

# **ULSD & BIODIESEL FUEL TECHNOLOGY**

## **- FREQUENTLY ASKED QUESTIONS -**



### **STANDARD FUEL TERMS:**

**ULSD** - Ultra Low Sulfur Diesel is the latest version of diesel mandated by the government. All fuel and fuel products must have less than 15ppm sulfur. High sulfur levels destroy the particulate emissions traps on 2007 and newer engines.

**BIODIESEL** - an alternative to ULSD. BioDiesel can be made from soy, corn, rapeseeds, palm oil, vegetable oil, and other plant and animal derived fats, oils and greases.

**PARAFFIN** - used to boost BTU's in the fuel, it must be managed properly or it turns to wax.

**WAX**- when the paraffin begins to coalesce and gel, it becomes wax, very similar to a candle.

**BTU'S** - British Thermal Units is a measure of the energy stored in fuel.

**CLOUD POINT** - the temperature at which wax crystals first begin to form.

**POUR POINT**- the temperature at which fuel no longer flows freely. Usually a much lower temperature than Cold Filter Plug Point.

**COLD FILTER PLUG POINT**- the temperature at which wax crystals are cold enough to bunch together and clog the fuel filter. Even though it still flows through the system, it gets trapped by the fuel filter at warmer temperatures than the Pour Point.

**COLD FLOW IMPROVER** - cost effective winter operation enhancers that permit the fuel to flow at low temperatures. Do not use alcohols; they do not work with the paraffin in fuel, and they can also reduce lubricity.

**CETANE IMPROVER** - an ignition delay reducer that improves power. It also makes cold starts easier.

**STABILIZER** - preserves the quality and color of fuel in storage. It also prevents the formation of varnishes and sludge that plug injectors.

**LUBRICANT** - protects fuel system components from premature wear resulting from the compromised lubricity of ULSD.

**BIOCIDE** - kills and prevents the growth of bacteria and fungus. Usually very harsh chemicals that require protective gear to handle. Does not mix well with other additives.

**BIOSTAT**- prevents growth of bacteria and fungus. Safer to handle than biocide. Mixes well with other chemicals.

**WATER** - water and other sediment in the fuel will clog fuel filters, cause power loss, corrosion, component wear, and harbor microorganisms.

**BACTERIA, FUNGUS, AND MOLD** - the presence of these indicates poor tank maintenance. These microorganisms can cause extensive damage to the system and impede performance.

### **ULSD:**

#### **IS ALL ULSD ALIKE?**

No. Each refinery's ULSD is a little different, depending on the crude oil that they start with and the process they use to reduce sulfur. ULSD does have to meet specific regulations to be sold. Every pumping station must have a label denoting that you are getting ULSD.

#### **WHAT ARE THE PENALTIES FOR FAILING TO MEET THE ULSD SULFUR STANDARDS?**

All ULSD fuels and fuel additives are required to have the statement, "This diesel fuel additive complies with the federal low sulfur content requirements for use in diesel motor vehicles and nonroad engines." Any person that violates the new ULSD regulations may be subject to civil penalties of up to \$32,500 for each violation.

#### **IS IT REALLY GOOD FOR THE ENVIRONMENT?**

The EPA believes that the impact of switching from LSD to ULSD will have a major impact on the environment. By the time every vehicle has been converted (approximately the year 2030) annual emission reductions will be like removing 90% of the pollution from today's trucks and busses.

#### **SHOULD YOU TREAT YEAR ROUND?**

The process used to remove the sulfur also reduces aromatics and density of the fuel, which lowers its energy content by about 1%. This may result in slightly decreased power and fuel economy. To combat this, treat your fuel all year round. In the warmer months, use a quality additive that eliminates bacterial and fungal growth, adds lubricity, improves cetane, and helps increase mileage. In the colder months, use an additive that also protects against fuel gelling.

#### **WHY IS EVERYONE TALKING ABOUT LUBRICITY?**

All highway fuel meets the specifications of government regulations. Do you need to add a lubricity enhancer? In many cases, the engine manufacturer's lubricity requirements are more stringent than the governments. Plus, low sulfur can cause certain types of seals to shrink and develop small leaks in the form of seepage or drips.

