

SOURCES AND FATES OF MARINE OIL SPILLS

Jamie Gathercole - OSRL

GI WACAF WEBINAR SERIES – JUNE 2020

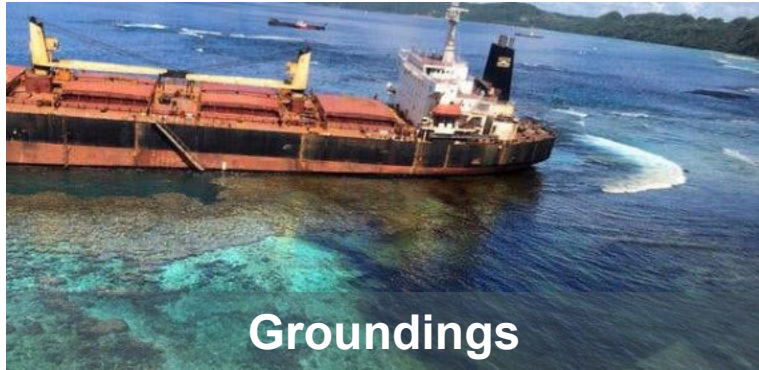


Session Objectives

The objectives are:

- 💧 To understand the key sources of oil spills into the marine environment
- 💧 To understand the likely fates and weathering processes of spilled oil

