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# THE GAMGRAM

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No. 17

JET FUEL BUGS

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Have you ever been in a situation where you were seeing things with your own eyes that proved respected authorities were wrong? I recall a time that this happened to me several years ago but I have not written about it before, possibly because I have to admit that I had been in agreement with them. However, one must admit when one is wrong.

The statement I object to is: "The quantity of jet fuel through this station is so low that we need not follow our usual change-out schedule for our filter separator elements."

Doesn't it appear logical that the less fuel pumped through a filter separator, the less frequently the coalescer elements need to be changed? If you believe this with no reservations, please don't ask me to fly in your airplane!

In years gone by, people who pay for replacement elements for filter separators have felt that they spent money needlessly in changing elements on a periodic basis. We must agree that time seems an illogical basis if the fuel effluent is clean and the pressure drop across the filter separator is low. There is nothing that time alone can do to the elements in a filter separator. The problem is that HEAT and TIME can cause astonishing things to happen in the WATER that has been collected by a coalescer.

The condition that I saw years ago (and now more frequently) was in a small filter separator rated at 100 gpm (378 liters/min.) but used only to refuel helicopters at about 30 gpm (113 liters/min.). The inside surfaces were covered with a slimy, stringy mess. The elements were 18 months old and the total throughput was estimated at only 84000 gal. (318,000 liters). If you think about it, that filter separator was a perfect incubator. The helicopters were refueled at night or in the morning, and the coalescers collected trace amount of water. Then the sun warmed the filter separator during the day. Microorganisms proliferated in the beautiful little incubator!

The "bugs" or microorganisms that are found in jet fuel systems are microscopic bodies that live in water and "feed" on the fuel. There are many varieties but if you want a name for the most popular breed, call them cladisporium resinae. The slime is probably not alive -- it is actually the debris left by the microorganisms. You would call it their trash heap.

In a commercial airport fuel system where airlines operate, the throughput per day is high. The filter separator does not stand in the hot sun all day long or sometimes two or three days without flow. If water collects in the coalescer, it is displaced by more water the next time flow occurs. It then gathers in the sump and is drained away each day. Severe microorganism problems are rarely seen in high throughput systems. The danger occurs as throughput per day become smaller, as flow rates become small in systems designed for high flow rates.

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Low flow rate facilities for jet fuel are being installed at an astonishing rate around the world. These facilities are serving executive jet airplanes and the turbine powered helicopters. We are absolutely convinced that these facilities should be installed so that the fuel in the tank can be recirculated on a frequent basis.

Standby refueling equipment is another potential source for great difficulty. At almost every airport, stationary and mobile equipment can be found that is kept ready for service in case of need, but it is very rare that flow ever takes place through the filter separators. Doesn't it seem logical that periodic operation of this equipment will minimize the possibility of microorganism growth? The frequency of this operation must certainly be based on experience and the best experience comes from an observation of the sump drainings from these filter separators. In this regard, you might wish to review GamGrams numbers 2, 3 and 5.

In considering these problems, think about how algae grows on a stagnant pond. It takes time for it to get started, but once it begins, it simply covers the pond at an astonishing rate. Have you ever seen algae growing on a full flowing river or stream? Certainly not! The same rule applies to a jet fuel system. Keep it moving and you cannot have microorganism growth.

If you have a system that has the characteristics that are described above, there are very intelligent things you can do:

1. Recirculate fuel through the filter separator and back to the supply tank every day at the designed flow rate.
2. Remove water from the supply tank before recirculating and check the filter separator sump while you recirculate.
3. If slime is observed in the water/fuel interface, discuss it with your fuel supplier.
4. Inspect the outside surfaces of the coalescers for brownish or black patches -- these are "colonies." Dispose of these elements immediately.

Remember that the small jet fuel systems and those with low throughput are MORE vulnerable to microorganisms and may require element changes MORE frequently than the big, high flow systems.