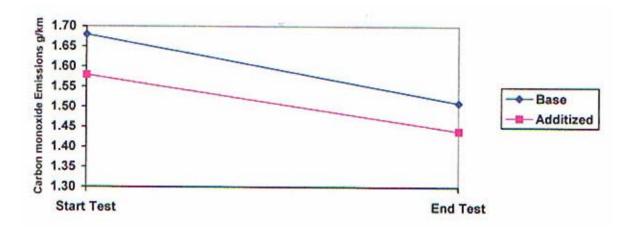


# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **HEAVY DUTY DI VEHICLES - HYDROCARBON EMISSIONS**



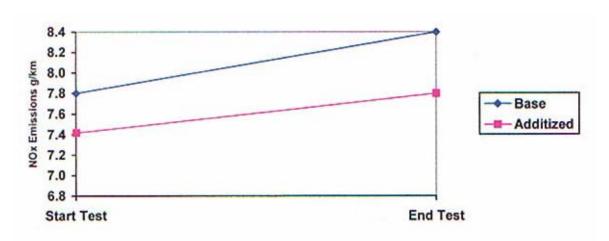
### **HEAVY DUTY DI VEHICLES - CARBON MONOXIDE EMISSIONS**



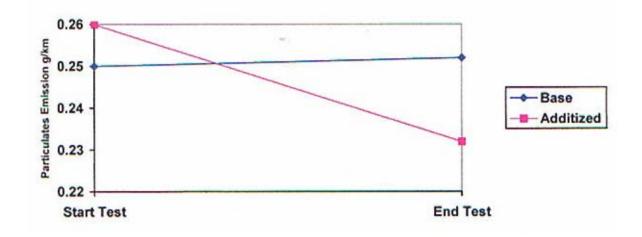


# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **HEAVY DUTY DI VEHICLES - NO<sub>x</sub> EMISSIONS**



#### **HEAVY DUTY DI VEHICLES - PARTICULATES EMISSIONS**

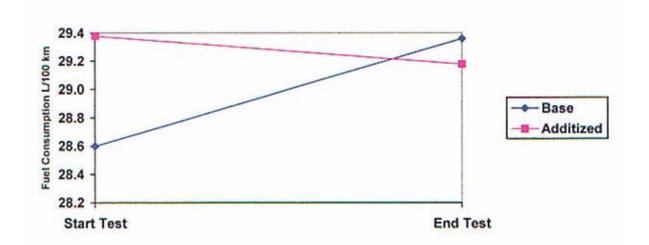




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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **HEAVY DUTY DI VEHICLES - FUEL CONSUMPTION**

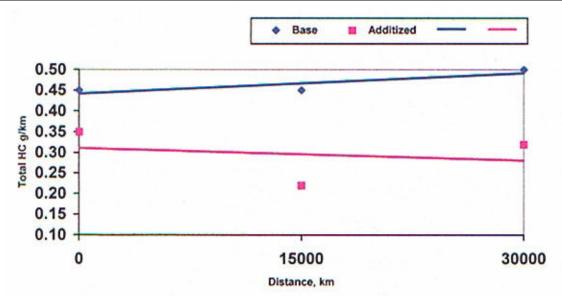




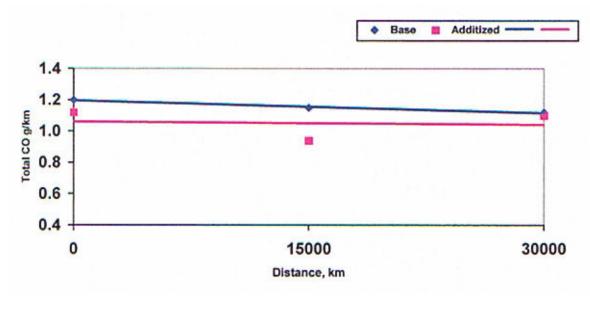
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### PASSENGER VEHICLES - HYDROCARBON EMISSIONS (PEUGEOT 306)



