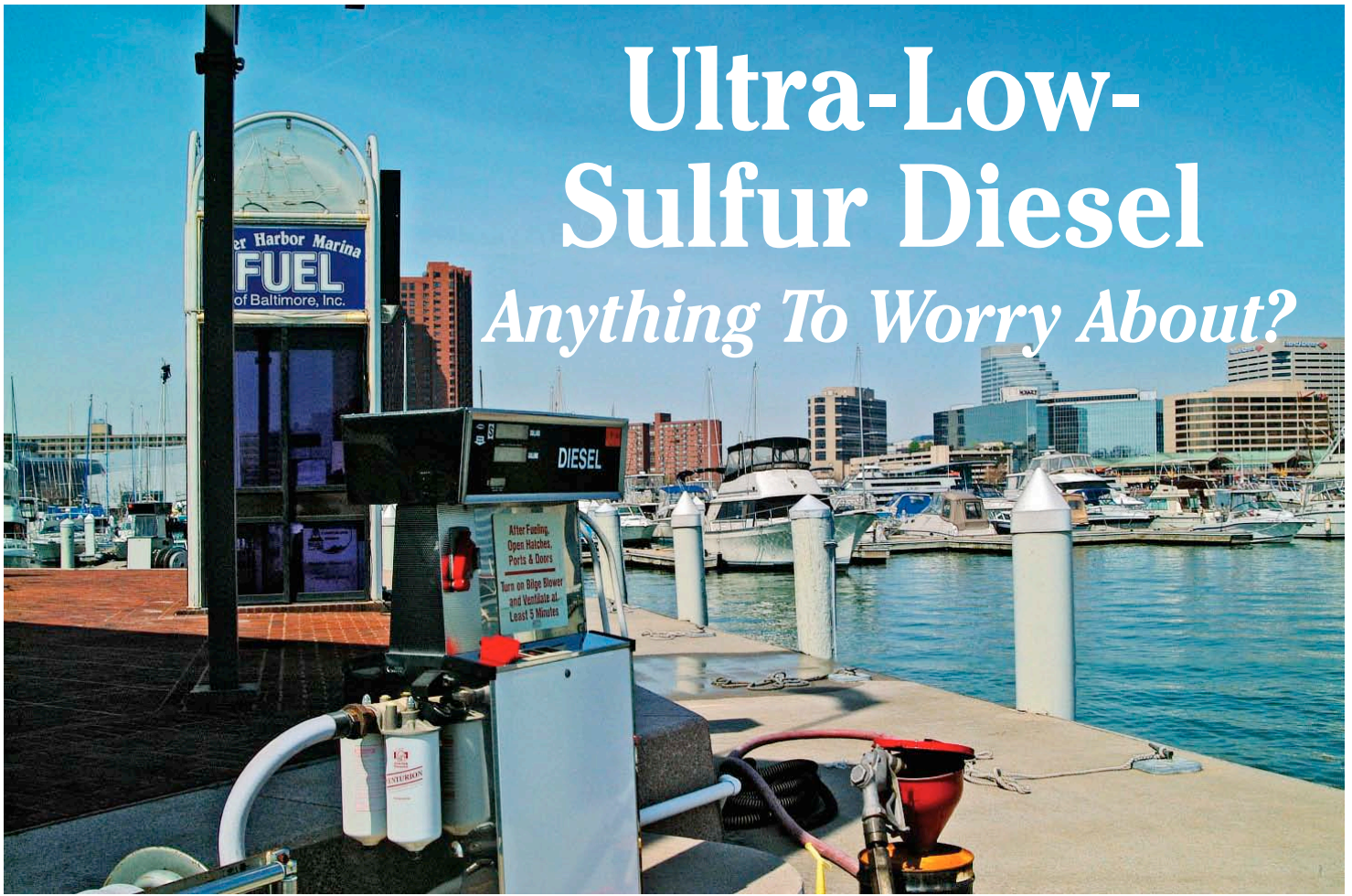


Ultra-Low-Sulfur Diesel

Anything To Worry About?



For anyone who is fond of breathing, there is a lot to like about ultra-low-sulfur diesel (ULSD). Less than two decades ago, diesel fuel contained up to 5,000 ppm of sulfur. That dropped to 500 ppm in 1993. Ultra-low-sulfur diesel, with only 15 ppm or less of sulfur, was mandated for use in most vehicles, boats and machinery in December 2010. As a practical matter, however, ULSD has been around a lot longer, since late 2006, when oil companies had to begin selling ULSD for use in model year 2007 diesel vehicles. (The latter have advanced emissions control devices that require ULSD in order to work properly.) A spokesman for one of the oil companies said that refiners typically don't have spare tanks available to offer two types of diesel fuel, so once ULSD was mandated for newer vehicles, it was usually sold to everyone. A survey of service stations by the Environmental Protection Agency (EPA) found that in September 2006, 85 percent of service stations were already selling ULSD (although less than half of the pumps were labeled correctly). And while the EPA didn't compile statistics for marinas, refiners don't store "marine"

"Minimum lubricity is a requirement of the ASTM-D975 standard, which means oil companies must use either soy biodiesel or a synthetic additive to return fuel to its pre-ULSD lubricity levels."

and "vehicle" fuel separately; whatever was going in trucks and automobiles was distributed to marinas.

