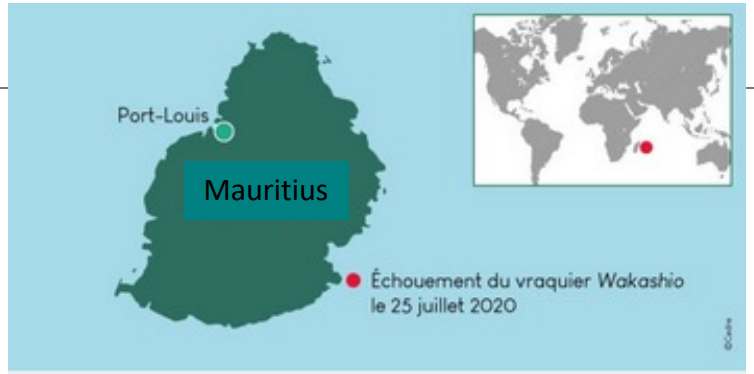
Cedre

International experts in spill preparedness and response

MV Wakashio - July 2020

Fanny CHEVER

Ground of the bulk carrier *MV Wakashio* in Mauritius



IN SHORT

25TH JULY 2020: GROUNDING OF THE *MV Wakashio* SOUTH OF MAURITIUS

FLAG: Panama

TYPE: Bulk carrier - **BUILT:** 2007

DIMENSIONS: 400 m long

DRAUGHT: 18 m

PRODUCTS TRANSPORTED: no cargo, approx. 3,800 t of VLSFO, 200 t of marine diesel, 90 t of lubricant oil

OWNER: Okyio Maritime Corporation

MANAGER: Nagashiki Kisen KK

CHARTERER: Mitsui OSK Lines

P&I CLUB: Japan P&I Club

Estimated oil release: 800 – 1 000 tons

On 25th July, the bulk carrier *MV Wakashio* ran aground on a coral reef off the south-east of Mauritius. No leaks were reported during the first few days, however on 6th August oil began to leak from the vessel. The Mauritian authorities requested international assistance. France sent equipment and personnel on site as well as experts from Cedre and CEPPOL.

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Immedialely after the shipwreck

- Activation of the **national oil spill contingency plan** by Mauritian authorities
- Alert to foreign countries, including France

6th of August

- Activation of the **Sub-Regional oil spill contengency plan** for the Western Indian Ocean Islands

Response Organisation

French authorities sent equipment to Mauritius by plane and ship: including 800 m of manufactured booms, skimmers, sorbents and pumps

Two-thirds of the POLMAR shoreline response equipment stockpile on Reunion Island was thus made available to the Mauritian authorities

The BSAOM Champlain loading response equipment

MV Wakashio

10th August

- 11 French experts deployed to provide on-site spill response support

12th August

- Shoreline clean-up began, involving many local volunteers
- French company Le Floch Depollution contracted by the shipowner + Polyeco

13th August

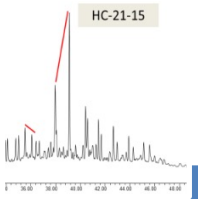
- Expert from Cedre joined CEPPOL on Reunion Island (Command Centre / Prefect for the Southern Indian Ocean Maritime Zone)

17th August

- Cedre and CEPPOL arrived in Mauritius. Took part in the work of the national incident management unit. Shoreline surveys, in particular in the mangrove area, and provided the Mauritian authorities with a report together with clean-up recommendations

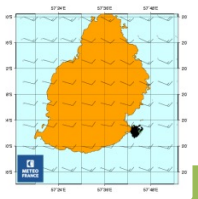
MV Wakashio

Cedre's contribution



Remote advice for Mauritius government

- Response recommendations
- Analysis and characterizations of oil samples



Remote and on-site advice for French governement

- Drift committee
- Response requirements

On-site recommendations (Aug. 20)

- Surveys
- Clean-up operations
- Waste management

Second visit on-site recommendations (Jan. 21)

