Mauritania – a model response planning process

Chinguetti Project – An Operator’s Perspective

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Interspill 2006

Overview

• Process & outcomes

• WACAF GI – role for IMO/IPIECA/Industry

• Woodside background & activities in Mauritania

• Development of OSCP
  – Environmental impact assessment
  – Spill risk assessment
  – Spill risk management
Process & outcomes

Catalyst to achieving significant progress against WACAF-GI objectives in NW Africa region

1. Operator OSCP Tier 1-3
2. Cooperation with Govt Agencies
3. Enhanced Response Capability at National Level
4. Progress on Mauritania & Senegal National OSCP's

WACAF GI (1) – principles

GI - Partnership between IMO & IPIECA to:

- Encourage & promote co-operation and partnership with shipping & oil industry

- Assist countries in developing national structure for dealing with oil spills through mobilization of external assistance & industry support at national / regional levels

- Encourage ratification & implementation on OPRC and conventions relating to liability & compensation
WACAF GI (2) – opportunities in NW Africa region

Increase level of preparedness at Government level:

• International Conventions
  – Mauritania & Senegal have not ratified CLC & FUND 92

• National contingency plans
  – Neither country has National OSCPs in force

• Identification of Competent National Authority

• Improve cross border co-operation

• Improve levels of training and equipment

Woodside

• Australia’s largest publicly traded oil & gas exploration and production company

• Assets, projects, development opportunities and exploration interests in Australia, Asia, Africa & US

• Sales of liquefied natural gas, natural gas, crude oil, condensate & liquid petroleum gas

• Formed in 1954, HQ in Perth, Western Australia. More than 3000 staff, listed on the ASX (WPL)
Woodside in Africa

- Operator of 6 PSCs covering 5 offshore blocks & 2 onshore blocks
- Chinguetti oil field discovered 2001
- Other discoveries under evaluation (Tiof, Banda, Tevét, Labeidna)
- 15% equity (non-operator) in Block 7

Woodside in Mauritania

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Chinguetti project (1)

- Woodside-operated Chinguetti oilfield located ~ 90km west of Nouakchott, in 800m water depth

- First oil production Feb 2006, field life ~10 years, peak production ~75,000 barrels a day

- Oil produced through subsea wells to an FPSO (*Berge Helene*) permanently moored (turret) over the field

- Oil periodically offloaded to trading tankers

Chinguetti project (2)

Participating interests in the Chinguetti field:

- Woodside group companies 47.4%
- Hardman Chinguetti Production Pty. Ltd. 19.0%
- Société Mauritanienne des Hydrocarbures 12.0%
- Mauritanian Holdings B.V. (BG group) 10.2%
- Premier Oil group companies 8.1%
- ROC Oil group companies 3.3%
Chinguetti project (3)

Chinguetti environmental impact statement

- Explains the Project, outlines environmental effects, describes management measures

- Focuses on five key environmental hazards
  1. Accidental oil spills
  2. Produced water discharges
  3. Drilling discharges
  4. Fisheries interactions
  5. GHG emissions
Regional values & sensitivities (1)

- Commercially-important demersal and pelagic fish in coastal and offshore waters
- Up to 32 cetacean species
- Several species of marine turtles and nesting areas
- Diverse populations of migratory and resident waterbirds and seabirds
- Deep-water seafloor features - carbonate mud mounds & underwater canyons

Regional values & sensitivities (2)

- Population of Mediterranean monk seals
- Seagrass beds and remnant mangroves
- Marine and coastal wetlands and bird habitats within declared protected areas and reserves
- Bird habitats in coastal wetlands and lagoons
- Major industrial and artisanal fisheries
Spill risk assessment

- Primary Risk Assessment
- Secondary Risk Assessment
- Risk Qualification
- Existing Spill Risk
- Change to Risk Profile
- Existing Response Capability
- Spill Risk Management

