WP4 - mechanical recovery

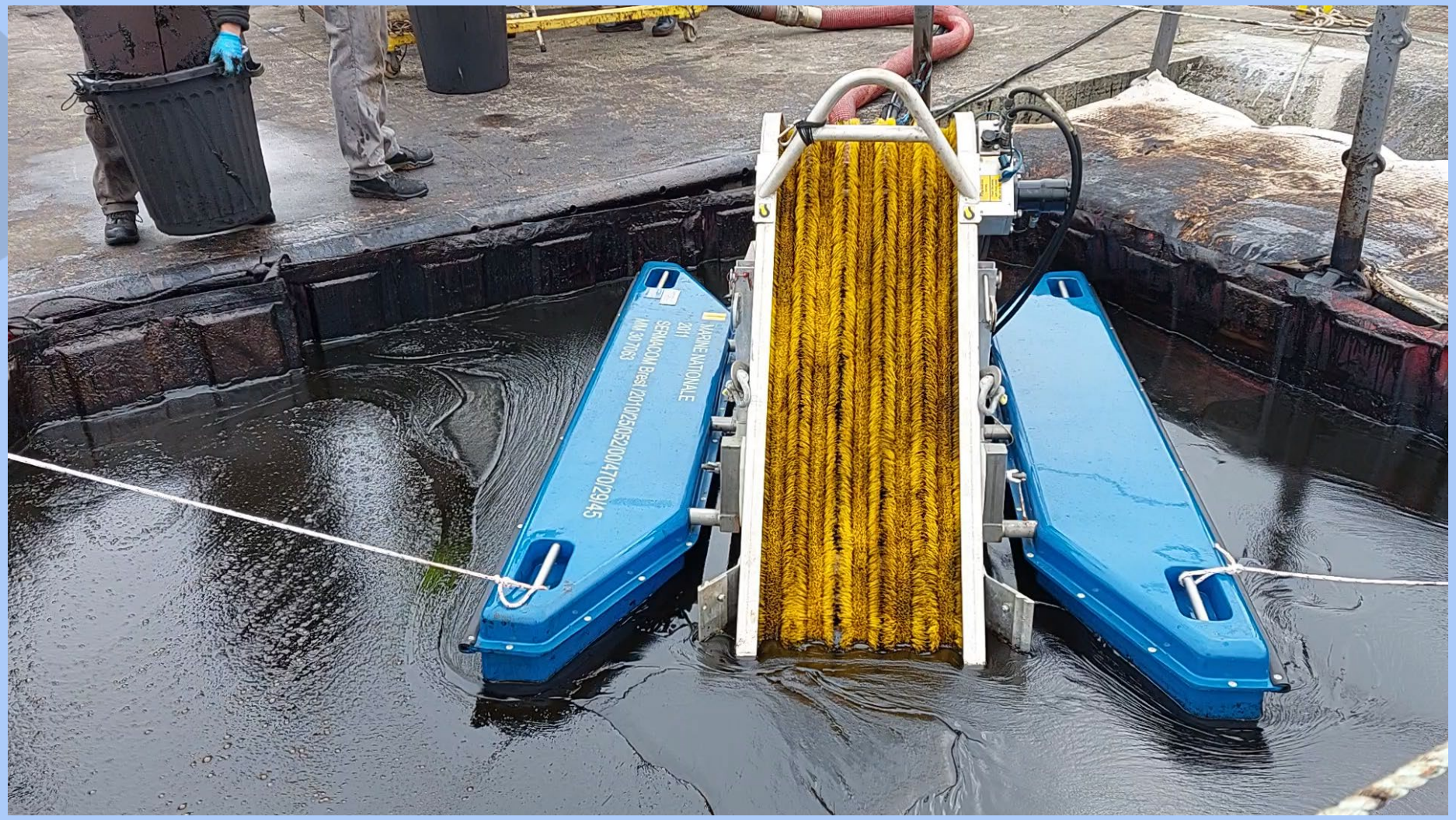
19.11.2025 Ingvild Frogner and Bjørn R Frost, NCA

About the work package

Objectives:

- The objective of WP4 is to give recommendations to the applicability of different mechanical recovery systems based on the challenging behaviour of LSFOs experienced in the IMAROS project.
- Promote innovation and improvement of existing equipment

