Offshore oil & gas activities in the Danish part of the North Sea

19 producing oil and gas fields
55 installations
3 operators (one more to start production in 2016)

Water depth: 40 – 70 m
Dist. to nearest coastline: > 200 km

First HPHT field were planned to start production in 2017, but has been postponed.
Legal Framework

**Amended Law on Environmental Protection of the Sea (Dec 2014):**

- The Danish Working Environment Authority (DWEA) and The Danish Environmental Protection Agency (DEPA) constitute in common the Competent Authority
- Overall responsibility for combatting of oil and chemical pollution at sea lies with the Ministry of Defense/Maritime Assistance Service (MAS)
- Offshore oil & gas operators required to immediately initiate their emergency response in case of spills of oil or chemicals to the sea
- DEPA can issue orders to the operators on which types of emergency response to initiate, if a spill has taken place
- DEPA can prohibit oil & gas activities if the operator does not comply with the legal requirements in the law and regulations
- Sanctions, if operators do not immediately initiate their emergency response and if they do not comply with DEPA orders.
Legal Framework

**Amended Law on Environmental Protection of the Sea (Dec 2014):**

- Operator’s oil and chemical spill response plans approved by DEPA, who can order the plans revised if needed

- Requirements for an overall national external emergency response plan comprising both the national and the operator owned emergency response equipment

- The Ministry of Defence/Maritime Assistance Service (MAS) has issued a plan for the state owned contingency equipment to be used in case of pollution of the sea from ships.

- DEPA can request MAS to assist in combatting a spill from an offshore installation, but the equipment is otherwise not available for the operators

- Operators shall pay the cost of use of MAS assistance

- MAS is national contact point for the surveillance of pollution at sea
Legal Framework

Amended regulation on preparedness in case of pollution of the sea of July 10, 2015:

Emergency response plans (spills of oil and chemicals to the sea):

- Offshore operators to maintain emergency response organizations (personnel and equipment) and to develop emergency response plans

- Plans cover both well operations (exploration, well service etc.) and production activities incl. activities at connected infrastructure within the safety zone and pipelines between installations. Plans for drilling rigs to be aligned with operator’s plan through bridging documents

- Plans cover all spills incl. spills that comprise a major environmental incident resulting from a major accident

- Plans to comprise an assessment of the effectiveness of the oil spill response (plans for new activities by July 2016 and for existing by July 2018)
Legal Framework

Amended regulation on preparedness in case of pollution of the sea of June 10, 2015 (contd.):

- Required information:
  - Alarm and communication systems incl. notification of authorities
  - Organization, responsibilities and procedures for initiation of the emergency response
  - Available equipment (type, capacity, location, ownership and mobilization time)
  - Actions taken in different pollution scenarios, combat methods, surveillance etc.
  - Procedures for immediate reporting of spills to MAS and DEPA and positions persons that are responsible for the reporting
  - Training of contingency personnel and conduction of exercises

- Requirement that the planning and conduction of exercises is done in close cooperation with DEPA

- DEPA conducts inspections on response procedures and equipment
Legal Framework

Reporting requirements – separate regulation amended June 10, 2015:

• Immediately by e-mail to MAS: All spills of hydrocarbons > 70 l and of chemicals. MAS forwards the e-mails to DEPA

• Spills > 5000 liters also immediately by telephone to MAS

• Immediately by phone to DEPA:
  - Spills > 5000 liters
  - All spills, if it is evaluated that they can be contained and recovered

• Spills of oil < 70 l to be reported to DEPA every half year. Report also to comprise the bigger spills and a description on the follow up and possible measures taken to prevent similar spills in the future

• Requirements on operator’s obligations to use the format of the EU implementing regulation (1112/2014) for reporting to DEPA

• DEPA forwards information to DWEA, who forwards the information to EU
Example of a pollution report form

Operators to send this to the Maritime Assistance Service immediately after a spill has been detected

MAS forwards the report DEPA, who is responsible for possible follow up on the report.
Legal Framework

Specific technical requirements to the response equipment:

