

FUEL TESTING

Low sulphur zones raise testing questions

With Europe at the vanguard of using low sulphur shipping fuel, the region has also become a testing ground for problems associated with sulphur regulations. Unni Einemo looks into some pertinent issues.

Environmental regulation has brought bunker fuel quality into sharper focus as 'on-spec' fuel is no longer just a commercial and operational issue, but potentially a legal one.

International Maritime Organization (IMO) and European Union (EU) regulations require ships to observe a 1.5% sulphur limit for fuels used during operations inside designated sulphur emission control areas (SECAs).

So far, the Baltic Sea and the North Sea & English Channel are the only regions to have obtained SECA status under Annex VI of the IMO's MARPOL convention.

The Baltic Sea became a SECA in 2006, while the enlarged European SECA becomes enforceable under Annex VI on November 22, 2007.

Under EU Directive 2005/33/EC, however, the North Sea & English Channel SECA came into force already on August 11, 2007.

Widespread compliance with the earlier SECA date led to a substantial increase in sales of low sulphur fuel oil (LSFO) to ships in the region, perhaps most conspicuously in the Amsterdam-Rotterdam-

Antwerp (ARA) bunker supply hub.

But as LSFO supply volumes grew, so did the number of 'off-spec' sulphur claims against bunker suppliers.

Statistics from Lintec Testing Services confirm this trend. Speaking at the ARACON 2007 conference in Amsterdam in October, Lintec's general manager Geoff Jones said there had been an increase in cases of fuels not complying with ISO 8217:2005, the most widely used international marine fuel quality standard.

Looking at fuels supplied to 1.5% maximum sulphur specification, Jones said 14% of recent samples had tested above that limit, which puts ships at risk of being in breach of MARPOL Annex VI and EU regulations.

The perceived risk among ship operators of being criminalised if caught out by port state control (PSC) with non-compliant SECA fuel caused a rash of bunker quality disputes during July and August 2007.

Bunker suppliers in Europe, particularly in Rotterdam, told Bunkerworld about numerous quality claims based on sulphur content. They said the majority of these disputes were subsequently

resolved in the suppliers' favour.

These quality disputes have been between commercial parties. Like most commercial quality disputes, they originated from testing done on a ship's sample, but would typically be settled on the basis of re-tests on the supplier's commercial sample.

With a spate of sulphur-related quality claims souring relationships between bunker suppliers and shipowners, suppliers expressed frustration that bunker buyers were lodging complaints which in their view could have been avoided.

Test r&R principles

According to suppliers, many bunker buyers appeared to be ignorant of the test reproducibility principle under ISO standard 4259: Petroleum products - Determination and application of precision data in relation to methods of test.

ISO 4259 recognises that a fuel's 'true value' for any parameter can never be established exactly, and introduces the principles of repeatability (r) and Reproducibility (R).

A fuel test, run several times at the same laboratory by the same person on the same sample under the same conditions, will rarely yield exactly the same result. Occasional human mistakes or omissions will introduce a random error which can be quantified for each test method as repeatability, or (r).

When different laboratories test the same sample, using the same test method, under the same conditions, the random error is called Reproducibility, or (R).

For ISO 8754:2003 - Petroleum products - Determination of sulphur content - the sulphur test method specified in ISO 8217:2005, the Reproducibility is as shown below.

For 1.5% sulphur:

$R = 0.0812 \times (1.5 + 0.15) = \text{plus/minus } 0.1339$

100% Confidence = 1.5 plus/minus 0.1339 = 1.366 to 1.634

95% Confidence = 1.5 plus/minus (0.5938 x 0.1339) = 1.420 to 1.580

Using the r&R principles, a fuel can be said to meet a 1.5% sulphur limit with '95% confidence' if a single test result falls within the ranges of 1.42% sulphur to 1.58% sulphur.

What frustrated suppliers was that many of the sulphur complaints from customers were brought following test results ranging from 1.52% to 1.57% sulphur, which falls within the acceptable confidence range according to ISO 4259 r&R principles.

Looking solely at test results, it is maybe not surprising that there were so many sulphur disputes.

Most suppliers will blend as close to the 1.5% specification limit as possible, and in doing so, there is a 50/50 chance that another laboratory will find a different value falling somewhere within the bell

shaped curve above.

Even when suppliers have used a lower sulphur blending target to ensure the fuel supplied is within spec, the ship will frequently take its own sample - different from the supplier's sample - and send it to a fuel testing agency.

Tests will then be carried out on different samples, in different laboratories, that may or may not be using the same test methods.

Under those conditions, variable single test results for sulphur content are to be expected.

Lack of IMO guidelines

Observers say these commercial disputes could become secondary when PSC authorities begin using the MARPOL sample to test for a fuel's sulphur content.

Using MARPOL samples to test for compliance with sulphur regulations can only be done on the request of a PSC authority.

To date, there are no standard test methods specified in MARPOL Annex VI, but industry experts have said it would be logical to suggest that the assessment of sulphur content should be carried out in accordance with ISO 8754, the method stipulated in ISO 8217.