Main sources / causes of marine oil spills around the world



Groundings



Loading / discharging



Collisions



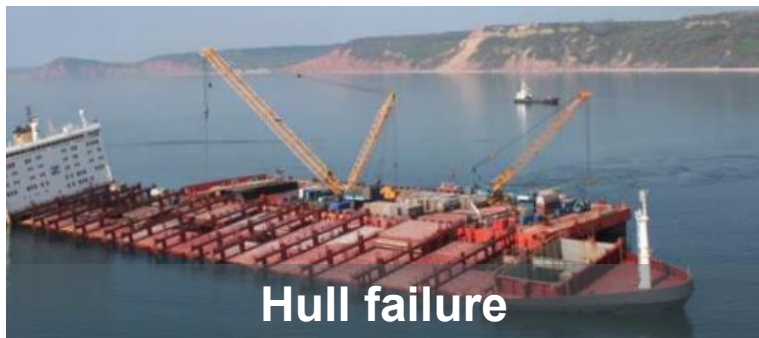
Infrastructure integrity



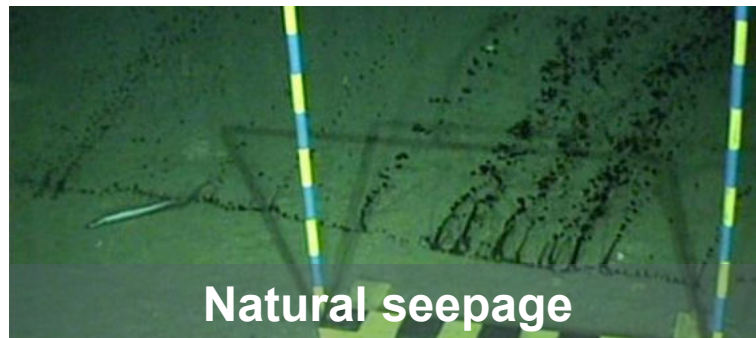
Process failure



Subsea blowout



Hull failure



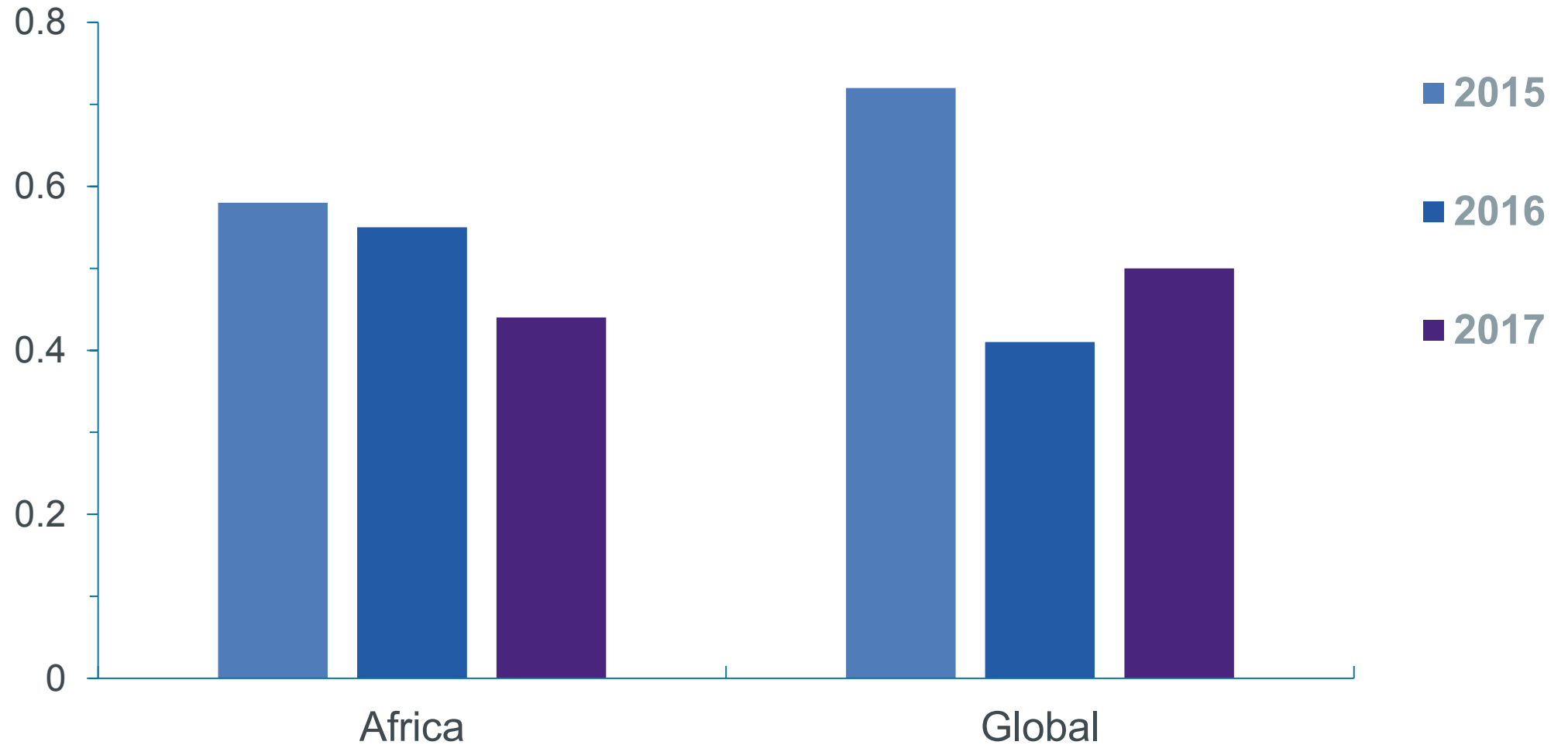
Natural seepage



Fire / explosion

E&P – *Number of oil spills* per million tonnes production (2015-2017)

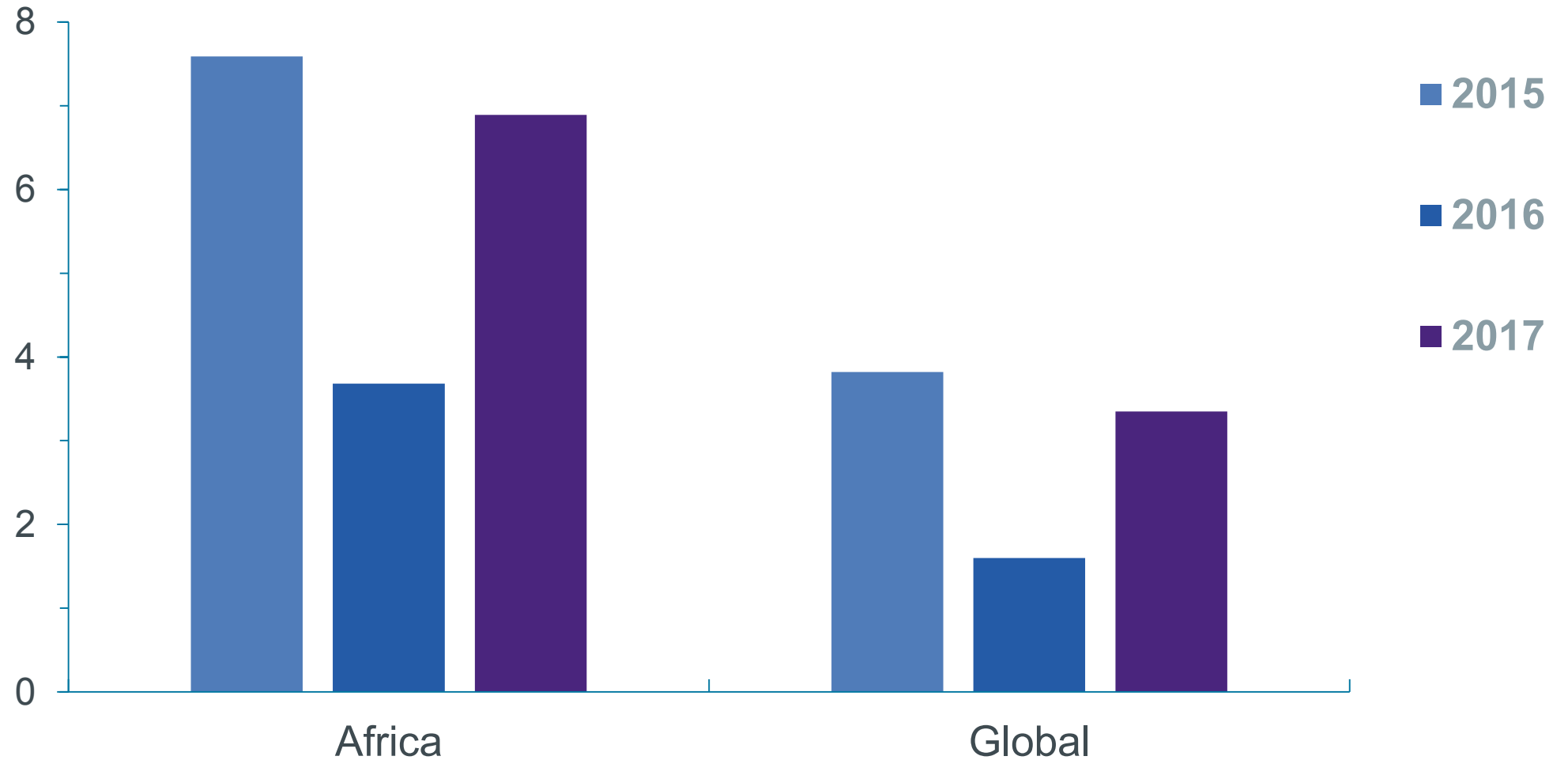
Spills >1 bbl



<https://www.iogp.org/bookstore/product/2017e-environmental-performance-indicators-2017-data/>

