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Cold Weather Factors: Exploding the Myths

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Although oil has long been a source of heat and energy, there are still many misconceptions about its handling and use, especially in cold weather. One would expect that by now all there is to know about petroleum would be clearly understood. However, many concepts involving fuel oil and diesel fuel are actually not based in fact and although generally accepted to be true, are actually myths developed over the years. Unfortunately, belief in some myths has had a negative influence on the course of action that a dealer might otherwise have followed to improve the overall fuel performance. This article, therefore, examines several traditional beliefs and explodes the myths; hopefully, allowing the oil dealer to make better decisions based on fact rather than fiction.

Myth: Wind Chill Affects Fuel Gelling.

Fact: The “wind chill factor” is a weatherman’s device to indicate the coldness felt on the exposed human flesh by a combination of temperature and wind velocity. Obviously, it has no relevance to any inanimate object such as oil being stored in an outside tank or fuel in a truck tank. Yet dealers constantly refer to the wind chill when predicting potential oil flow problems. To be sure, an outside tank situated on the windy side of the house will tend to be colder and will affect the stored product, but this is due to the fact that the wind and shade are both producing a lower and more prolonged absolute temperature. This same reasoning applies to fuel in a tank mounted on a diesel truck, since the absolute temperature in the tank would tend to be colder simply because of its location and exposure, but again not due to any wind chill factor.

The importance of understanding this relationship lies in the fact that an effective pour point depressant can be used to prevent gelling problems since reductions of as much as 25-30 degrees are typically achieved with effective depressants such as C & S Scientific’s *Antigel*. With most typical fuels, this type of improvement is more than sufficient to cope with the coldest of winter’s temperatures, and so provides a ready remedy to cold flow problems. The dealer who previously might have doubted the efficacy of a chemical treatment, primarily because of wind chill considerations, now should appreciate the real benefit of such an approach.

Myth: Kerosene is the Best Means of Winterizing Fuel.

Fact: There is no question that kerosene will thin out a fuel and will, as a result, allow the product to flow at lower temperatures. However, since kerosene acts only as a diluent, large quantities must be blended in order to achieve any significant results.

Generally, a minimum blend of 30 percent kerosene is required to reduce the pour point by 15 degrees; in the case of highly paraffinic oils, blends as high as 50- 60 percent are recommended to yield this result. Obviously, the greater the kerosene content, the higher the cost of the winterized blend since kerosene has traditionally been two to five cents per gallon more than heating oil, and for obvious reasons, tends to rise in cost as the wintry weather sets in. Aside from the cost factor, there are many inherent disadvantages with kerosene blends including a marked decrease in the Btu content of heating oils and in the cetane number of diesel fuels. Also, the kerosene tends to lessen the natural lubricity of the fuel and thereby poses an adverse effect on pumps and other mechanical parts; this is especially critical in on-road diesel fuel since the low sulfur fuels already have less than ideal lubricity. Finally, although kerosene will reduce the temperature at which a fuel will begin to “wax out”, the interval between the first evidence of such wax (the Cloud Point), and the total congealing of the fuel (the Pour Point), will not change and will generally encompass only a ten degree range.

Understanding the advantages and limitations of kerosene can allow the fuel dealer to weigh the alternative solution to cold weather control – that of chemical treatment with a reliable cold flow improver. Additive treatment typically requires only 0.1 percent or less additive to substantially lower the Pour Point and the operability temperature, while extending the interval from the Cloud Point to the Pour Point by as much as 30 degrees. Despite these superior results, the added cost per gallon of fuel for additive treatment is less than one cent instead of the average 3-5 cents for kerosene blends. Since such small ratios are introduced into the fuel, the Btu content, the Cetane number, the lubricity, and any other natural properties of the fuel are not adversely affected.

Myth: Purchasing Winterized Fuels is the Best Choice.