- End-points requirements for clean-up operations

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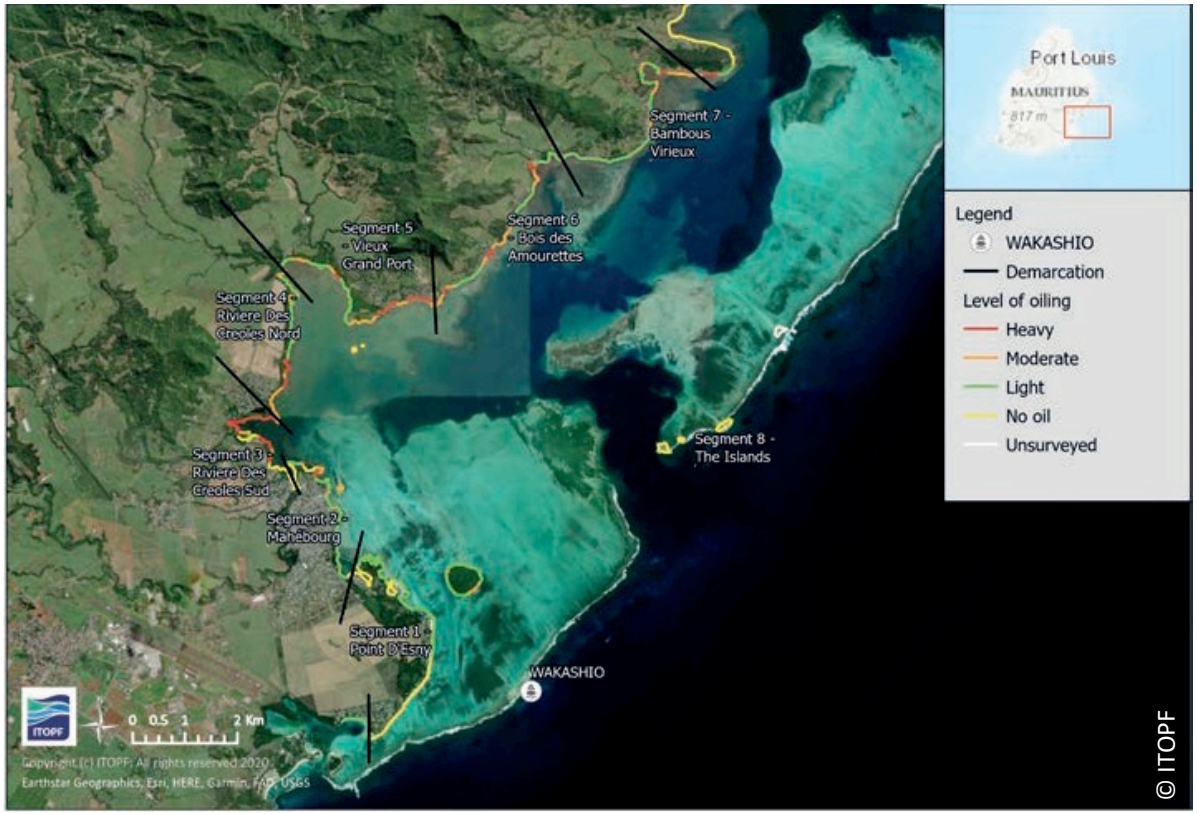
MV Wakashio

Technical expertise made by ITOPF (mandated by P&I Club)
Surveys & expertise on cleaning techniques



Typology

30 km of shoreline
Natural reserves
Mangroves
Beaches
Rocks
Port infrastructures

IMO/UNEP Expert

Cedre

MV Wakashio

Shoreline contamination – mangrove heavily affected

© Cedre

MV Wakashio

Shoreline contamination – rocky and sandy shores

© ITOPF

- Rocky shores: discontinued pollution. Special focus on « île aux Aigrettes » (natural reserve): Even if natural cleaning favorable, porous rocks. Difficult access (mainly by boat)

- Artificial structures: Accumulation in cavities

- Sandy beaches (touristic impact): Slightly polluted

Shoreline clean-up operations

Delay in the organized shoreline clean-up (Covid-19)

Clean-up operation by Le Floch Dépollution and Polyeco

Actions by well-meaning volunteers generated large volume of oil to remove before clean-up operation

Remove wastes collected

Remove improvised bagasse booms (50 km)

Remove waste (plastic litter, scrap metal, tyres, etc.)

Shoreline clean-up operations

Deployement of booms and systems isolating the sites being cleaned up
Avoid oil remobilization and various coastal debris due to tidal currents
Prevent re-contamination of areas already treated

Shoreline clean-up operations

Phase 1: Manual collection

- Recover the oil liable to be washed back out to sea to prevent the contamination of unpolluted areas.