Spill modelling

- HYDROMAP + OILMAP + SIMAP
- Determination of a range of oil spill scenarios, including surface and seabed releases
- Model outputs provide information on expected probabilities of oiling and minimum potential time before exposure
- Model outputs represent “conditional probabilities”
- Single trajectory plots vs stochastic modelling
Single trajectory plots vs stochastic modelling

- Risks of misinterpretation of probability contours from stochastic modelling

Probability results

<table>
<thead>
<tr>
<th>Season</th>
<th>Minimum time to shore (hours)</th>
<th>Maximum time to shore (hours)</th>
<th>Maximum oil to reach shore (tbbis) (% of release)</th>
<th>Conditional probability of some oil arriving at the coast within 14 days (%)</th>
<th>Combined probability over 10 year field life (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>28</td>
<td>&gt;530</td>
<td>32,000 (22.9%)</td>
<td>84</td>
<td>0.2</td>
</tr>
<tr>
<td>Autumn</td>
<td>44</td>
<td>&gt;530</td>
<td>4,452 (3.2%)</td>
<td>86</td>
<td>0.2</td>
</tr>
<tr>
<td>Winter</td>
<td>78</td>
<td>&gt;530</td>
<td>9,114 (6.9%)</td>
<td>94</td>
<td>0.2</td>
</tr>
<tr>
<td>Spring</td>
<td>48</td>
<td>&gt;530</td>
<td>11,648 (8.3%)</td>
<td>84</td>
<td>0.2</td>
</tr>
</tbody>
</table>

- Conditional probabilities do not take into account:
  - Likelihood of spill will occur in the first place
  - Any response measures to eliminate / minimize consequences
Modelling validation

- Deployment of 12 satellite-tracked drifter buoys over 12 month period

Existing spill risk (1)

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>No of Transits (2000–2002)</th>
<th>Crude Oil Quantity (Tonnes)</th>
<th>Crude Oil Quantity Yearly Average (Tonnes)</th>
<th>Average Crude Oil Quantity per Trans (Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk oil (SI)</td>
<td>10</td>
<td>1,110,000</td>
<td>372,667</td>
<td>111,800</td>
</tr>
<tr>
<td>Bulk oil (DI)</td>
<td>54</td>
<td>5,715,400</td>
<td>1,250,667</td>
<td>106,339</td>
</tr>
<tr>
<td>Crude oil tanker (SI)</td>
<td>505</td>
<td>72,171,444</td>
<td>24,097,113</td>
<td>42,194</td>
</tr>
<tr>
<td>Crude oil tanker (DI)</td>
<td>629</td>
<td>92,916,604</td>
<td>30,972,201</td>
<td>47,721</td>
</tr>
<tr>
<td>Non-specific tanker</td>
<td>16</td>
<td>2,423,892</td>
<td>808,665</td>
<td>47,721</td>
</tr>
<tr>
<td>Oil</td>
<td>5</td>
<td>1,233,397</td>
<td>411,116</td>
<td>42,669</td>
</tr>
<tr>
<td>Product tanker (SI)</td>
<td>21</td>
<td>1,282,670</td>
<td>417,599</td>
<td>46,669</td>
</tr>
<tr>
<td>Product tanker (DI)</td>
<td>7</td>
<td>435,305</td>
<td>148,462</td>
<td>68,000</td>
</tr>
<tr>
<td>Chemical/oil tanker (DI)</td>
<td>1</td>
<td>80,000</td>
<td>26,667</td>
<td>80,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1248</strong></td>
<td><strong>177,405,759</strong></td>
<td><strong>58,474,285</strong></td>
<td><strong>123,341</strong></td>
</tr>
</tbody>
</table>

- Chinguetti Project will add ~3.3 million tonnes per annum (average), or ~5.7% by volume, at peak production
Existing spill risk (2)

Chinguetti oil properties

- Assessment of environmental consequences of spills based on:
  - Local & regional values and sensitivities
  - Oil spill modelling
  - Oil properties: potential for natural evaporation and dispersion
  - Weathering testing
  - Ecotoxicity testing
  - Dispersability testing
Spill risk assessment outcomes

