Risk Management in Late Life Asset

PMT Joint Venture
(Operated by ONGC, RIL and BGEPIL)
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Panna-Mukta & Tapti at a Glance

- Joint venture- ONGC, RIL & BGEPIL
- 600+ million BOE gross sales
- 20 offshore platforms
- 180 development wells drilled (60 currently flowing)
- >130 well service jobs per year
- 6-7 vessels supporting operations and well interventions
- PSC expires in 2019
- Tapti in Decommissioning stage
Panna-Mukta Fields

- Panna reservoir – 450 km²
- Mukta reservoir – 777 km²
- Process platform (PPA)
- 13 Wellhead platforms
- Avg. water depth: 154 Feet
- Commissioned July 1997
- Capacities (per day):
  - Oil: 60,000 bbls
  - Gas: 240 mmscf
- Average daily production
  - Oil: 18,000 bbls
  - Gas: 200 mmscf
Key Challenges

- Producing since 1987, ageing legacy facilities posing typical late life asset integrity issues - design life, obsolete equipment etc.

- Increasing HSSE risks that has the potential to affect integrity of barriers; significant effort and resources spent in actively managing the risks

- More than 90% of offshore workforce efforts on liquidating preventive maintenance work

- Complex logistical challenges involving helicopter, tanker, SPM and supporting vessel operations
  - 600+ landings every month across Panna installations ferrying 4500+ passengers

- Presence of H2S creating a complex HSSE risk in every operation

- Emerging risks constantly disrupting priorities

- Long lead times for designing and executing the mitigation measures
Approach

A holistic process to dynamically:

– Collect, assess and review risks

– Assign actions to mitigate the impact of risks and reduce the likelihood

– Set priorities, focusing management efforts on the issues where management can make the biggest difference (i.e. largest potential effect on impact and / or probability)

– Make appropriate resource allocation decisions

– Widen perspectives on risks, such that a broader range of issues can be considered

– Communicate risks appropriately so as to inform decisions on strategy, investment, functional actions, etc.

– Enhance corporate risk memory with better retention of knowledge about HSSE risks faced, actions taken and lessons learnt from the success or failure of those actions

– Strengthen and optimize Asset Integrity assurance
Risk Management Process

**PMT Joint Venture** (Operated by ONGC, RIL and BGEPIL)

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**Business Risk Management Plan**

- Finance
- Legal
- Commercial
- HR
- PCA

**PMT Top HSSE risks**

**Risk Review Committee**

- CAP
- MAH

**ESRB**

- Feed
- Escalate

**HSSE Risk Registers**

- Environmental Aspect/Impact register
- Significant Risks

**Execution Plan/Implementation**

- Update

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**MOC Dispensation**
- RCA, RFA
- Audits
- Safety case

**Panna Mukta**

**Shorebase**

**Tapti**

**BG office**

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**Well services**

**Drilling**

**Operations**

**Projects**

**Logistics**

**Shorebase**

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**MOC**

**Dispensation**

**RCA, RFA, Audits**

**Safety case**

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**Environment**

**Synergi/FIM**

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**Risk Map**

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**Significant Risks**

**PMT Risks**

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**PMT Risks**

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**Heat Map**

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**Risk Management Process**
## PMT Joint Venture
(Operated by ONGC, RIL and BGEPIL)

### Risk Matrix

<table>
<thead>
<tr>
<th>Impact (on &amp; off site)</th>
<th>People</th>
<th>Financial</th>
<th>Reputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Multiple fatalities &gt;50 persons require medical treatment including some serious injuries</td>
<td>Single fatality; &gt;50 persons require medical treatment including some serious injuries</td>
<td>&gt;US$1bn</td>
</tr>
<tr>
<td>Workers, Public</td>
<td>Fewer fatalities (1 to 5)</td>
<td>&gt;10 persons require medical treatment, some serious/ disabling injuries</td>
<td>Between US$100 million and US$1 billion</td>
</tr>
<tr>
<td>Workers, Public</td>
<td>Multiple lost time injury, injury or illness resulting in permanent disability</td>
<td>5-10 persons require medical treatment including some serious injuries</td>
<td>Between US$10 million and US$100 million</td>
</tr>
<tr>
<td>Workers, Public</td>
<td>Single lost time injury, injury or illness resulting in temporary disability</td>
<td>1-5 persons require medical treatment including some serious injuries</td>
<td>Between US$1 million and US$10 million</td>
</tr>
<tr>
<td></td>
<td>Medical treatment or restricted workload case</td>
<td>1 person requires medical treatment no serious injuries</td>
<td>&lt;US$1 million</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Never occurred in the industry</th>
<th>Previously occurred in the industry</th>
<th>Occurs more than once per year in the industry and has occurred in BG</th>
<th>Common in the industry and/or BG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Highly Unlikely</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>2. Unlikely</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>3. Possible</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>4. Likely</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>5. Highly Likely</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Barrier Model

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Consolidated live view of asset risks.

Pulls the information from ORAs and SCRAs.

Weekly Risk assessment meeting with TAs.

Assess/demonstrate the cumulative effect of the risks to TAs/OIMs.
Risk Reduction Plot

Risk Reduction Chart for December 2016

Completed Activities:
1) PE Sump Caisson remedial

PC test sep PFP appln, # LRUT of riser -PH/J/K/L #
Trim Cooler T sec Composite wrap# Well integrity PA-2,3
PC-11, PK-6, PF-2# Gas Export riser wrap inst# PD riser wrap
at PD end, PB Anode inst# CUI Inspection @ PPA# PJ-5
flowarm inst# PC riser wrap inst# PB IP# MA riser CP remedial

New Additions:
PE-IP# PD Anode inst# PPA LP sep DBB #
Installation of SDV at PB/D/E riser at PA#
Quill inst on gas lift hdr at PPA # PA HIPPS Inst#
Boat landing remedial at PA, Riser guard at PPA
PGC#3 engine changeout

Well integrity PA-5, 6,8 #
Thickness insp of PA conductor wells
Q&A