Phase 2: Techniques used

- Flushing low pressure
- Underwater agitation
- Concrete mixer (pebbles and gravel)
- Flushing (rocky and sandy shores)
- High-pressure cleaning (Hard substrates)

Clean-up using the flushing technique

Underwater agitation

Mangroves

- Remove bulk of oil from the roots and leaves with sorbents,
- Rinsing with a very large volume of water at low pressure in order to remove the remaining traces of oil

Mangroves cleaning-up:
Most time-consuming operation, involving meticulous work by a limited number of operators to minimise trampling in these areas.

Manual recovering

Hair as a floating hydrophobic sorbent

Initiative consisting in contributing to the response by donating hair to make sorbent booms

Laboratory tests performed at Cedre

Behaviour of hair in contact with water and oil

- when in contact with water, loose hair or hair booms soak up 1 to 2 times their weight in water. There are therefore not considered to be hydrophobic. They soak up water and sink.
- when in contact with oil, loose hair or hair booms soak up 2 to 3 times their weight in oil.

Good initiative that can be implemented pending the supply of manufactured sorbents
Not sufficiently effective to be used in the same way as recommended hydrophobic floating sorbents

Product: Low Sulphur Fuel Oil (LSFO)

Traditional marine fuel oil: naturally contains **sulphur**

→ Emission of sulfur oxides (SOx) into the atmosphere during combustion

→ SOx have harmful effects on human health and the environment

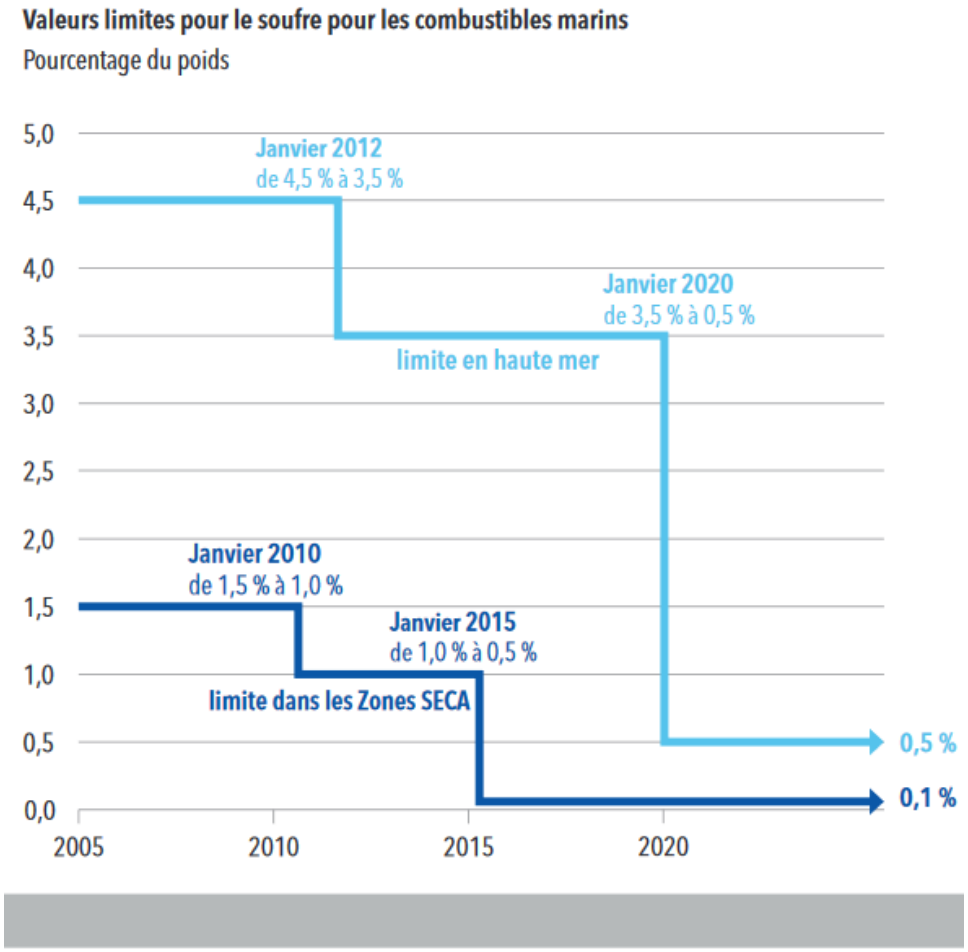
→ Need for a regulation to lower the level of sulphur in marine fuels to protect humans and their environment

→ 2005: IMO rules to reduce sulfur oxide emissions from ships (Annex VI MARPOL).