E&P – *Tonnes of oil spilled* per million tonnes production (2015-2017)

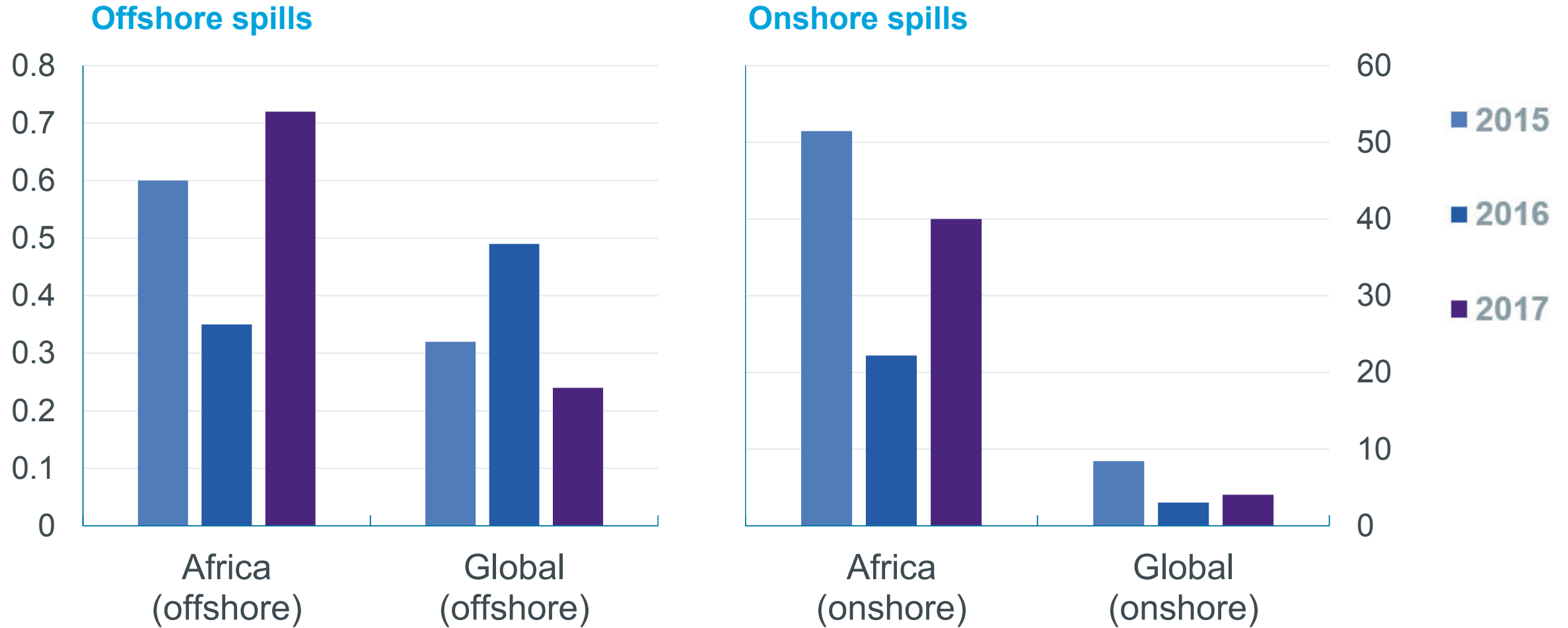
Spills >1 bbl



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E&P – Tonnes of oil spilled per million tonnes production (2015-2017)

Spills >1 bbl



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Exploration and Production Spill Causes (Global Data; 2017)

- 35 reported spills in which more than 100 bbl of oil was released
- Cause also reported in 31 out of 35 (88%) reported incidents

Cause	Number of incidents	Percentage of incidents	Percentage of volume spilled
Corrosion	11	31%	18%
Equipment failure	3	9%	3%
Operator / technical error	1	3%	4%
Third party damage	16	46%	68%
Other	4	11%	7%

