Contaminated Bunkers damage hundreds of ships
Do authorities really care?

Prelude to 1 January 2020 safety problems?

An INTERTANKO Critical Review

Background

Since late May 2018, there have been an increased number of reports on serious technical problems and mechanical damages encountered by more than one hundred ships due to contaminated fuel oils that were delivered to them. The contaminated fuels were initially supplied in the Houston (USA) area. Following this, the same contaminated fuels were supplied in some Caribbean ports such as Panama and then (so far) "exported" and supplied to Singapore and Malaysia. We fear that this will become a global epidemic with the possibility of disastrous events as outlined below.

One can say "so far" as there is no sign of any coordinated effort to control and remove such contaminated fuels from the market. The first deliveries of such contaminated fuels were conducted in January 2018. But even if one could accept that mistakes do happen and can create massive problems, it is not acceptable that months after initial deliveries and months after problems were reported, there has been no action that we are aware of to initiate an investigation in order to (a) identify the causes of this serious problem, (b) identify the sources from where it originated, (c) identify the remaining contaminated fuel batches still out there to be delivered and potentially crippling and damaging more ships' engines, and (d) alert the whole industry, particularly the fuel oil producers and suppliers in order to keep the industry updated on progress and findings.

Other than advisories issued by fuel testing laboratories, the only official information from an authority that we are aware of is a Marine Safety Alert issued by the United States Coast Guard (USCG) on 8 June 2018 (USCG Marine Safety Alert 10-18 (https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/INV/Alerts/1018b.pdf?ver=2018-06-12-093650-663) with a standard message only to make ships aware of emerging problems. There was no indication of any possible/further action to target the source of the problems.

One can only speculate at this stage the root cause of these contaminated fuels but ship operators cannot disassociate this massive problem with potential safety problems they might face with the new blends to come up as compliant 2020 fuel.

Consequently, INTERTANKO has decided to issue this Critical Review based on information received from its Members, releases from marine fuel testing laboratories and other sources through the media. We appreciate that not everything that has been published in the media has been checked thoroughly by the authors of those articles, but, taking into account the complete lack of interest by official/governmental/authority to address these serious safety problems, we feel impelled to initiate at least a public debate. The lack of action after so many months following such huge safety risk posed

by deliveries of contaminated fuels has left us with no other option. As one of INTERTANKO Members impacted by these events said: *"the industry has to voice its deep concerns on this most likely criminal act, beat the media drums and start to provoke a mindset change on the side of the bunker industry people"*. We would like to add "and also to provoke a mindset change on governments and authorities".

We are of the view that governments and authorities should investigate these fuel contamination cases and take appropriate actions, including giving serious fines together with restitution for the ships impacted.

The contaminated fuel will in many cases lead to engine failures and associated losses of propulsion, placing the safety of the affected ship and crew at risk. These may, in turn, affect the safety of navigation for other ships that are sailing close to the affected ships resulting in events such as grounding collisions with loss of life and severe damage to the environment.

History of events

Based on the INTERTANKO Members' reports, ships had received contaminated fuels in ports located in the Houston area as early as January 2018. Since then such deliveries continued at ports around that area. Reports indicated that the first deliveries of contaminated fuels at some Caribbean ports were in April 2018 followed by first deliveries in Malaysia and Singapore in the same month: (https://www.reuters.com/article/singapore-bunker-shipping/contaminated-marine-fuels-clog-ship-engines-in-singapore-hub-surveyor-idINKBN1KH172) Of course, these are indicative dates based on the limited information we have.

All ships which had experienced mechanical failures due to these contaminated fuels had fuel samples taken during delivery and then tested at reputable laboratories.

Routine laboratory analysis of fuel samples showed compliance with ISO-F-RMG 380 grade. From the reports we received, only a few fuel samples indicated a higher Total Acid Number (TAN) value but not at a level to indicate the use of fuels that may cause mechanical failures. To our knowledge the test result in one fuel sample had a TAN value which indicated imminent risks. The ship did not use that fuel and de-bunkered it. Concluding, standard fuel oil test methods have failed to detect contaminants.

