Fuel Appearance is Deceiving

A white paper prepared by
FOI Laboratories

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Introduction: *Questioning a Judgment Call*

FOI Laboratories conducted a nation-wide survey asking this question: “How is the decision made whether or not to send a sample of stored fuel to a laboratory for testing?” This was asked of hospital technicians, facility managers and field technicians from 5 branch locations of every major OEM generator distributor/service company per time zone in the continental US.

Method: *Eyeballing the Fuel*

Three answers dominated the responses.

1. Only if the client asks for the fuel to be tested.
2. We don’t usually test the fuel.
3. If the fuel looks bad, we have it tested.

There is an astonishing amount of guess work being relied upon as to the fuel quality in storage tanks. End user clients who keep their tanks above 75% full but burn through a volume of fuel equal to the tanks’ total volume in one or two years assume that the fuel in the tank is clean. Individuals primarily concerned with minimizing a maintenance budget wait until their generator filters are plugged before being concerned that something might be wrong with the fuel. Of concern for this study was the overwhelming response “if it looks bad, we have it tested”.

Analysis Methods: *Look Deeper*

Numerous generator technicians discussed how they would look at a sample that appears clean, dump it back in the storage tank, and report it to the client as good fuel. Equally disturbing are the number of fuel polishing companies that will extract a bad looking sample and polish the fuel based on appearance alone. Once the polishing is done, they will pull a good looking sample for the client to see and then leave the client with nothing more than “It looked bad and now it looks better”. The polishing company and the end user have no scientifically proven data or complete knowledge of what was wrong to begin with, nor do they know how good the fuel is after polishing.

Based on the survey responses, several samples were pulled from generator storage tanks and the samples that were clean in appearance according to ASTM D4176 were selected for this study. This clean appearing fuel is exactly representative of the fuel service representatives are pouring back into storage tanks. These fuel samples were run through the FOI Complete Diagnostic Package. This collection of fuel tests was assembled by the FOI chemist to meet standards stringent enough for the expectations of JCAHO accreditation.

Out of the collected samples, a few tested as clean fuel samples as represented by Sample A. The majority of the samples are represented visually by Sample B in the following display:

Appearance is Deceiving

Sample A and B have a clean Visual Appearance. (ASTM D4176)

These samples were pulled from the main storage tank at 2 different locations and are visually identical.

Sample A: No notable particulate contamination (ASTM D6217)

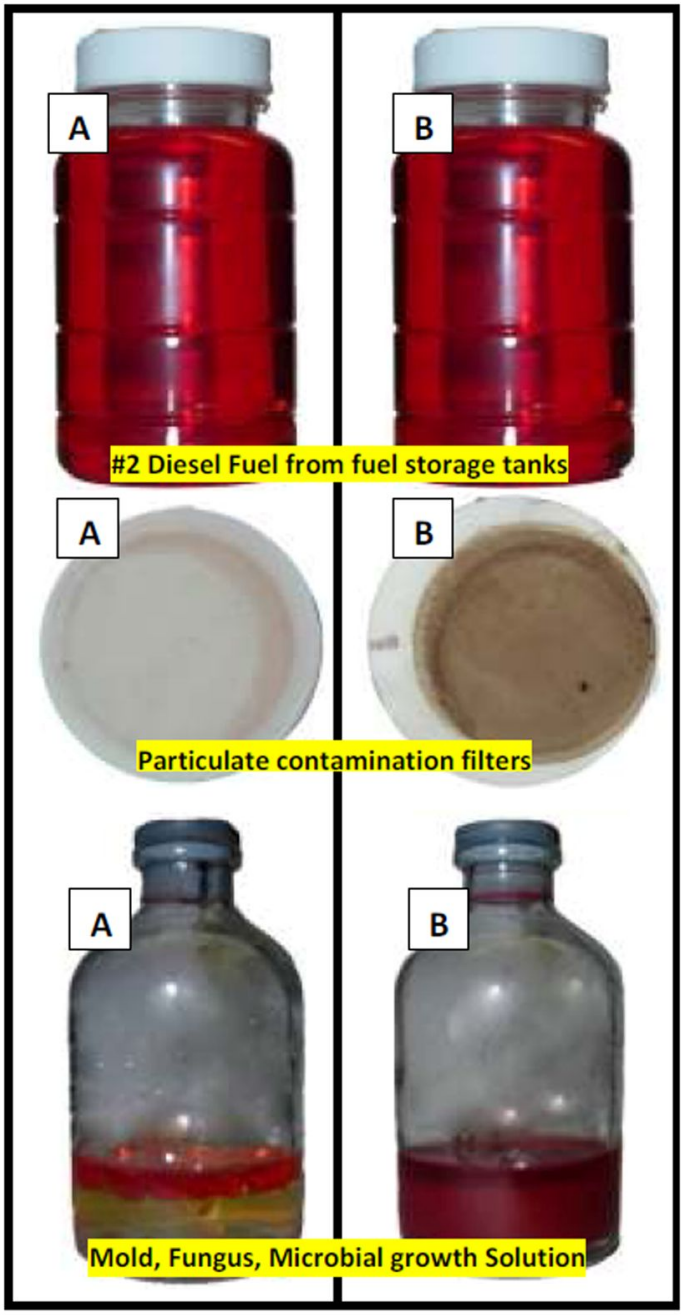
Sample B: Heavier particulate contamination (ASTM D6217)

Causes corrosion, wear, bacterial growth, premature fuel filter clogging and de-rates generator performance.

Sample B: The entrained water content (invisible to the eye) and sulfur content have combined to create a highly corrosive environment. (ASTM D6304, D5453)

Sample A: Has No growth (culture medium)

Sample B: Has Microbial growth (culture medium)



ALWAYS TEST THE FUEL

Concluding Discussion: *Testing holds the Truth*

Assuming fuel is good because it looks good is the first step towards disaster. Always test stored fuel at twice per year. Today's new fuels demand an exact science, not a good "eye-balling". When the fuel is delivered, there is no way to know whether it is fresh from the refinery or if it has been sitting in storage tanks for the last two years. The test that should at least be run annually regardless of the assumed age of the fuel is the Basic Wellness Package as illustrated below:

Test	Units	Method
Distillation, IBP	Degrees F	ASTM D86
Distillation, 10% Recovery	Degrees F	ASTM D86
Distillation, 50% Recovery	Degrees F	ASTM D86
Distillation, 90% Recovery	Degrees F	ASTM D86
Distillation, End Point	Degrees F	ASTM D86
Sulfur	ppm	ASTM D5453
Microbial Growth	pos/neg	Microscopic/Culture Growth

For those under more stringent regulation, diagnostic fuel test packages have been developed by the FOI chemist and should be done annually as well. The old school "look and sniff" test method combined with the occasional "pasteon-a-stick" dip missed developing fuel problems 60% of the time in this study. These practices are leading the way to critical emergency generator failure and crippling engine damage. The message that must be communicated to everyone with stored fuel is "Be safe, not sorry." Always laboratory test your fuel.

About FOI Laboratories

FOI Laboratories is a state-of the-art fuel analysis, testing and research laboratory that specializes in providing high quality fuel analysis and testing services to commercial and industrial businesses. The company offers comprehensive testing services for diesel, bio-diesel, jet fuels and marine bunker fuels that have been designed to detect storage integrity and classify product by ASTM and industry specifications.

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