

International experts in spill preparedness and response



Task 3.1 – Physical-chemical characterization

Fanny Chever CEDRE

Malta, 31/05/2022



- 13 samples collected (2 L)
- 2 ULSFO (S% < 0.1) / 11 VLSFO (S% < 0.5)
- From 7 countries
- From oil producers, bunkers delivery & Wakashio
- Mostly blended products
- 3 semi-solid oils at room temperature









MV Wakashio Sample – IM-5

Name	Wakashio	
Accident date	25/07/2020	
Location	lle Maurice	
Accident area	Au sud de l'Ile Maurice sur un récif corallien	
Spill area	Inshore	
Cause of spill	Grounding	
Quantity transported	3,800 t of VLSFO, 200 t of marine diesel, 90 t of lubricant oil	
Ship / structure type	Bulk carrier	
Built date	2007	
Length	299 m	
Width	Width 50 m	
Draught	aught 17.9 m	
Flag	Panama	
Owner	Okiyo Maritime Corporation	
Manager	Nagashiki Kisen KK	
Charterer	Mitsui OSK Lines	
P&I Club	Japan P&l Club	
IMO number	9337119	



25th July: MV Wakashio hit a reef and ran aground 28th July: Traces of oil were detected and floating booms were set up 6th August: Oil leaked out of a fuel tank Estimated quantity of oil released: 800 – 1 000 tons in an ecological sensitive area



Imaros

Source: http://wwz.cedre.fr/en/Resources/Spills/Spills/Wakashio





MV Wakashio Sample – IM-5

Immediately after the spill:

Activation of the **national oil spill contingency plan** by Mauritian authorities

Alert to foreign countries, including France

Sub-regional oil spill contingency plan for the Western Indian Ocean Islands:

- Equipment mobilised, experts deployed to provide onsite spill response support
- Experts from Cedre and CEPPOL (French Navy) joined the Mauritian incident management unit to assist the Mauritius Authorities

Second on-site mission in Jan. 21 to assist and advise the Mauritian authorities in assessing end-poins for clean-up operations.

Samples collected in the wreck sent to Cedre for analysis



























WP3: Task 3.1 – Screening / Laboratory results – Fresh oils



WP3: Task 3.1 – Screening / Laboratory results – Fresh oils









	Asph. (wt.%)	Wax (wt.%)
Min	0.4	5.2
Max	4.0	26.1

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 \rightarrow Variability of asphaltenes and wax contents







- ightarrow Variability of asphaltenes and wax contents
- ightarrow Same variability as for crude oils







- ightarrow High variation of asphaltenes and wax contents
- \rightarrow Same variability as for crude oils
- \rightarrow Most oils with wax content higher than IFOs
- ightarrow May contain less asphaltenes than IFOs





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Temperature (°C)

IM-13

Imaros

*: from MSDS



















IM-2

IM-1

IM-3

IM-4

IM-5

IM-6

IM-7

IM-8

IM-9

IM-10 IM-11 IM-12 IM-13

Imaros

ightarrow Persistency at sea surface

*: from MSDS







 \rightarrow Persistency at sea surface

Flash Point

- Minimum: 78°C
- \rightarrow Safety recommendation: No flammability issues
- All above 60°C

IM-2

IM-1

IM-3

IM-4

IM-5

IM-6

IM-7

IM-8

Gasoline *: < - 40 °C HFO*: > 60 °C

IM-9 IM-10 IM-11 IM-12 IM-13

*: from MSDS









 \rightarrow Depending on the LSFO involved and on the local temperatures, behaviour can greatly differ and recovery can be challenging







PAH quantification (µg/g)



E10 Gasoline *: ~4 000 (N: 70%) HFO*: 16 000 (N: 42%)

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- \rightarrow Range generally observed for HFO
- \rightarrow Potential impact on marine organisms

*: Cedre's database





Laboratory weathering:

- Once topped at 250°C some oils become highly viscous and sticky
- Some viscosities at 5°C (100 s⁻¹) could not be determined because of too sticky products. At 15°C viscosities up to ~ 300 000 mPa.s





WP3: Task 3.1 – Screening / Laboratory results: dispersibility at 15°C



At 15°C

• Some fresh oils potentially dispersible







WP3: Task 3.1 – Screening / Laboratory results: dispersibility at 15°C



IFP test : Low energy

At 15°C

- Some fresh oils potentially dispersible
- Once weathered dispersibility decreases







WP3: Task 3.1 – Screening / Laboratory results: dispersibility at 15°C



IFP test : Low energy

At 15°C

- Some fresh oils potentially dispersible
- Once weathered dispersibility decreases







- High variability of the physico-chemical properties : likely reflects different ways of making VLSFO to comply with the sulfur limits
- Safety: No flammability issues. Wear appropriate PPE (potential light fractions).
- Considering evaporation, persistence at sea surface is expected
- Immersion issues could be encountered in particular environments (freshwater, ...)
- Sticky behaviour could be encountered
- Pumping/recovery operations could be difficult and challenging
- The use of dispersants may be very limited at 15°C

Need to have as much information as possible to have an idea of the potential behaviour at sea







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Task 3.1 - Screening

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Co-funded by

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