Until the IMO produces guidelines on test result interpretation, it will be up to individual flag or port states to decide how to interpret 'borderline' sulphur test results.

That creates uncertainty, and many believe the commercial sulphur disputes experienced in Europe in the summer of 2007 were just a 'prelude to when PSC fines start flying'.

L. Robert Pedersen, Director of Regulatory Affairs, A.P. Moller-Maersk, told Bunkerworld that regulations in most countries do in fact take the r&R principles under ISO 4259 into account.

There are exceptions, however, with some countries considering 1.5% as an 'absolute limit' for sulphur in marine fuels for SECA use.

But while suppliers, for cost reasons, would like to blend fuels as close to the 1.5% maximum limit as possible, Pedersen said suppliers should use 1.42% sulphur as their blending target.

He even suggested that bunker suppliers should be made to provide SECA fuel and BDNs with 1.42% sulphur as standard.

That would be the only way the supplier, and by extension the ship, could guarantee with 95% certainty that the fuel would not exceed 1.5% sulphur content.

A Norwegian proposal submitted to the IMO has suggested that a verification test result between 1.42% and 1.58% sulphur should cause a portion of the sample to be sent to a second, possibly even a



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third, laboratory for verification testing. The average of all test results should then be used.

The Norwegian proposal goes on to say that a verification test result below 1.42% sulphur should be considered as in compliance with MARPOL Annex VI, but a verification test result above 1.58% sulphur would be considered in violation of the regulation and require action against the supplier.

European legislation the key?

EU legislation on the testing of land-based petrol and diesel may hold the key to providing guidelines for the marine fuels industry.

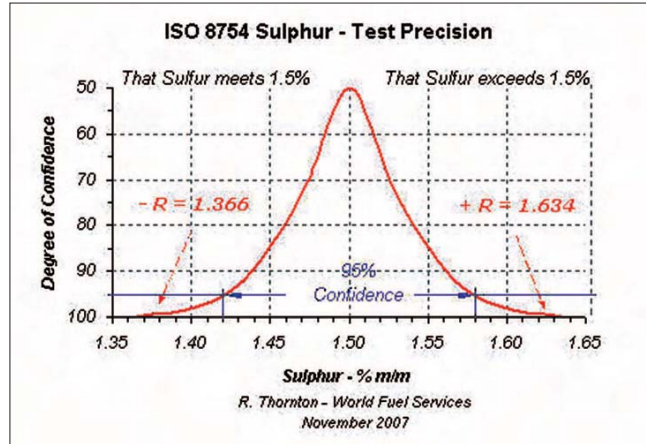
Directive 2003/17/EC, relating to the quality of petrol and diesel fuels, states that the results of individual test results "shall be interpreted on the basis of the criteria described in ISO 4259".

One could argue that the laws dealing with the enforcement of land and marine fuels should be consistent.

In that case, a single fuel test result should not be considered to be exceeding the 'true value' of 1.5% sulphur unless the result exceeds 1.58% sulphur.

Authorities in the Netherlands already apply sulphur test method ISO 8754:2003 when carrying out checks on ships' compliance with sulphur limits.

By the same token, it has stipulated that the upper and lower limits when the sulphur limit is specified as 1.50%, are 1.42% and 1.58% respectively.



ISO 8754 Reproducibility.

In cases where the Netherlands Shipping Inspectorate decides to take sulphur compliance checks beyond just inspecting the paperwork, it employs the services of a fuel testing service.

Meindert Vink, Senior Policy Advisor at the Netherlands Shipping Inspectorate, told ARACON 2007 that samples from ships will be taken by representatives from the SGS fuel testing company, as near to the engine as possible. He did not mention any examples of the official MARPOL sample being used for sulphur test purposes.

Reassuringly for ship operators, he said port state action in response to alleged contraventions would not penalise owners for breaches of sulphur content if the bunker delivery note (BDN) showed less than 1.5% sulphur content.

In such cases, Vink said the vessel would be asked to rectify the sulphur content before departure.

If, however, both the test result and the BDN where to show sulphur content above 1.5%, it would be ground for detention and a major non-conformity, resulting in the port state sending a report of viola-

tion to the vessel's flag state.

Again, the vessel would need to rectify the fuel non-compliance before departure.

Vink also warned that if a fuel does not comply with the BDN, the Netherlands could take action against bunker suppliers in the country found to have delivered non-compliant fuels.

Moreover, Vink said the Netherlands would report on bunker suppliers' non-compliance to the IMO, the flag state of affected vessels, and the state of the supplier that delivered the fuel.

Back to basics

The question of test methods and interpretation of sulphur content in fuel is undeniably an important issue for suppliers and shipowners alike.

But before even considering these relatively sophisticated issues, the first point of port state control inspection is the ship's documentation, including Bunker Delivery Notes (BDNs) and associated samples.

Shipowners therefore require Annex VI compliant BDN's, and they need the bunker supplier's signature on the official MARPOL sample.

According to global operator A.P. Moller-Maersk, however, suppliers in many areas fail to provide correct BDNs, and many refuse to sign the MARPOL sample.

Global ship operators need suppliers everywhere, not just in Europe, to provide proper MARPOL documentation. ■

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