



MicrobMonitor

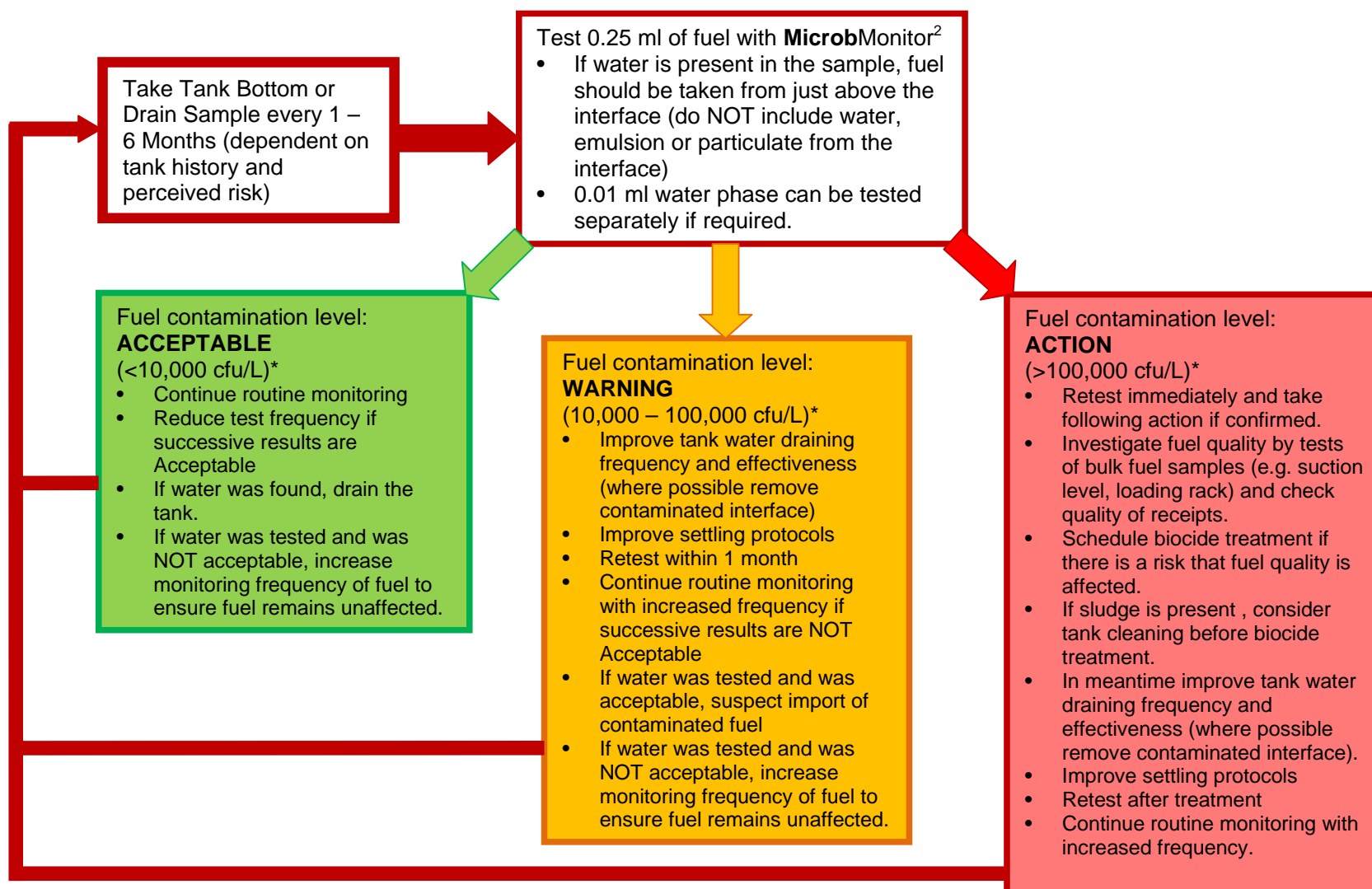
Routine Monitoring of Diesel Fuel Tanks and
Distribution Systems with **MicrobMonitor**²

Technical Guidance

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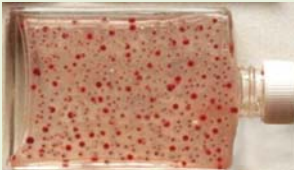

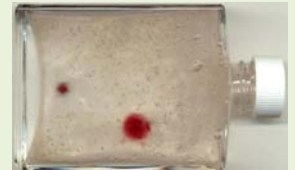

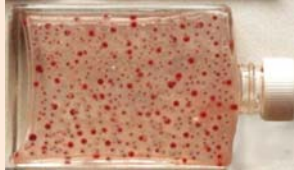


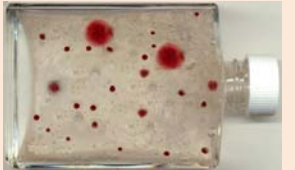

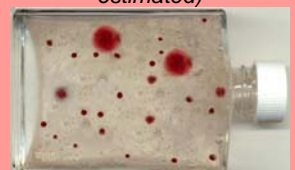

Routine Monitoring of Diesel Fuel Tanks and Distribution Systems with **MicrobMonitor**²



* See interpretation chart for more information on contamination levels in fuel and water phase in tank bottom samples and samples of bulk fuel and fuel delivered.