• Equipment for both mechanical and chemical combatting of oil pollution

• The equipment should be able to handle the max. flow of oil from a production well or a pipeline or the estimated max. flow of oil from an exploration well

• Working criteria for oil skimmers, booms and transport equipment:
  - wave heights up to 2.5 meters and sea currents up to 1 knot
  - air temperatures: + 50 to – 20 °C , water temperatures: + 40 to – 1 °C

• Equipment to be at spill location within a time frame specified by DEPA taking into account the geographical location of the installations

• DEPA considers to make it mandatory that e.g. stand by ships are equipped with oil spill equipment for small spills and the initial response on bigger spills

• Use of chemical dispersants only after specific approval from DEPA in each case
Main features of oil and chemical spill response plans approved by DEPA

- Based on risk assessments
- Covers all spills of oil and chemicals no matter the volume
- Tier based
  - Tier 1: Local resources (e.g. stand by vessels)
  - Tier 2: National private resources (e.g. ESVAGT or Mærsk Oil in Esbjerg)
  - Tier 3: International resources (Oil Spill Resources Ltd. in Southampton)
- Lists all the equipment available, the ownership of the equipment, where it is located and how fast it can be put into operation
- Response organization and procedures integrated in the management systems of the operators
- Prepared by operators only:
  - In case of drilling activities it is the operators responsibility that the contingency procedures are coordinated with the procedures of the drilling rig
## Risk assessment

<table>
<thead>
<tr>
<th></th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of year</td>
<td>All year</td>
<td>June-November</td>
<td>December-May</td>
<td>March-September</td>
</tr>
<tr>
<td>Release rate</td>
<td>4,200 stbo/d</td>
<td>40,432 stbo/d</td>
<td>40,432 stbo/d</td>
<td>8,534 stbo/d</td>
</tr>
<tr>
<td>Release period</td>
<td>90 days</td>
<td>16 days</td>
<td>16 days</td>
<td>16 days</td>
</tr>
<tr>
<td>Total mass spilled</td>
<td>53,400 MT</td>
<td>90,004 MT</td>
<td>90,004 MT</td>
<td>19,016 MT</td>
</tr>
<tr>
<td></td>
<td>(378,000 stbo)</td>
<td>(646,912 stbo)</td>
<td>(646,912 stbo)</td>
<td>(136,544 stbo)</td>
</tr>
<tr>
<td>Model run</td>
<td>118 days</td>
<td>44 days</td>
<td>44 days</td>
<td>44 days</td>
</tr>
<tr>
<td>ITOPF (API)</td>
<td>3 (API of 17.5-35)</td>
<td>2 (API of 35-45)</td>
<td>2 (API of 35-45)</td>
<td>1 (API of &gt; 45)</td>
</tr>
</tbody>
</table>
Probability (%) of oil spreading at sea surface in case of a worst case blowout during the spring, when the oil will spread the most.
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<table>
<thead>
<tr>
<th>Consequence to environment</th>
<th>Severity: manageable</th>
<th>needing upgraded efforts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible (Tier 1)</td>
<td>&lt; 0.1 tons</td>
<td>1 - 4 tons</td>
</tr>
<tr>
<td>Minor (Tier 2)</td>
<td>4 - 6 tons</td>
<td>6 - 9 tons</td>
</tr>
<tr>
<td>Moderate (Tier 2 - 3)</td>
<td>40 - 70 tons</td>
<td>70 - 150 tons</td>
</tr>
<tr>
<td>Major (Tier 3)</td>
<td>&gt; 150 Tons</td>
<td>Oil Well Blowout</td>
</tr>
</tbody>
</table>

manageable within present measures taken

mobilisation of equipment and personnel onshore (OSR) should be considered

mobilisation of internal as well as external combat assets (OSR) required
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Rig equipment resources:

<table>
<thead>
<tr>
<th>Type</th>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorbent</td>
<td>Pads</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Booms</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Pillows</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Bags loose cellulose</td>
<td>36</td>
</tr>
<tr>
<td>Several</td>
<td>Repair putty/for watertight repair of drums and piping</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Shovel</td>
<td>9</td>
</tr>
</tbody>
</table>

Stand-by vessel equipment resources:

If necessary the stand-by vessel can sail up and down the slick in order to let it disperse and evaporate in a natural way.