Fact: In recent years, many major oil suppliers have been providing winterized fuel direct from the terminal, and many resellers have bought into this concept. At first blush, this package does seem to be most attractive because of its ease of purchase and delivery; a situation that the majors emphasize in order to promote their product. However, often the winterized fuel is merely a kerosene blended product, with all the disadvantages referred to in the preceding paragraphs. Also, the cost for such a blended fuel is often two to three cents per gallon more than for an untreated fuel. Even when an additive is added to the product by the major, the amount of the additive is generally quite low and can fluctuate depending upon the season. In the latter case, since the cost for winterized fuel is quite stable, a reduction in the additive content does not show up as a corresponding reduction in the cost of the final product. Finally, although winterized fuels are often advertised as a guaranteed product, it has to be noted that the guarantee is only applicable to whatever temperature the major oil supplier determines to be critical.

Typically, the guarantee is to an operability temperature of Zero degrees; this temperature would be acceptable during a mild winter, but as has been shown in the recent past, the product will fail whenever a real cold snap hits.

Recognizing the fact that blended, winterized fuel supplied by the major can be a costly and ineffective means of cold weather protection allows the dealer to consider other means. Using an effective chemical treatment can represent an economical alternative and one by which the dealer can once again assume control of the type of product being sold. For instance, in the case of diesel fuel, products like C & S Scientific's *DieselAdd* can yield a fuel far superior to winterized product in such critical areas as price, lubricity, operability temperature, cetane level, and overall fuel economy.

Myth: Oil Color Indicates Oil Quality.

Fact: Often, the color of a fuel is used to evaluate the quality of the product and to predict its potential for handling and combustion problems. This marker is, in fact, frequently used to provide a "quick and dirty" measure of a fuel's cold weather properties. The popular theory once was that if the fuel is water-white, than it resembles kerosene and so must behave like kerosene. Consequently, if the oil is dark amber, than it must be a heavier grade and so must have poor cold flow characteristics. In the case of diesel fuel, this is still the common belief. However, today with all heating oil being dyed red, the theory has been somewhat altered to the belief that as long as the oil is a clear, light-pink color, the product is of top quality, and if it is of a dark-red color, the fuel is of poor quality.

In truth, color is not any indication of a fuel's characteristics. Through the simple mechanism of oxidation, or aging, any distillate will in time darken in color. However, it is essential to realize that this process does not have any significant positive or adverse affect on the overall properties of the fuel, and especially as it relates to cold flow. In fact, the only real concern is when the oil appears to be black in color, since this is a clue that sludge residues have accumulated at the bottom of the storage tank. With respect to the gelling question, the critical factor is the paraffin content inherent in the fuel under consideration, and this content cannot be estimated by its appearance but only through quantitative measurements with sophisticated scientific equipment, or by actually conducting Cloud and Pour Point tests.

Myth: Low Sulfur Fuels are Overall Superior Fuels.

Fact: There has recently been a trend for oil dealers to consider using low sulfur diesel-type product for their heating oil accounts. Some preliminary reports have suggested that the low sulfur fuel is superior in its ability to lessen carbon and soot deposits, and to flow at lower temperatures than higher sulfur distillates. As a result, some dealers are leaning toward absorbing the extra cost in using low sulfur fuel even when it is not legally mandated, in the expectation that they will offset the cost through lower maintenance and reduced service calls.

If it is understood that the only difference between a low sulfur and a high sulfur fuel is its sulfur content, than it should become evident that this difference cannot affect any other properties of the fuel. At the refinery level, when crude is being processed, it

undergoes an operation known as desulfurization in order to lower the sulfur content to whatever point desired. No other properties of the crude are affected during this procedure. The carbon content, the paraffin content, the Btu and mpg rating, the specific gravity, the viscosity, the flash point, and all other key specifications except for sulfur content are unaffected. This fact can only lead one to the correct conclusion that a change in sulfur content does not result in a superior fuel and that any reports to the contrary are subjective and misleading. The only proven method to optimize a fuel's performance is by incorporating an effective chemical conditioner into the product. The addition of such additives is best handled through injection systems; C & S Scientific, for example, offers several unique automatic systems to ensure uniform blending of the chemical into the oil.

Once the above facts are considered, it should be easier to make decisions based on realistic expectation supported by scientific evidence. Proper decisions are crucial at any time of the year, but take on even more significance during the cold months when fuels tend to gel. The main conclusion gleaned from this report is that kerosene-blended and/or refinery-produced winterized fuels are costly and ineffective and that additive treatment is the most economical approach in providing high-performance heating oil and diesel fuels, regardless of sulfur content.