- Mechanical recovery trials
  - 2 trial periods in Horten, Norway, in fall 2024 and spring 2025
  - 1 trial period in Kotka, Finland, in ice conditions winter 2025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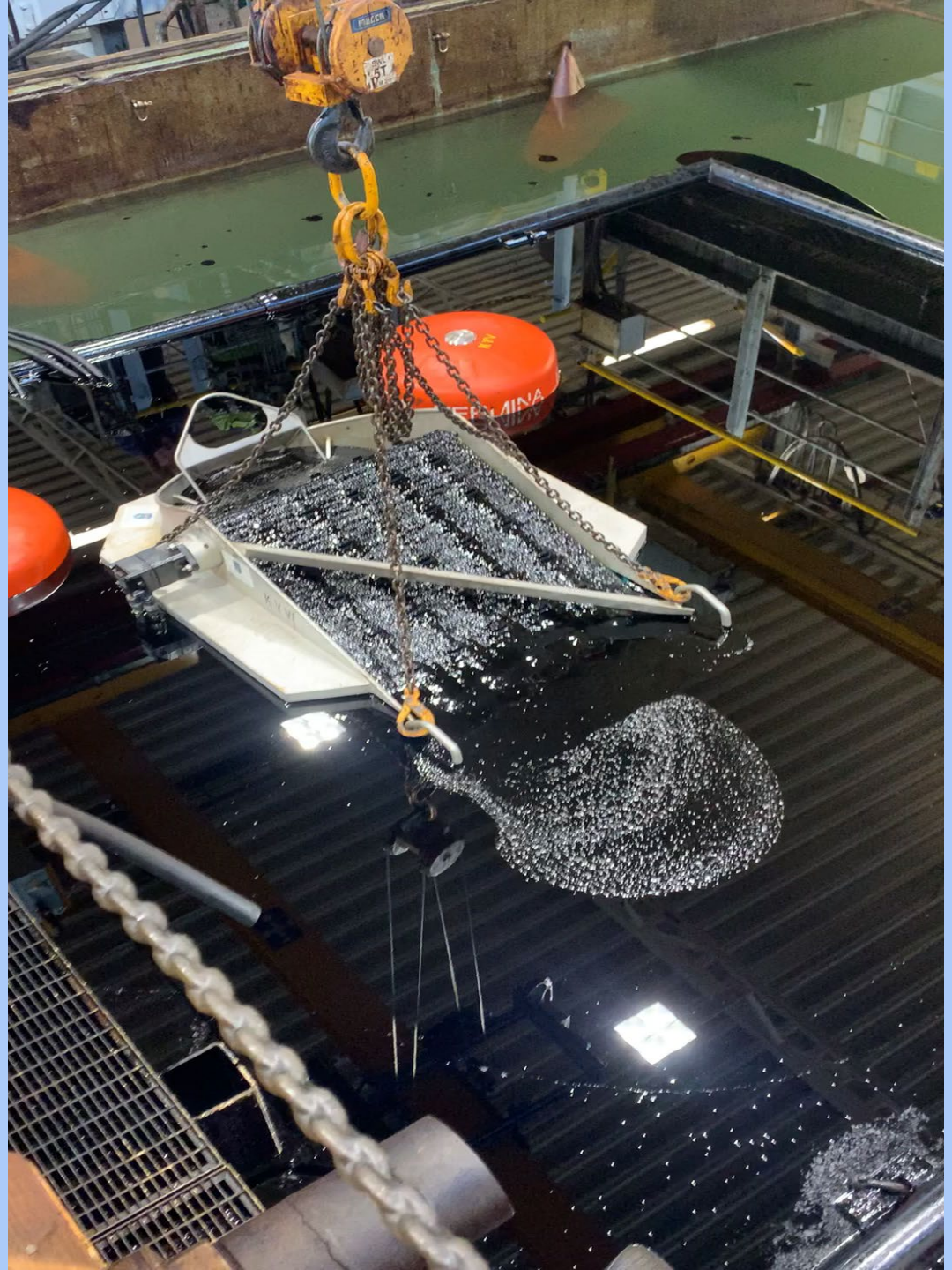
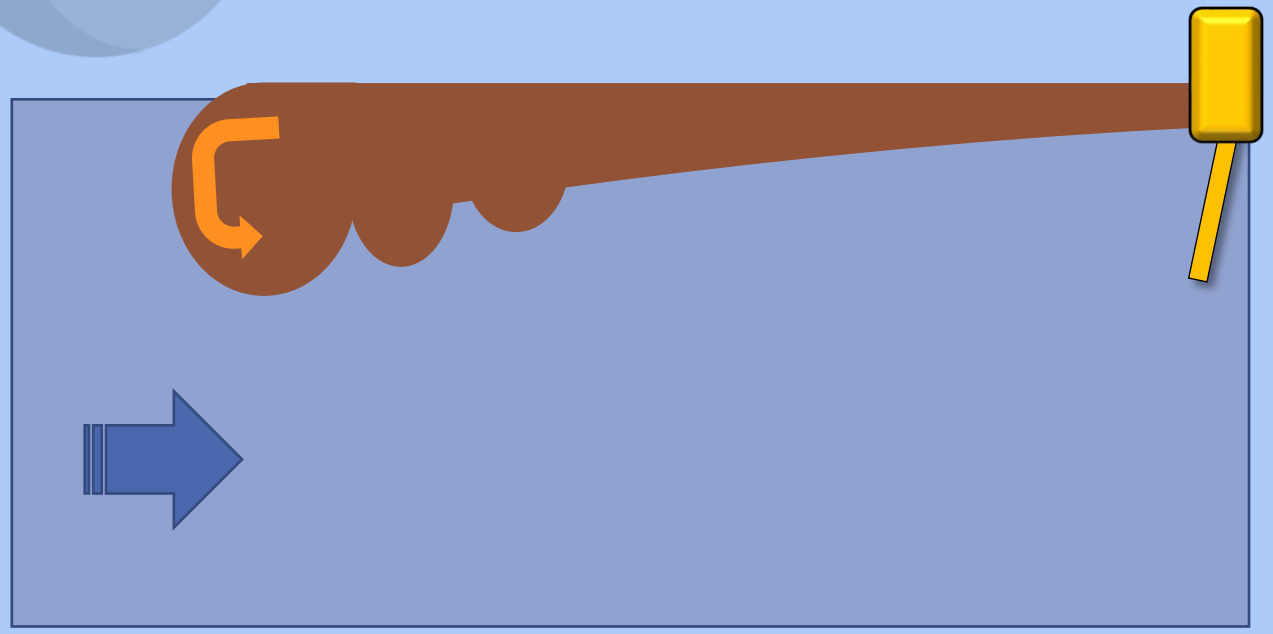
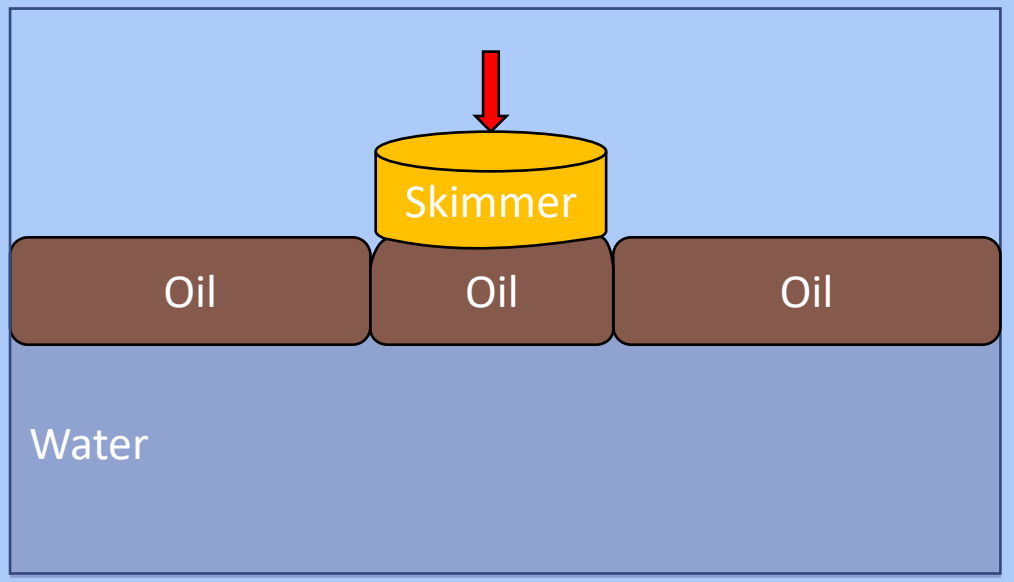
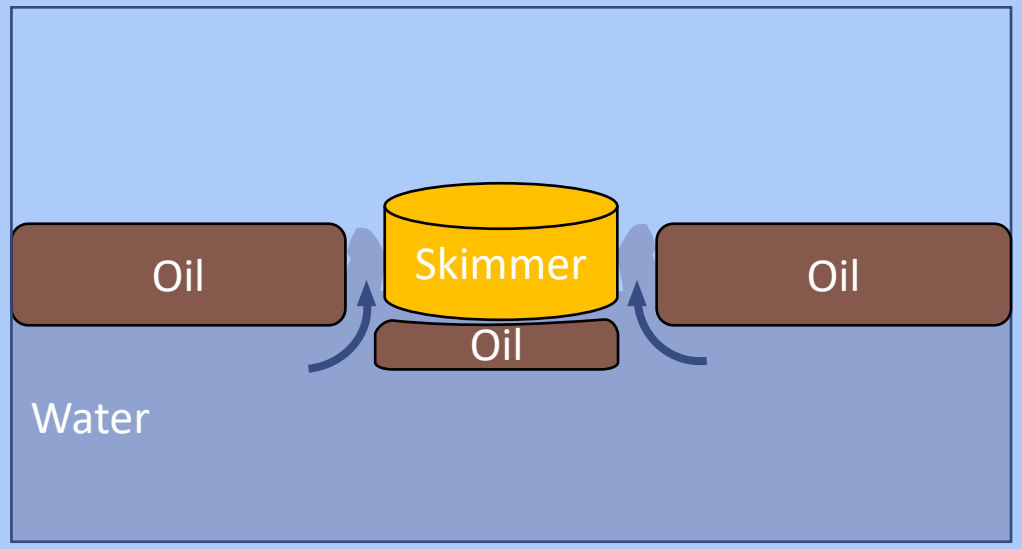


