

Coal Tar Viscosity Reduction, Emulsion Breaking, and Bio-control at MGP Sites

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Emulsion Basics

An emulsion consists of two liquids, such as oil and water, which are essentially mutually insoluble

Emulsions form when such liquids are mixed with enough energy, resulting in droplets of one liquid dispersed within and throughout the other liquid

Emulsions can be stable or unstable: Unstable emulsions will separate into two liquid layers over time, while stabilized emulsions do not



Bio-emulsions in Oil-Water Separators

Biopolymer Impact

Bacteria generate biopolymers as part of their metabolic processes

Biopolymers are long chain compounds, which in many instances, also have polarity

Biopolymers may stabilize an emulsion by physical entanglement, chemical stabilization, or through both mechanisms

Stabilization Mechanisms

Electrostatic charge - depends on droplet size among other parameters

Chemical - generally molecules that have a non-polar end and a polar end, such as surfactants

Physical entanglement - high molecular weight molecules, such as biopolymers, can create a web in which microscopic droplets of dissimilar liquids are entrapped

Emulsion Control & Prevention

Why it is Important

- Prevent equipment fouling, recovery & treatment system failure
- Enhanced product recovery - Emulsions contain as much as 50% product by volume, recovered product offsets the cost of chemical treatment, reduces disposal costs

Chemical Emulsion Breaking Methods

- Specialty coagulants
- Biocides & Bio-dispersants (for bio-emulsions)
- Select solvents
- Acidification

Case Study 1 - Viscosity Reduction of Coal Tar Emulsion by Redux HCB

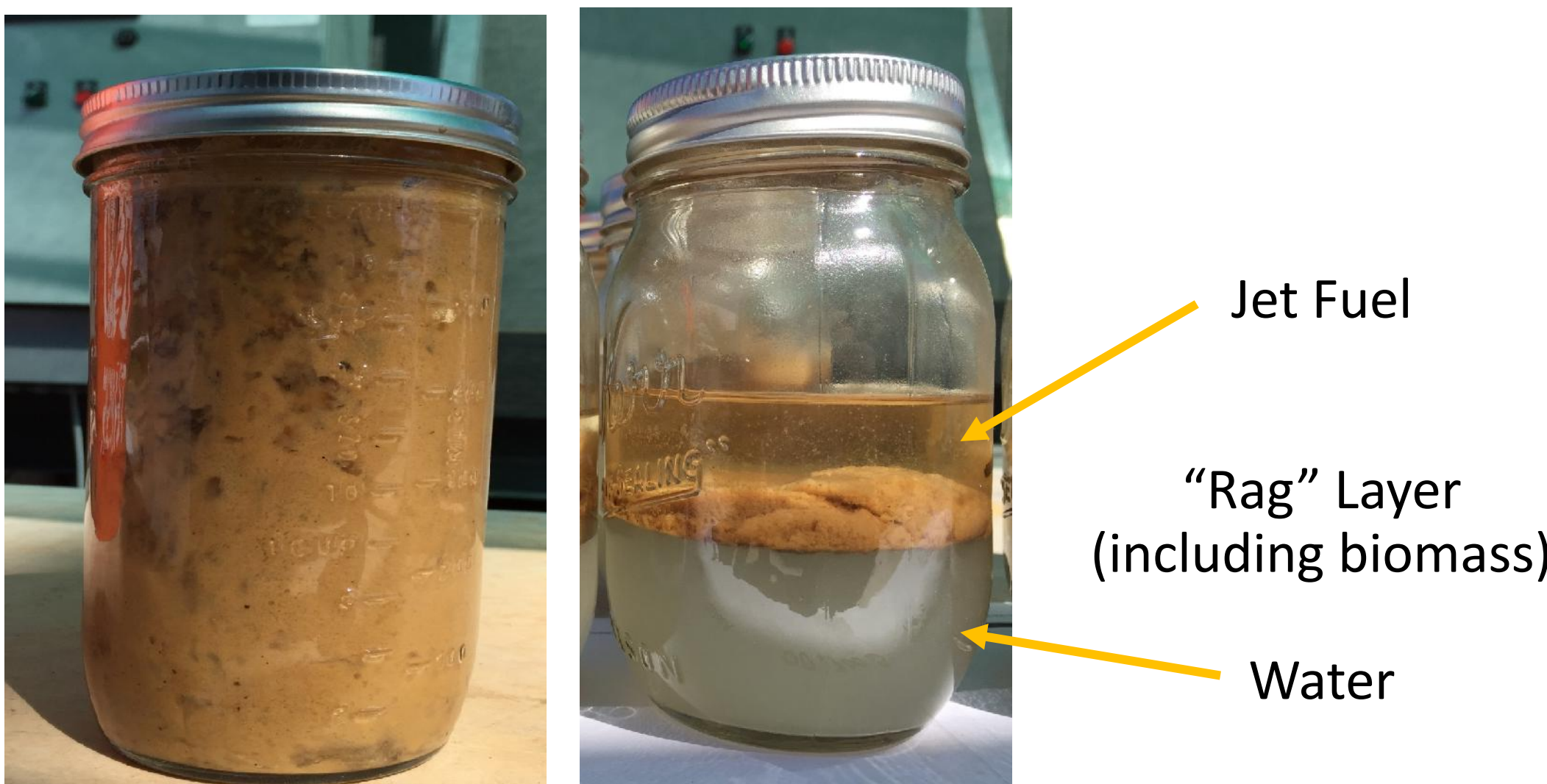


Viscous emulsion prevented recovery and blinded well screen, requiring screen replacement. Redux HCB solvent broke emulsion restoring recoverability.

% HCB V/v	ml Redux HCB	ml DNAPL emulsion	ml free water recovered
10	10	90	30
7.5	7.5	92.5	30
5.0	5.0	95	25
2.5	2.5	97.5	17.5

Case Study 2 - Jet Fuel Emulsion Breaking by Redux 700B

Copious emulsion formed in settling tanks during jet fuel recovery using steam. Foamy emulsion threatened to overflow available tankage. Redux 700B De-emulsifier split emulsion, greatly increasing free product recovery and reducing waste disposal costs.



Case Study 3 - #2 Fuel Emulsion Breaking by Redux 910

bio-emulsion compromising separation weir



Weathered diesel fuel formed bio-emulsion, causing oil-water separator weirs to fail to properly separate product from water, and creating ongoing O&M issues. Redux 910 de-emulsifier broke emulsion enabling product recovery and resale far exceeding chemical costs while reducing disposal costs.