### PASSENGER VEHICLES - CARBON MONOXIDE EMISSIONS (PEUGEOT 306)

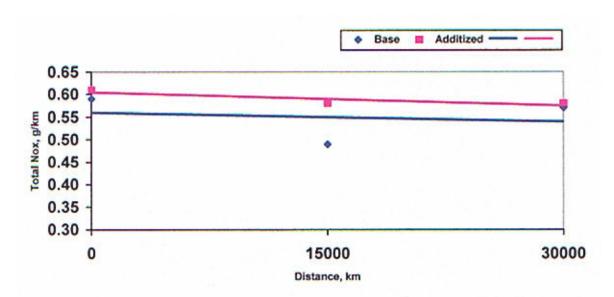


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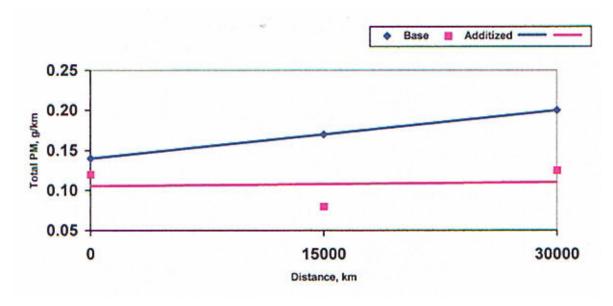


# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

### PASSENGER VEHICLES - NO<sub>x</sub> EMISSIONS (PEUGEOT 306)



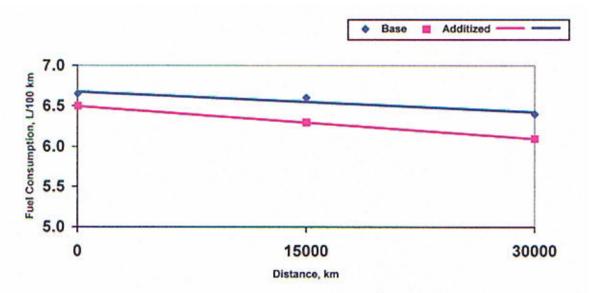
#### PASSENGER VEHICLES - PARTICULATE EMISSIONS (PEUGEOT 306)



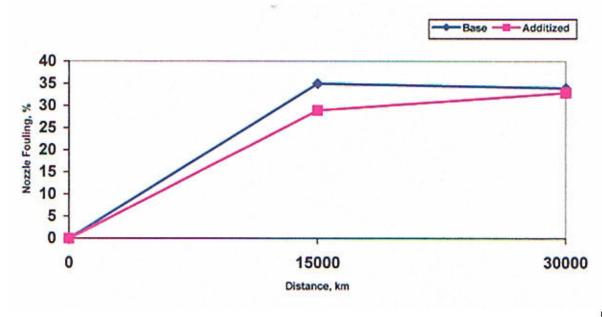


# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### PASSENGER VEHICLES - FUEL CONSUMPTION (PEUGEOT 306)