What did we learn from IMAROS 1







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Oil bridging in front of skimmers

Skimmers that don’t move and have obstacles in front or around

Producer involvement conference May 2024

Producer involvement conference, hosted by Swedish Coast Guard

Invitation to participate in the project

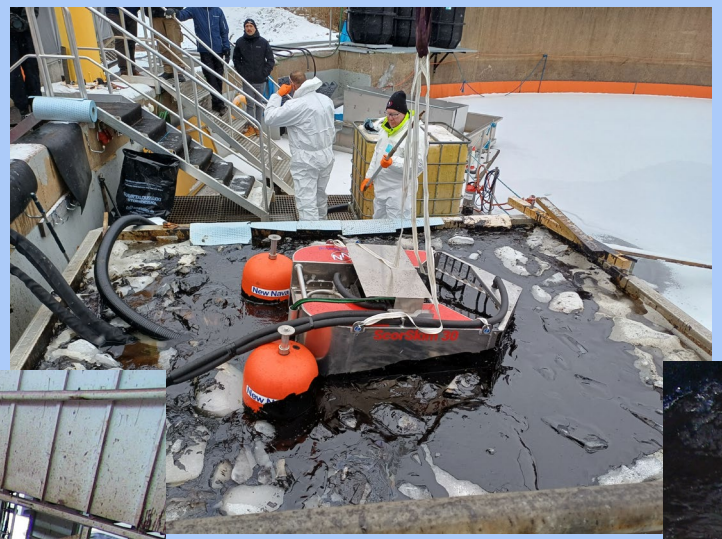
(we got applications from 11 companies)

Process with all project partners to select the most promising approaches

Producers that applied for the project

- AllMaritm AS
- Desmi
- Elastec
- Faltech Aktiebolag
- Koseq
- Lamor
- New Naval
- NorLense
- Seinprotek
- Technika
- Vikoma

The chosen ones



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The test trials

Task 4.2 Mechanical recovery trial period 1	NCA Horten test facility	Mechanical recovery tests at NCA's facilities. The manufacturers will be conducting the tests, supported by the project group. After the first test trials are conducted, the manufacturers get time to make modifications or new technologies to their equipment.
Task 4.3 Mechanical recovery trial period 2	FBG, NCA Kotka test facility	Mechanical recovery tests of LSFO in winter conditions i.e., oil in ice recovery tests to gain understanding of how the LSFO oil behaviour changes in sub-zero temperatures. The manufacturers will be conducting the tests, supported by the project group. The tests will utilize the same methodology that NCA uses in T4.2.
Task 4.4 Mechanical recovery trial period 3	NCA Horten test facility	Mechanical recovery tests at NCA's facilities with modified equipment. The manufacturers will be conducting the tests, supported by the project group.

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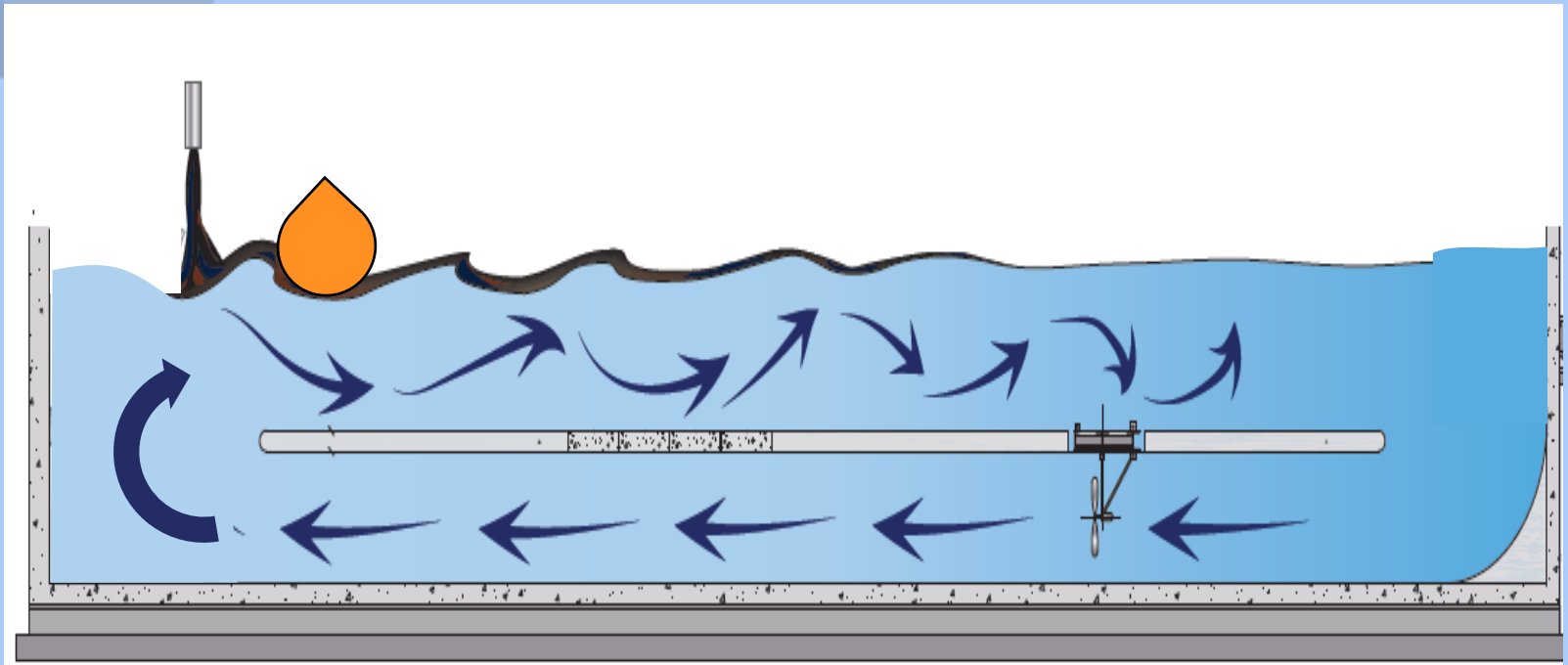
National test centre of oil spill response equipment



