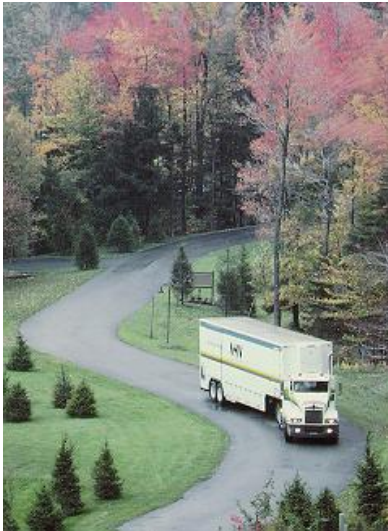




PREMIUM DIESEL 2000™ **FUEL PERFORMANCE BENEFITS**

EMA Requests New ASTM Designation for Diesel Fuel



With the recent movement in Canada and the U.S. to low sulfur diesel fuel and with similar changes occurring in Mexico, the European community, and throughout the world, the Engine Manufacturers Association has endorsed a new series of diesel fuel properties to be included in a new ASTM specification. A driver for this specification is the ever-increasing pressure for improved diesel emissions throughout the world. Specifically, reduced particulates, NOx, and visible smoke are the areas getting the majority of the regulator's attention. Emissions must be maintained at or near original operating conditions for 290K miles in the U.S. or about 454,000 KM. In order to achieve this criteria, diesel fuel must have a detergent additive capable of achieving the desired EMA rating in the L-10 Depositing Test of CRC ≤ 10.0 .

Low Sulfur Fuels

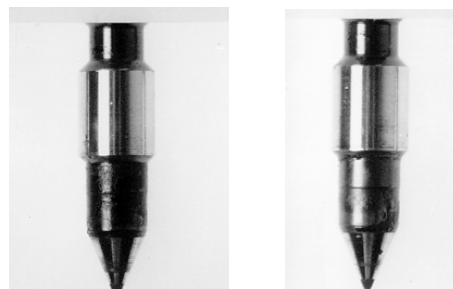
Environment Canada has promulgated regulations regarding the sulfur level of diesel fuel. The regulations will ensure provision of

100% on-road low sulfur diesel fuel by January 1, 1998 for use in light-duty vehicles, light-duty trucks and heavy-duty vehicles. The sulfur level of this fuel shall not exceed 0.05 percent by weight. For comparison, the sulfur level of regular sulfur diesel fuel in Canada is in the range of 0.2 to 0.3 weight percent.

In October 1, 1993, the U.S. EPA mandated that all highway diesel fuel had to meet a maximum sulfur level of 0.05 weight percent. This was mandated by the EPA through the lobbying efforts of the U.S. Engine Manufacturers Association. This group realized that even with state of the art electronic controlled engines that the 1994 emissions standards for both particulate and NOx could "not" be attained without a substantial change in diesel fuel quality. The refinery processing now being used to meet this new standard has changed many of the traditional features associated with high sulfur diesel fuel. Lubricity, seal swell tendency, corrosivity, and response to additives have all been affected. All of the performance features presented in this brochure have been demonstrated in both high and low sulfur fuel.

Benefits When Using a Fuel with a Superior Cleanliness Rating

The injectors shown below compare one with a CRC ≥ 25.0 typical of untreated high or low sulfur diesel fuel versus a clean injector using a Superior level of detergent CRC ≤ 10.0 .