## HOW DO YOU KNOW AN ADDITIVE IS GOOD?

Because each manufacturer makes ULSD a little differently, the additives that treat them will behave differently on each one. For example, an additive may reduce CFPP of one ULSD fuel sample to  $-35^{\circ}\text{F}$ , while only reducing it on another sample of ULSD to  $-10^{\circ}\text{F}$ . The additive is usually very consistent, so the fuel is the difference. Test some different fuel additives, and see what works best for you.

## WHAT TYPE OF WINTER PROBLEMS DOES ULSD HAVE?

The process that refineries use to eliminate sulfur not only raises the fuel cloud point but also lowers aromatics of the fuel. Therefore, when the paraffin changes to solid wax, it doesn't remain suspended in the fuel. Instead, the wax stays solid, clumps together, and falls to the bottom of the tank. These clumps are then drawn to the fuel filter where they plug the system.

## IS WATER A PROBLEM IN ULSD?

Water and fuel do not mix. Water gives microbes a place to live, and it is very bad on injectors. In a tank, water stays separated from fuel. The line where water and fuel meet is where all the microbes live. They are supported by the nutrients in the water, and reproduce immediately when they come in contact with diesel fuel. Treat your fuel with additives year round to prevent water problems.

## DO YOU NEED TO DO ANYTHING DIFFERENT TO YOUR STORAGE TANKS?

It is very important to have maintenance procedures in place for storage tanks. You should regularly power wash the tank and ensure that the water accumulated on the bottom of the tank is removed. Also, you should test your fuel deliveries to see if they are coming with any water or microbes.

# BioDIESEL!

## WHY USE IT?

There are lots of benefits to using BioDiesel. It burns cleaner, it's renewable, it's helping to revitalize rural America, and it's moving the United States closer to energy independence. Here are the basics. The terms B2 or B5 tells you the percentage of BioDiesel mixed in with ULSD. B2 contains 2% BioDiesel and 98% ULSD, B5 is 5% BioDiesel and 95% ULSD. BioDiesel can be run in diesel engines without modification. Sulfur emissions will be reduced with even the smallest amount of BioDiesel. BioDiesel provides extra lubricity that used to come from the higher sulfur fuels that are no longer available.

## CAN YOU FIND IT?

More and more BioDiesel stations are popping up out there, and the number will continue to grow. BioDiesel production is growing from 500,000 gallons in 1999 to 75 million gallons in 2005. This year it is estimated that 250 million gallons will be produced, and by 2015 that number is expected to grow to 2 billion gallons. In comparison, the entire trucking industry burns about 40 billion gallons of fuel each year. BioDiesel is still a long ways from replacing ULSD, but a good sign of potential growth is that there are 25+ different pending issues in the federal government regarding BioDiesel.

## HOW IS THE QUALITY?

A survey done last year on BioDiesel quality found that more than half of samples taken failed the required specifications. BioDiesel is a hot new item and many smaller operations are trying to make a quick buck off of it. Currently there are more than 100 sizable facilities in the US manufacturing BioDiesel. As the industry grows, bigger refiners are starting to grow with it, and the quality of the fuel is beginning to improve. Make sure that your BioDiesel comes from BQ-9000 certified suppliers.

## WHAT DOES IT DO TO YOUR WARRANTY?

Using BioDiesel does not void the engine warranty as long as the fuel meets the OE standard. Most OEM's will allow B5, and some have even approved even higher levels. Cummins approved B20 for 2002 and later emissions-compliant ISX, ISM, ISL, ISC, and ISB engines. Even though BioDiesel does not invalidate the warranty, OEM's do not cover any problems caused by fuel, only failures of workmanship and material.

## HOW DOES IT PERFORM IN COLD WEATHER?

BioDiesel is a lot like bacon fat. When it is warm, the fat is a liquid and it flows smoothly. However, when it cools even a little you can see it begin to solidify. BioDiesel typically begins to have flow problems at warmer temperatures than ULSD. Begin treating your BioDiesel at  $+30^{\circ}\text{F}$ . Look for additives specifically designed for use in BioDiesel.

## HOW DOES WATER EFFECT BIODIESEL?

BioDiesel has a percentage of ULSD mixed in with it. If you think water is tough in ULSD, it's even more problematic in BioDiesel. BioDiesel holds significantly more dissolved water than ULSD. Make sure you buy a high quality fuel/water separator filter and check it regularly. Also make sure that you treat your fuel year round with a quality additive designed for use in BioDiesel.

