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How Shell is assuring that jet fuel supplies to airports contain < 5 ppm FAME contamination

To Whom it may concern,

The purpose of this letter is to explain what Shell is doing to ensure that jet fuel supplies to airports and aircraft are free from FAME contamination. We trust that the following will also address the specific questions in your letter of 24 February 2009.

Firstly, it is worth stressing that the mandatory introduction of biodiesel has put the aviation industry in a very difficult situation. Over the past 40 years, a very efficient and reliable distribution system with associated QA procedures has evolved that controls cross contamination between jet fuel and other products (such as diesel) to less than 1 part in 200. This has worked very well and the absence of fuel quality related aircraft accidents is testament to its effectiveness. Using the system, the fuel supply industry has been able to manage product quality issues away from the airport and has an excellent track record for maintaining supplies despite the occasional PQ incident or even hurricane. However, the introduction of biodiesel into the global distribution system (ships, pipelines etc) and the imposition by the engine OEMs of a maximum concentration of 5 ppm FAME has meant that the same distribution system must now be operated to prevent cross contamination between products (specifically jet fuel and diesel) at the level of 1 part in 10,000. As you can imagine, this is proving very challenging.

The second part of the problem is that the limit of 5ppm that was incorporated into the DEF STAN 91-91 specification in August 2008 represents the detection limit of the most advanced analytical methods available. There continues to be a shortage of testing laboratories that are able to perform these sophisticated methods. The UK Energy Institute is addressing this issue with a fast track programme to develop reliable and easily conducted test methods (see JIG Bulletin 20). Within the past few months, a test method has been developed and a round robin should start soon to define its precision. We are working on getting laboratories around the world set up to

conduct the testing but the equipment is expensive and, inevitably, will only be available in the larger, more sophisticated laboratories.

Whilst this work is ongoing, Shell (like other major suppliers) is following the guidelines set out in JIG Bulletins 16 and 21. We are assessing the potential risk of FAME carry-over in all our supply chains and are conducting focused testing. Where assessments suggest that there could be a potential risk of FAME carry-over in jet fuel supplies additional quality assurance procedures are introduced to increase control. Where the risks are assessed to be high and impossible to control with additional QA procedures, routine testing of every batch is being instigated. At the moment, for the reasons noted above, it is not possible to introduce routine testing for all batches supplied to all airports. Fortunately, the DEF STAN 91-91 specification actually acknowledges this problem and does not require testing of every batch. Given all the constraints, the structured risk assessment process is the best option at the moment.

Although the initial focus was on multi-product pipelines, multi-product ships have also been identified as a high-risk source of contamination. The industry has worked hard on new tank cleaning guidelines to minimise the risk and these are currently being introduced (EI document HM50). We would recommend reference to these procedures in any shipping operations that you are involved with.

All the above testing and additional control is designed to prevent contaminated fuel reaching airports. However, because of the lack of comprehensive testing facilities, it is conceivable that test results become available that show that fuel has been delivered to an airport with > 5ppm FAME content. Although the likelihood of this happening is extremely low, to help manage such an emergency, the fuel suppliers asked the OEMs to work on an Emergency Protocol for what to do with aircraft already fuelled or actually flying with fuel containing FAME in the range 5-30 ppm. The upper limit of 30ppm was chosen to cover the expected maximum level based on the very few airport incidents and near misses that have occurred so far. With such a level, it should be possible for fuel suppliers together with airlines to minimise the disruption that a >5 ppm excursion at an airport might cause.

The situation is extremely dynamic and JIG member companies are working actively within the industry to manage this issue. In addition to the development of new test methods and QA procedures, we are funding an industry programme that is seeking approval from the aero engine and airframe manufacturers for up to 100ppm of FAME in jet fuel. Based on existing test results, 100 ppm represents a realistic and achievable approval level but the approval process could take up to 12 months.

If there are any incidents where FAME levels >5 ppm are detected at airports that could affect your operations, we will, of course, notify you immediately. As with any incident, we will work with all the relevant stakeholders to remediate the situation and minimise adverse effects on your operations.

We envisage that the next 12 months (until the 100ppm approval is granted and more widely available testing is in place) will be a difficult period. Please rest assured that, as always, we will do everything that we can to provide you with clean, dry on-specification fuel safely and efficiently.

Yours sincerely
Shell International Petroleum Company Limited

Mike Farmery
Global Fuel Technical and Quality Manager