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The Key Properties of Oil

Specific Gravity / API°

- How heavy; density

Viscosity

- How thick; resistant to flow

Pour Point

- Temperature below which oil does not flow

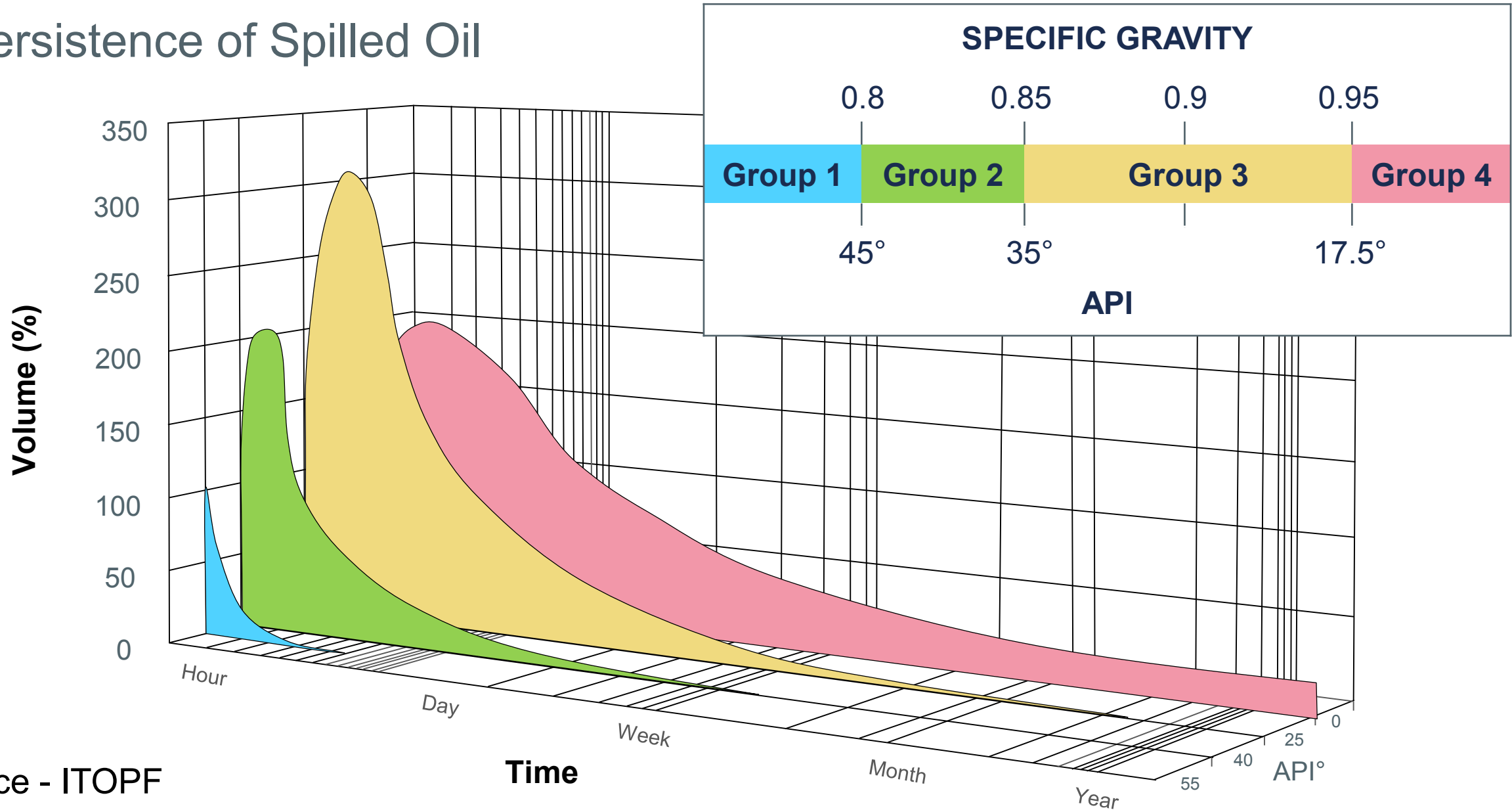
Volatility

- Propensity to evaporate (% @ 200°C)

Asphaltene Content

- Propensity to emulsify (~0.5%)

Persistence of Spilled Oil



Source - ITOPF

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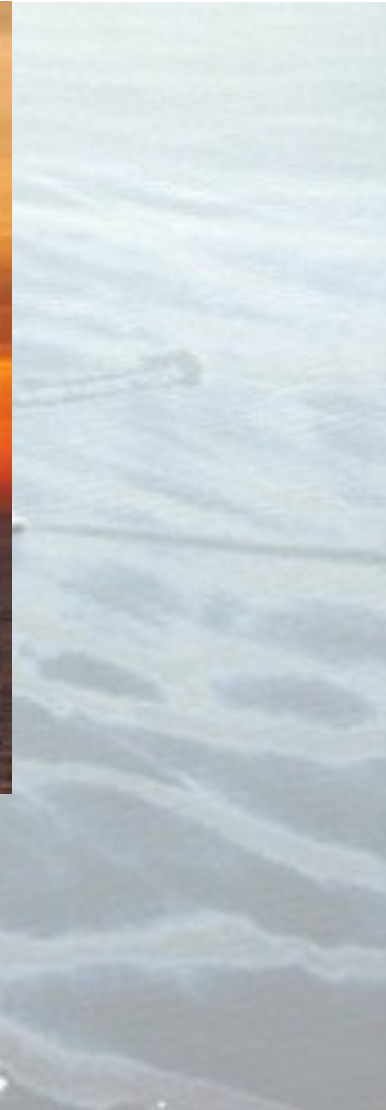
Asphaltene Content

- Propensity to emulsify (~0.5%)

