


TECHNICAL CIRCULAR

A detailed photograph of marine engine machinery. The scene is dominated by blue-painted metal components, including large valves with red handwheels and various pipes. Several circular gauges with white faces and black markings are mounted on the machinery. The background shows the interior of a ship's engine room with white structural elements.

# HIDDEN CHEMICAL RISKS IN MARINE FUELS

# UNUSUAL CHEMICAL COMPOUNDS IN ISO 8217-COMPLIANT MARINE FUELS – OPERATIONAL CONSIDERATIONS AND RECOMMENDATIONS

## Industry Observations

Recent industry reports indicate a growing number of vessels receiving bunkered fuels that comply with standard ISO 8217 specifications, yet subsequently exhibit atypical chemical characteristics when subjected to advanced analytical testing.

In several cases, Gas Chromatography–Mass Spectrometry (GCMS) analysis has revealed significant concentrations of unusual hydrocarbon compounds, phenolic substances, and alkylresorcinol derivatives. These findings raise concerns regarding fuel quality consistency and potential operational implications.

## Geographic Origin and Market Context

The majority of these fuels have been bunkered in regions across Southeast Asia, particularly in major supply hubs such as Singapore, Hong Kong, and Malaysia.

Industry observations and laboratory analyses suggest that some of these fuels may contain components associated with shale oil derivatives. This trend is believed to be linked to blending practices adopted by certain suppliers in response to elevated bunker fuel prices, influenced by ongoing geopolitical tensions, including conflicts in the Middle East.

## Laboratory Findings

Advanced GCMS testing has identified the presence of the following compounds at notable concentrations:

- Hydrocarbon compounds (e.g., dihydro-dicyclopentadiene, indene): approximately 5,000 – 14,000 ppm
- Alkylresorcinol derivatives: approximately 4,700 – 6,000 ppm

Similar chemical profiles have previously been associated with fuels containing Estonian shale oil components. Comparable cases were also reported in 2019 involving Very Low Sulphur Fuel Oil (VLSFO) supplied in the ARA region.

## Regulatory Perspective

It is important to note that shale oil and related compounds are not classified as contaminants under ISO 8217 and may be used as blend components.

However, elevated concentrations of such compounds are not typical of conventional marine fuels and may indicate the presence of unconventional blending streams.

Furthermore, in accordance with Clause 5 of ISO 8217, fuel shall be considered non-compliant if it contains any substance or chemical waste that:

- Jeopardizes the safety of the vessel
- Adversely affects machinery performance
- Is harmful to personnel
- Contributes to increased air pollution

## Operational Risks

While many vessels have consumed such fuels without immediate or severe issues, the presence of these atypical compounds may pose potential operational risks, including:

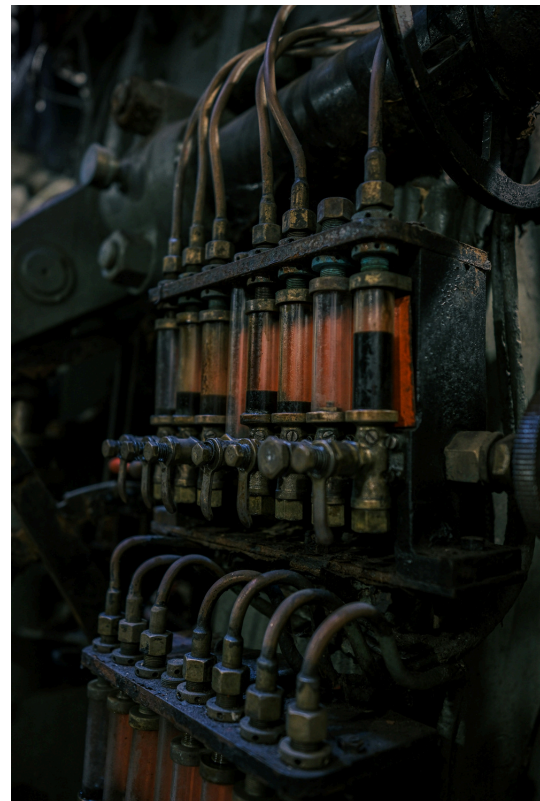
- Sludge formation
- Fouling of filters and purifiers
- Fuel injection system disturbances
- Reduced engine performance

It is emphasized that these risks are not guaranteed outcomes; however, the presence of such compounds should be treated as a warning indicator requiring further assessment.

