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Shell Commercial Marketing

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Subject: Ultra Low Sulphur Diesel Suitable For Agricultural Equipment

As of June 1, 2006, national regulations have required Canadian refiners to dramatically reduce the amount of sulphur in on-road diesel to improve air quality. At Shell, we blend our Ultra Low Sulphur Diesel (ULSD) to provide the right balance of all the properties required by diesel engines. Recently customers have raised the following concerns regarding the use of ULSD in off-road agricultural equipment.

- Lack of power in their equipment.
- Wear on parts due to decreased lubricity.
- Leaking seals.

The process of removing sulphur to create ULSD reduces the aromatics and the density of fuel. It also tends to remove naturally occurring lubricity agents in diesel fuel. Prior to the introduction of ULSD in 2006 Shell and industry colleagues worked diligently to identify, anticipate and address these potential concerns in on-road and off-road equipment.

Effects on Power

The reduction of aromatics and the density of fuel may lower the energy content per litre by about 1%. This could result in a small decrease in the peak power of the engine. However, customers typically do not see a loss in fuel economy.

Effects on Wear

ULSD requires good lubricity and corrosion inhibitors to prevent unacceptable engine wear. Lubricity is a measure of the fuel's ability to protect the various parts of the engine's fuel delivery system from excessive wear. The Canadian General Standards Board has a lubricity specification defined in CAN/CGSB-3.517 for all diesel fuel that has been in effect for many years (in the U.S. the equivalent standard is ASTM D975 as issued by ASTM International). Shell and other industry colleagues include a lubricity additive in all ULSD produced to prevent unacceptable engine wear. Therefore, if the ULSD is dyed and sold for agricultural equipment it still contains the lubricity additive. This approach of adding lubricity has been used successfully in Europe for many years.

Unexplained Fuel Leaks

Old fuel seals (i.e. o-ring seals, elastomers) may leak in some equipment when ULSD is used. Fuel seals in vehicles older than 1993 with high mileage (particularly those operating regularly at higher temperatures) are most at risk of leaking. Since ULSD is lower in aromatics the seals may shrink and leak. A new seal of the same material will generally work as suggested. Shell recommends customers contact their local dealer or vehicle manufacturer for additional information.

Cautions

Shell is aware of instances where farmers have used furnace fuel in their equipment. Furnace fuel does not require a lubricity additive, which would mean a lesser quality fuel without the necessary inhibitors to prevent

unacceptable engine wear. Additionally true furnace oil likely does not meet the diesel cetane requirements of the agricultural equipment. This would cause poor running and a lack of power.

Great care is required when using after market additives. Selection of the wrong product can cause more harm if used in the incorrect application. For example, an acidic lubricity additive could cause problems with the in-line pump plunger sticking. This is often misdiagnosed as a lubricity issue. Many older tractors use in-line pumps.

For additional information please visit the ULSD Frequently Asked Questions section available on Shell Source at https://services.shell.ca/portal/wps/myportal/Ultra_Low_Sulphur_Diesel. Shell Source also provides further links to Environment Canada and the Canadian Petroleum Products Institute (CPPI).

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