Given the problems that arose with ethanol, the obvious question from anyone who owns an older, pre-2007 diesel is, "What's ULSD fuel liable to do to my engine?" After talking to numerous repairers, marina managers, engine manufacturers, and oil company technicians, the answer is likely to be, very little.

Below are the potential trouble areas and what, if anything, could be in store for your marine diesel engine.

Lubricity

The most immediate concern with ULSD—certainly the one that has received the most publicity—is lubricity. When diesel fuel is refined to make ULSD, it is reacted with hydrogen to remove the sulfur. This *process* also removes much of the fuel's lubricity. (Many people mistakenly believe that it is only the sulfur that supplies lubricity.)

Lubricity is essential in diesel fuel to reduce friction at finely machined pumps and injectors; without sufficient lubricity, a diesel would grind itself to a premature death.

Minimum lubricity is a requirement of the ASTM-D975 standard, which means oil companies must use either soy biodiesel or a synthetic additive to return fuel to its pre-ULSD lubricity levels. Soy biodiesel has the potential to loosen built-up gunk in the tank and clog filters, but not to the extent that ethanol did with gasoline tanks. Note, however, that a synthetic additive is more likely to be used, since it is less expensive and more stable than soy.

Cetane

Diesels rely on compression (and not a spark) to ignite the fuel. A higher cetane number means the fuel will ignite more readily, run smoother and produce less smoke. All diesel fuel must have a cetane rating of at least 40. Most regular diesel fuel has a cetane rating of 43 to 45, which should be fine for most boat engines. The good news is that the cetane numbers remained the same with ULSD.

Using an additive to boost cetane may help your engine, but be aware that an independent study of 19 additives sold to improve an engine's cetane rating found that five had no significant effect on the fuel's cetane rating and four additives significantly *lowered* the cetane content.

Corrosion

Since ULSD was introduced in 2006, some suppliers have reported accelerated corrosion in underground steel storage tanks. The cause is unclear and no one is certain whether it is related to ULSD, an additive, or something that occurred during the transition from low sulfur diesel (LSD) to ULSD. (Curiously, in Europe, where ULSD has been in use for much longer, there have not been any corrosion issues, according to a report in *Fuel Oil News*.) The only solution, thus far, is to keep tanks as clean as possible with no water bottoms so there is nothing for the fuel to react with. On boats, repairers we talked with had not seen any indications of corrosion problems.

Leaking Gaskets

When the transition was made to LSD in

1993, there were problems with leaking gaskets. Newer gaskets that resist leaking were developed, but there were some fears that the gaskets might not stand up to ULSD. After talking to numerous marina owners and engine manufacturers, leaking gaskets don't appear to be a problem.

Water and "Bugs"

Microbial growth—bugs—needs water to grow and has always been a concern with diesel fuel. ULSD holds *less* water than older, higher-sulfur fuels. While that sounds like good news, it's not; any water that finds its way into a boat's tank is less likely to be absorbed into the fuel and is more likely to wind up at the bottom of the tank, where it can help spawn the dreaded microbial "bugs." Biocides kill bugs (as will freezing temperatures), but their tiny little carcasses accumulate at the bottom of the tank and form a funereal goo. It's possible that tanks may need to be cleaned more often to prevent filter clogging and corrosion.

The best defense is to keep water out of your fuel by keeping the tank topped off to reduce condensation, only buying fuel from a reliable source, and checking your water separator. If water starts to appear routinely, you'll have to take steps to clean your tank and polish the fuel.

Cold Weather

The refining process used to lower the sulfur content of ULSD also can affect the content of naturally occurring paraffin (wax) in diesel fuel, which causes it to gel more readily in cold weather. For the vast majority of boat owners, who lay up their

boats over the winter, cold weather starting isn't a concern. For anyone who plans to use their diesel in winter, distributors compensate for colder temperatures by selling a winter blend. If you still have a summer blend in the tank, you'll need to use a cold-weather additive and follow the instructions. Use only the recommended

dose, as too much additive may make gel problems worse.



Keeping Diesel Fuel Clean

Keeping fuel healthy is the key to a healthy diesel engine. Below are four important considerations to keeping fuel clean.

- 1 Start by adding clean fuel, which means buying your fuel from a reliable source. Fuel that has been languishing for months in an underground storage tank is more likely to have water, rust, and even bugs.
- 2 Microbial bugs can't live without water. Keeping the tank topped off minimizes condensation. Check your fuel separator routinely for water, which can signal a problem that will have to be corrected.
- 3 Check if your fuel distributor uses biocides in its fuel. If not, adding a biocide may be helpful, but take care to use the recommended dosage.
- 4 Change filters at least annually. Slimy, smelly filters are indications of a microbial fuel infection. If filters, especially secondary filters, look dirty, consider having your tank emptied and cleaned. Otherwise, you'll be fighting an uphill battle.

Fuel Source

A reliable source for your fuel is (and has always been) very important. A high-volume dealer is far more likely to have fresh fuel than a sleepy, backwater marina. As a general rule, diesel fuel can be expected to remain "healthy" for at least a year. The major oil companies or distributors will sometimes use their own additives (antioxidants and biocides). If the fuel has been treated and stored in a clean (no rust), water-free tank that is in a cool (or underground) climate, diesel fuel can last as long as three years. 