## Role of GCMS in Troubleshooting

GCMS testing has proven particularly valuable in cases where vessels experience fuel-related operational problems.

When used as part of a troubleshooting process, GCMS analysis can help establish a correlation between observed machinery issues and the presence of specific chemical compounds within the fuel.



## Recommendations and Best Practices

Members and operators are strongly advised to exercise enhanced due diligence when procuring and handling marine fuels. The following measures are recommended:

### **Supplier Vetting**

- Conduct thorough evaluation and selection of bunker suppliers
- Seek transparency regarding blending components and fuel origin

### **Fuel Testing**

- Perform comprehensive fuel analysis prior to use
- Recognize that standard ISO 8217 testing may not detect phenolic or atypical compounds
- Arrange for extended GCMS testing through reputable laboratories when deemed necessary

### **Fuel Handling and Monitoring**

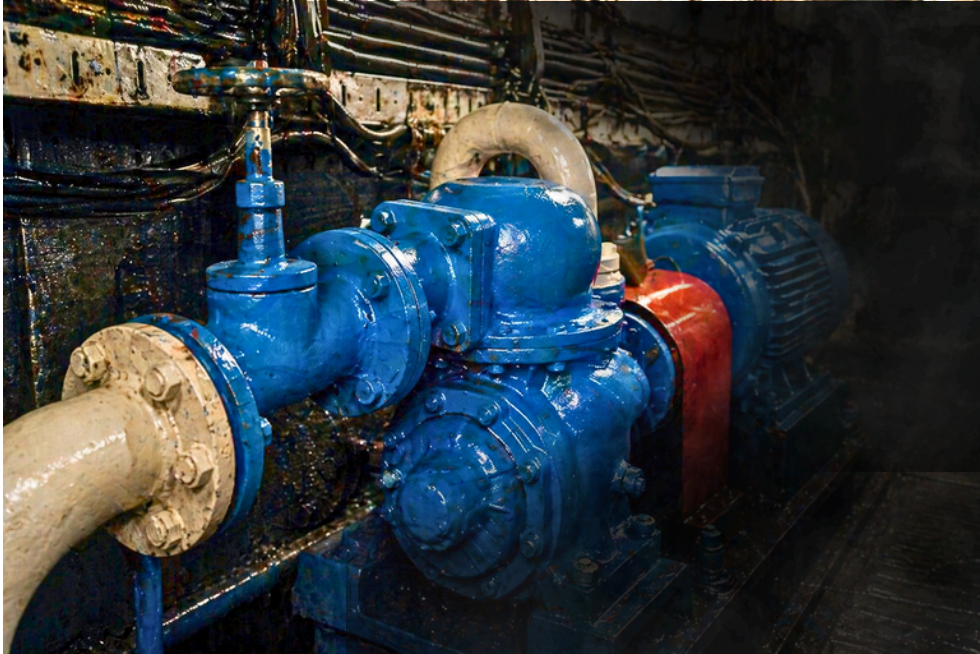
- Implement correct onboard fuel handling procedures
- Enhance monitoring of fuel treatment systems, including purifiers and filters

### **Record Keeping**

- Maintain accurate and detailed records, including:
  - Tank soundings
  - Fuel transfers and consumption logs
  - Temperature settings for storage tanks, purifiers, and engines

### **Fuel System Checks**

- Conduct regular checks on fuel entering the engine to verify quality and consistency



## Conclusion

The detection of atypical chemical compounds in otherwise ISO 8217-compliant marine fuels highlights the limitations of standard testing methods and underscores the importance of advanced analytical techniques such as GCMS.

While not all such fuels will result in operational issues, their presence warrants careful risk assessment, vigilant monitoring, and proactive management to safeguard vessel performance and safety.

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