Environmental Risk from ship traffic along the Norwegian Coast


Odd Willy Brude
Content

- Process on how to establish an environmental risk picture
  - Establish ship traffic pattern – AIS data on ship movements
  - Mapping of spill probability and impact potential
    - Incl. Measures to reduce accident probability
  - Analysis of environmental risk
    - Mapping of environmental sensitivity
    - From potential damage to consequence
    - Establish the risk picture

- Results
  - and use of results as input to oil spill response planning

Work performed for The Norwegian Coastal Administration in 2010-11
Probability for acute oil pollution from ship traffic

- Establish a traffic pattern based on Automatic Identification System (AIS) data from ships
  - Ship types & size categories

- Tankers
- Cargo ships, passenger ships, fishing vessels and other

Size category:
- < 1 000 GRT
- 1 000 - 5 000 GRT
- 5 000 - 10 000 GRT
- 10 000 - 25 000 GRT
- 25 000 - 50 000 GRT
- 50 000 - 100 000 GRT
- > 100 000 GRT

Environmental Risk from ship traffic along the Norwegian Coast
Probability for acute oil pollution from ship traffic

Type and volume categories

Modeling of ship traffic

Estimation of accidental frequencies

Modeling of spill potential

Assessment of effect of measures TTS & Tugs

Assessment of effect of other measures

Oil tankers
Product tankers
Bunker oil

Int. statistics incl. adjustments to Norwegian waters

Fire/explosion
Grounding
Collision
Structural damage

Fordeling av ulykkeskategorier

Grounding 49 %
Collision 26 %
Fire/explosion 20 %
Structural damage 5 %
Probability for acute oil pollution from ship traffic

- **Effect of measures**
  - Traffic separation system (TSS) moving ships from 12 nm to 30 nm away from the coast
  - Vessel traffic service (VTS)
  - Tug response
Probability for acute oil pollution from ship traffic

2025 with implemented measures

2025 with all measures (TTS, VTS & Tugs)

Spill probability indicator:
- >100 years
- 50-100 y
- 25-50 y
- 20-25 y
- <20 y
Environmental risk analysis

- Activity level: Ship traffic
  - 2008
  - 2025

- Measures
  - Accidental event:
    - No pollution
    - Oil pollution
      - Probability
      - Type, volume

- Sensitivity
  - Sea surface (seabird, marine mammals)
  - Water column (fish)
  - Shoreline habitats

- Environmental consequence

- Environmental risk
Environmental damage potential

Type and volume decides potential damage

Spill type and volume

Damage categories

Environmental Risk from ship traffic along the Norwegian Coast
## Environmental damage potential

<table>
<thead>
<tr>
<th>Sea surface impact (seabirds / marine mammals) + shoreline</th>
<th>Spill volume (tons)</th>
<th>Damage potential category</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>DP1</td>
<td>DP2</td>
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<tr>
<td>Crude oil</td>
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<td>100-2000</td>
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<td>Light refined oil products</td>
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<td>Heavy refined oil products</td>
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<td>Light bunker oil</td>
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</table>
Environmental sensitivity

Adjust potential damage with environmental sensitivity to conclude on consequence.

Higher consequence (ex. Damage potential cat 3 goes to Consequence category 4)

Lower consequence (EX. DP3 goes to C2)

Additional adjustment
Small spills impact 1 coastal segment
Moderate spills impact 3 segments
Huge spills impacts 5 segments
From damage potential to environmental risk

Environmental sensitivity adjustment

Damage categories

Consequence categories

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Environmental risk picture

High risk areas

No high consequence

Environmental Risk from ship traffic along the Norwegian Coast
Risk picture for different kind of environmental resources

Seabirds

Marine Mammals

Fish

Environmental Risk from ship traffic along the Norwegian Coast
Change in risk related to future traffic

Environmental Risk from ship traffic along the Norwegian Coast

Change in risk 2008 to 2025

Risk reduction

Risk increase (especially for high consequence)
Environmental Risk from ship traffic along the Norwegian Coast

Thank you 😊
Safeguarding life, property and the environment

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