Following good results on the fuel sample test, ships started to use these fuels on sea passages. The first warning sign for those ships was blockage of fuel filters. Initially, the crew not being aware that the fuel was contaminated, tried to find the cause of the problems but, despite their efforts, they experienced more and more problems. A summary of further damage encountered includes:

- blocking and excessive wear of fuel separators;
- blocking and damages to fuel filters;
- sticking and excessive wear of fuel injection pumps and fuel injectors;
- damage to engine piston rings and excessive wear of the pistons and cylinder liners

It was only after further damages occurred that crew and ship operators began to suspect that the cause of the problem might be the fuel which could contain contaminants which are of a non-petroleum refining origin. As one member commented, when the crew checked the installation they found "*small plastic stones/rocks that of course very easily block filters and pumps and result in engine failure/stoppage*".

Consequently, ship operators with ships that have experienced such issues requested advanced analytical test techniques like Gas Chromatography combined with Mass Spectrometry (GCMS) to determine reliable source of the problem. Although it is difficult to provide detailed information on each of these test results, laboratories reported that phenolic compounds were identified in each of the fuel samples taken from different ships with 4–Cumyl–Phenol being the phenolic compound of highest concentration. In addition, all samples contained a high concentration of boiling carboxylic acids (fatty acids). Some other extra fuel samples showed a presence of benzoic acid, cyclohexane diol isomers and dehydroabietic acid and other oxygenated compounds. These do not normally form a component of marine fuels and contradict MARPOL Annex VI regulation 18.3 and International Marine Fuel Standard ISO 8217, Clause 5.

A phenolic compound like 4–Cumyl–Phenol is used industrially for developing epoxy resins (forms a sticky compound) in pesticides, to manufacture lubricants and surfactants. The presence of 4–Cumyl–Phenol and all other mentioned components are in violation of Reg. 18.3 of MARPOL Annex VI and Clause 5 of ISO 8217.

We learned that 4–Cumyl–Phenol has, in the past, been associated also with the use of fuel oil cutter stocks. Cutter stock is generally a clean light petroleum distillate used to reduce the viscosity of high viscosity residual fuel oils in order to bring the fuel to "on spec". However, due to economic reasons blenders/suppliers allegedly do switch to cheaper alternatives of cutter stocks which contain contaminants like 4–Cumyl–Phenol.

Although it is not for INTERTANKO to draw a conclusion, advanced test results may indicate that in these cases multiple waste products from multiple sources seem to have been combined into bunker fuel as cutter stock.

It is important and relevant to recall that similar damage to propulsion machinery were identified in 2007 and 2013 where cutter stock was determined as the possible source of contamination on fuels delivered in the same US ports.

Industry demands government/authority action

IMO and many national maritime agencies have great demands and expectations regarding the safety operations of ships. Likewise, ship operators expect that fuel supply industry assumes its own responsibility to provide ships with good quality fuel oils and that authorities take measures to ensure that bunkers delivered at locations under their jurisdictions are safe.

Ship operators shall continue to practice due diligence to sample and test fuels before ships use them but make no mistake about who has the responsibility to make sure fuels

delivered to ships are safe. Events in 2007, 2013 and now in 2018 are the responsibility of fuel producers and fuel suppliers while investigative action in such cases falls under the responsibility of authorities.

As mentioned, to date, only the USCG has issued a Safety Alert in June. This only "*raises awareness of a significant emerging problem in the US Gulf Coast region regarding contaminated vessel fuel oil bunkers*" and states that "*standard fuel oil test methods . . . will not detect these underlying problems*". The Safety Alert includes a recommendation to vessel owners and operators by one fuel testing organisation. The USCG then "***recommends*** *that vessel owners and managers ensure vessel operators are made aware of this potential hazardous condition, closely monitor fuel oil systems and consult their bunker suppliers and other technical service providers regarding this issue"*

We appreciate that an authority should word its statements carefully at the initial stages of a potential safety issue but, we are very concerned that since June there has been no official information regarding an intent to initiate an investigation.

This lack of investigation into such a serious breach of safety norms, is totally inadequate and hugely disappointing. It seems that authorities are failing to appreciate or understand the high risks that these events are exposing ships (and their crew) to and the potentially environmental consequences that could arise as a result of ships left without power.

One should keep in mind that it takes time for ships' crews to detect what is wrong with their installations when there is no information about possible contaminated fuels. Even when fuel contamination might appear to be the possible problem, there is only a limited number of laboratories worldwide that can conduct such an extensive range of tests.

In conclusion, the source of the problem is not the ship owners, the ship managers or the ship operators, but rather an apparent complete lack of interest to control the quality of bunkers supplied to ships and a lack of initiative on the part of the authorities to introduce standard investigations when such events occur.