#### PASSENGER VEHICLES - NOZZLE FOULING (PEUGEOT 306)



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### SHORT TERM NO HARM EFFECTS - HEAVY DUTY DI ENGINES

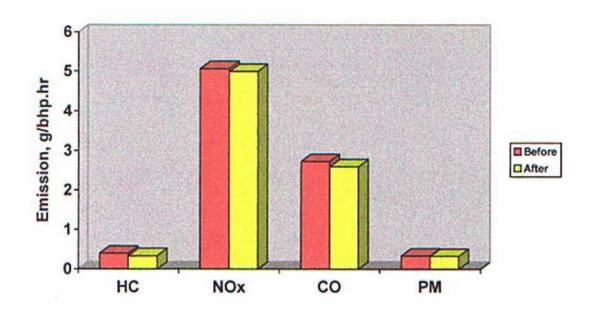
- ► A CUMMINS L-10 TEST BED ENGINE WAS USED TO DETERMINE THE POTENTIAL FOR INJECTOR DEPOSIT CLEAN-UP USING 20310 AND TO ASSESS WHETHER A CHANGE IN ENGINE OUT EMISSIONS OCCURRED AS A CONSEQUENCE OF THE CLEAN UP.
- ► THE ENGINE WAS RATED AT 225 KW @ 2100 RPM. THE TEST CYCLE WA DIVIDED INTO FOUR PHASES:
  - PHASE 1 COMPRISED THE STANDARD 125-HOUR INJECTOR CUMMINS L-10 DEPOSITING TEST PROTOCOL 14183. CAT 1-K FUEL WAS USED DURING THIS DIRTY UP PHASE.
  - PHASE 2 WERE EMISSION TESTS PERFORMAD ACCORDING TO THE EPA PROCEDURE FOR CERTIFICATION FOR HEAVY-DUTY DIESEL ENGINES, AS FOUND IN CODE OF FEDERAL REGULATIONS. A BASELINE USING AN UNTREATED CAT-1K FUEL WAS ESTABLISHED.
  - PHASE 3 WAS A CLEAN-UP CYCLE USING APPROXIMATELY 1140 LITERS OF COMMERCIALLY AVAILABLE DIESEL FUEL EQUIVALENT TO ONE TANK FULL. THE ENGINE WAS OPERATED OVER A CYCLE OF 20 MINUTES EPA TRANSIEN CYCLE; 15 MINUTES RATED CONDITIONS AND 25 MINUTES AT A SPEED AND LOAD EQUIVALENT TO 60 MPH OPERATION, FOR A TOTAL OF 35 HOURS.
  - PHASE 4 WAS A FURTHER SET OF EMISSIONS TESTS USING UNTREATED CAT-1K TO ESTABLISH ANY CLEAN UP BENEFITS COMPARED TO THE INITIAL TEST MEASUREMENTS.



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **SHORT TERM NO HARM EFECTS - CUMMINS L-10 ENGINE**





# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### SHORT TEAM NO HARM EFECTS - PASSENGER VEHICLES

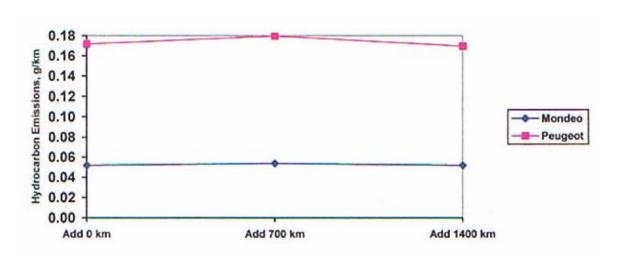
- ► A 1.9 LITER NORMALLY ASPIRATED INDI PEUGEOT 306 AND A 1.8 LITER CATALYSED INDI FORD MONDEO TUTBO WERE CHOSEN TO QUNATIFY THE EMISSIONS IMPACT OF DETERGENT AFTER TWO TANK FULLS.
- ► THREE ECE URBAN AND EXTRA URBAN EMISSION TESTS WERE COMPLETED ON EACH VEHICLE AT THEIR 'AS FOUND' CONDITION USING COMMERCIAL FUEL ADDITIZED WITH THE DETERGENT PACKAGE.
- ► A CLEAN UP DISTANCE OF 435 MILES (700 KM) WAS THEN ACCUMULATED ON BOTH VEHICLES AT A FULLY LADEN ROAD LOAD USING THE ADDITIZED FUEL TO ESTABLISH THE EFFECTS OF APPROXIMATELY ONE "TANK FULL".
- THREE ECE URBAN AND EXTRA URBAN EMISSION TESTS WERE CARRIED OUT TO ASSESS EMISSION CHANGES. THE CLEAN UP PHASE WAS EXTENDED TO INCLUDE ANOTHER 435 MILES (700 KM) USING FUEL ADDITIZED WITH DETERGENT AND EMISSION TESTS WERE REPEATED.