How to Interpret MicrobMonitor² Test Results For Diesel Samples



Interpretation	SAMPLE TYPE		
	Filter / Tank Drain or System Low Point		Bulk Fuel or Fuel Delivered (0.25 ml tested)
	Water phase (if present) (0.01 ml tested)	Fuel phase (0.25 ml tested)	
Acceptable	<p><100,000 cfu/ml (<i><1000 colonies estimated</i>)</p>  <p>to</p> 	<p>< 10,000 cfu/litre* (<i><3 colonies counted</i>)</p>  <p>to</p> 	<p><4,000 cfu/litre (<i>No colonies</i>)</p> 
	Warning	<p>100,000 - 1,000,000 cfu/ml (<i>1000 – 10,000 colonies estimated</i>)</p>  <p>to</p> 	<p>10,000 - 100,000 cfu/litre* (<i>3 - 25 colonies counted</i>)</p>  <p>to</p> 
Action		<p>>1,000,000 cfu/ml (<i>>10,000 colonies estimated</i>)</p> 	<p>>100,000 cfu/litre (<i>>25 colonies counted or estimated</i>)</p>  <p>to</p> 

Notes on Reading Tests

*2 colonies is equivalent to 8000 cfu/litre and 3 colonies is equivalent to 12,000 cfu/litre.

The pictures shown are typical results for MicrobMonitor². The size and shape of the colonies may vary but it is the number which is important. The recommended test volume for diesel fuel is 0.25 ml. Some fuels (e.g. B100 and some marine diesels) may produce a slight uniform pink or orange discolouration in the test gel; this discolouration will not affect the test result but testing a smaller volume (e.g. 0.1 ml) can improve the ease of reading results (adjust interpretation accordingly).

Notes on Taking and Testing Samples

It is important when testing routinely to be consistent in the procedure for sampling and testing, so that results over time can be compared. In particular sampling equipment and sampling valves should be clean and, if possible, sterilised by rinsing or wiping with a 70% alcohol solution (ensure all residues of alcohol are removed before taking the sample or it will affect the test result). Suitable MicrobMonitor sampling bottles and alcohol wipes are available. It is a good idea to rinse sampling equipment with fuel from the tank to be sampled before taking the sample for test. Appropriate sampling procedures are described in the Energy Institute *Guidelines for the investigation of the microbial content of petroleum fuels and for the implementation of avoidance and remedial strategies* (Energy Institute, London) and ASTM D 7464 *Standard Practice for Manual Sampling of Liquid Fuels, Associated Material, and Fuel System Components for Microbiological Testing* (ASTM International, PA, USA).

Usually most microbial contamination will be present in the tank bottom, particularly at any fuel water interface and in water droplets suspended in the fuel. For routine monitoring, we recommend testing low point (dead bottom or drain) samples as these will provide the earliest and most consistent indication of tank contamination. Because water phase may not always be recovered in these samples, for purposes of consistency in trend analysis, we recommend fuel phase from just above any water phase and interface is tested routinely. Ideally, the sample should be allowed to stand for a few minutes (about 2 minutes per cm height of fuel in the sample) so that any water settles and then 0.25 ml fuel for test taken from half way down the fuel phase, avoiding transfer of visible interfacial particulate, water droplets or emulsion. The water phase or interface can be tested separately if required (0.01ml recommended); levels of contamination in water phase will usually be much higher than in fuel phase which is why separate guidance is given above. Note; in accordance with industry convention, water phase results are expressed per millilitre whilst fuel phase results are expressed per litre.

Increasing trends of contamination may be as important as absolute limit values. It is recommended to retest a fresh sample if moderate or heavy contamination is detected, to confirm the result before taking corrective action; in some cases contamination can be transient and corrective action is not necessary but persistent indication of moderate or heavy contamination should instigate remedial measures (seek expert advice where appropriate).

Low point samples will not necessarily reflect the status of bulk fuel delivered from the tank but when fuel is received into a tank it is likely to disturb any contamination on the tank bottom into the bulk fuel. Thus, heavy contamination in the tank bottom indicates a potential for contaminating bulk fuel, particularly if inadequate product settling is allowed after fuel receipts. Testing bulk fuel layer samples (e.g. suction level or samples of fuel delivered to the tanker loading rack) can provide indication of status of fuel delivered from the tank and provide assurances about fuel quality. Results will be applicable to the time of sampling and may be subject to change with product settling or if tank bottoms are disturbed. Where possible, bulk fuel layer samples should be taken after any standard product settling and immediately before tank release as this will reflect the "worst case".

Numbers of cfu/litre cannot be used alone to indicate whether fuel is fit for purpose and where heavy contamination is indicated in bulk fuel, further investigation by a competent laboratory is recommended.

The limit values given are for guidance only. Variation to these limits may be appropriate in consideration of operating practice and experience and the perceived risk; in some cases more stringent standards may be appropriate for fuel in long term storage.

This leaflet is appropriate for samples from automotive diesel, marine diesel, gas oil and heating oil systems. Other technical leaflets are available at www.microbmonitor.com

- For interpretation of results of tests of aviation fuel distribution system samples please see our leaflet EP119 *How to Interpret MicrobMonitor² Test Results for Aviation Fuel Distribution System Samples*
- For interpretation of results of tests of aviation fuel samples from aircraft please see our leaflet and EP096 *How to Interpret MicrobMonitor² Test Results in Accordance with IATA Guidelines for Aircraft Drain Samples*.

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