- Length 30m
- Width 7m
- Depth 4.4m
- Current 3 - 4 knots
- Wave height 1.1m

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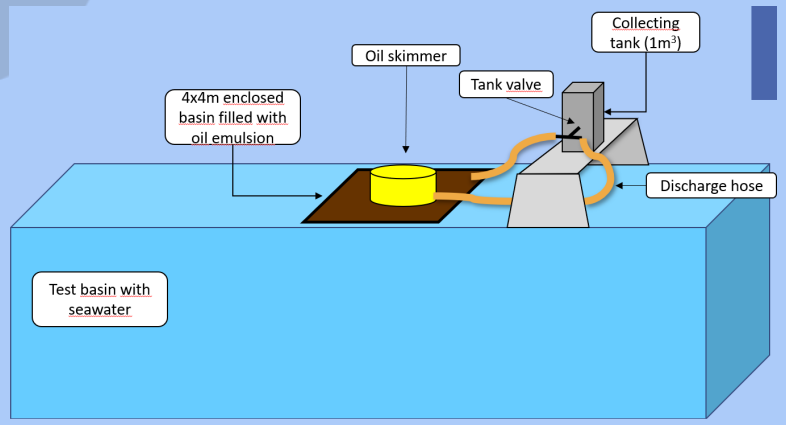
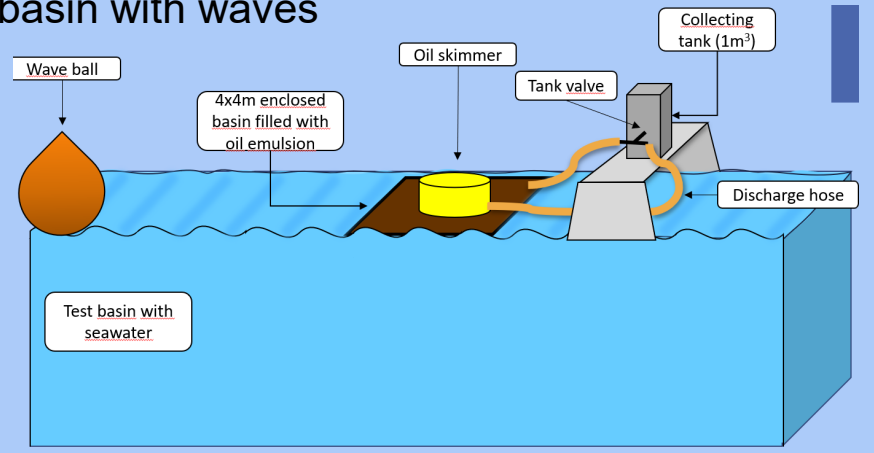
Test procedures fall 2024

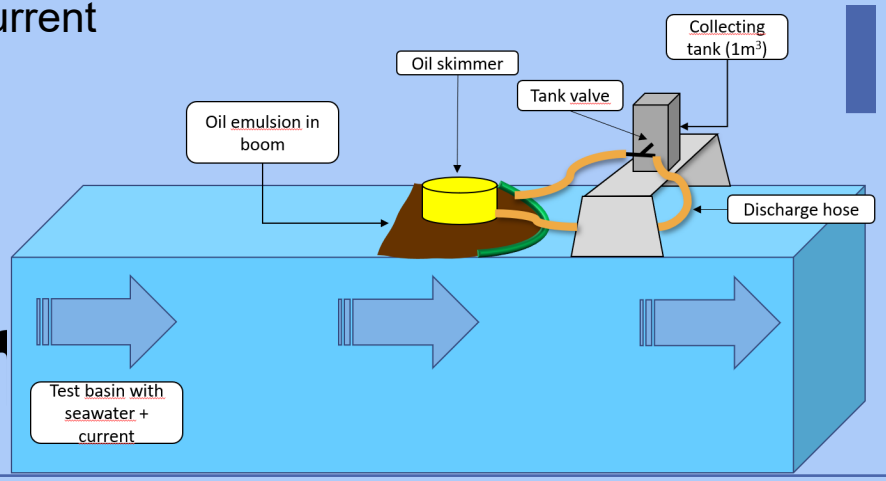
- **Test 1 -** Capacity test of oil emulsion in confined basin



