# Practical Experience with MBG Problems and Road Fuel Supply

**16 March 2011**

# Overview

- Operational problems
- Investigations
- Root cause
- Remedial action
- Best practice at fuel terminals
- Best practice at filling stations

# Tesco Fuels

- Launched biofuels in 2005
- BX diesel blend with 5% FAME
- Inspected & dewatered tanks
- No immediate problems

# Timeline

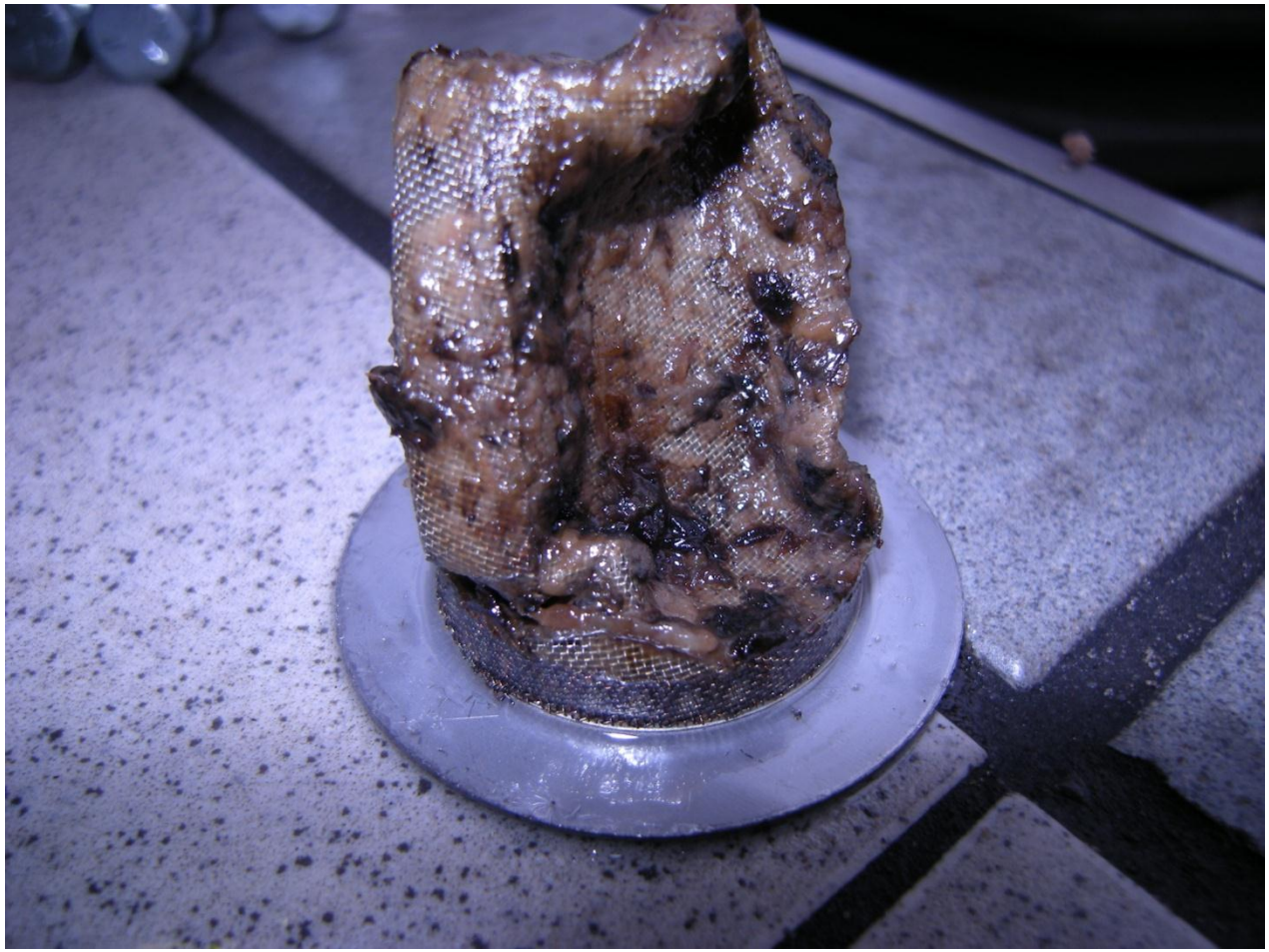
- Minor issues prior to 2008
  - Some cases of water layer & biofilm in tanks
  - Most common at high volume sites
  - Easily managed with routine maintenance
- 01/2008 UK moved to 10ppm low sulphur diesel
  - No free water layer, hazy fuel at bottom of tanks
  - Biofilm on tank walls
- Filter blocking problems began in 04/2008
  - Before RTFO implemented in UK
- Focused in specific regions
  - Number & frequency of problems rapidly increased