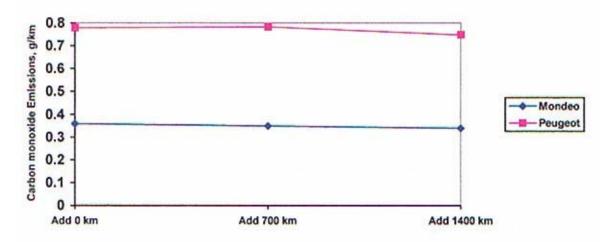
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **SHORT TERM NO HARM EFFECT - HYDROCARBON EMISSIONS**



#### **SHORT TERM NO HARM EFFECT - CARBON MONOXIDE EMISSIONS**

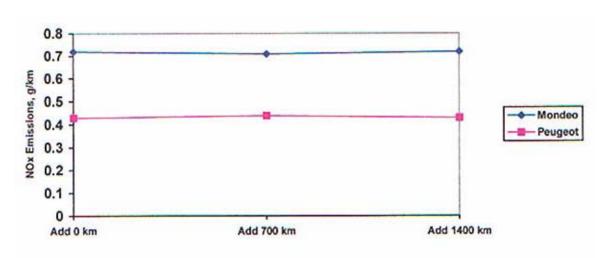




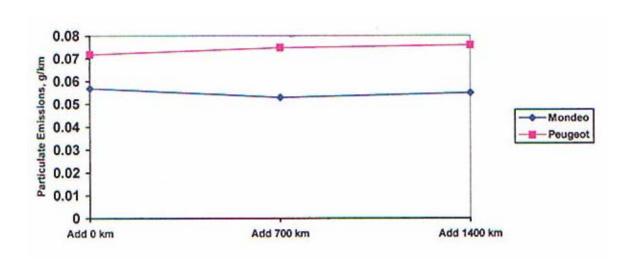
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

### SHORT TERM NO HARM EFFECTS - NO<sub>x</sub> EMISSIONS



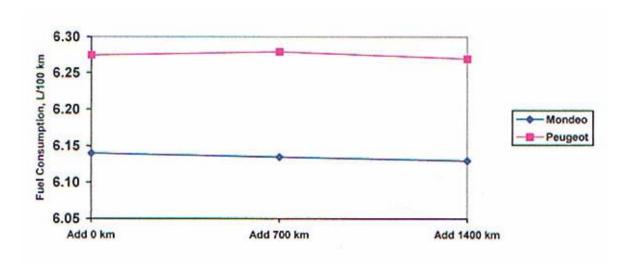
#### SHORT TERM NO HARM EFFECTS - PARTICULATE EMISSIONS





# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **SHORT TERM NO HARM EFFECTS - FUEL CONSUMPTION**

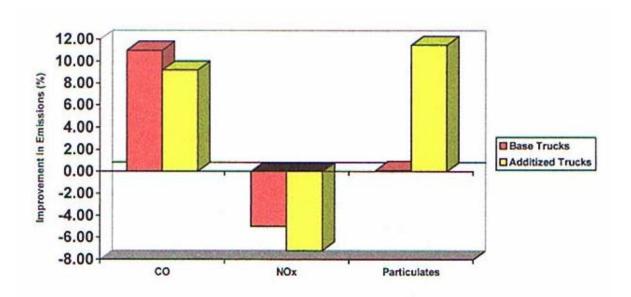




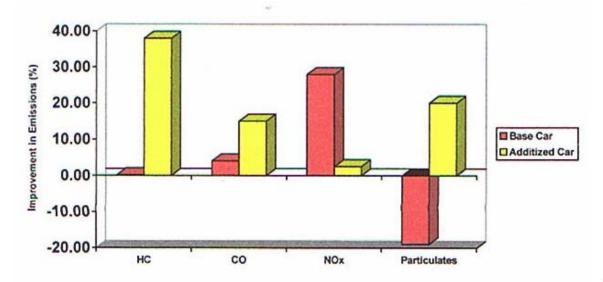
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### PERCENTAGE EMISSION IMPROVEMENT - TRUCKS



