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EMERGENCY PREVENTION, PREPAREDNESS AND RESPONSE

Low Sulphur fuels, fate and behavior in cold water conditions

A joint PAME and EPPR project, under the Arctic Council

PAME
Protection of the Arctic Marine Environment

Terminology used in this presentation

- Residual fuel – Fuels with a residual component in it, it is the “counterpart” of clean distillate such as diesel fuel
- VLSFO – Very Low Sulphur Fuel Oil. Residual fuels with 0,1% - 0.5 % Sulphur content
- ULSFO – Ultra Low Sulphur Fuel Oil. Residual fuels with 0.1% Sulphur content, or less sulphur - mandatory to use in Sulphur Emission control areas
- Viscosity - refers to a fluid's resistance to flow.
- Pour point - the temperature below which the liquid loses its flow characteristics
- Density - Density is the relation between mass and volume at a stated temperature. The unit for density is kg/m3
- Cutter stock - Cutter stocks are oil and oil-related (by)products used to thin residual oil.

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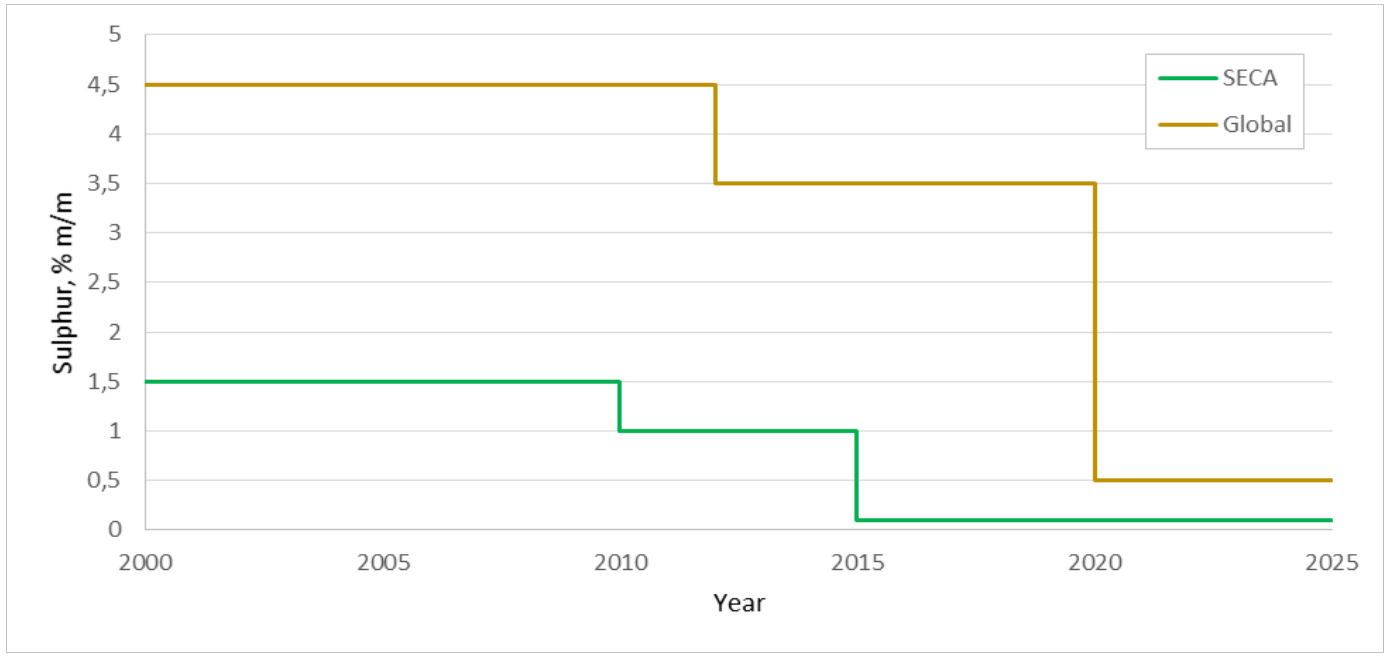
Background(2)

MARPOL Annex VI – Fuel oil Sulphur limit



Fuels used in arctic waters and concerns about the Arctic HFO ban

Definition for Heavy Fuel Oil

Arctic HFO ban:

MARPOL Annex I, decided during MEPC 75:

The Arctic HFO ban covers fuel oils having

- a density at 15°C higher than 900 kg/m3
- or a kinematic viscosity at 50°C higher than 180 mm2/s (cSt).