# Operational Issues

- Slow diesel dispenser flow rates
  - Disrupted forecourts
- Blocked filters
  - Under pump valve, meter & nozzle filters
- Filter & tank cleaning only short-term fix
  - Biocide & additives treatments not a solution
- Problems focused in certain regions
  - Not all sites affected in a specific area
  - Additional regions impacted
  - Not a seasonal issue

TESCO
Every little helps

# Witches Hat Filter



Acknowledgement to Eurotank Limited

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# Meter Filters

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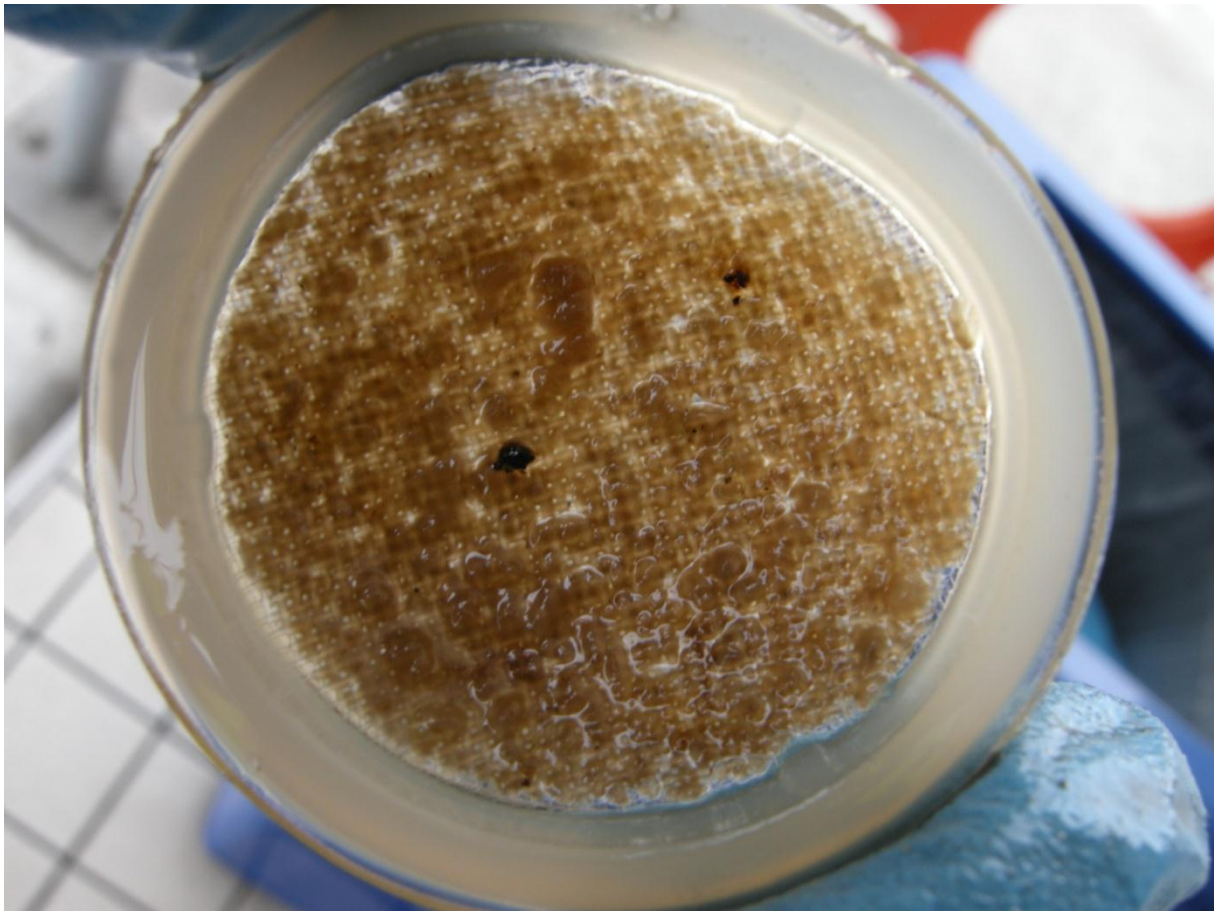
# Nozzle Filter