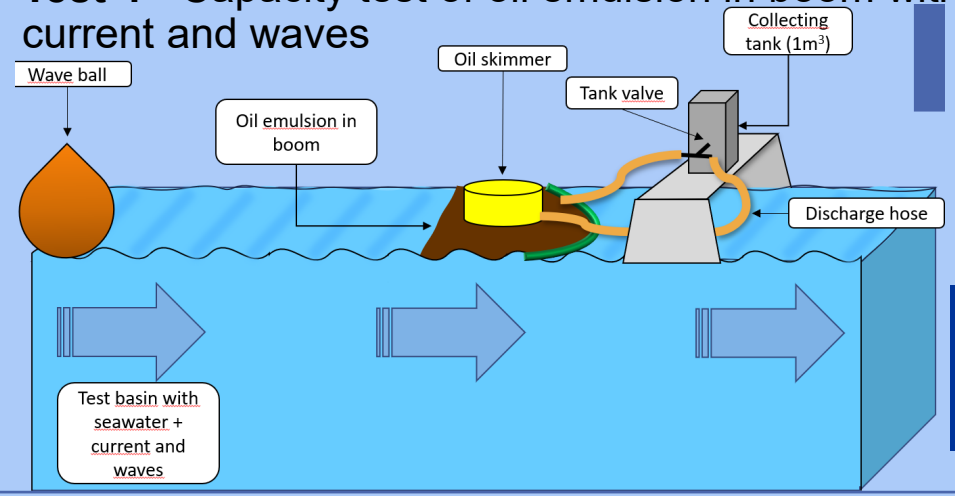
- **Test 2 -** Capacity test of oil emulsion in confined basin with waves