CSR equipment resources:

<table>
<thead>
<tr>
<th>Type</th>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery Booms</td>
<td>Roskim system 150 metres Bay boom</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Roskim system 350 metres Bay boom</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Vikoma 3 pump weir boom</td>
<td>1</td>
</tr>
<tr>
<td>Offshore Booms</td>
<td>Roboom 1500, 200m, on reel</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Roboom Bay 200m in container</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Roboom Ocean 200m on reel</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Vikoma Ocean 500m boom</td>
<td>3</td>
</tr>
<tr>
<td>Inshore Booms</td>
<td>Sea Sentinel boom 10m air/skirt</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Sea Sentinel boom 20m air/skirt</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>Shore Guardian boom 10 metre for beach</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>Shore Guardian boom 20 metre for beach</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Trel Boom GP 750 x 200</td>
<td>1</td>
</tr>
<tr>
<td>Vessels</td>
<td>4.7m inflatable + outboard</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>7.5m semi rigid + outboard</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5.2m semi rigid + outboard</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Rotork landing craft 13m</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Workboat</td>
<td>1</td>
</tr>
<tr>
<td>Dispersant Application</td>
<td>AR 19 Beach spray set</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>AR 30 Beach spray set</td>
<td>10</td>
</tr>
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Oil Spill Response Effectiveness

- Work on developing a paradigm for evaluation of the effectiveness of the oil spill response is ongoing
- First meeting held in May 2016 with participation of the operators and OSRL
- OSRL presented the “UK model”
- Operators and DEPA agreed that the operators should develop a proposal based on this model to be implemented in the emergency response plans at the latest by July 2018.
- Main issue is the use of dispersants, as this is only allowed after permit from DEPA in each individual case.
The national plan will consist of two parts:
- A plan covering rescue and evacuation of personnel developed by DWEA
- A plan for oil and chemical spill emergency response developed by DEPA and MAS

DEPA compiles the two plans into one overall National External Emergency Response Plan as shown below:

<table>
<thead>
<tr>
<th>Danish National External Emergency Response Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text on how the plan is structured, what it contains, who is responsible for the emergency response, reporting and communication procedures and how often it will be updated.</td>
</tr>
<tr>
<td><strong>DWEA</strong></td>
</tr>
<tr>
<td>Plan for rescue and evacuation of personnel</td>
</tr>
<tr>
<td>Operator’s and owner’s plans incl. equipment lists</td>
</tr>
<tr>
<td>Governmental plans and equipment</td>
</tr>
<tr>
<td>Governmental plans and equipment</td>
</tr>
</tbody>
</table>

Both parts of the overall plan is developed in close cooperation with the operators

Covers both the national (MAS) and the operator’s emergency response organizations and equipment as described in the national emergency response plan and in the operators internal emergency response plans
Based on the principle that the operators has the full and sole responsibility for initiating and carrying out the necessary emergency response in case of oil spills to the sea

Based on the requirements of immediate reporting to MAS and DEPA in case of oil spills to the sea

Will reflect that DEPA monitors the emergency response carried out by the operators and that DEPA can request MAS to assist the operators with the emergency response if needed and appropriate

Will also reflect that the operators does not by law have access to the national emergency response equipment

Will finally reflect that the present Danish operators draw on the same tier 2 and 3 oil spill contingency equipment. The equipment lists in the external emergency response plans to reflect this
The authorities emergency response committee

- The offshore safety act prescribes the establishment of the “Authorities Emergency Response Committee”
- The Committee comprises the following authorities:
  - The Working Environment Authority (Chair)
  - The Energy Agency
  - The Maritime Authority
  - The Defense Command
  - The National Police
  - The Environmental Protection Agency
- The committee gathers in case of major accidents offshore. Staff from the participating institutions are on call 24/7.
- Overlook the emergency response and if needed to coordinates the response of different stakeholders
- Takes care of the overall information to the public about the incident
- Regular meetings 3 times a year to discuss emergency response issues
THANK YOU FOR YOUR ATTENTION!