

## Blending Used Crankcase Oil with Diesel Fuel for use in Caterpillar Heavy Duty Diesel Engines

### Engine Capability

Caterpillar heavy duty diesel engines are capable of combusting a controlled amount of diesel engine crankcase oil correctly blended into the diesel fuel without severe engine problems. In general, accelerated engine wear is not expected when the correct blending and filtration procedure is used; however, fuel filter replacement and fuel system wear, particularly with the newer high injection pressure fuel systems needs to be monitored.

It is the intent of Caterpillar that the consumption of used engine oil by Caterpillar heavy duty diesel engines be limited to only the drain oil from these engines. In mixed fleets (or sites) where the drain oil is being consumed by all engines equally, the burning of drain oil from other diesel engines is acceptable. If other engines in a fleet (or sites) are not burning their used drain oil, only the used oil from Cat engines should be consumed by Cat engines.

The following information outlines the recommended procedures for burning used diesel engine crankcase oils in Caterpillar heavy duty diesel engines. Any variation in the recommended procedures can result in reduced fuel system and engine life.

Only diesel engine crankcase oils can be mixed with the diesel engine fuel supply. Under no circumstances should gasoline engine crankcase oils, transmission oils, hydraulic oils, greases, cleaning solvents, etc., be mixed with the Caterpillar diesel engine fuel supply. Also, never use crankcase oils contaminated by water or antifreeze due to engine coolant leaks or poor storage practices. *Clean handling techniques of the*

*used diesel engine crankcase oils are essential in preventing contamination of the diesel fuel supply from outside sources.*

### Caution

- Do not burn crankcase oil that has a milky appearance in your engine.
- Engines equipped with an oxidation catalyst (often referred to as a catalytic converter) should *not* use oil/diesel fuel blends.
- A fuel mix of less than 1% is recommended where fuel filters are subject to plugging from the waxing of cold diesel fuel.
- An oil and fuel mix cannot be used if exhaust valve deposits have been a problem.

### Marine Engines

- Use a duplex fuel filter that permits element or canister changing while the engine(s) are operating.
- Onboard personnel *must* know how to change fuel filters, bleed the fuel system and restart the diesel engine(s).

### Blending

*Adequate premixing and filtering of the used diesel engine oil and fuel is essential.* Clean handling techniques of the used diesel engine crankcase oils are essential in preventing contamination of the diesel fuel supply from outside sources. Do *not* mix/blend in open containers. For bulk blending it is *strongly recommended* that after-market devices designed to provide proper handling, filtering, and blending be used. Use proper filter maintenance intervals for the filtering /blending unit.

Lube oil and fuel will combine and not separate if properly premixed. Before addition to fuel tanks on the truck or adding to bulk storage tanks, mix an equal amount of used oil with diesel fuel (50-50 mix). Filter this mixture through a superior grade fuel filter (Cat fuel filter part no. IR-0749 or equivalent — 2 micron) prior to addition to the fuel supply tank. Visually inspect the mixture looking for globules of undiluted lube oil that can lead to premature fuel filter plugging. If globules of undiluted lube oil are present, the fuel lube oil mixture needs to be agitated, filtered or rebled to assure blending of the lube oil and fuel. If the globules do not dissolve with additional blending, this can signal oil contamination with water, antifreeze, or other compounds that do not dissolve in or combine with diesel fuel. Do not burn used oil that does not mix completely in diesel fuel. To complete the blending process, add the 50-50 mix to the fuel supply tank first and then add a substantial amount of clean diesel fuel to that mixture (top off tank). The ratio of used oil to fuel must *not* exceed those detailed below under “Bulk Blending”. Caterpillar does *not* approve the practice of adding *unfiltered* 50-50 mixes to the fuel supply.

Under no circumstances should oil drained from the engine sump(s) be added directly to fuel tanks on the truck or bulk storage tanks without first filtering and pre-blending to a 50-50 mix of fuel and drained lube oil.

*Do not exceed the maximum allowed ratio of used diesel engine crankcase oil to diesel fuel, as detailed below under “Bulk Blending”, and “On-board Blending”.*

## **Bulk Blending**

- When consuming used diesel engine oil from more than one engine on a continuous basis, an average ratio of 1% lube oil to diesel fuel can be burned without a significant increase in engine deposits. The ratio of used oil to fuel may vary due to the amount of fuel in bulk storage facilities. *At no time should the ratio of used crankcase oil to fuel in a bulk storage tank exceed 3%.* The lube oil must be premixed and filtered as outlined under the “Blending” heading.

**Example:** A fleet of Caterpillar engines can operate continuously on a mix of 100 gallons of properly filtered and premixed used engine oil to every 10,000 gallons of diesel fuel in a bulk storage facility.

- *When consuming the used crankcase oil from a single engine at the time the oil is changed, a **one time** ratio of up to 5% oil to fuel can be burned immediately following the oil change.* The oil/fuel mixture *must* be split between tanks on a dual (saddle tank) system. The lube oil must be premixed and filtered as outlined under the “Blending” heading.

**Example:** Ten gallons of used engine oil, properly filtered and mixed, can be added to 200 gallons of diesel fuel and burned after each recommended oil change interval.

## **On-Board Blending**

*When a continuous blend system is installed to draw oil from the engine crankcase to the truck fuel tanks, the rate must not exceed the equivalent of a 0.5% ratio of used oil to diesel fuel.*

The 0.5% ratio is the maximum average ratio than may be used. The correct selection of used oil to fuel ratios (not exceeding the maximum allowed) when using blending systems not manufactured by Caterpillar is the responsibility of the system manufacturer and the customer. The lube oil *must* be filtered through a Cat IR-0749 fuel filter or equivalent (2 micron) *and* be routed early into the fuel return line, to enhance oil/fuel blending. The used, filtered, oil must *not* be routed directly into the fuel tank(s). The filters may require more frequent replacement than is necessary for fuel filters on these engines when not burning used crankcase oils. The fuel level should not be allowed to drop below a quarter tank, as bypassed fuel will continue to raise the average oil level in the tank. *An engine using a continuous blend system should not draw fuel from a bulk fuel storage tank with premixed oil/fuel blends.*

**Example:** A fleet has equipped their trucks with devices that transfer filtered used crankcase oil to the fuel tanks. The rate must be selected so that no more than one half gallon of oil is added to the fuel tank during the time that 100 gallons of fuel is burned.

## Summary

When burning used diesel engine crankcase oils in Cat heavy duty diesel engines you *must* utilize the recommended filtration and blending techniques at the recommended concentrations for the various methods that can be used.

*In general, accelerated engine wear and changes in engine performance are not expected using this procedure. However, some additional fuel filter replacement and fuel system wear is possible.* The addition of used oil to the fuel may also cause some discoloration to various fuel system components.

The user must monitor engine operation and modify the procedure of adding used crankcase oil to the fuel supply if unusual problems occur. Contact your Caterpillar dealer for additional information regarding proper engine maintenance and operation. This publication supersedes the information on this topic found in SEBDO717 "Diesel Fuels and Your Engine", and any other procedural writing on this subject.

*It is the user's responsibility to monitor Federal, State, local, and any other laws and/or regulations which control this method of used oil disposal. See Engine Data Sheet, 62.0 .*