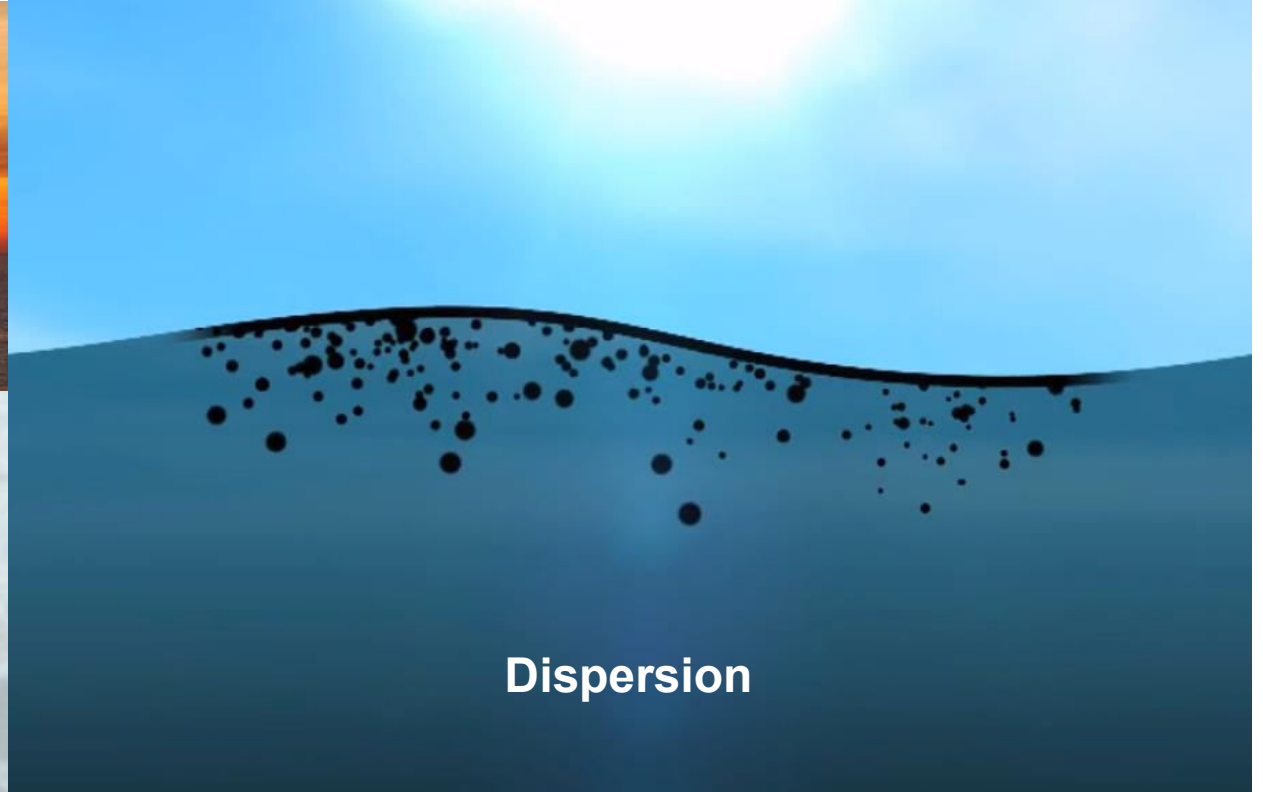
Fates of Spilled Oil



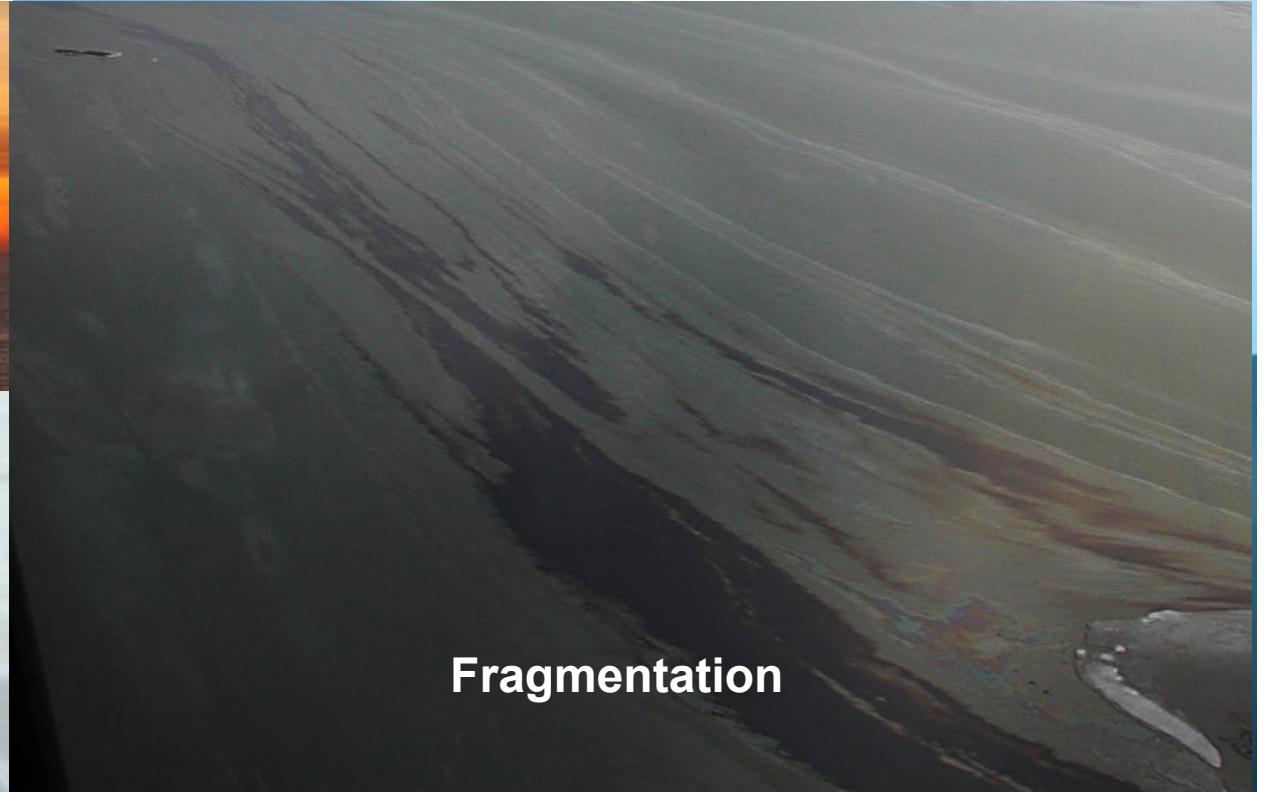
Fates of Spilled Oil



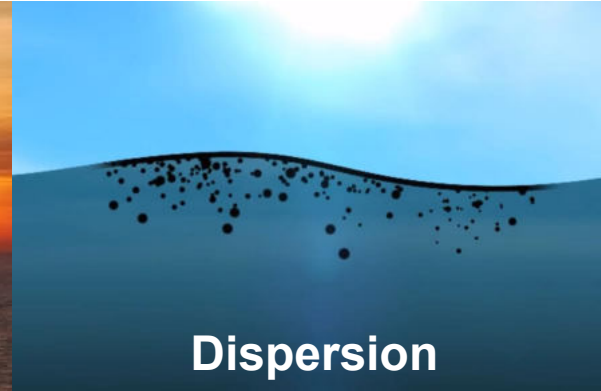
Fates of Spilled Oil



