

Your questions answered on Chlorinated Compounds in Singapore

FAQ

Chlorinated compounds in HSFO, Singapore

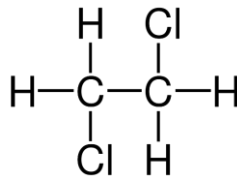
Singapore | February & March 2022

What do you need to know about this contamination issue?

The high sulphur fuel batches with chlorinated compounds from Singapore, were delivered in February and March 2022. The component found in the highest concentration is 1,2-dichloroethane which has been found up to 5000 ppm (=0.5% m/m).

Chlorinated hydrocarbons are widely used as solvents and raw materials for the synthesis of various products, such as cleaning agents, pesticides and poly vinyl chloride.

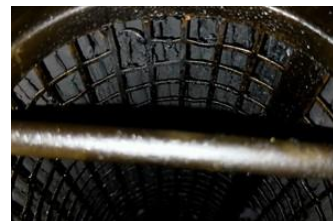
As of today, close to 30 operators are affected (some with multiple vessels). Two suppliers and many barges were involved.



1,2-dichloroethane

What did the ships observe?

The ships experienced engine fuel pump issues and severe filter clogging issues. In the worst cases, the ships lost power and had to replace fuel pumps at sea.



Fuel pump plunger and filters



What does it take to analytically identify the contaminants in the bunker sample?

These components cannot be detected via the standard 8217 analysis but require GC/MS.

The only industry acknowledged standardised method for GCMS, ASTM D7845, covers the quantitative determination of a variety of chemical species (including chlorinated hydrocarbons) in marine fuel oil (bunker fuel oil) by gas chromatography/mass spectrometry.

Was there any prior experience with these components in bunkers?

Yes, back in 2004 in Fujairah, about 20 ships experienced damage to fuel valves as well as sticking of the engine fuel pumps, plunger and barrels followed by rapid failure of the fuel pump units. Main components identified at that time were: 1,2-dichloroethane and 1,1,2-trichloroethane. Despite the presence of these components, some ships managed to consume the fuel at the time without any operational issues.

In fact, IMO Resolution MEPC.320 (74) – to which VeriFuel contributed – includes these compounds associated with fuel pump seizures.

ASTM D7845 was initially released in 2013 and provided the industry with a method to quantitatively identify a range of chemical components. Work is currently ongoing to potentially establish the correlation between concentration and issues.

Is there any correlation with the Houston 2018 contamination issue?

As per the statement prepared by CIMAC WG7 Fuels, no final and concrete conclusion could be made as to what specifically in the fuel formulation the Houston incidents.

The Singapore situation is linked to chlorinated hydrocarbons whereas, in the Houston case, there is yet to be a definitive culprit. Singapore MPA is currently investigating the case, requesting that the specific fuel is no longer supplied and exploring the cause of the contamination.

Both endemic cases were linked to high sulphur fuels.



Are chlorinated compounds normally included in crude oil?

The literature ranges normal values between one and five ppm.

In May 2019, the massive Druzhba pipeline network was contaminated with several hundred parts per million of organic chloride, which is corrosive and can damage both pipelines and refineries. During the refining process, organic chlorides transform into hydrochloric acid which can cause intense corrosion. The associated value of the contaminated crude was US\$2.7 billion.

Is the problem gone for now?

No one can say for sure. Debunkering operations of the contaminated fuel will take place in various areas, i.e. spread around the world. In addition, there is a risk (as happened in Houston in 2018) that the remaining fuel batch may be transferred to other geographical areas for further blending in order to dilute.

Taking quality assurance seriously, Singapore MPA is currently investigating the case having contacted the bunker suppliers to ensure that the specific batch of fuel is no longer supplied.

What is VeriFuel's recommendation?

Seek assurance from the supplier that the fuel is fit for purpose.

Be aware of the time bar limitation for launching a quality claim. If bunkered fuel is not to be used immediately, it is prudent to consume it for a couple of days by closely monitoring any case of adverse effects. Documentation is the key, e.g. photo document parts before/during/after consuming the fuel and take fuel system samples in case needed for analysis later.

VeriFuel can assist evaluating if a specific fuel may be harmful to operation.



Anything else to be cautious of when consuming fuels with chlorinated hydrocarbons?

The fuels containing these components have viscosities (@50 °C) in the 300-380 cSt range and therefore require heating to 98 °C in the separators and about 130 °C at engine inlet.

The boiling point of 1,2-dichloroethane is 83 °C. At above temperatures, and given the high concentration, the component may be found in the surroundings, especially around the separators. Short-term exposure to the component can cause irritation to eyes, respiratory system and skin.

Caution should always be taken around marine fuel oils, irrespective if contaminated by unusual components or not, however, it is recommended to ensure good ventilation when these fuels are consumed.

How often do you find chlorinated hydrocarbons ?

Chlorinated hydrocarbons are seldom found in marine fuels and when found it is at significantly lower concentrations than the recent problematic Singapore deliveries of HSFO.

Does Clause 5 / MARPOL Annex VI, reg 18.3 apply ?

ISO 8217:2017 clause 5.2 as well as MARPOL Annex VI reg 18.3 say that fuels must not be harmful to personnel, jeopardise the safety of the ship, or adversely affect the performance of the machinery.

Contaminated fuels that have adversely affected performance of the machinery therefore violate clause 5 and MARPOL Annex VI, reg. 18.3.



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IN 2021



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employees*

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BUSINESS TO
SOCIETY
COMPANY

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laboratories

IN 140
COUNTRIES