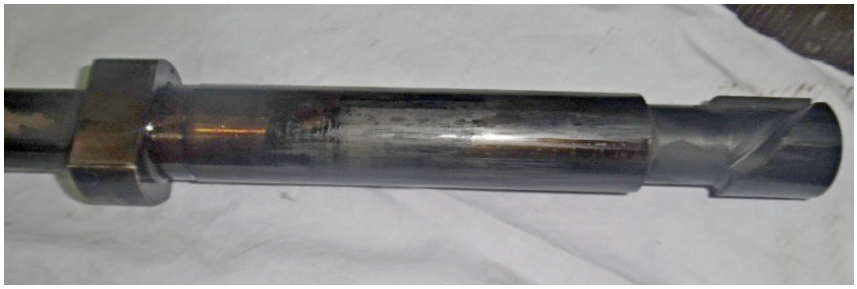
Until the fuel supply industry and the authorities accept their share of responsibility there is an obvious need for more public awareness in the media. A purely legal approach will not change the mindset of those who might deliberately put our crews, the environment, the ships and their cargoes in serious danger.

The ultimate request from the INTERTANKO membership is that fuel blenders and fuel suppliers should be required to fully warrant the quality of their fuels.

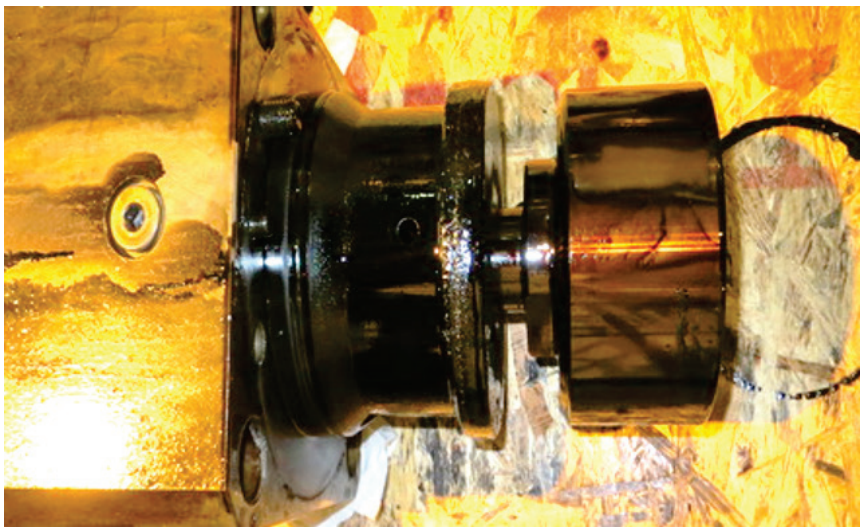
Enclosure: pictures from ships impacted by the contaminated fuels

HFO separator after one hour operation - blocked by heavy, hard sludge

HFO separator damaged gear due to overload caused by heavy sludge

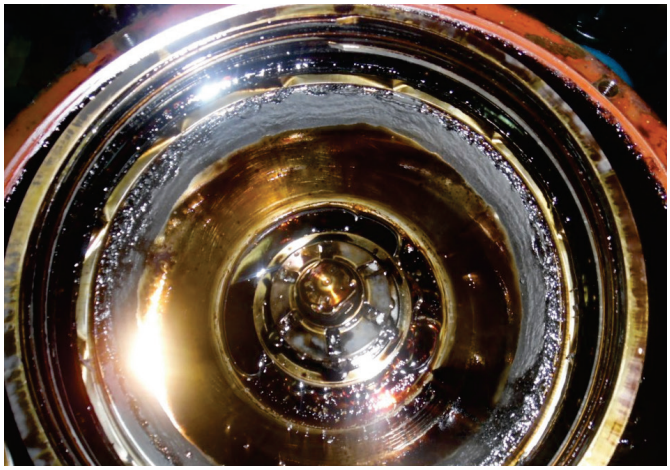


Fuel injection pump – the plunger was found completely seized in the barrel



Fuel booster plunger stuck in the barrel

Sludge particles



HFO separator – completely blocked by heavy, hard sludge

Fuel filter – visible heavy sludge, which blocked the filter completely

Plunger Remove from the pump

Fuel Pump

Plunger and Barrel

Pump Barrel

Carbon on Plunger