INTERNATIONAL TANKER OWNERS
POLLUTION FEDERATION LIMITED

Oil Spills in Cold Water: Lessons Learned

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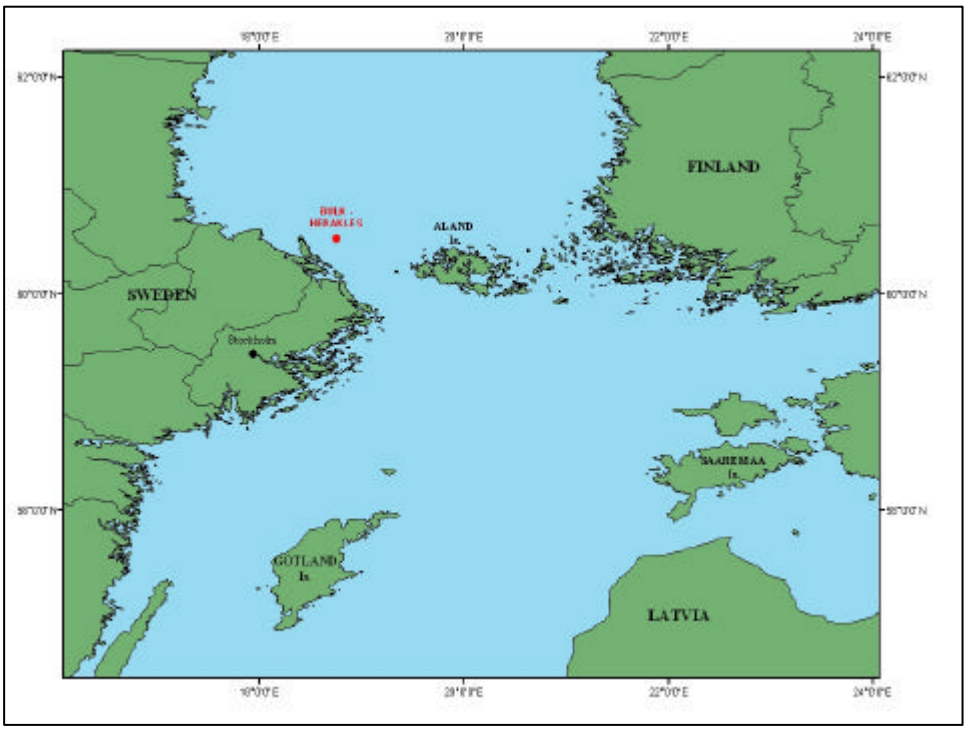
Review of three incidents

- Bulk and Herakles collision
  - March 2004, Gulf of Botnia, Sweden
- Polo M grounding
  - November 2004, Gotland, Sweden
- Selendang Ayu grounding
  - December 2004, Alaska, USA

Bulk and Herakles incident

- Collision with a navigational aid while in transit between Finland and Sweden on March 2, 2004
- Both sank causing a spill of:
  - 13000 m^3 of coal
  - 70 m^3 of IFO-180
  - 120 m^3 of MDO
- Oil and ice drifted on nearby island (Swedish Natural Reserve)