### PERCENTAGE EMISSION IMPROVEMENT - CARS



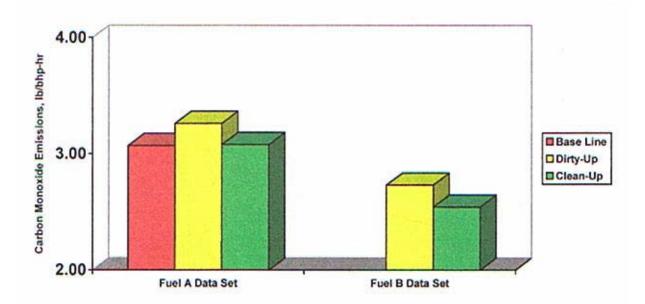
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **CARBON MONOXIDE EMISSIONS DATA**



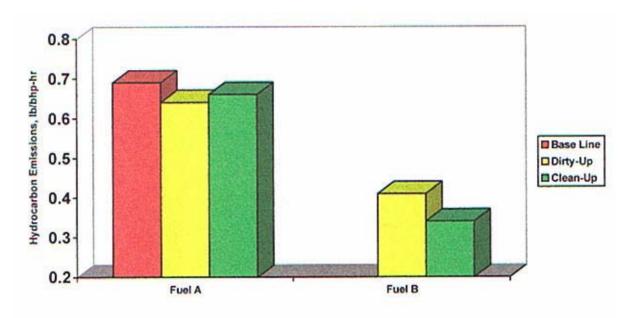
- ▶ DIRTY-UP FUEL FOR FUEL "A" DATA WAS COMMERCIAL LOW SULFUR
- ► DIRTY-UP FUEL FOR FUEL "B" DATA WAS CAT-1K (0.4% S)
- ► TREATMENT RATE FOR FUEL "A" WAS 110 PPMV OF 20310
- ► TREATMENT RATE FOR FUEL "B" WAS 123 PPMV OF 20310



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **HYDROCARBON EMISSIONS DATA**



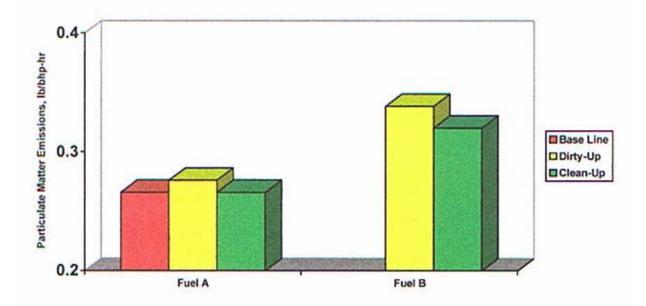
- ▶ DIRTY-UP FUEL FOR FUEL "A" DATA WAS COMMERCIAL LOW SULFUR
- ► DIRTY-UP FUEL FOR FUEL "B" DATA WAS CAT-1K (0.4% S)
- ► TREATMENT RATE FOR FUEL "A" WAS 110 PPMV OF 20310
- ► TREATMENT RATE FOR FUEL "B" WAS 123 PPMV OF 20310



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### PARTICULATE MATTER EMISSIONS DATA



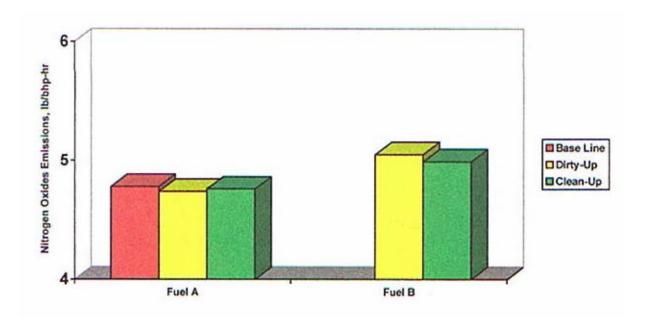
- ▶ DIRTY-UP FUEL FOR FUEL "A" DATA WAS COMMERCIAL LOW SULFUR
- ► DIRTY-UP FUEL FOR FUEL "B" DATA WAS CAT-1K (0.4% S)
- ► TREATMENT RATE FOR FUEL "A" WAS 110 PPMV OF 20310
- ► TREATMENT RATE FOR FUEL "B" WAS 123 PPMV OF 20310



