

Coping with Fuel Contamination

From Pacific Fishing, January 1998

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As every owner knows, diesel engines are pretty reliable as long as they are fed a steady diet of clean fuel. But problems quickly occur when microorganisms take over the fuel tank. Fuel turns murky, filters plug with brown slime, engines falter and then quit.

“Algae” is the term often used to describe growth in diesel fuel tanks, although none of the several species of single-cell organisms that live in fuel, is really an alga. Some are bacteria, some yeasts or fungi. All are too small to be seen, but the confusion lies in the fact that the byproducts of these tiny creatures, combined with a sludge of degraded fuel residue, can easily be seen. In fact, the bottoms of your fuel tanks may be coated by an inch-thick mat of what is, in effect, bacteria poop.

Bacteria and fungi are everywhere, and some species are adapted to living in environments of high temperature, strong chemicals, and an absence of oxygen. It is doubtful whether they live through the petroleum refining process, but it is certain that by the time fuel reaches your tanks it has been contaminated by microorganisms—from the refinery’s tanks, from transport vessels, and from the air. These microscopic “bugs” can survive in an anhydrous or water-free environment, but they can’t grow, feed, and reproduce. To become a problem they need water.

Water, of course, is readily available in fuel tanks. Maybe it’s pumped in with bad fuel, maybe it just condenses out of the air space at the top of the tank as it cools in the evening. Since water is heavier than diesel fuel, it settles to the bottom. The fuel-water interface has everything the bugs need: darkness, water, fuel for food, and a little heat from the fuel returning from the injector bypass.

You may not even know you have a microbe problem until you stir things up by bouncing around in rough water, then

suddenly you’re plugging filters. I once had microbial contamination so bad that for a few weeks, until most of the crap had been sucked out of the tanks by the engine, I had to change fuel filter elements every two hours of running time.

To prevent microbial contamination, just keep the water out, and drain or pump out whatever water does get into the tanks. Unfortunately, this is often easier said than done since many tanks were built without drains and cleaning access hatches. Chemical emulsifiers can remove small amounts of water, but are ineffective on more than about an inch of water.

A bigger problem is ridding your tanks of bugs once they take hold. Large seaports have companies that provide “fuel polishing,” which means pumping fuel (and associated water and scum) from the tanks, filtering, and returning the fuel to the tanks. You can buy an on-board fuel polishing system, consisting of a timer, a circulating pump, a magnetic microbe killer (more on this below), a filter, and the required valves.

Short of external or on-board fuel polishing, there are two common approaches to combating fuel microbes: biocides and magnetic decontamination. Most fuel dealers sell fuel biocide additives that kill organisms in the tank. Just follow the instructions on the label; a heavier dose is applied the first time to kill what’s currently in the tank, then lighter “maintenance” doses are applied regularly to prevent recontamination. Biocides work but they are hazardous chemicals, and filter clogging can be worse after application since the organisms and their byproducts may be more dispersed in the fuel rather than confined to the water-fuel interface.

The magnetic devices are another matter. The claim is that, as the organisms pass through a magnetic array, the cell walls are damaged, causing death or at least im-

paired metabolic function and reproduction. Since most diesels recirculate two-thirds to 80% of the fuel that passes through the fuel lines back to the tanks through the return lines, the idea is that after running the engine for a time, all the fuel in the tanks will have passed through the decontamination unit and the microorganisms will be dead or incapable of causing problems. Manufacturers and dealers of these units can provide testimonials from users, but microbiologists say there is no experimental evidence to support the concept of killing microbes with magnetic fields.

Unfortunately, there doesn’t seem to be a single magic bullet for fuel problems. What is required is a system approach:

1. Keep water out.
2. Get the water out when it gets in.
3. Kill the bugs with a magnetic device, if you believe in it, or with chemical biocides.
4. Monitor your filters (a vacuum gauge between filter and engine lift pump will indicate if the element is starting to plug), and change them frequently if necessary. Carry lots of spare filters.
5. Consider a fuel polishing service or an on-board fuel polishing unit. ♦