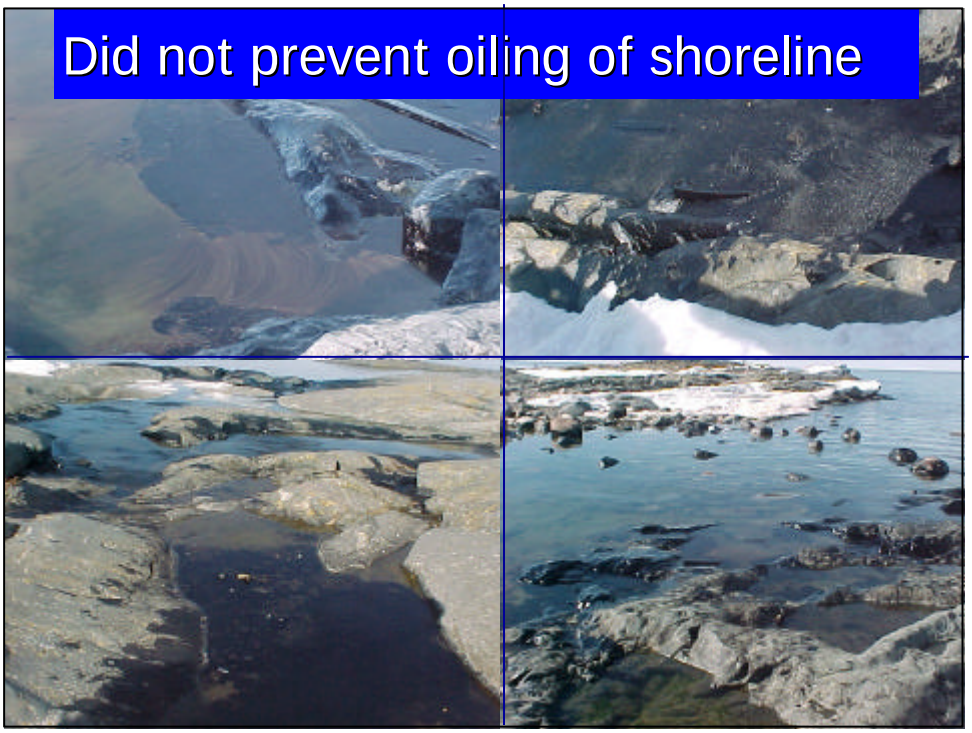

•Accumulation of oily ice near Rodskar Island (14nm SW)
•No oil on water surface

- Approximately 30m^3 at two locations
- Mechanical recovery of contaminated ice
- Melted with steam to recover oil

Success?

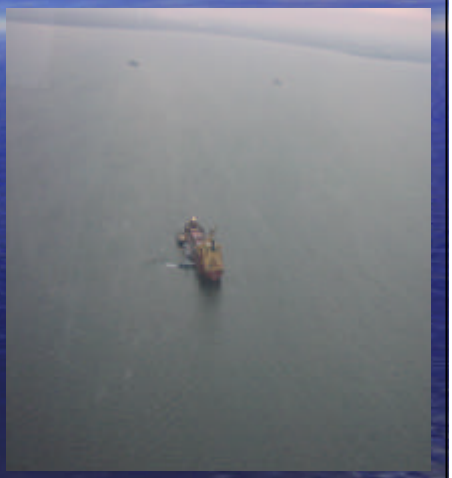
- After 10 days:
  - 200 containers recovered
  - Oil collected = 1 to 5m^3
  - 5 to 25 litres/container
  - \$129,000 USD/m^3
- Recovery rate very low
- Most of the contaminated ice melted on the shore or drifted away

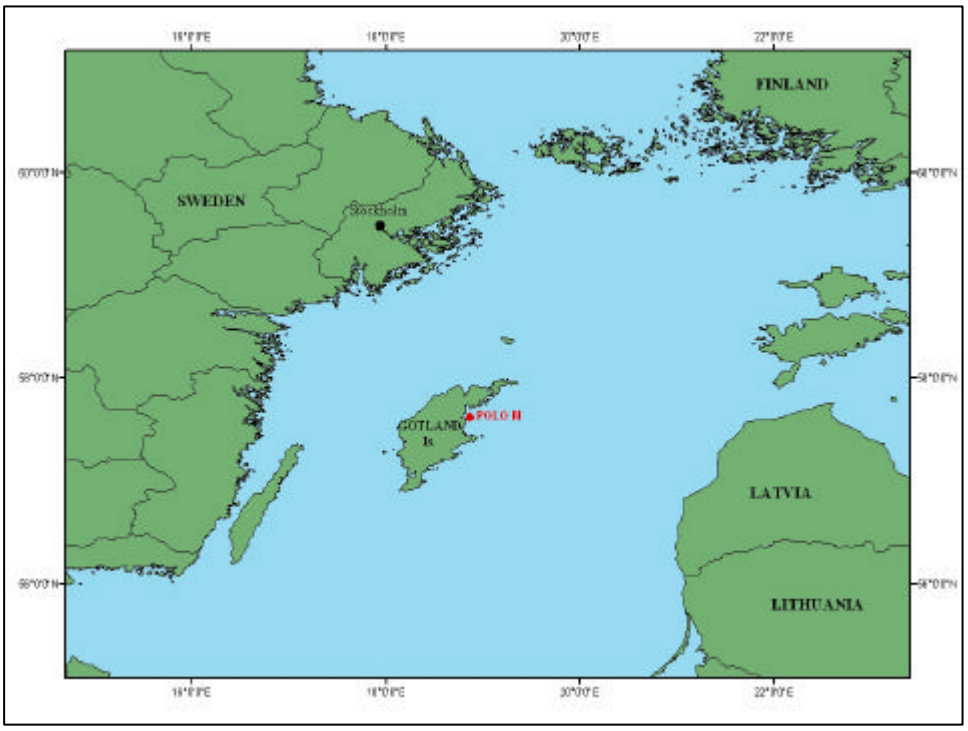
Did not prevent oiling of shoreline



M/V POLO M Grounding

- Due to bad weather, vessel ran aground on November 23, 2004 on Gotland Island, Sweden
- Severe damages to the bottom
- On board:
  - 23000 tonnes of cement
  - 1000 m^3 HFO-380
  - 150 m^3 MDO