Residual fuel properties (distillates not part of the study)

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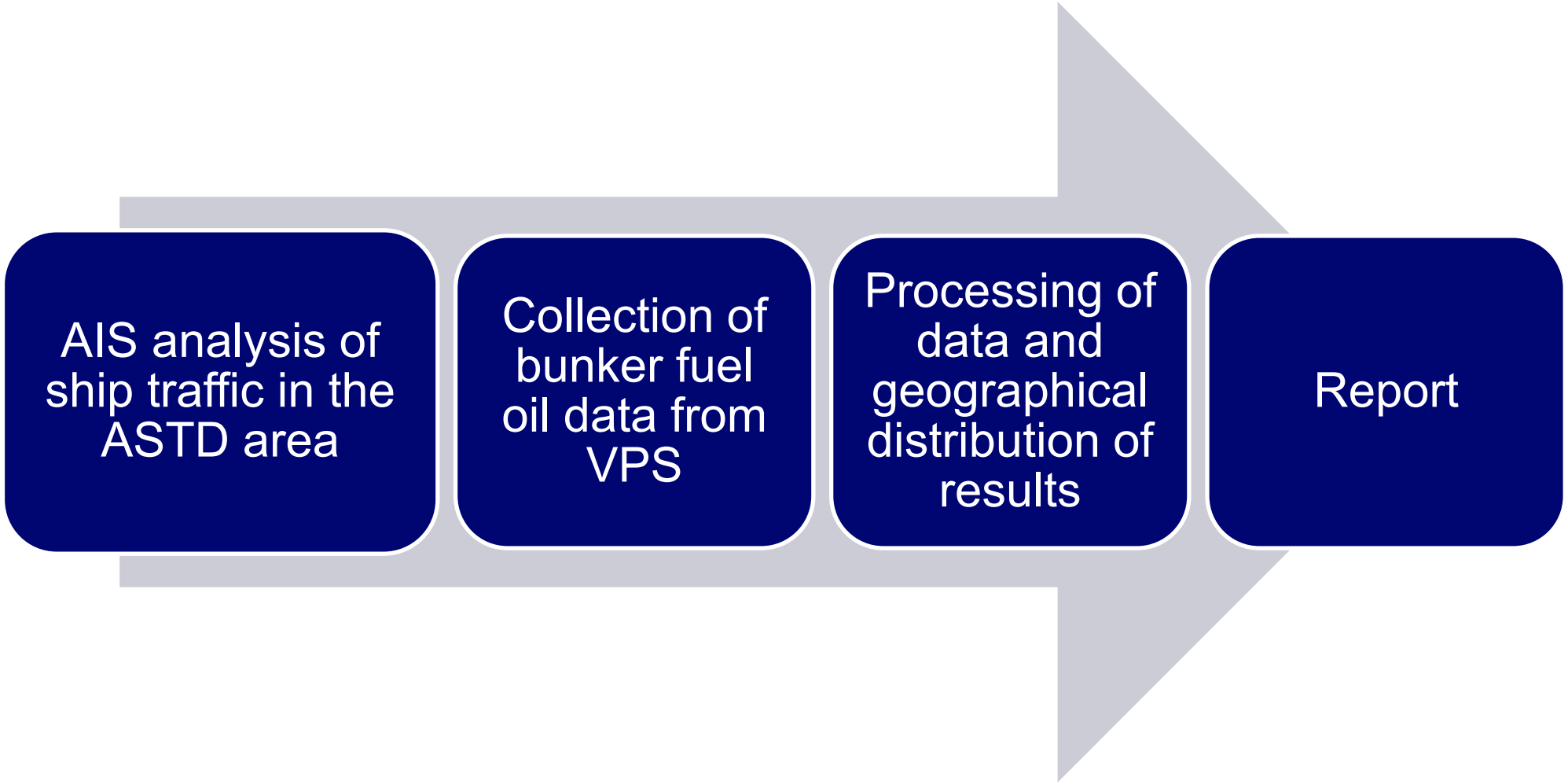
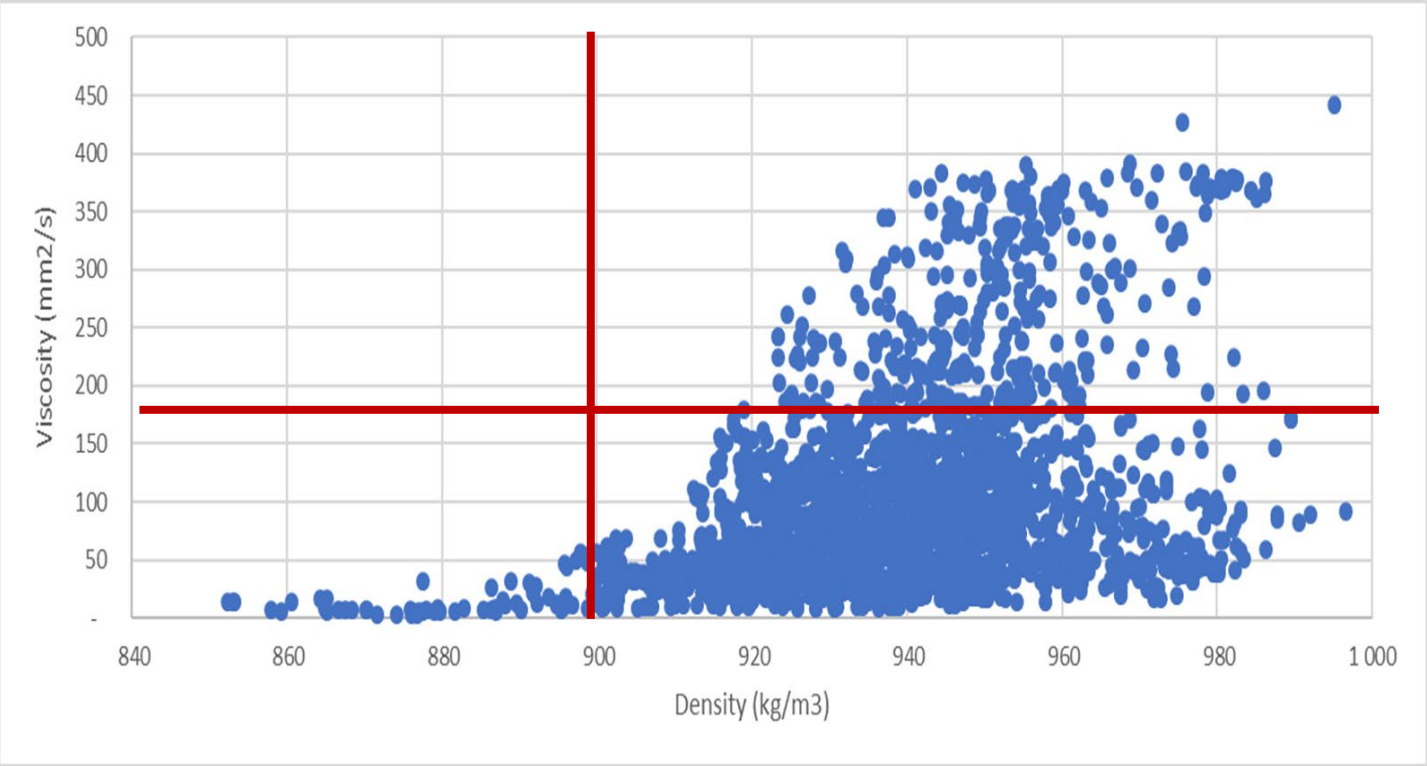