→ Implementation of SECA areas

→ 1st Jan. 2020: 0,1% in SECA area, 0,5% outside

Product: Low Sulphur Fuel Oil (LSFO)



Valeurs limites pour le soufre pour les combustibles marins.
Source : U.S. Energy Information Administration, based on IMO

→ New genereation fuel oil:

VLSFO (Very Low Sulphur Fuel Oil) : <0.5%

ULSFO (Ultra Low Sulphur Fuel Oil): < 0.1%

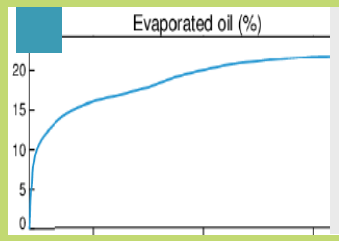
→ **Difficult to categorize according to existing standards.**

Can be a real challenge if accidentally spilled at sea

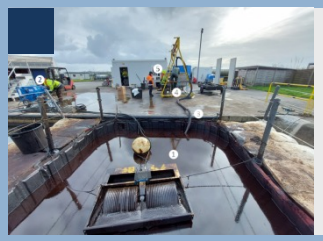
Improving response capacities and understanding the environmental impacts of new generation low sulphur MARine fuel Oil Spills

Characterization weathering & **dispersibility**

Ecotoxicity



Modelling



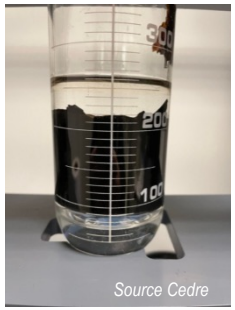
Mechanical recovery / sorbents

Shoreline cleanup

ISB

High variability of physical-chemical properties
Different behaviours at sea

- Safety: **No flammability issues** (flash point: 78°C - > 100°C)
- **Persistency at sea** (evaporation rate: 3 % - 28%, mean ~ 12%)
- **Potential immersion** in some cases (fresh oil density at 15 °C: 0.90 - 0.98)
- **Potential challenging recovery**:
  - May be semi-solid
  - May turns highly viscous
  - Potential high elasticity behaviour
  - **Pour point varying between -27°C and + 33°C**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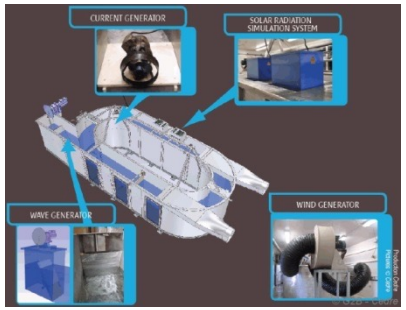

