Black Engine Coolant

Category: Coolants
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Introduction:

Since early 1998 the antifreeze industry has seen a dramatic increase in reports of dark or "black" coolant. Users of high-horsepower diesel engines and/or during warm weather most commonly make these reports. Penray has investigated the phenomenon of "black coolant". We have verified the situation is real and that "black coolant" is problematic. It should not be allowed to remain in service.

Specific Problems Observed:

Users report a dramatic darkening of ethylene glycol-based coolant in some diesel engines. In the extreme cases, the coolant turns so dark that it is often described as "black". The observations are made in various brands of engines. The coolants that turn black are not related to any particular inhibitor technology or manufacturer. Usually an entire fleet is not affected, only apparently random trucks. The coolant may, or may not, also exhibit a significant increase in fine silt-like deposits in the radiator or other low-flow areas of the cooling system. Analysis of the coolants typically reveals extraordinary high concentrations of metals, especially aluminum and iron. If formate/glycolate concentrations are reported, they are typically found extremely high (well over 1,000 ppm). Further, the pH and RA are far below normal values. "Black coolant" is corrosive. It has been observed in some engines that have failed, but most reports of black coolant are from engines in service. Over 90% of reports originate in systems subjected to intense heat stress. (i.e. High horsepower versions of engines, warm ambient temperatures).

Penray's Recommendation:

Penray strongly recommends that users who observe "black coolant" immediately drain and flush their cooling systems. Flushing should be done with fresh water until the water exiting the engine runs clear. Dispose of the effluent fluid as hazardous waste. Refill the cooling system with one of the following modified coolant solutions:

- **Modified coolant #1:**

To optimize heat transfer, engines operated in climates where a -10 oF freeze protection is adequate, mix 33% "fully-formulated" antifreeze (RP-329 specification) with 66% pure water and 1% Pencool® 3000 SCA. The reduced glycol content will help reduce the operating temperature of the engine. The additional Pencool will replace the inhibitor protection compromised by diluting the antifreeze.

- **Modified coolant #2:**

In situations where a -10 oF freeze protection is not adequate, mix 50% to 60% propylene glycol based "fully-formulated" antifreeze (RP-330 specification) with the balance or pure water. Propylene glycol based antifreeze has been shown to resist the breakdown experienced by ethylene glycol in high temperature operating conditions. FleetCharge® PG antifreeze has been tested and found to prevent recurrence of this problem.

Persistent problems should be addressed to the engine manufacturer or Penray Tech Service for further recommendations.