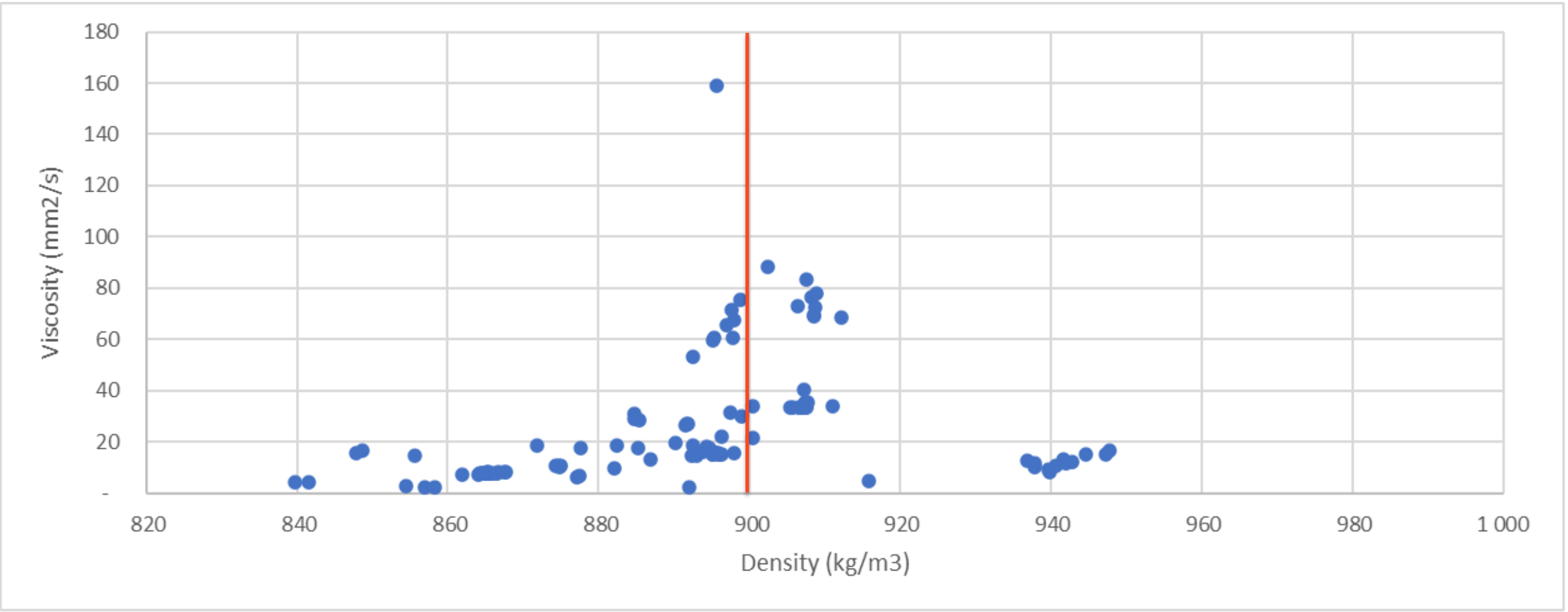
IMO heavy fuel ban in Arctic waters, from July 1, 2024 - VLSFO