- **Test 3 -** Capacity test of oil emulsion in boom with current

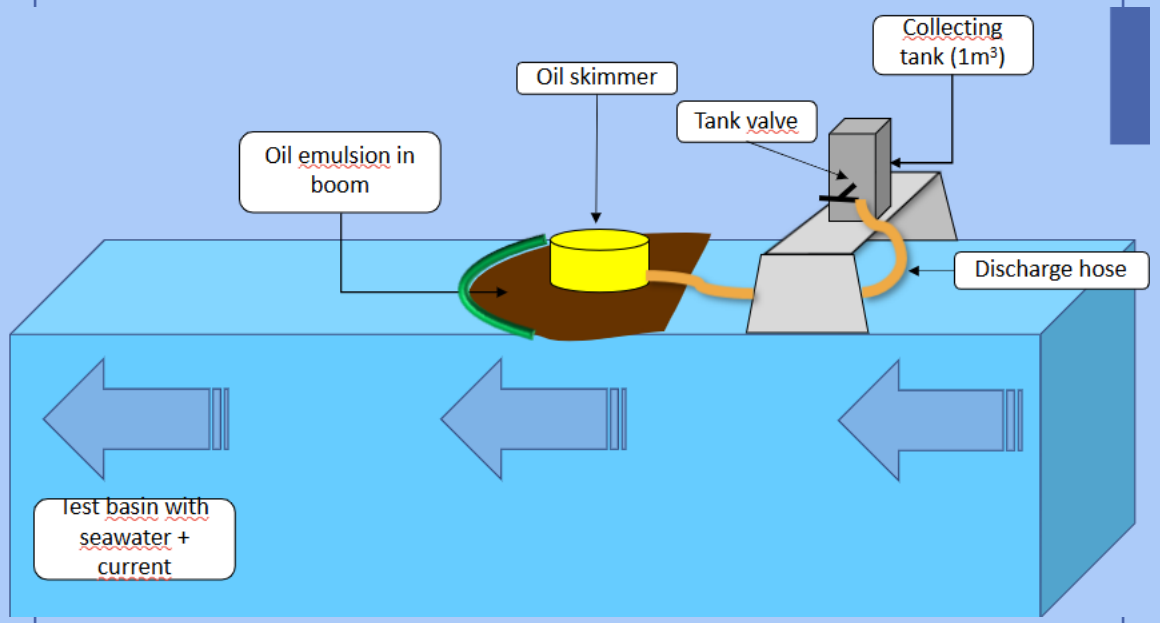


- **Test 4 -** Capacity test of oil emulsion in boom with current and waves

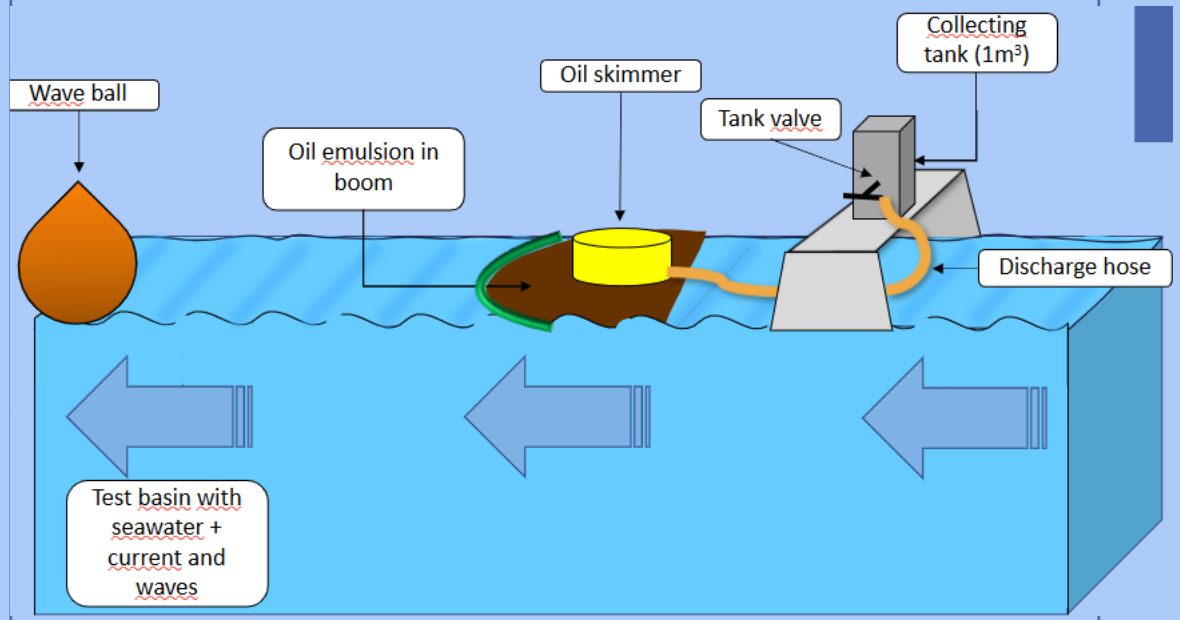


Test procedures spring 2025

- **Test 3 -** Capacity test of oil emulsion in boom with current



- **Test 4 -** Capacity test of oil emulsion in boom with current and waves



The three large oil samples

Imaros 2 ID	Oil type	Viscosity of fresh oil, temp sweep (cP)		Density (g/mL) 50°C	Viscosity of emulsion at 10°C ($10s^{-1}$)	Pour point of fresh oil (with max. and min.)
		10°C	50°C			
IM-27	VLSFO	23104	282	0.931	9998 – 42548	12 (9, 24)
IM-28	VLSFO	36277	110	0.909	21386 – 54734	27 (21, 30)
IM-29	ULSFO	932	9.6	0.866	12173 – 18492	27 (15, 24)

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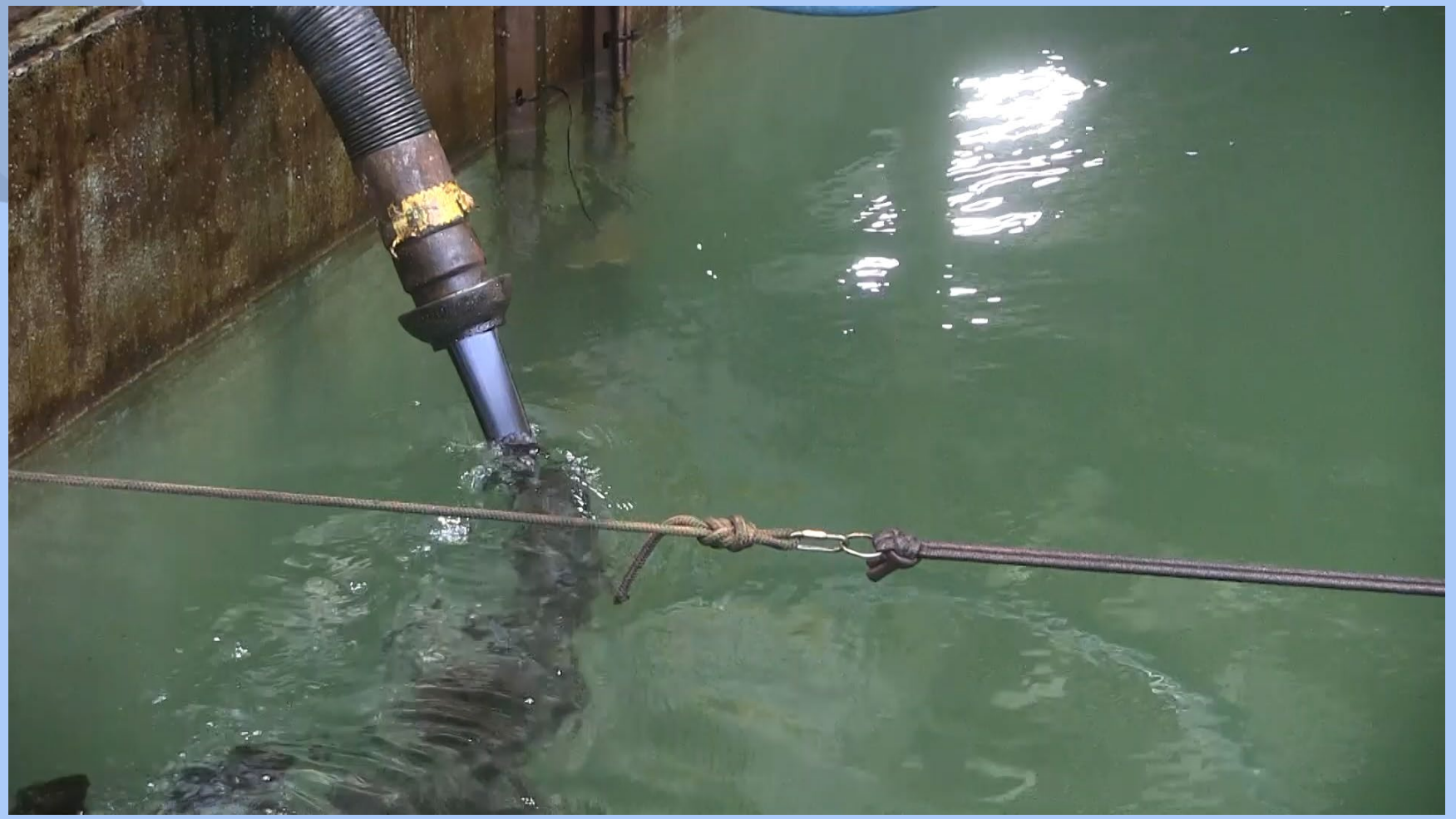
IM-27

