KP4 Interim Report
Marine Aspects

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Marine inspections

• 18 KP4 inspections to date
• 5 floating installations
• 4 marine inspections
• Phase 2 – Feedback to KP4
• Onshore: Management Overview
• Offshore: Maintenance of Marine SCE
Floating Installations
Current Findings

- Policies are in place, for maintenance not ageing
- Inspection cycle typically based on 5 year cycle
- ‘Fix on Fault’ strategy
- Performance standards based on functional specifications
- Inshore repair and maintenance helps
- Well defined requirements for primary hull structure and marine systems
- Technical authorities remote from the operational role
- In-house marine integrity reviews are helpful
- Maintenance recording systems inadequate for trending and life extension issues
- Marine and structural integrity the ‘poor relation’ in regard to production and operational problems
- High operational workload and bed space limitations
Marine Major Accident Hazards

Loss of Stability -
Royal Yacht Britannia's leaking door fixed
http://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-16537159

Offshore Information Sheet
No. 4/2011 - Flooding risk

Loss of Position –
Major Mooring failures: Gryphon A; Petrojarl Banff

These major hazards apply to ageing installations
• Degradation mechanisms
• Inspection
• Testing

…all are important!
Floating Installations
Good practice found so far

- High level risk matrix produced together with allocation of key responsibilities up to Vice-President level in duty holder organisation.
- Use of KPI dashboard for reporting of current performance.
- Use of inshore dry-dock and refit periods.
- Involvement of offshore crew in the preparation of shipyard repair workscope.
- Complete replacement of Inert Gas plant and piping rather than a continuous programme of repairs.
- Replacement of ballast system piping.
- Use of in-house marine superintendent in support of marine technical authority for internal ‘marine integrity reviews.'
• Drydocking?
  – 30 year in field life – or a re-useable asset?
• 30 yr: Why not plan for a mid life major inshore upgrade?
  – moorings / tank coatings / risers / structure
  – oil production profile changes / tie-backs
• Re-useable asset: will it be easy to modify?
  – modular process and utilities
• Both require a design for maintenance approach
• Moorings and risers – design for disconnection?
• Through Life Costs v Project Costs will give answers
Fairleads – Do they swivel?

How much can be determined from in-water inspection?
Fairleads – Side Loads, Corrosion

Impossible to detect corrosion on in-water inspection
Fairleads – Underwater access

Difficult and hazardous area for inspection and access
Side loads unexpected, wear impossible to inspect
FPSO / FPU / FSU: Challenges

- Structural defects in tanks: detection, inspection method and repairs
- Planned and opportunistic tank entry and inspection
- ROV inspection of internal structure
- Ship side valve integrity - ROV / camera inspection. Isolation methods.
- Mooring integrity - risk based inspection - key areas
- Passing valves - measurement of leakage rate? trending?
- Tank gauging - accuracy and obsolescence of equipment?
- Ballast control - age and obsolescence of control system?
- Hydraulic and air accumulators and systems - leakage rates and trending?
- Thrusters, fairleads and mechanical equipment? - wear and ageing. In water replacement?
- Prime movers and generators - when and how to service / replace?
- Piping on deck - supports, dead legs, corrosion traps (internal and external),
- Piping internal erosion (tight radius bends, fluid content)
Floating Installations
KP4: suggested priorities for future

• Improve performance standards to include more specific and measurable acceptance and rejection criteria for inspection routines.

• Improve maintenance management recording systems to include trending of SCE performance criteria.

• Include as part of verification activity the analysis of any trending of data to determine wear rate, future life, and the continued suitability of the SCE.