Fuel oils having a density at 15 °C higher than 900 kg/m³ or a kinematic viscosity at 50 °C higher than 180 Cst are forbidden



- Viscosity vs density of approximately 2600 unique VLSFO samples in the Arctic Polar Code area
- Most VLSFOs used by ships in the Arctic is affected by the HFO ban

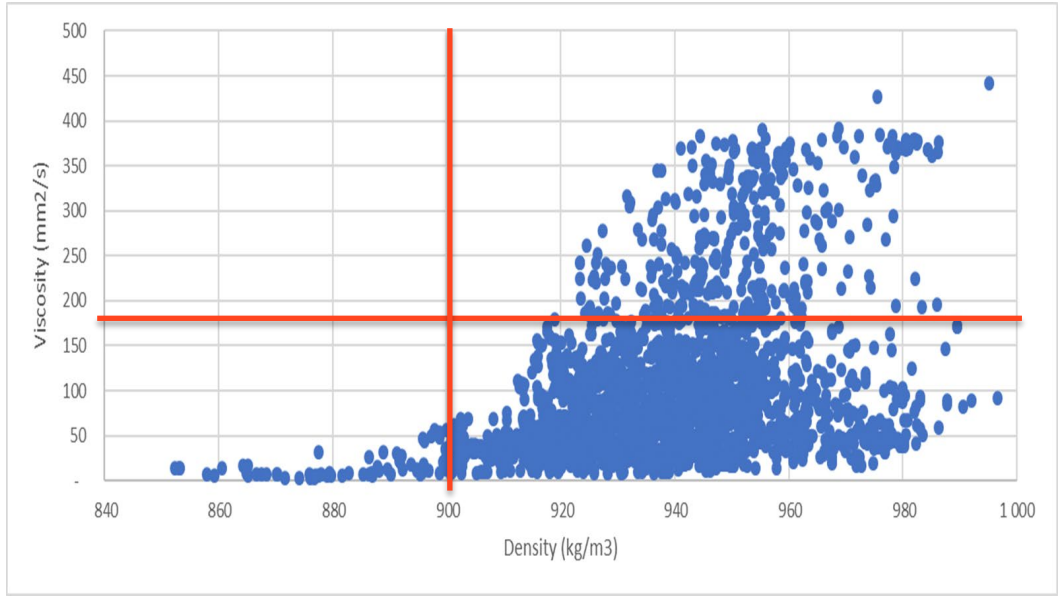
Most ULSFOs can be used in Arctic waters