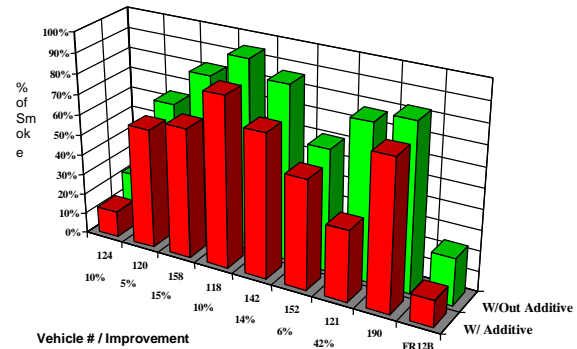
Fuel Economy

In a fleet test accumulating over 1 million kilometers, 8 trucks using a typical untreated diesel fuel were compared to an identical 8 trucks using a diesel fuel having similar properties to **UPI PREMIUM DIESEL2000™**. The clean fleet averaged slightly less than 5% fuel economy advantage. What can you expect? Switch to **UPI PREMIUM DIESEL2000™** and prove it to yourself!



comparing the two trucks emissions, improvements ranged from 4% to 22% for the trucks using additized diesel fuel. What reduction will you observe? Use **UPI PREMIUM DIESEL2000™** and see the emissions benefit yourself!

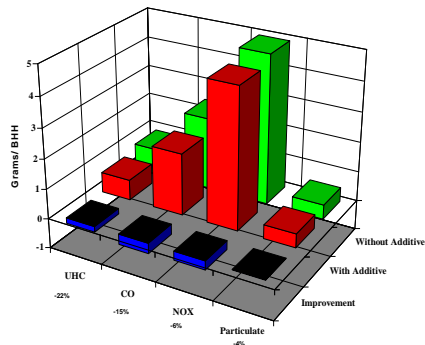
Cleaner Running Engines Mean Less Smoke



What is the one characteristic that people equate to diesel trucks? Black smoke. In yet another fleet test comparing a fleet with various types of diesel engines, black smoke or opacity was measured using what is commonly referred to as the "SNAP IDLE TEST" before and after additive treatment. After one month of service on a premium clean diesel fuel, improvements of 4% to 42% were measured. Not all trucks respond the same, but black smoke can be reduced by cleaner engines. Clean your engine with **UPI PREMIUM DIESEL2000™** and watch your smoke plume decrease!

Reduce Emissions

Also in the same fleet test as previously described, the trucks were tested using the U.S. Heavy Duty Transient Emission test cycle at SWRI in San Antonio. After a truck from each group attained the required 290K miles



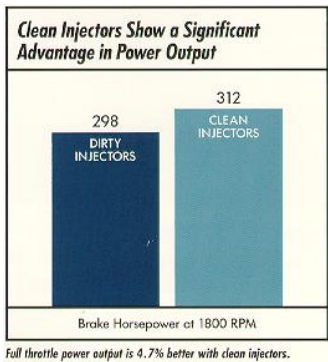
Peak Engine Power and Performance

In another fleet test, a severely coked set of injectors from an NTC-400 engine operating on standard unadditized diesel fuel for 150,000 miles were removed and inspected for deposit formation. The injectors exhibited heavy carbon deposits consistent with untreated CRC ratings in the 25 - 30 range. Fuel flow measurements with these injectors demonstrated a 3.5% fuel flow loss as compared to the original operating condition.

mandated by the EPA, the same emissions tests were again performed at SWRI. In



The graph below compares the horsepower output on these two sets of injectors, the highly carboned set showed a 4.7% loss in power. Clean injectors simply means better power and performance. How much more horsepower can you anticipate using **UPI PREMIUM DIESEL 2000**? Test it in your trucks and see for yourself. Ask your drivers! Others have and continue using **UPI PREMIUM DIESEL2000™**.



