SEAR JIP – The value of sharing of lessons learned on subsea integrity and reliability
Agenda

1 – Overview
2 – Challenges
3 – SEAR Reliability Database
4 – SEAR Testing Program
5 – Outlook
Overview

6 Operators participating on Phase V of the SEAR JIP:

**Goal**: Reduce subsea equipment failures through collaboration and knowledge sharing.
Overview – The Environment

The Environment:

- High sea water temperatures
- High nutrient environment
- High currents
- Cyclones
Overview – Intervention Issues
SEAR Reliability Database

**Vision:** Low cost / high value method of capturing, sharing failures and lessons learnt for Australia.

- Collection of asset and failure information
  - Anonymization of results

- Reliability Dashboard
  - Presentation of reliability data to permit comparison with other industry data sources (i.e. OREDA)

- Lessons Learned information incorporated into the SEAR Database
Problem: Unwanted marine fouling in subsea structures: significant interventions cost

- Significant problem for all SEV and operators in Northern Australian
- 2 fold challenge: marine growth and calcareous deposit
- Poorly understood how to design-out mechanisms
- No industry guidelines on how to design for warm waters
- Anti-fouling coatings used elsewhere perform inadequately here
- No industry best practice on how to remediate marine fouling
- Subsea Test Structure to test full scale equipment performance
- High Intervention Cost to Remediate the Problem
SEAR Testing Program - STS Delivery Roadmap

- Transforming Australia Subsea Equipment Reliability (TASER) ➔ Subset of the SEAR JIP
- Collaborative industry effort, across operators, universities and suppliers, to address the root causes of marine fouling challenges.
- Testing Program will deploy game changing technology in ‘living laboratories’.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2016</td>
<td>Vendor Engagement (EOI)</td>
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<tr>
<td></td>
<td>Select Technology Vendors</td>
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<td>Establish contract with Vendors</td>
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<td>STS Design &amp; Fabrication</td>
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<td>2017</td>
<td>STS Deployment</td>
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<td>2018</td>
<td>STS Inspection</td>
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<td>2019</td>
<td>STS Inspection</td>
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<td>2020</td>
<td>STS Inspection/Retrieval</td>
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<td></td>
<td>Data Collection/Assessment</td>
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<td>Issue Industry Best Practice</td>
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*TASER – funds awarded by NERA
SEAR Testing Program

Suppliers collaborating with the Test Program:

- BAKER HUGHES
- GE
- OneSubsea
- A Schlumberger Company
- TechnipFMC
- TELEDYNE MARINE
- SIEMENS
- Walther Präzision
- Quick Coupling Systems

Vision:
- Lessons learned on the testing program will be shared back to vendors, enabling equipment reliability issues to be designed out.
- Over 100 samples loaned to be tested on STS.
- STS will be underwater for at least 3 years.
- Issue Best Practice Guideline on Marine Fouling
**Problem: Unwanted gas in controls systems; a source of loss of insulation resistance?**

**Significant problem for all SEV and operators in Northern Australian**

**Poorly understood mechanisms and origins of gas evolution**

**Poorly understood long term effects of gas presence on performance**

**Gas presence thought to be the cause of electrical termination failures**

**High Intervention Cost to Remediate the Problem**

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**Umbilical Test Program Roadmap**

**2018**

- **Issue RFP to Research Institutions**
  - Desk top analysis to determine the possible cause(s) of gassing and fluid migration in subsea controls umbilicals

**2019**

- **Test Program**
  - Perform cost effective tests to verify the plausible cause(s) of subsea umbilical cable gassing, fluid ingress and migration and performance impact
Outlook

• **COLLABORATIVE** effort across large group of Australian Subsea System Operators.

• **COLLECTION** of reliability data for Australian operations.

• Marine Fouling Mitigation and Remediation: Findings will be consolidated into **INDUSTRY BEST PRACTICE GUIDELINE**.

• Umbilical Performance Test: Findings will allow **DESIGN-OUT** gas migration challenge.
For additional information please contact:
searjip@woodplc.com
or
www.searjip.com