LUBE TECHNI-GRAM

FROM:

LEWIS FOX
DIRECTOR OF TECHNOLOGY

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Today's Fuels and Fuel Injection Systems Need Improvers

More and more customers are recognizing the need for cost effective diesel fuel improvers. Continued legislative pressure to reduce emissions from diesel vehicles has led to the introduction of advanced fuel injection equipment and these design changes present a challenging environment for fuels.

Improvements include the introduction of injectors where fueling is electronically controlled via a solenoid or piezo system where injection pressures have increased from around 350 bar to in some cases over 2,000 bar. In addition, the number of injections per combustion event has increased five - fold and there has been a substantial increase in the temperature of the injector tip. Temperatures of injector tips have gone from less than 230ºC in 1995, too now greater than 250ºC. Not only have the conditions changed, but there has also been physical changes to the injector. The number of injector holes has increased and is projected to increase still farther, and their diameter has reduced significantly to less than 0.1 millimeters… about the same diameter as two human hairs. In 1995, the average injector hole was approximately 0.5 millimeters. All these changes are designed to increase the kinetic energy of the fuel spray leading to a smaller droplet size in the combustion chamber, aiding fuel atomization and resulting in more efficient and complete combustion.

High injection pressures allow the fuel needed for combustion to be sprayed through smaller injection holes, thus generating a finer fuel spay that mixes more easily with air and burns more efficiently. However, these high pressures and narrow injection spray holes lead to increased temperatures in the area of the injector tip. Subjecting the fuel to high temperatures can cause the fuel to degrade and form deposits at and around the injector tip that restrict fuel resulting in:

- More engine noise
- Rough idle
- Poor driveability
- Power loss
- Increased fuel consumption
- Increased exhaust emissions

In addition, these deposits seem to be far more difficult to remove than those found in earlier fuel injection systems. Traditional detergents that have successfully resolved the problem in the past are now proving to be less effective. This is the very reason Southwestern Petroleum introduced SWEPCO 501 *Premium* Diesel Fuel Improver.

SWEPCO 501 *Premium* Diesel is a true *multifunction* product. SWEPCO 501's superior benefits are the result of the blending of two separate additive chemistries…first, a **cetane booster**, and, second, an **advanced protective chemistry package** which adds lubricity to diesel fuels and controls combustion deposits.

At its normal treatment rates, SWEPCO 501 Premium Diesel Fuel Improver can add as much as 4 or more to the cetane number of diesel fuels, depending upon what the starting cetane number is. Heavier doses can add as much as 7 to 9 points to the cetane rating without harming engines in any way.

Boosting cetane numbers has a number of beneficial results:

- it allows fuel to ignite earlier which helps insure full power strokes
- it promotes more complete combustion of the fuel for greater fuel economy
- it significantly reduces levels of hydrocarbon, carbon monoxide, nitrogen oxide and other emissions
- it significantly improves cold weather performance of diesels, including lower cold start-up temperatures and quicker warm-up
- it reduces misfiring, white smoke and knocking

The second way we help the engine convert fuel into more work is by controlling combustion deposits and wear on fuel system components. Both can slowly rob engines of power and fuel efficiency, as well as causing higher levels of exhaust emissions. We do this with a separate additive package which focuses on engine cleanliness and lubricity. SWEPCO 501 Premium Diesel Improver offers improved performance in all areas:

- it keeps injectors cleaner for complete fuel atomization and combustion
- it helps prevent formation of carbon and sludge in engines
- it decreases wear of injectors and injector pumps

*Note: Special *Winter Formula* for SWEPCO 501 Premium Diesel Fuel Improver provides protection from cold weather fuel system plugging due to gelling of the wax portion of diesel fuels.