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **NITROGEN OXIDES EMISSIONS DATA**



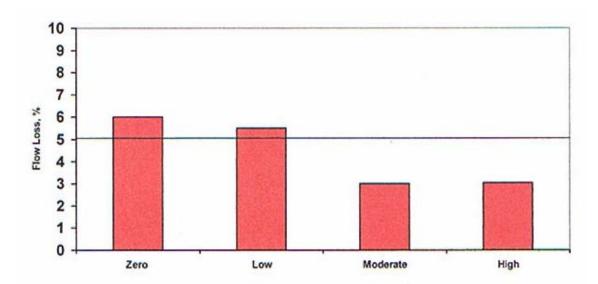
- ▶ DIRTY-UP FUEL FOR FUEL "A" DATA WAS COMMERCIAL LOW SULFUR
- ► DIRTY-UP FUEL FOR FUEL "B" DATA WAS CAT-1K (0.4% S)
- ► TREATMENT RATE FOR FUEL "A" WAS 110 PPMV OF 20310
- ► TREATMENT RATE FOR FUEL "B" WAS 123 PPMV OF 20310



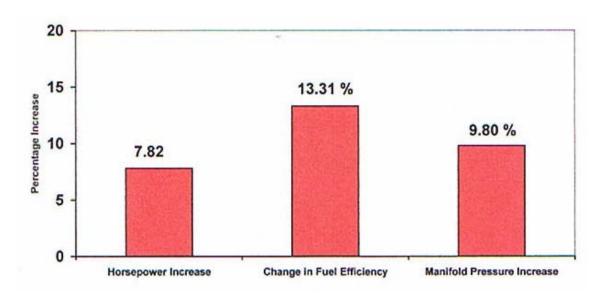
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### FUEL ECONOMY - INJECTOR FLOW LOSS IN CUMMINS L-10 ENGINE TEST



#### **FUEL ECONOMY - BRAKE SPECIFIC FUEL CONSUMPTION**

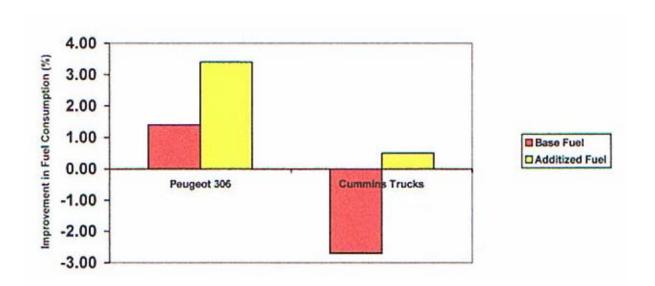




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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### FUEL ENONOMY - PERCENTAGE FUEL CONSUMPTION CHANGES

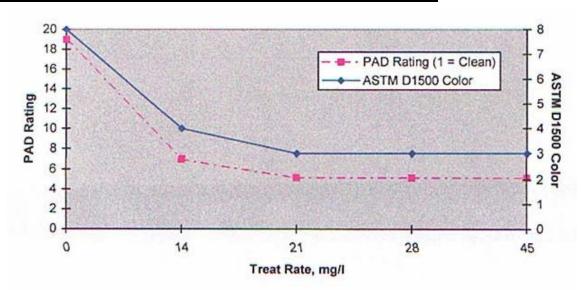




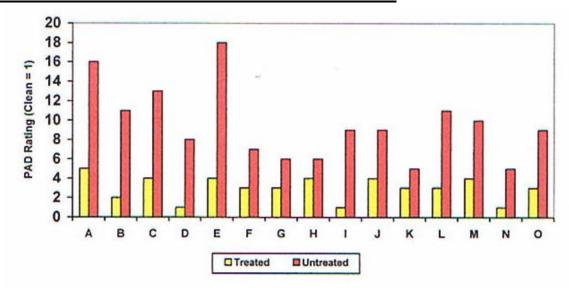
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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### FUEL STABILITY - F-21 HIGH TEMPERATURE TEST



