Bunker Fuel Quality
– Past and future

Since DNV Petroleum Services started up in 1980, the quality of heavy fuel being sold as marine fuel has developed substantially in most parts of the world. It is perceived in the market that the development has been only negative and some say it has gone from bad to worse. DNV Petroleum Services has in this period analysed more than half a million fuel samples and the results have a story to tell.

As of today more than 75,000 fuel samples per year, representing approximately 70,000, 000 Mt of fuel, are tested in DNVPS’ seven fuel testing laboratories in Oslo (Norway), Teaneck (US), Singapore, Rotterdam (Holland), Fujairah (UAE), Algeciras (Spain) and Houston (US). This represents 60-70 per cent of the total number of marine fuel samples currently being tested world-wide. It is, however, estimated that in total only 40-50 per cent of all bunkering is being tested which means a large number of ships are continuously using fuel with basically unknown quality.

Around 10 per cent of the samples tested by DNVPS are found to be offspec on one or more parameter according to ISO 8217:1996, while around 1 per cent are seriously offspec and could cause severe engine damage.

Based on the above it is clear that in any case the risk involved in bunkering and using bunker fuel on ships is substantial. It is, however, possible to reduce the risk by establishing proper fuel management procedures onboard the vessels and by using a fuel testing program.

To minimise the risk of operational problems and economic loss, it is essential for the ships to have the possibility to go back and look over previous bunkering, as a combination of many minor factors could combine in serious problems for the engine. For example, cat fines and sediments can build up in the service and settling tanks over time and can in bad weather conditions suddenly be released. This can seriously affect fuel quality through the system and can potentially lead to engine damage.

DNVPS therefore encourage testing of all bunkers, so that a historical picture of the fuel quality can be built up, and if problems arise, the necessary test results of each individual bunkering are available.

Development of fuel quality in recent years shows the following general trends:

1. Fuels are becoming increasingly aromatic which is influencing ignition and combustion properties in a negative way.
2. Average density of fuels world-wide is increasing.
3. Cat fines found in fuel in an increasing number of ports due to introduction of new cat crackers.
4. Increasing number of cases involving chemical contamination of fuel (e.g. polymers or corrosive chemicals).

During the years we have seen a large number of so-called epidemic fuel problems involving a number of different vessels. In the last few years these problems have become more severe and they also occur more frequently than before. In November 2004, polystyrene contaminated fuel in ARA (Amsterdam, Rotterdam, Antwerpen) caused severe filter problems for 13 vessels, several of which debunkered. In April – May 2004 organic chlorides in fuel from Fujairah/Muscat caused fuel pump problems/failure on more than 20 vessels, which caused complete loss of power for two vessels in open sea, one of which was a fully loaded crude oil tanker. In December 2004 - January 2005 high sodium fuel from Singapore which caused severe filter problems was delivered to more than 50 vessels; several of these vessels were forced to debunker.

So far in 2005, 32 DNV Petroleum Services bunker alerts have been sent out, the last five ones are:

<table>
<thead>
<tr>
<th>No. Issued</th>
<th>Subject</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>08-Sept-05 High Al + Si</td>
<td>Bintulu, Malaysia</td>
</tr>
<tr>
<td>29</td>
<td>08-Sept-05 Contaminated Fuels</td>
<td>St. Petersburg, Russia</td>
</tr>
<tr>
<td>30</td>
<td>22-Sept-05 High Density</td>
<td>Panama Canal Zone</td>
</tr>
<tr>
<td>31</td>
<td>07-Oct-05 High Al + Si</td>
<td>Jeddah, Saudi Arabia</td>
</tr>
<tr>
<td>32</td>
<td>07-Oct-05 High Al + Si</td>
<td>Dunkirk, France</td>
</tr>
</tbody>
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Each of these cases is based on a number of bunker samples showing similar results and which can be related to the same batch of fuel.

As the price of crude oil seemingly continues to increase, the oil companies drive to utilise the increasingly “precious” crude oil in the most cost efficient way is expected to increase even more. Combined with the Marpol Annex VI and EU requirements with regard to sulphur content in residual fuel oil this is likely to influence the fuel quality substantially in the years to come. The drive towards lower sulphur levels in Heavy Fuel Oil is expected to further enforce the quality trends described above, mainly due to a substantial increase in the mixing of oil components with different origin in order to achieve the required sulphur content.

Future refinery processes can also be expected to become more advanced and this in turn means that future fuel buyers can only realistically look forward to more complicated and difficult residual fuels. This in turn will bring new challenges for both the shipping community and fuel management service providers to try to work together to solve new complex fuel problems in the fastest and safest possible way and to ensure minimum risk related to the use of bunker fuels for propulsion of ships in the future.

For further information about DNV Petroleum Services, please visit www.dnvps.com/