To whom it may concern,

Subject: US Gulf Coast Marine Fuel Incidents March to July 2023

The CIMAC Fuels working (WG7) group consists of experienced stakeholders representing refiners, suppliers, traders, and fuel producers for both petroleum and biogenic sourced fuels, along with the machinery OEMs, ship operators, fuel testing labs and classification societies.

In 2023, mainly during the period between March and July, an uncharacteristic number of operational engine issues were reported to have occurred after consumption of Very Low Sulphur Fuel Oils (VLSFO) bunkered in the US Gulf Coast, and even since then similar issues continue to be intermittently reported.

Responding to the industry need for the investigation of such endemic cases, CIMAC WG 7- Fuels formed an Incident Response Sub-Group (IRSG); prompted by one of the missions of CIMAC, to facilitate safe and efficient operation. This statement has been written to:

- highlight the existence and alert the activity of this subgroup.
- report on the initial findings of this 2023 investigation of incidents in the US Gulf Coast
- make associated authorities aware of the CIMAC concerns related to such incidents occurring and discuss measures to mitigate the risk of such incidents re-occurring.

The Reported Issues

Fuel testing agencies, participating in CIMAC WG 7, received reports of similar operational problems after deliveries from multiple fuel suppliers in the US Gulf Coast area during the stated subject period. A combination of fuel injector system damage, leading to severe engine performance degradation and a loss of engine power and propulsion (in some cases even leading to blackouts) were reported. Approximately 1% of the ships, during the stated period, based on the recorded deliveries of very low sulphur fuel oil (VLSFO) in the US Gulf area have reported these similar problems.

Figure 1 illustrates a typical case study showcasing the prevalent issues of fuel pump deterioration reported.

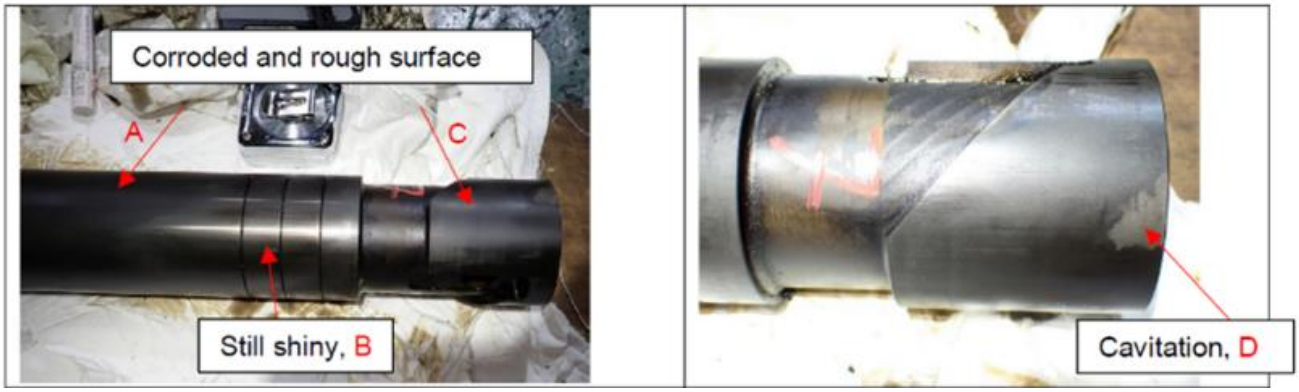

Figure 1: Fuel plungers and barrels were dismantled from the fuel pump on all cylinder units of the main engine on one ship. The top area of all fuel plungers was found corroded and the fuel pump could not be re-used. The corrosion leads to leakages between plunger and barrel, jeopardising the fuel injection due to reduced compression efficiency.

The Data Collection process

For the investigation, the IRSG collated fuel analysis data and information related to the reported problems from the fuel testing agencies. The data consisted of fuel analyses for bunkers as supplied to ships, both relating to problem fuels and fuels that were not associated with any reported operational problems. Although there were some differences in scope and test methodologies between the contributing fuel testing agencies, the fuel analyses generally consisted of routine ISO 8217 tested parameters along with in-depth investigative testing methods such as Fourier-transform infrared spectroscopy (FTIR) and Gas chromatography–mass spectrometry (GC–MS). Information of the ship machinery plants as well as photographic and written reports of the issues were provided where available. (See list of information normally sought after in the Annex I).

Comparing the Data received

To identify potential fuel quality trends, the collated data was assessed by comparing the data between the ships that ‘did’ and those that ‘did not’ report operational problems, during the same time period.

The evaluated fuel analysis data consisted of 95 key parameters, including the routine ISO 8217 residual fuel oil parameters, in-depth GC-MS analysis and, for some samples, FTIR.

In the absence of standardised industry methods, differing in-house laboratory test methods and practices were used. Due to the nature of these different in-house test methods, the samples were not always analysed for the same compounds, neither was quantification available for all.

Based on the available comparable information that was obtained, the following was recorded:

1. 13 suppliers and 7 barges have been involved across 5 given port locations in the US Gulf Coast: Houston, New Orleans, Barbour's Cut, Galveston, and Bayport.
2. 34 ships reported problems representing approximately 1% of the VLSFO fuel deliveries during the subject period, of which 23 had sufficient test data to be included in an overall assessment.
3. 38 Ships that did not report any problems had sufficient test data to be included in an overall assessment.
4. Details of the ships' operating profiles and applied fuel management best practises were for the most part not available.
   From all the ships that reported problems (34), the type, make and age of the affected engines varied and therefore indicated no commonality between the make and types of engines recorded.