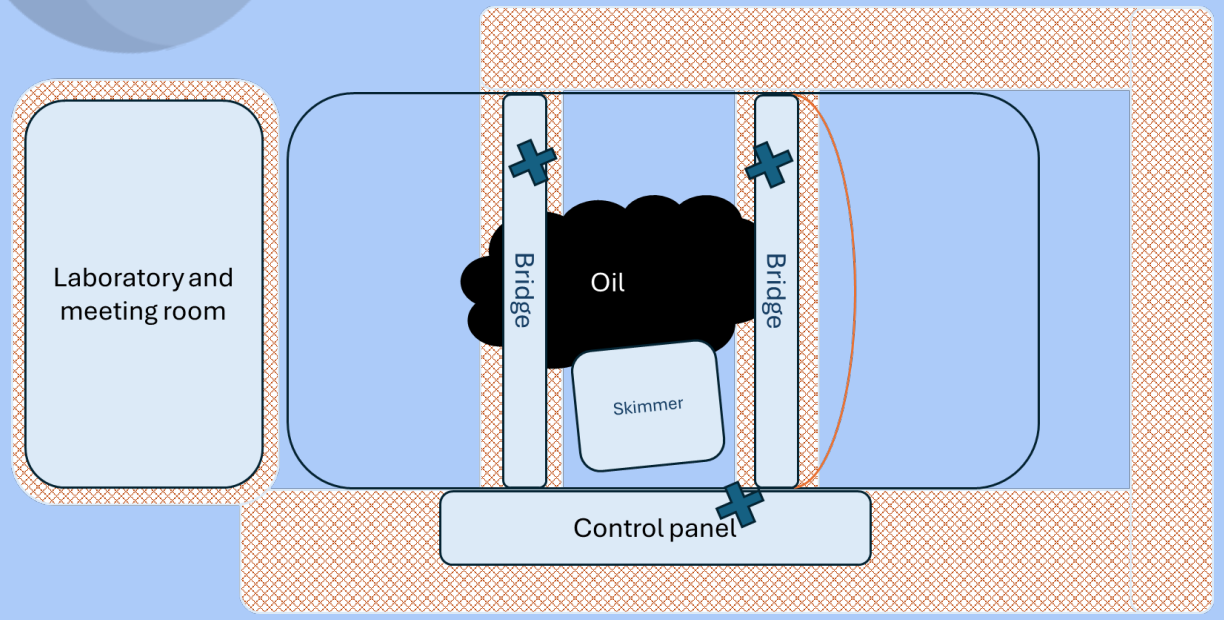


IM-28

IM-29

ULSFO 2018

Measurements of exposure to workers



Personal and **stationary** samples collected for each oil

Personal (within the breathing zone of three workers during a working day ~8 hours)

Stationary (collected in parallell to the personal samples).

Short term sampling (~15 min) during clean up were collected for all three oils.

Concentrations were generally low and significantly lower than the current norwegian Occupational Exposure Limits.

So, what did the producers come up with and how did it go?

LAMOR LAM 50 with Feeder in IM-29

LAMOR LAM 50 with Feeder in IM-28

DESMI Octopus in IM-29

DESMI Octopus in IM-27

VIKOMA in IM-28

VIKOMA in IM-28

KOSEQ in IM-28

KOSEQ in IM-27

CONCLUSIONS

- THRUSTERS
- OBSTACELS/FLOATERS
- HOPPER
- BRUSHES
- PUMP
- ATTACKING THE OIL SLICK
- OPERATING SPEED/IMMERSION DEPTH

Challenges we do not have answers to

- Temperature (colder)
- Weathering over time
- Individual lumps (varying size)
- Pump capacity (hoses are 100m)
- Emptying the collection tank
- Things we haven’t thought about yet

Thank you for your attention

Visit IMAROS 2:

https://civil-protection-knowledge-network.europa.eu/projects/imaros-2

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LAMOR, DESMI, VIKOMA, KOSEQ and NEW NAVAL

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