KP4 AGEING & LIFE EXTENSION PROJECT
INTERIM REPORT

Andy Duncan
KP4 Manager
WHAT IS AGEING?

“AGEING IS NOT ABOUT HOW OLD YOUR EQUIPMENT IS;
IT’S ABOUT WHAT YOU KNOW ABOUT ITS CONDITION,
AND HOW THAT’S CHANGING OVER TIME”

(HSE Report RR509)
AGEING:
INCIDENTS & COSTS

- In EU hazardous industries ~60% of incidents are integrity failures, for ~50% of these ageing is significant factor
  HSE report RR823
- The EU MAHB estimates 28% of all reported major accident loss of containment events are due to ageing
  HSE report RR823

- 2002 NACE Cost Of Corrosion study est. cost to USA ~3.1% of GDP
  www.nace.org
- UK est. corrosion costs ~4%GDP (~$96 Billion pa on $2.4 Trillion pa)
  www.icorr.org
- Est. value of North Sea oil to UK ~$18 Billion pa
  Office for Budget Responsibility, 29th October 2012
- Est. cost of corrosion to North Sea oil & gas industry ~$720 Million pa
- Worldwide corrosion cost est. ~$2 Trillion pa
  www.efc.org
WHAT IS KP4/ALEP?

- Looking forward/anticipating long term asset integrity management issues
- Raise awareness of consequences of ALE
- HSE working with Duty Holders, Consultants, Suppliers, ICPs for a common goal
- Understanding & anticipating long term degradation mechanisms & rates of SCEs
- Understanding & anticipating SCE obsolescence management
- Continuous health & safety improvement
- Reducing HCRs
- Regulatory compliance
- Sharing ALE knowledge for the benefit of all
Background

What is Ageing & Life Extension?

Interim Topic Specialists findings:
Process Safety  Structures
Fire&Explosion  Corrosion
Mechanical  Pipelines
Human Factors
EC&I  Marine

What next for KP4/ALE?
NATURE OF KP4 REPORT

• Industry strengths
• Industry good practices
• Additional focus required
18 KP4 inspections have been undertaken
6 still to do 2012 Q3/2013 Q1
8 to do 2013. Project ends December 2013
Phase 2 inspections are underway
Industry has reacted well to KP4/ALE initiative
Positive engagement of ALE concepts
DHs undertaken independent reviews of their IM practices wrt life extension of mature assets
DHs developing long term ALE IM plans
Good evidence that DH senior management recognise ALE importance
Good evidence of industry ALE knowledge sharing
OGUK providing forum for the development of ALE guidance documents
Workforce involvement through Step Change in Safety
Much still to do
OIL & GAS UK

• O&GUK leading development of ALE technical guidance documents

• HS073 - Guidance on the Management of Ageing and Life Extension for UKCS Oil and Gas Installations

• Two technical work groups underway:
  • Marine
  • Electrical, Control & Instrumentation
ORGANISATION AND HUMAN FACTORS

- AIM high priority for snr mgt
- Good response to KP4
- Sophisticated leading & lagging KPI dashboards
- Independent ALE audits
- Reviewing contracts to consider obsolescence mgt
- Good succession planning
- High AIM workloads
- Suggest dedicated ALE focal points
- Suggest ALE embedded into existing AIM policies & procedures

Enduring issue (>2 Months)
- MAHE system inhibits
- Static at 2 inhibits

Key Events from graph
- Maintenance backlog increased from zero to 6 tasks (48 Hrs)
- Temporary repairs reduced from 18 to 14 repairs. Permanent repairs carried out.