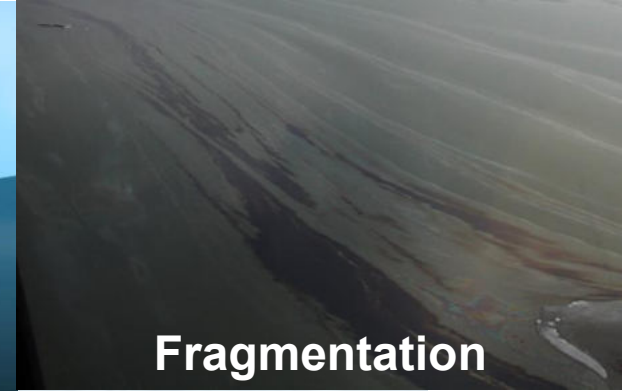
Fates of Spilled Oil



Fates of Spilled Oil



Dispersion



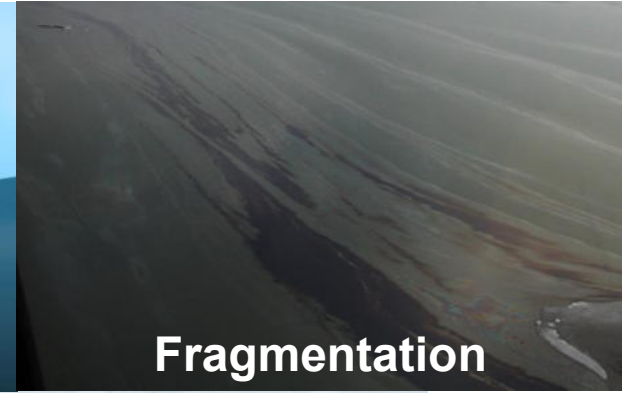
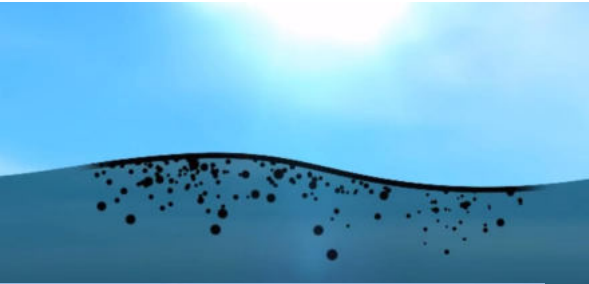
Fragmentation