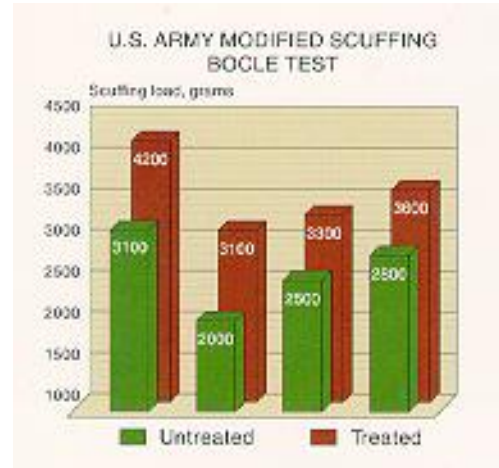
Additional Benefits to Reduce Maintenance Costs and Downtime

Diesel fuel has historically provided lubricity protection to critical engine parts such as injectors and fuel pumps. However, naturally occurring components in diesel fuel that would adhere to metal surfaces, thus providing component wear protection, are now being reduced. The hydroprocessing now being used to meet today's low sulfur fuel requirements is, in fact, removing these components.

Increase Fuel Lubricity

Laboratory testing has been developed to characterize a fuel's lubricity characteristics. Based on the new fuel specification being introduced by EMA, a Scuffing BOCLE value of equal to or greater than 3100 grams is deemed desirable. Extensive testing of various diesel fuels have shown a wide range of values. By selecting those fuels not meeting the new criteria, the table below was developed. These data clearly show that a correctly formulated premium diesel additive package can improve Scuffing BOCLE by up to 30%. What does this mean to customers? Using **UPI PREMIUM**

DIESEL2000™ can provide wear protection which translates into longer lasting injectors and fuel pumps, increased engine life and lower maintenance costs, with less downtime. The real savings can only be determined by you.



Corrosion/Rust Protection

The same hydroprocessing that can adversely effect fuel lubricity also can remove diesel fuel components that provide natural corrosion protection. The pictures below show the results of standard ASTM or NACE rust testing. The untreated spindle is extensively covered with rust, whereas the treated fuel under the same test conditions, looks brand new. This rust, which occurs from water condensation, can cause fuel system problems, increased downtime, and increased maintenance cost. **UPI PREMIUM DIESEL2000™** can protect your engine's fuel system, storage tanks, and transfer lines to again reduce your costs!





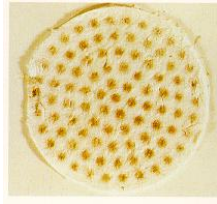
Improved Fuel Stability

Diesel fuel can degrade over time to form sludge and polymeric sediment that can plug filters and reduce power. The filter pads shown below demonstrate how using **UPI PREMIUM DIESEL2000™** will improve fuel stability to prevent sludge and sediment formation. Look at the treated pad. Which do you prefer? Stabilizers also protect against peroxide formation that can attack seals and gaskets. The bottom line is reduced maintenance costs and keep the fleet running. Again, the savings will depend upon your fleet and fuel storage facilities.

Unadditized

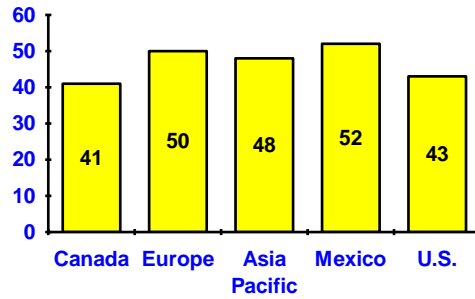


Additized



Higher Cetane Number Fuel

Based on worldwide fuel surveys conducted annually, it becomes readily apparent that the U.S. and Canadian diesel fuel is significantly lower in cetane number than most global diesel fuels.



Yet, the benefits of higher cetane number fuels are widely published and accepted by fuel technical associations throughout the world. The use of higher cetane number fuels will improve low temperature starting which can reduce maintenance costs.

Also, higher cetane number fuels improve combustion which reduces NOx emissions, reduces white smoke during cold start, and reduces engine noise. All contribute to you observing better equipment performance. Use **UPI PREMIUM DIESEL2000™** to see the benefits for yourself!



CONCLUSION

UPI PREMIUM DIESEL2000™ can provide specific fuel features to meet higher performance expectations and new regulatory demands on fuel quality!

This page pictorially shows the benefits available from UPI PREMIUM DIESEL2000™.

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