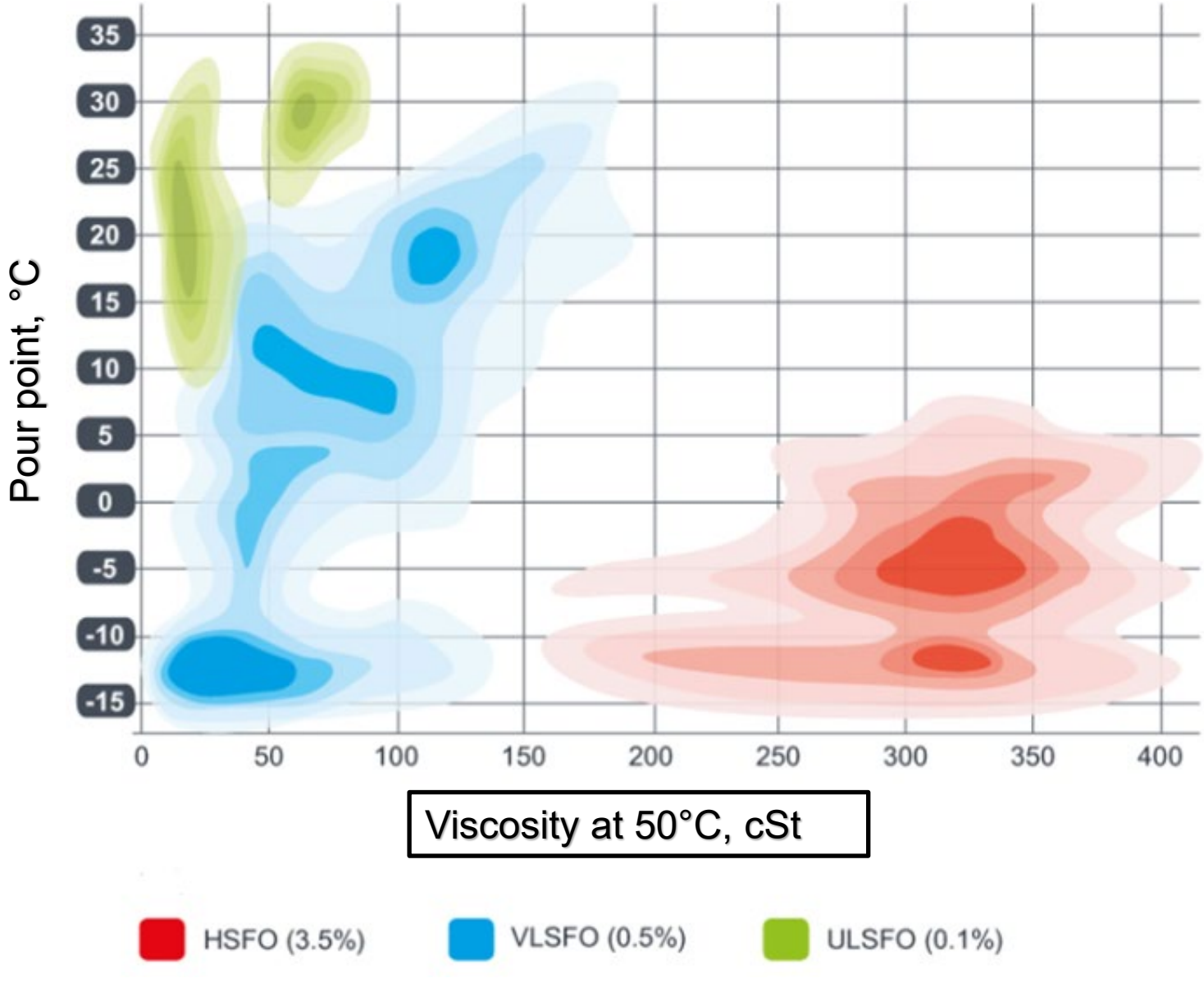
Concern about the Arctic HFO ban

Fuel providers will make use of paraffinic cutter stock to reduce viscosity and density to target specifications.

- Paraffinic cutter stock contains wax.
- Wax in the fuel oil increases the pour point !



Comparison of HSFO, VLSFO and ULSFO, Reference: Intertek (4)



The efficiency of mechanical oil uptake/removal and dispersion is considerable reduced