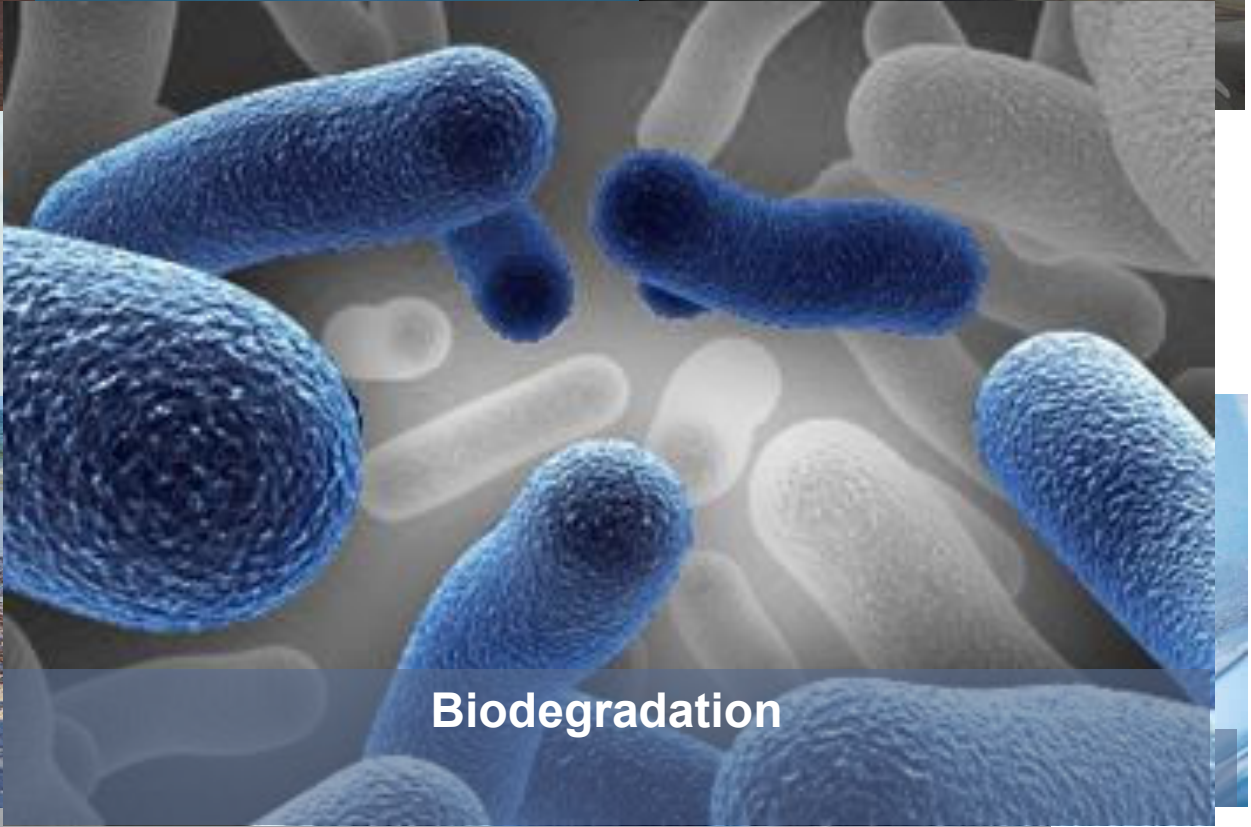
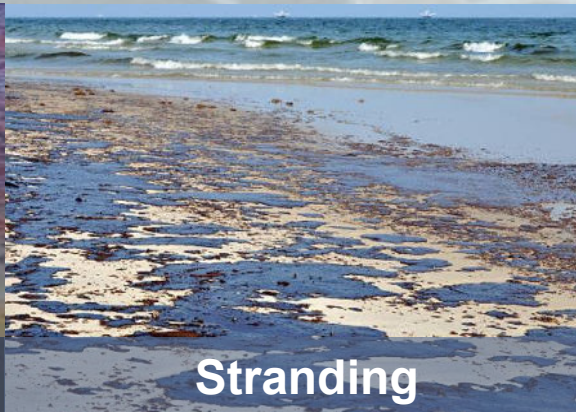
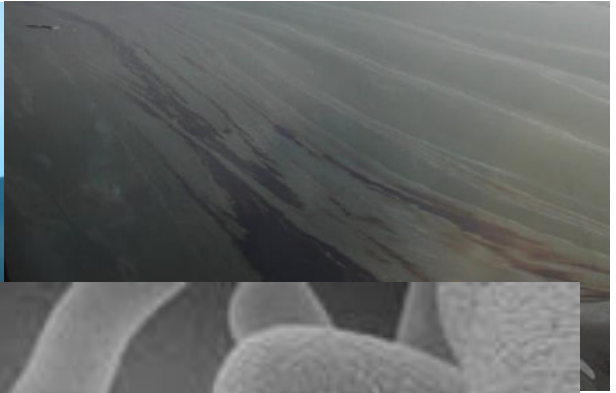
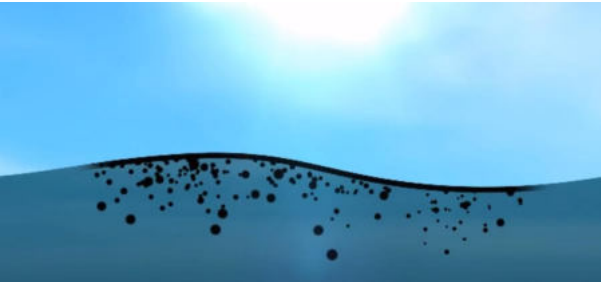
Emulsification



