THE GAMGRAM

No. 42 **MAR. 1994**

BEING AWARE OF CHANGES: THE KEY TO SAFE FUELING

The difference between a good doctor and a poor doctor is that a good one can examine you and figure out exactly what is wrong with you. The secret is knowing what to look for and understanding what you see. This is also true when you examine your fuel system. You have to look for things out of the ordinary and understand their importance.

FILTER MEMBRANE TESTS

(otherwise known as “Millipore tests”)

A change in membrane color in consecutive tests on incoming fuel could show a potential problem. Doing a test before and after each filter vessel shows you how much of the contamination is being removed by each vessel. Slight coloration of the membrane is normal. A darker membrane than usual on the inlet warns you to test the fuel after the filter. Also compare the color on the membranes from these two tests. If there is little or no difference in color, you may have either a burst, damaged or improperly mounted element or extremely fine (small) particles that pass through the grade coalescer you are using. You may need a tighter filter (lower micron rating) to remove this contamination. To evaluate this, put two new membranes in one monitor and run the test again to determine if the contaminant is really only “color bodies” -- (dye-like materials which rarely are a real problem). If the top and bottom membranes are the same color, it isn’t dirt that is causing the color. A difference in color represents filterable dirt on the top membrane.

DIFFERENTIAL PRESSURE READINGS

Natural law says that differential pressure should increase with time. A decrease in differential pressure usually means loose or burst elements. Be sure to correct for different flow rates (see GamGram 26). Keep records on graph paper. A sudden increase in differential pressure means that you have a sudden increase in contamination. You should do a filter membrane test to be sure that the elements are removing all of the contamination. If the color is unacceptable, some of the contamination may be too small to remove completely on the first filtering. You may need finer elements (lower micron rating) or recirculation to clean the product properly.

An increase in differential pressure on clay elements means water 99% of the time. The other 1% is gross particle contamination. Pressure drop cannot be used to evaluate clay treatment capability. See GamGram 14. WSIM and IFT (Interfacial Tension) are the only proven indicators of clay depletion. The important thing to look for is the difference in WSIM or IFT between inlet and outlet readings. The greater the difference, the better the clay is working. If you do not have an Emcee Microseparometer to read WSIM (the new term is MSEP rating), Velcon makes a “Swift Kit” tester to read IFT but it does not yet have ASTM acceptance. Do not assume that a low differential pressure means that the clay is good. Have MSEP tests performed.

An increase in differential pressure on a filter separator that is downstream of a prefilter is important. A small increase can be normal, caused by a buildup of fine contamination that got through the prefilter and was stopped in the coalescers. Water can also cause an increase in differential pressure but this increase will usually disappear with volume throughput because the coalesced water will end up in the sump. Often, a buildup of differential pressure means that the micron rating of the prefilter is too large to protect the coalescers. Modern coalescers are filtering at the 1/3 to 1/2 micron level so it makes little sense to try to protect them with 2 to 5 micron prefilters.

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VISUAL TESTING

There is no substitute for a visual test on fuel delivered by transport vehicles. Considering the cost of the equipment, the test is the most cost effective method of protecting your system. A white porcelain (or properly grounded plastic) bucket is all that is necessary, but a glass jar is a good additional tool.

Clean the bucket (or jar) carefully and, before the truck driver connects the delivery hose, open the valve and take a one or two gallon sample into the bucket. Look for:

1. Free water in the bottom.
2. Particles in the fuel.
3. Improper smell, (if allowed by personnel safety rules).
4. Improper color.
5. Haze (a glass jar is a great help for this. See GamGram 21).
6. A wispy white film or a foam that does not break up and disappear easily.

Your experience will show you that small quantities of water or particles are acceptable but any substantial increase is cause for concern. Run the test again. If you get the same results several times, you have a reason to register a complaint. Improper smell and haze are conditions that should cause great concern. Color should be perfectly clear to slightly yellow (“straw color”). A white film or “soap suds” can mean surfactant contamination. This can ruin filter separator elements and make a mess of your fuel system. (See GamGram 14 and GamGram 28).

A change in any of the above conditions is cause for concern. Call your supplier’s quality control people (or your own) if in doubt. You are the last line of defense in the event of a fuel problem. You may prevent the great inconvenience to your company of a fuel system being contaminated. You might even save lives (not to mention your job).

SUMP DRAININGS FROM FILTER SEPARATORS

Please review GamGram 3 and GamGram 21. Changes in water quantity are important in filter separators, because water has to come from somewhere. Small quantites can be normal, caused by condensation. You should trace larger quantities to the source.

If you keep getting haze in sump drainings after several samples have been taken, it only means one thing. Your system is in trouble. (Be sure you have established flow for some time before you take the sample. Fuel can get hazy from cooling when the system is stopped. You must flush this out of the system). As coalescer elements become contaminated with surfactant, they start to allow a small amount of haze through if water is present. Allow us to repeat: Haze in a filter separator sump means that your system is in trouble. You are not removing water and if you don’t do something fast, this could mean that some airplane full of people may be in big trouble. Call your supplier’s quality control people or your own. This is very, very important. Even if your filter separator is close to the airport and the fuel will be filtered again, the surfactant and water can go right on through. Every filter separator along the way to the aircraft can become disarmed. Only carefully controlled and monitored clay treatment can save this fuel. Remember, YOU CAN SAVE LIVES.

Particles in filter separator sump drainings means one thing -- trouble. The elements could be loose, burst or damaged and immediate investigation is necessary. If you are lucky, the cause may be found to be that the filter separator was not properly cleaned at the last element change. Dirty water is not what we are talking about. A small amount of “dirty” looking water can be normal. Visible dirt in the fuel is big trouble.

In conclusion, look for changes. You are responsible for one important aspect of flight safety. You can have a problem. We hear of cases regularly. It happens to almost everyone, eventually. Don’t gamble – be careful. Do you expect everyone to call the newspapers when they have a problem? Of course not! They simply clean it up before it gets to be a real problem (hopefully). Every fuel system and every quality control person in the world is part of an invisible network. Our industry is very good at quality control. It is something to be proud of. Keep up the good work. Help train your new people, test regularly and look for changes.