High pour point, an Arctic problem – VLSFO 2485

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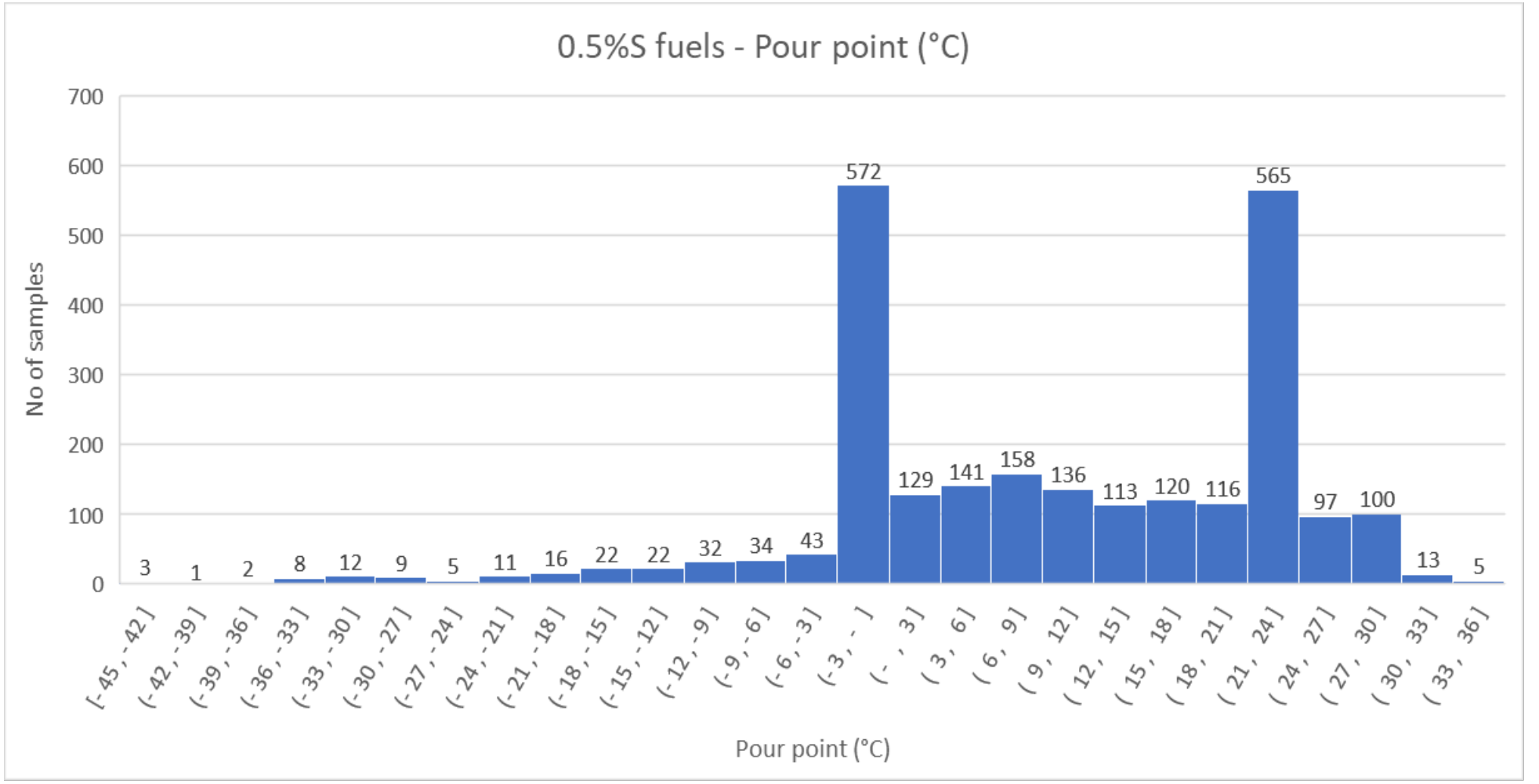
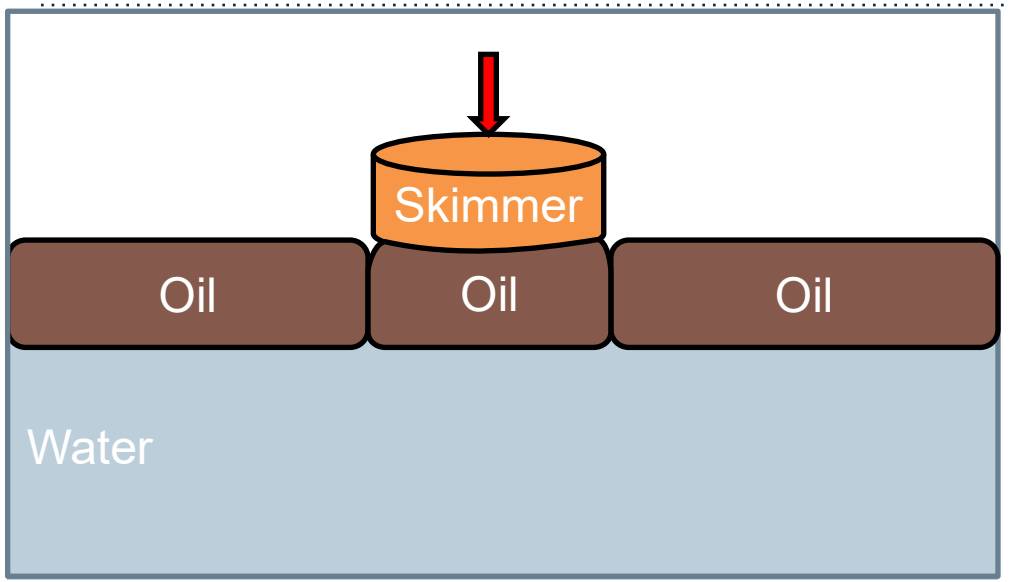
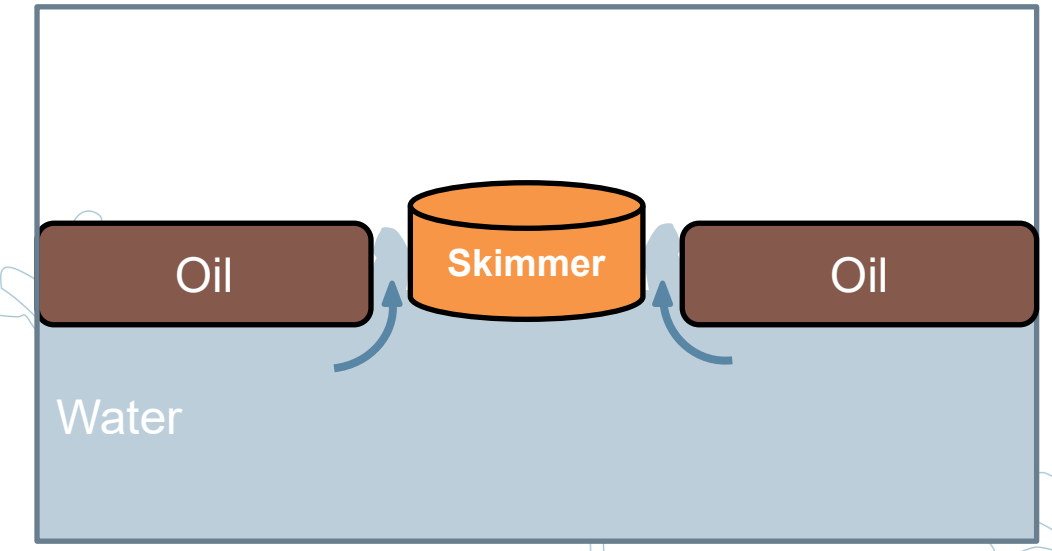


High pour point reduces the effectiveness of oil combat techniques and equipment





	VLSFO IM-14		VLSFO IM-15		ULSFO IM-16	
	Fresh oil	Emulsion	Fresh oil	Emulsion	Fresh oil	Emulsion
Drum skimmer	poor	reduced	reduced	reduced	unsuitable	unsuitable
Belt skimmer	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Adhesion band skimmer	poor	reduced	reduced	good	unsuitable	unsuitable
Brush skimmer		poor				
Weir skimmer		unsuitable				