#### FUEL STABILITY - D6864 THERMAL STABILITY



A - Dallas, TX; B - Atlanta, GA; C - Nashville, TN; D— Lowell, AR; E—Baton Rouge, LA; F—Springfield, MO; G—Columbia, MO; H—Harrison, AR; I—Jackson, MS; J - Memphis, TN; K—Tulsa, OK; L—Ft. Smith, AR; M—Chicago, IL; N—Wichita, KS; O—Oklahoma City, OK.



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

#### **FUEL STABILITY - OXIDATION STABILITY**

Additive Treated Rate	Total Insolubles, mg/100 ml	Improvement, %
Zero	0.757	-
Moderate	0.599	21

#### FUEL STABILITY - CORROSION RESISTANCE

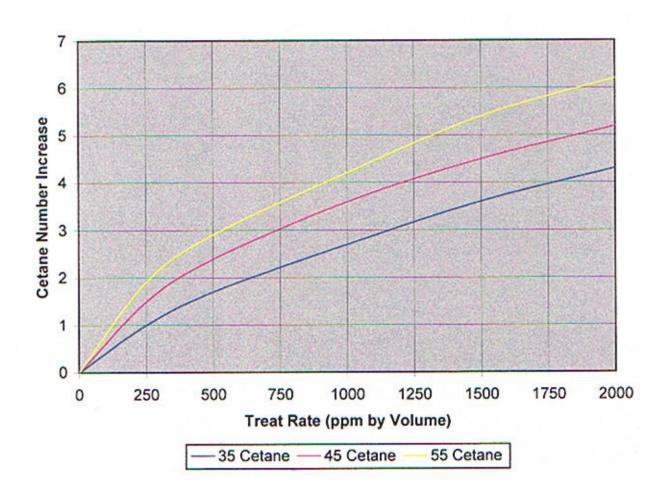
Additive Treated Rate	NACE Scale Rating	Pass/Fail
Zero	E	Fail
Moderate	A	Pass
Moderate	A	Pass



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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE

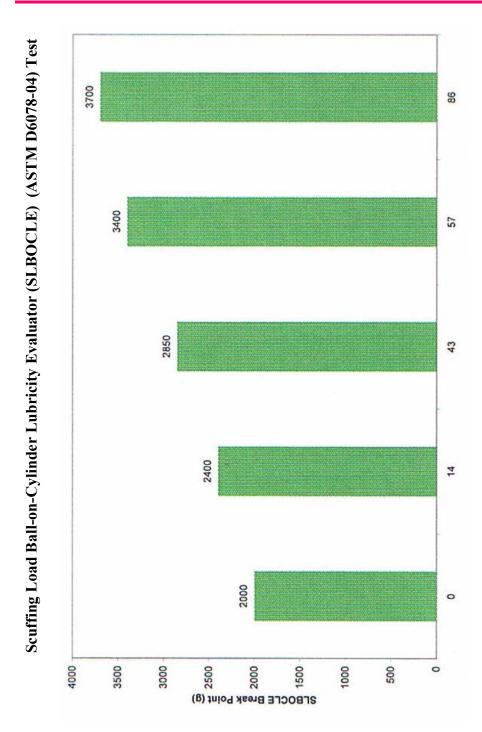
#### 20310 TREAT RATE vs CETANE No. INCREASE





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# PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE



20310 Treat Rate (mg/lit)



# **PREMIUM DIESEL DETERGENT INHIBITOR CONCENTRATE**

