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A RAPID LABORATORY ANALYTICAL METHOD FOR DETECTING LOW LEVELS OF FAME IN JET FUEL: METHOD DEVELOPMENT AND PRELIMINARY INDUSTRY STUDY RESULTS

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The European Union's directive that a minimum of 10% Biofuels should be used in road transport fuels by 2010 has some unintended consequences. The fatty acid methyl esters, (FAME) contained in biodiesel (currently at approximately 5% by volume) and carried within the multi-product supply chain throughout Europe, have the potential to come into contact with jet fuels carried in those systems.

Recent studies and incidents have shown that FAME contamination of jet fuels can and has occurred, despite improved fuel handling procedures. This has raised concerns about the safe supply and use of jet fuel, and at the 2008 UK Aviation Fuel Committee meeting there was a call for studies to commence to resolve this issue. In response, the Energy Institute (EI) invited oil majors and interested parties to take part in an industry-wide study towards developing FAME detection methods.

Shell Global Solutions, UK had already started work on potential detection methods during 2007 and continued this work in 2008 with Stanhope-Seta for the development of the 5ppm "Laboratory Analytical Method", resulting in the only 'rapid' screening test methodology, for detection of FAME as low-level contaminants in Aviation jet fuels, currently being considered by the EI group.

This paper describes the development and trialling of the rapid laboratory analytical method. It involves a novel two-step approach using solid phase extraction chromatography (SPE) and Infra Red (IR) spectroscopy. It initially separates FAME compounds, by extraction and evaporation, from the fuels (both jet and diesel fuel), and then quantitatively analyses the FAME concentration down to 5ppm (by mass) levels. This paper compares data from the rapid laboratory analytical method with sensitive, laboratory methods such as ^{1}HNMR and GCxGC, proving that the concept is robust. It also details the results from studies, using a set of blind samples provided by the EI, aimed at determining the 'robustness' of the method. The EI samples contained 6 different FAMEs at levels of 0 to 150 ppm (by mass), in 2 different base fuels. An automated version of the method is currently being developed as an instrument for routine use in the industry and is the subject of a separate paper.