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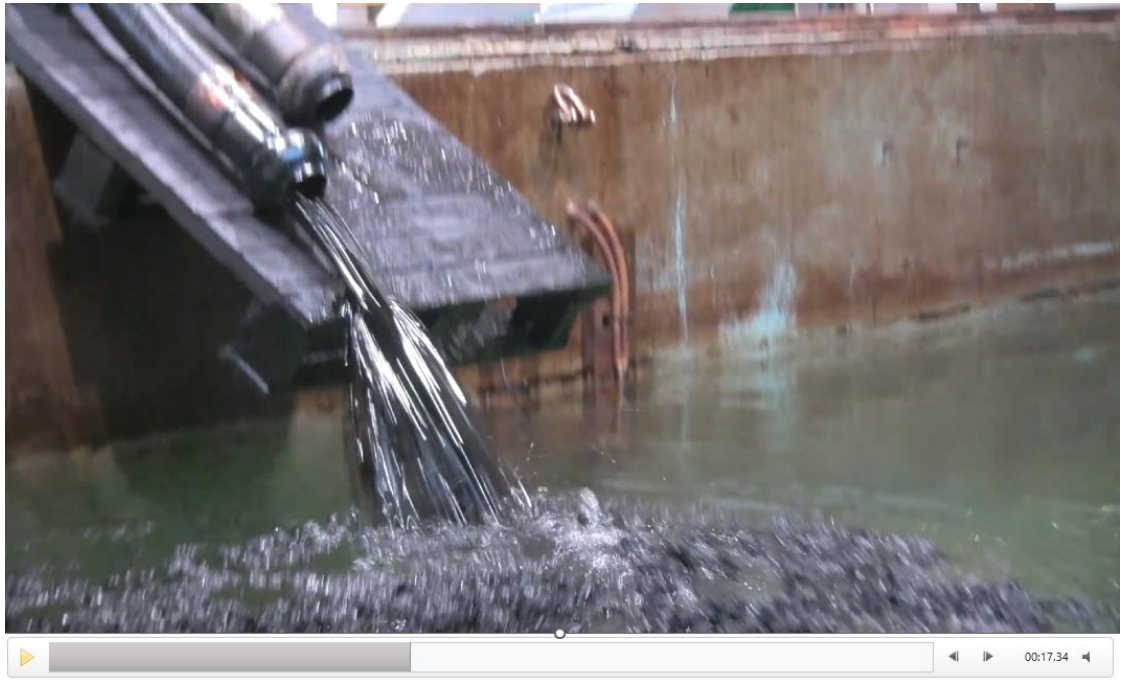
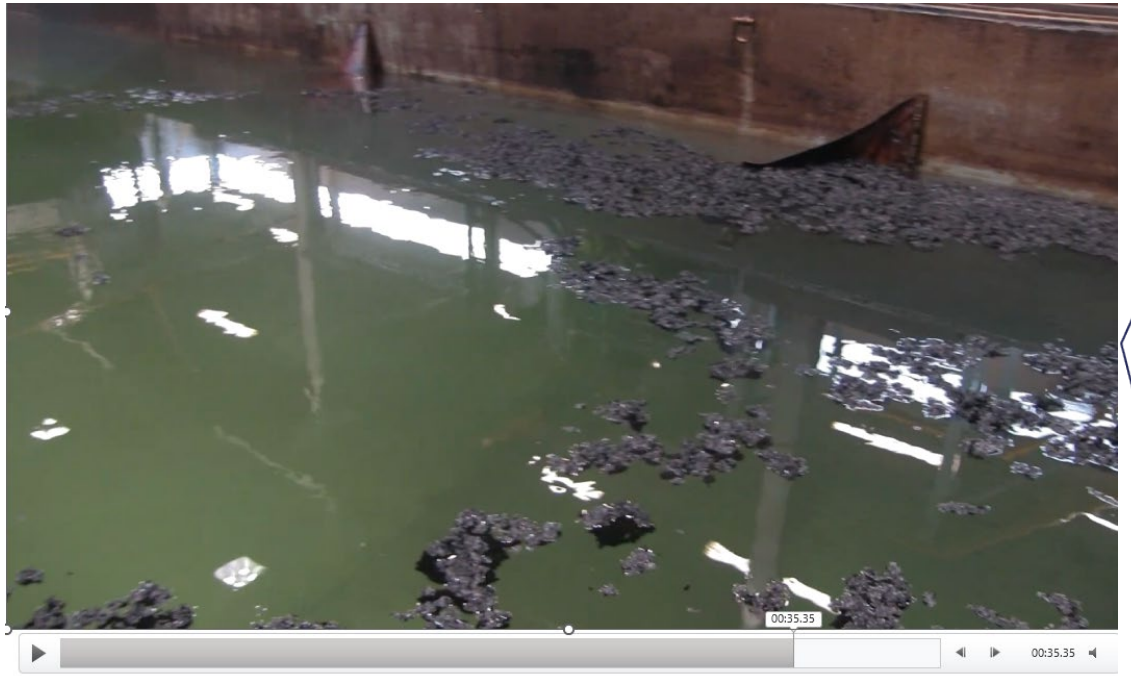
Pouring out ULSFO at 37°C





Mechanical uptake

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Lamor skimmer in Stena oil emulsion (VLSFO IM-14)

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Bow collector

The bow collector normally operates most effectively at vessel speeds of up to four knots.