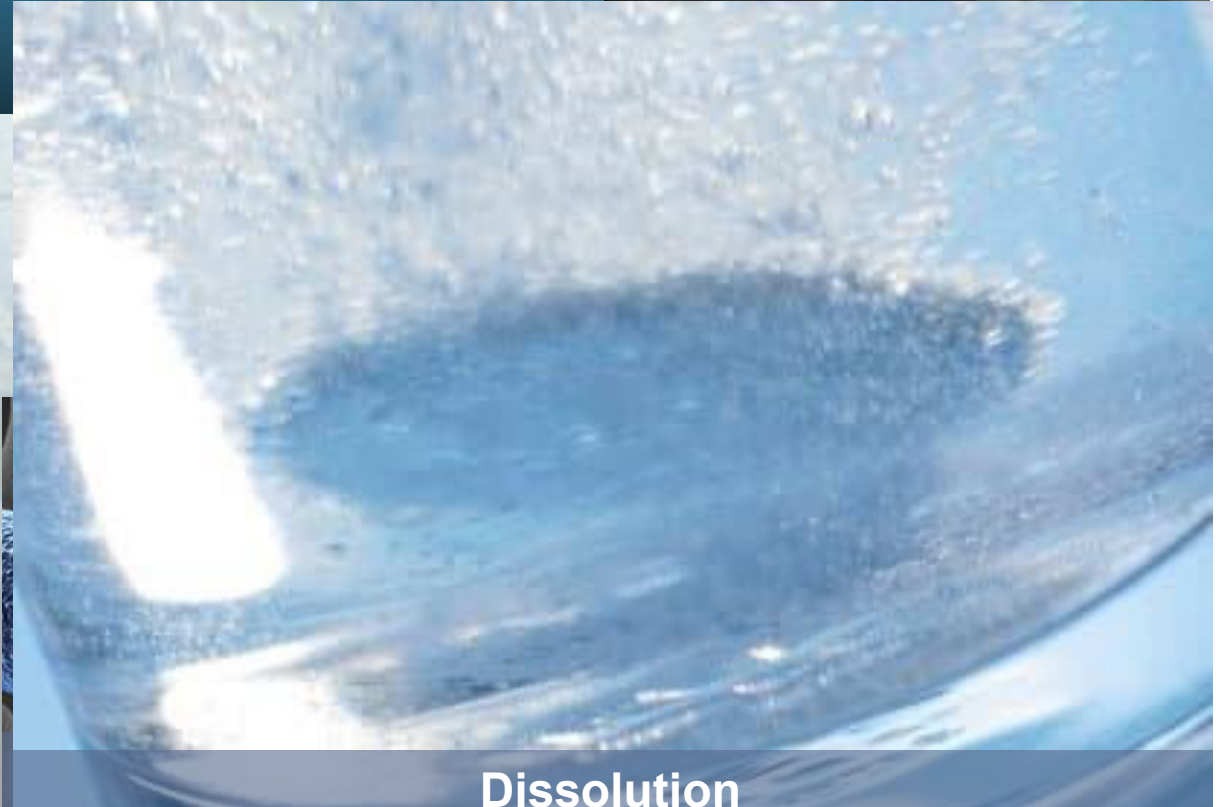
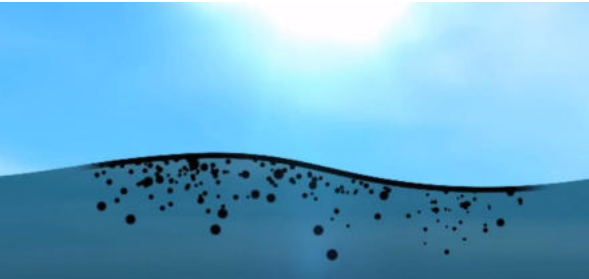
Fates of Spilled Oil



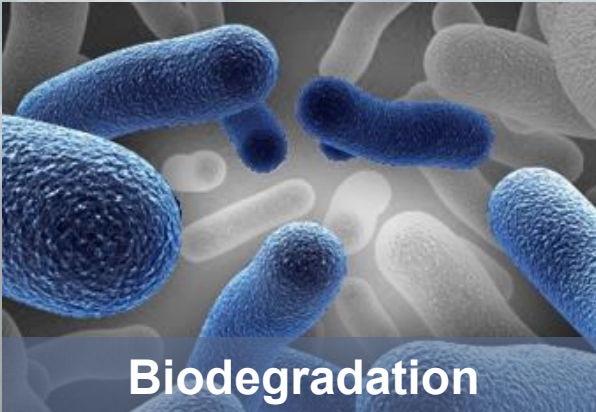
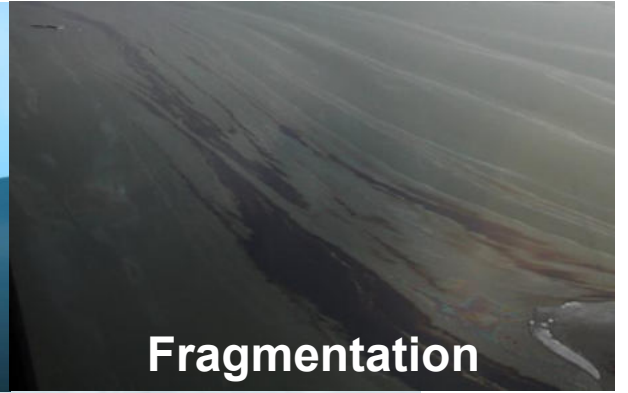
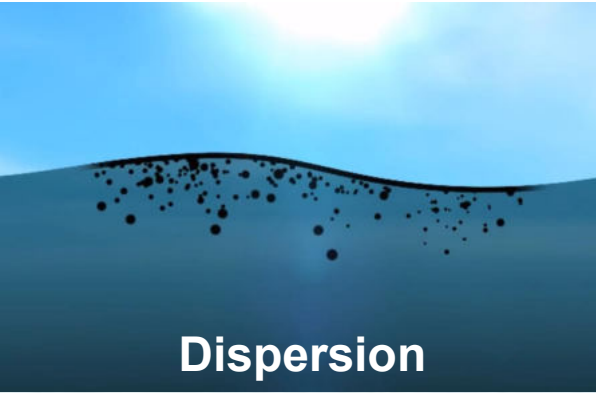
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Fates of Spilled Oil



Response Perspective

- 💧 Key oil properties inform the early actions of an Incident Management Team
- 💧 Oil spill experts / computer models can provide guidance on response strategy

Low Persistence

High Persistence



Summary

- 💧 There are global trends around spill numbers and causes
 - 💧 The less frequent incidents often offer the largest impact
- 💧 Key oil properties can greatly influence the behaviour of the oil
 - 💧 Safety and Operational consequences
- 💧 Take samples as early as possible after a release



Thank you

jamiegathercole@oilspillresponse.com