M/V POLO M Grounding

- Lightering operation
  - Cement (4000 tonnes)
  - HFO (900 m3)
- Estimated spill between 50-100m^3

Oil Behaviour

- Tar balls and pancakes visible in vicinity of ship
- No oil observed on water
- But oil washing up on shoreline?

➢Submerged oil (10 cm to 1m depth)

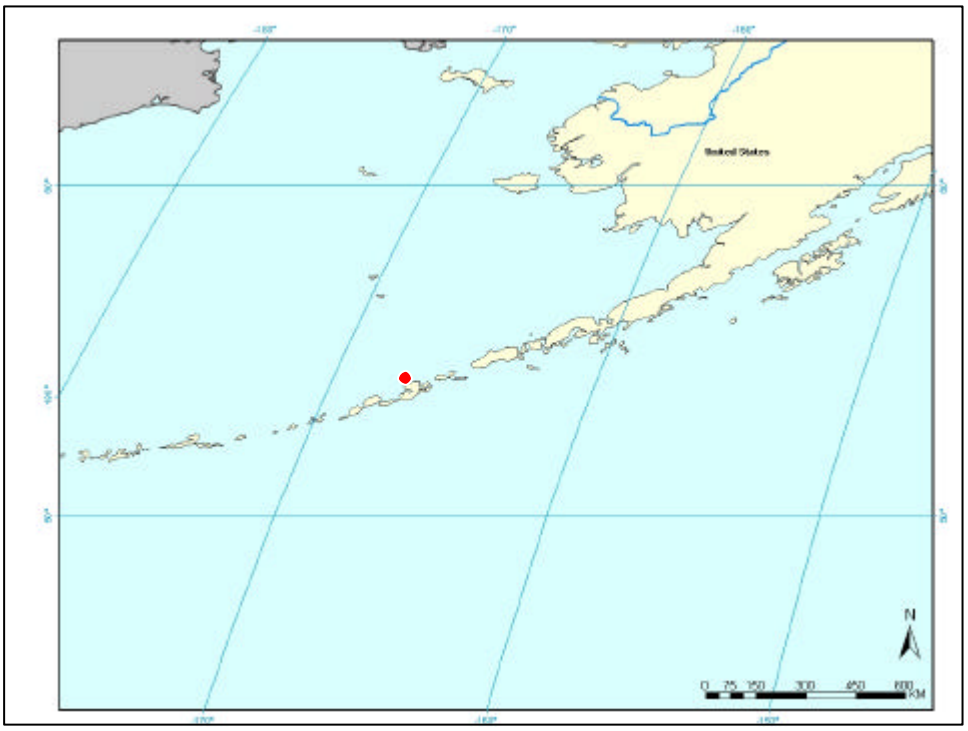
Submerged oil?

- Why?
  - Oil density (0.9901 at 15^0C)
  - Water temperature 4^0C
  - Low water salinity ($10^{0/00}$)
- Oil density increased above water density
  - ➢Submerged oil


Blankvatten från haveristen ner mot Vitviken.
Synliga klumpar vissa "bröder" och andra verkar ligga lite under ytan.

M/V Selendang Ayu Grounding

- Following a power failure, ran aground and broke in two on Unalaska Island, Alaska
- 6 crew members died during evacuation of vessel
- December 7th 2004
- Very remote location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M/V Selendang Ayu Grounding

- On board:
  - 1600 m^3 HFO-380
  - 70 m^3 MDO
- Approximately 1000m^3 were spilled
- Lightering of stern section

Oil Behaviour

- Floats
  - Slicks
  - Tar balls
- Increased viscosity
  - Cold temperature (3^0C)
  - Emulsification
- Small amount of oil in ice


Higher viscosity prevented deep penetration in sediment

Lessons Learned – Cold Water

- Safety issues
  - PPE
  - Logistics
- Low recovery rate for oil in ice
- Affect oil density and viscosity
  - Increase
  - Potential for sinking oil
- Improve effectiveness of manual recovery