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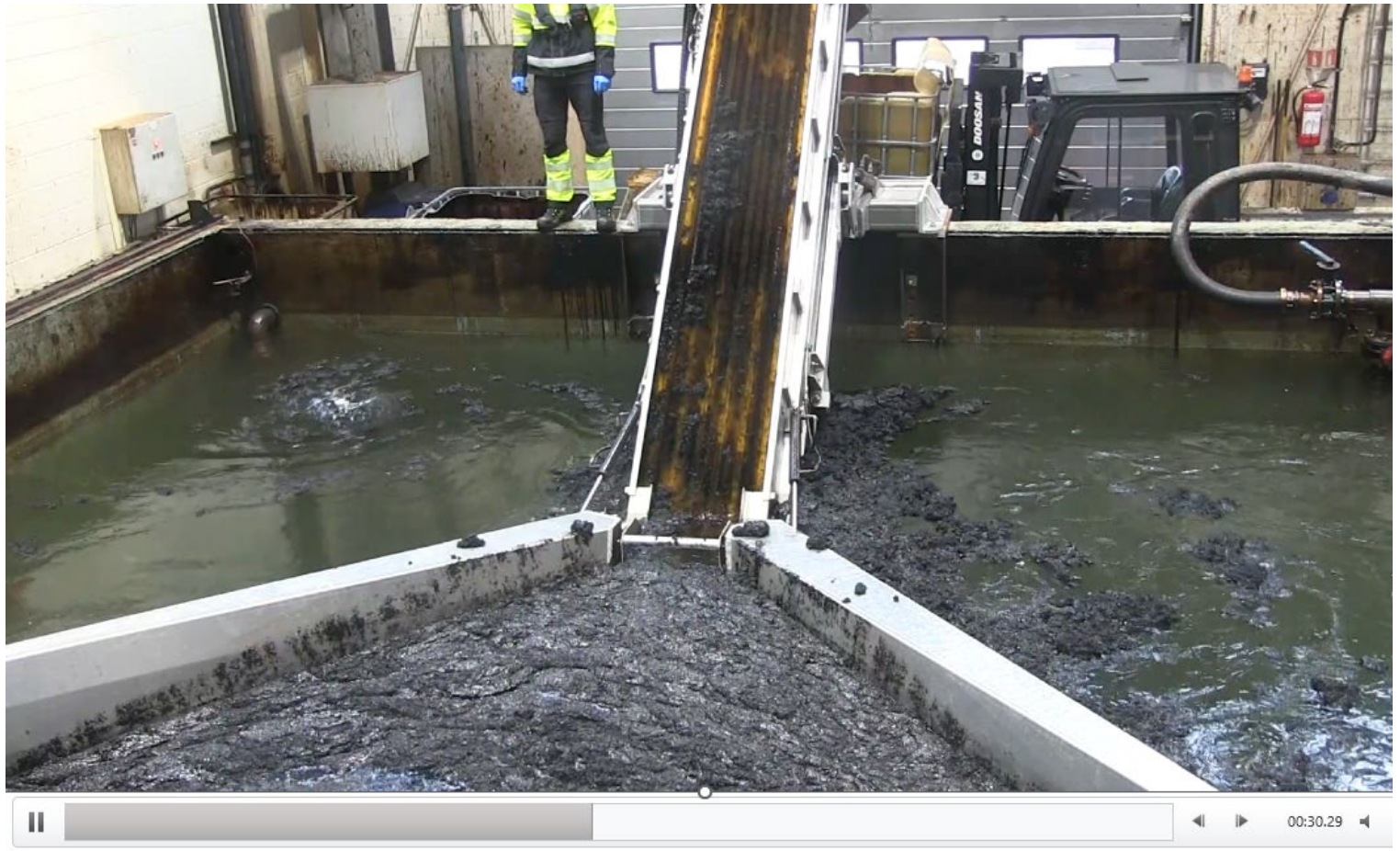
Increasing the current to 4 from 6 knots



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Excavator bucket (grab)

Main recommendations

- The use of distillates in the Polar Code Area would help mitigate the risks associate with a spills
- Additionally, several fuel characteristics that create specific challenges for spill response has been identified.
  - Regulating the upper pour point value in the Polar code area to 5°C
  - and viscosity of 180 mm^2/s (cSt) measured at 5°C would also alleviate significant challenges for spill clean up and the persistence of fuel oil in the Arctic.

Recommendations for mandatory information in the bunker delivery note

- Pour point - ASTM D97
- Viscosity measured at 5 and 50 °C - ASTM 7052

Thank you for your attention!

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