Summary of the compared data

Based on the collated fuel analyses results, the following differentiating trend markers were identified between the problem and the non-problem fuels:

- In comparing the ISO 8217 table parameters, most of the parameters tested had similar average results between the problem and non-problem samples with the following exceptions where the problem samples average were different:
  a) Viscosity @50°C was noticeably lower (38cSt vs 82cSt)
  b) Total sediment levels were slightly elevated. (0.07 vs 0.04 m/m)
  c) Phosphorus content slightly higher (26 vs 13 mg/kg)

- Comparing the more in-depth investigative chemical analysis results, which included the standard ASTM D7845 and the in-house GC-MS methodologies, the following was observed between the problem and non-problem fuels:

A range of chemical compounds were detected, although at relatively low levels, in both the problem fuels and the non-problem fuels, while a combination of a few compounds were more noticeably present in the problem fuels.

From the above we notice that:

- despite comparing the commonality of the feedback from the ships, on similarly sourced bunkers, and noting the differences identified between the analytical results found, no clear 'cause and effect' relationship can be established.

- the GC-MS has limitations in the range of chemicals it can detect and therefore it cannot be excluded that other chemicals which were not detected were in the fuel.

- the distinctive presence of some compounds which were detected by GC-MS, although in low concentrations, in the problem and less so in the non-problem fuels, indicate the possibility that these bunkers contained chemicals or combination of chemicals that were potentially of high enough concentration to cause operational problems.

Comparisons between the incidents of 2018 and 2023

In 2018 in Houston, the industry experienced a similar situation but with a different failure mode. At that time over 100 vessels, representing approximately 1% of HSFO deliveries, were affected (see CIMAC WG 7 statement of 10 Nov 2018). The direct cause of these problems remains unreported to the public domain and so left unresolved. This previous experience triggered CIMAC to investigate this newly reported incident.

The similarity between 2018 and the 2023 cases, points to an upstream failure to check the suitability of one or more of the compounds entering the fuel in either the processing, blending or supply systems.

The operational problems experienced in both 2018 and 2023, raise continued safety concerns about the reliability of the quality of bunkers supplied in this area.

It further highlights the importance of a supply chain that ensures 'bunker-suitable' feed- and blend stocks, ensuring safe and uninterrupted sea passage for the ships using the fuel, which seems to be lacking in this area.

It appears that there is an absence of a robust quality control system, compounded by the lack of a local mechanism to systematically collect and process feedback for continuous improvement of routines and fuel quality.

Concluding outcome on this investigation to date:

The information to hand points to the fuel as supplied was a contributing factor to the problems reported by these 34 ships, despite not being able to conclude on the cause of the incidents with currently available information and test methodology.

The collated information and analysis data has not been able to point to the exact cause of the experienced problems. However, the general characteristic differences between the problem and non-problem fuels, indicate a potential presence of other substances that so far have been unidentifiable.

The severity of the incidents, the issues reported, and the number of the ships involved raises again the concern about ships safety when bunkering fuel oil in the aforementioned locations, warranting CIMAC WG 7 to investigate and highlight the issue to the stakeholders.

Way forward:

The potential outcome from a breakdown of the integrity of the supply chain, which this specific incident has highlighted, is a reminder to the global bunker market of the consequences of such a failure in fuel quality control.

1. CIMAC WG 7-Fuels is willing to engage with any authority capable of documenting, discussing, or amending local supply procedures, to ensure quality assurance for bunkers to be supplied. We are available to discuss or engage with any suppliers in the region, blending and/or delivering fuel.

2. CIMAC WG 7 anticipates that those responsible for supplying marine bunkers will prioritise the assessment of the 'bunker-suitability' of components chosen for blending and to avoid potential contamination sources in the supply system. If it is established that the supplied fuel is accountable for operational issues experienced, it would then indicate that the bunkers did not meet the ISO 8217 standard as ordered.

We reiterate the importance that blend components should be verified as 'bunker-suitable' before blending and the infrastructure and procedures to prevent contamination (e.g. line flushing) should be in place. The fuel shall not contain harmful or damaging materials in concentrations that may cause damage to machinery as defined in Clause 5 of ISO 8217:2017, in place at the time of delivery, and Regulation 18.3 of MARPOL Annex VI. If it is established that the supplied fuel is accountable for operational issues experienced, it would then indicate that the bunkers did not meet the ISO 8217 standard.

CIMAC WG 7 members therefore express their concern that, if recommendations are not followed, re-occurrence of these fuel quality incidents will be inevitable to the detriment of the ‘safety of life at sea’.

The experts of CIMAC WG7 - Fuels will continue this investigation in support of the ISO 8217 committee to better understand these and future challenges, both in the US Gulf Coast area and world-wide.

Best regards,

CIMAC WG7 - Fuels

July 2024

Annex I

For any investigation of endemic fuel cases – both this and for future cases - the following information is sought after

1. By estimation, the number of deliveries in the affected area (in this case the US Gulf Coast), during a specified period.
2. Supplier[1] and Barge[1] names on all suspect deliveries.
3. All test results for the affected area during the given period including routine ISO 8217 and any additional tested parameters.
4. All involved ships to share the following information:
    a. Age of ship.
    b. Main and Aux Engine make and types.
    c. Separator(s) make, type and arrangements
    d. Detailed explanation of the experienced problem(s), including:
        i. Examination of the damaged component(s)
        ii. Photographic evidence
        iii. Other evidence considered prudent to the challenges.
    e. Ship operating condition while using the said fuel:
        i. Was the fuel comingled on board?
        ii. Were fuel additives used on board?
        iii. Operating condition / load profiles
    f. Ship's fuel management best practice protocols carried out during the period of the problems occurred.

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[1] The names of both suppliers and barges were anonymised