<table>
<thead>
<tr>
<th>Environmental Hazard</th>
<th>Hazard sub-category</th>
<th>Likelihood</th>
<th>Environmental consequence</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Spills</td>
<td>1,000-18,000 bbls</td>
<td>Possible to Unlikely</td>
<td>Minor to Slight</td>
<td>Medium to Low</td>
</tr>
<tr>
<td></td>
<td>18,000-50,000 bbls</td>
<td>Unlikely to Remote</td>
<td>Moderate to Minor</td>
<td>Medium to Low</td>
</tr>
<tr>
<td></td>
<td>50,000-500,000 bbls</td>
<td>Unlikely (well blowout); High; Unlikely to Remote (other hazards)</td>
<td>Major to Moderate; Major to Extreme</td>
<td>High to Medium (well blowout); Medium to Low (other hazards)</td>
</tr>
</tbody>
</table>

- Most oil spill risk in Medium to Low categories, except for hypothetical development well blowout (High to Medium)

Spill risk management

- Prevention Measures
  - Equipment
  - Systems / Procedures
  - Training / Inductions
  - Checks / Audits
  - Trading Tanker Vetting
  - Navigational Management
  - Fisheries Interactions

- Spill Risk Management
- Response Measures
  - OSCP
    - Interfacing with National OSCP(s)
    - Stakeholder Consultation
    - Sensitivity Mapping
    - NEBA
    - Response Strategies
    - Equipment Deployment
    - Capabilities & Preparedness
      - Training / Exercises
Oil spill contingency plan

- EIS identified need for effective measures to respond to oil spills under framework of an OSCP
- Woodside drilling operations since 2001 covered by existing OSCP
- Decision taken to develop new OSCP based on changing oil spill risk profile (commencement of production)
- Oil Spill Response Ltd contracted to write new OSCP

Spill response strategies

Key elements that were considered in developing response strategies:

- Requirements relating to Mauritanian draft national OSCP (POLMAR)
- Need for capacity building to develop national spill response capability under POLMAR
- Concerns & issues arising from stakeholder engagement
- Trans-boundary spill risk
- Evaluation of most appropriate spill response techniques
### OSCP (1) – structure

<table>
<thead>
<tr>
<th>PLAN</th>
<th>HANDBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Purpose &amp; Scope of Plan</td>
<td>1. Introduction</td>
</tr>
<tr>
<td>2. Initial Action Procedures</td>
<td>2. Summary of Legislation</td>
</tr>
<tr>
<td>3. Spill Assessment</td>
<td>3. Operational Risk Assessment</td>
</tr>
<tr>
<td>5. Organisation &amp; Management</td>
<td>5. Oil Weathering &amp; Fate</td>
</tr>
<tr>
<td>7. Contact Details</td>
<td>7. Tier 3 Logistics</td>
</tr>
<tr>
<td>8. Forms</td>
<td>8. Forms</td>
</tr>
<tr>
<td></td>
<td>9. Oil Spill Training &amp; Exercises</td>
</tr>
</tbody>
</table>

### OSCP (2) – equipment stockpiles
OSCP (3) – 2006 activities

- Sensitivity mapping of coastline (LandSat; ASTER; QuickBird)
- Decision support mechanism for chemical dispersant application (NEBA process)
- Training & deployment exercises
- Audits

Key outcomes

- Chinguetti Project response capability established for Tier 1-3 spills consistent with industry best practice & IPIECA guidelines
- Cooperation with Govt agencies in Mauritania & Senegal
- Mauritania national oil spill response capacity enhanced with additional equipment & trained personnel
- Progress on Mauritania and Senegal draft national OSCPs. More work needed on interfaces
Acknowledgements

- Government of the Islamic Republic of Mauritania
- Mauritania Joint Venture Participants:
  - Hardman Resources
  - Société Mauritanienne des Hydrocarbures
  - BG Group
  - Premier Oil
  - Roc Oil
- OSRL
- IPIECA
- IMO