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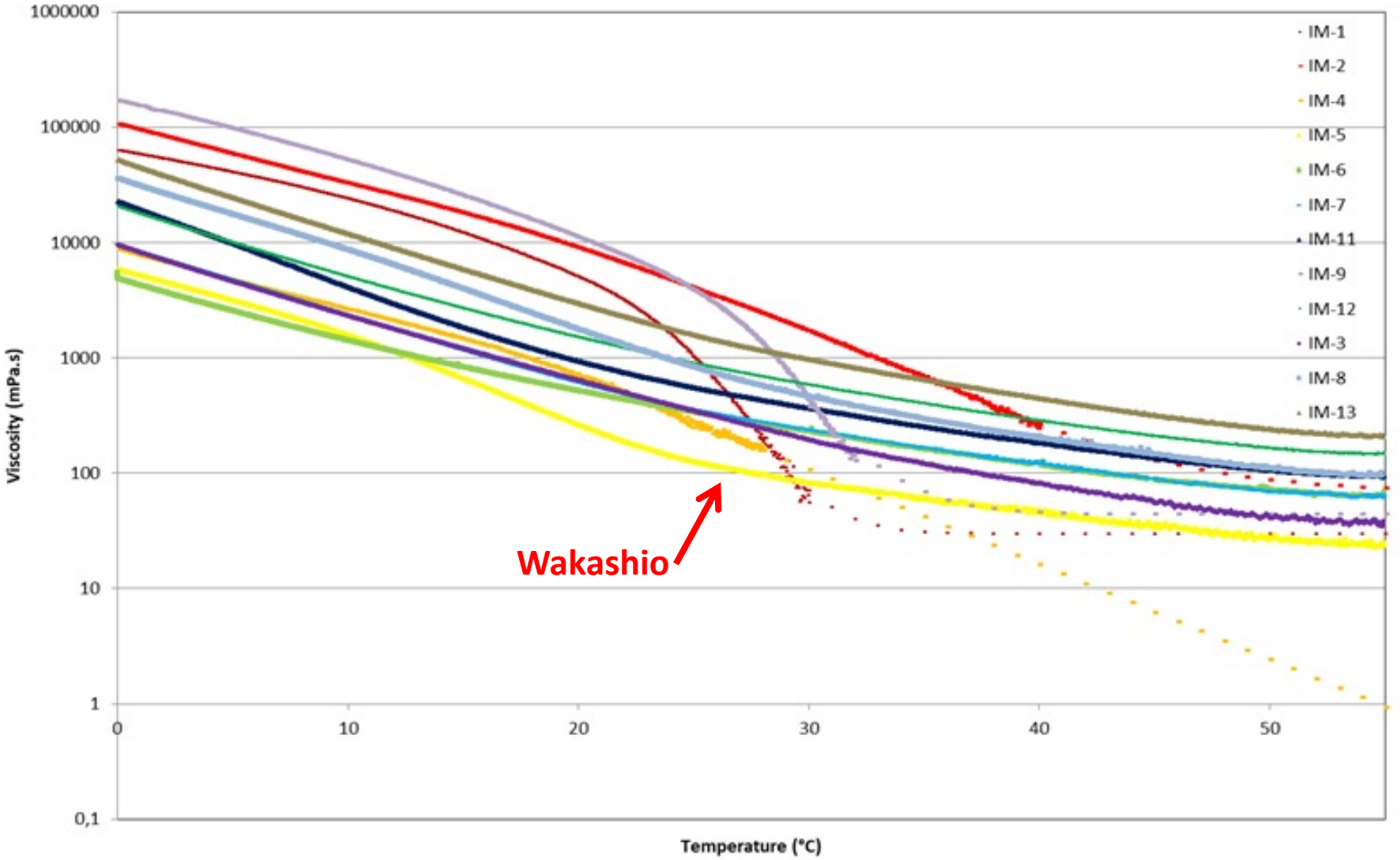
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Viscosity (mPa.s)
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IM-6
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IM-11
IM-9
IM-12
IM-3
IM-8
IM-13
Wakashio

LSFO can also be…

Source Norvegian Coastal Administration

End points

Cedre worked with the Government of Mauritius in order to prepare the site inspection process

Cleanup site inspections conducted in Jan. 2021
Excellent quality of work carried out by the contractors appointed by the polluter's P&I Club

Advice on the achievement of satisfactory clean-up levels, with a view to deciding on clean-up site closure

End points

Method

- Direct, mainly qualitative observations in the field (with supporting notes, photographs, etc.)
- Work jointly with stakeholders
- Applied to more than 40 sites

Example of closure site meeting

End points

At each cleaned sites

- Assessment of presence or absence of residual oil and, where present, its state, form and location on the substrates and habitats
- Detailed report of observations, comprising the characteristics of each site (e.g. habitats/substrates; presence of vegetation, associated wildlife, etc.) and the status of the pollution at the time of the survey
- Checking of the clean-up levels achieved against the guidelines

Checking for any oil that may be remobilised or likely to cause oiling due to rubbing, present on the surface or in the cracks/pores of a port structure (here: grouted stone wall treated by rinsing followed by high-pressure cleaning)

Subsurface inspections to check the level of cleanliness of a sediment foreshore (stones on sandy mud) treated by flushing (with low pressure hoses) to extract the infiltrated oil

End points

Positive signs can be observed (young shoots, open lenticels, crab burrow openings, etc.)

Sensitive mangrove site featuring heavily oiled Rhizophora mucronata in August 2020 (treated using the flooding technique and manual wiping)

Main challenges

- Covid-19 pandemic
- Difficulty to define clean-up strategy
  Approval obtention
- Nature of the oil LSFO
- Complexity of some sites
- Waste (plastic litter, scrap metal, tyres, etc.)
- Limited access due to the site configuration (e.g. along busy roads) or tides (difficult access to mangroves or rocky areas at high tide)
- Rigorous organization to avoid trampling of sensitive soils
- Strong media pressure

Thank you for your attention