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# Investigations

- Only a few UK fuel retailers reported problems
  - Now many more retailers have seen problems
- Liaised with industry contacts in Germany
  - Similar problems experienced
  - Microbial contamination
- Our initial analysis of deposits was inconclusive
- Polysaccharides found later – evidence of bugs

# Supply Chain Study

- Investigation of fuel distribution system
- Sampling at various points in supply chain
  - Terminals, road tankers, filling stations etc
- Identify sources of microbial contamination
  - Determine levels of microbial activity
- Locate critical control points
- Identify root cause

# Findings

- High microbes & water found in some terminal tanks
  - No clear fuel/water interface
  - Hazy fuel layer with high water/bug content
  - Microbial growth found in hazy fuel layer
- High microbes & water found in corresponding filling station tank bottoms
  - Hazy contaminated fuel layer
- Direct link between filling station issues & high water/bug counts in terminal tanks

# More Findings

- Filter blocking problems at filling stations primarily due to microbial growth on filter surfaces
  - Filter blocking can rapidly reoccur
- Filters stop biomass getting into vehicles tanks
  - Over 50 million diesel cars filled in 2010
- Conclusion – it a terminal and a filling station issue

# Root Cause

- Terminal tanks initial source microbial contamination
  - High water content fuel supports microbes
  - FAME provides food source & promotes microbial growth
- Hazy fuel layer contains micro-droplets water
  - Evidence of water droplets attached to active bugs
  - Observation of microbial growth in fuel layer
- Tank turbulence transfers microbes downstream
- Biofilm grows on filling station tanks walls etc
  - Leads to operational problems in filling stations

# Solutions

- Cooperative & collaborative effort
  - Must address issues at terminals and filling stations
- Fuel retailers, suppliers & terminals work together
  - Control microbial contamination & biofilm growth
  - Effective water management
- Preventive maintenance & monitoring is critical
  - Regular draining of water & hazy fuel in terminal tanks
  - Thorough removal of biofilm in tanks & lines at filling stations
  - Preventative tank cleaning programme at retail sites
  - Routine monitoring of water & microbial activity throughout
- No silver bullet!

# Way Forward

- Build awareness
  - Fuel suppliers, terminal operators & retailers
  - Control microbial contamination, water content & bug growth
  - Improved housekeeping at terminals and filling stations
  - More effective bug testing methods
- Share industry best practice
  - Regular terminal maintenance & testing
  - Preventative housekeeping at filling stations
- Define industry guidelines specifically for biodiesel
  - Terminal operations & filling station housekeeping
  - Current guidelines focused on conventional diesel
  - Needs to be updated to reflect current knowledge & experience