Fuel Right

Understanding Cold Weather Fuel Issues

When temperatures plunge fuel sometimes doesn't flow. Why this happens and what one can do about it are widely misunderstood issues and worth discussing.

The first thing that causes cold flow problems - and by far the most common winter problem with diesel fuel and heating oil – is **fuel line freeze-ups**. This has nothing to do with the makeup or quality of the fuel itself, but is rather simply water freezing at or below 32° F. Water collects in low spots in fuel lines and at the bottom of tanks. Sludge deposits – which are essentially water-filled masses, likewise usually collect at low spots in the system. When the temperature drops below the freezing point of water these things can freeze solid and restrict flow. Fuel pumps are generally better at pushing fuel than at "sucking" fuel, so they just stop working if the restriction becomes too great.

The answer to fuel line freeze-ups is to use a fuel anti-freeze. Alcohols fit this category – but, for reasons discussed in other tech notes, alcohols are generally not good in #2 fuel systems. A better answer is to treat with glycol ethers. These are used in aviation fuels for the same purpose – and are what are sprayed on the wings of airplanes in the winter to prevent ice buildup. Glycol ethers do not carry any operating downside as do alcohols. What is more, they will accumulate in aqueous deposits throughout the year and offer freeze protection even months later is those deposits are still there when winter arrives. All Fuel Right® products contain a healthy amount of DPM glycol ether – the best form of fuel antifreeze. Incidentally, blending kerosene with #2 fuel does nothing to prevent fuel line freeze-ups.

The second problem to occur as the temperature continues to drop is **waxing of filters**. Somewhere below about 20° F paraffin starts to come out of the fuel, and the fuel starts to appear cloudy. The temperature at which this happens is reported as the "cloud point" of the fuel. This by itself means little, but it is easy to measure and is often included in fuel analyses. At some point below the cloud point, enough wax has precipitated to build up on the surface of cold filters and, eventually, seal the filter against flow. At this point the system shuts down until the filter is heated or replaced. (The wax readily melts back into the fuel if it is warmed slightly. Waxing is only a problem where the filter and the fuel are cold – usually outdoors. It is retarded or inhibited by treating the fuel with what are called "wax crystal modifiers" – or by blending kerosene into the fuel to dilute the paraffin concentration. Kerosene blending at up to 50% concentration is the best and surest way to retard waxing – but it carries a list of negatives that, in the minds of some, more than make up for its cold-flow benefits. (See Fuel Right® vs. Kerosene for Winter Treatment for more details)

The last problem to occur as the temperature continues to drop is **gelling** of the fuel. This occurs when enough wax comes out of the fuel to make it a heavy slush that won't move. The lowest temperature at which the fuel is still a pourable liquid is called the "pour point" of the fuel.