Corporate Tolerance Levels exceeded are:
- Approved Temporary repairs reduced from 18 to 14 repairs
- 8 are on Hydrocarbon / Process Systems [CTL=6]
- Deviations and ORAs increased from 7 to 8 [CTL=6]

No barrier breaches during June 2012

Asset 'X' Example Dashboard

Lagging Indicators

Leading Indicators
PROCESS SAFETY

• Existing O&M systems identify most PS ALE issues,
• Good protocols for documentation, roles & responsibilities, authority, consultation,
• Developing tools to outline SCEs which act collectively as barriers to prevent loss of HC containment

• Need extra focus:
  – Need clearer mapping of SCEs and SIL assessments,
  – Insulation removal must be PS driven to avoid risk of hydrate blockage of PRVs,
  – Need freer inter-departmental comms to facilitate identification and management of hazards,
  – Maintenance of red-line mark-ups of offshore docs,
  – Hardware and software obsolescence,
  – Plant simplification,
  – Changes to codes, standards, guidance

New ESDV hydraulic bottles
FIRE & EXPLOSION

- ALE management tools in place/being developed
- F&E asset reviews (HAZOPS etc) aligned to 5 yearly TRS
- Performance trending of SCEs
- Meeting agendas addressing issues of: “yesterday, today, and tomorrow”
- Spreadsheets identifying relationships between SCE failure and MAH risks
- RCAs TR integrity, smoke & fume ingress, survivability demonstration

More focus on:
- Long term TR integrity management; including trend analysis and maintenance
- Reliability of obsolete gas detection systems
- Full life costing of active fire protection and mitigation systems – not just capital costings
- Review QRAs in line with 5 yearly TRS – and reduce ALARP
- Review ORMs to ensure suitability
STRUCTURES

• Identification of ageing processes, anomaly reviews and failure trend analyses,
• “Life of Field” teams undertaking ALE structural integrity assessments
  – emphasis on LE
• New structural ALE policies, procedures, “road maps”, gap analyses, KPIs
• Re-evaluation of CP systems

• More focus needed on:
  – Ensuring structural analyses are up to date and good for ALE
  – Ensure structural analyses aligned with Codes
  – MoDU jack-up fatigue assessments
  – ALE performance standards
  – Suitability of failure and deterioration models for both A and LE
  – Reassess barriers to failure to ensure they are suitable for ageing structures, particularly for life extension
  – Risks associated with un-inspectable components
  – Review air gaps for 1,000 and 10,000 year wave
Newly refurbished helideck
MECHANICAL

- DHs taking greater control of integrity and maintenance management
- Replacing defined life repairs with permanent solutions
- Greater use of OEM maintenance recommendations
- Experts advising on ALE - gap analyses
- New ALE guidance documents
- Improving anomaly management tools
- ALE included in HAZOPS

More focus needed on:
- Understanding ALE effects and consequences
- Integrate into AIM programmes
- Fabric maintenance,
- Organisations to minimise potential conflicts of interest
- Static parts of rotating equipment
- Fatigue assessments of pressure vessels beyond design life
  - re-base lining? (esp. if there is a new DH)
- Long term maintenance strategies for cranes
Refurbished crane boom
Pipe defect identity tags

Bolt replacement tags
CORROSION

• Very good cross industry knowledge sharing
  – Quality EI corrosion management docs
• Robust and mature CTA, RBI, CMS systems; consider ALE and new process streams; regularly reviewed
• Presence of an OIE significant benefit to integrity management and safety
• Support for novel NDT techniques
• Major FM improvements across the North Sea
• Novel ideas coming through for FM and CUI
• FM of MoDUs & FPSOs particularly well looked after

• More focus needed:
  – Ensuring equipment lists are up to date
  – Deeper audits on accuracy of CTAs, RBIs, CMSs
  – Audits on the implementation of CMSs
  – Audits to ensure accuracy of inspection data
  – Need for high reliability chemical injection systems
  – Accelerate FM programmes
ELECTRICAL, CONTROL & INSTRUMENTATION

• Effective inspections of EC&I equipment and day-to-day maintenance

• Reviewing EC&I ALE management and obsolescence issues

• High workloads detracting from ALE issues

• Need to improve failure trend analysis to identify future repair or replacement needs

• Need to improve understanding of obsolescence issues to plan replacements or timing of purchasing spares – especially where vendor support may cease
• Good policies for structural and marine integrity of floating assets are in place
• ALE KPIs and dashboards are being developed
• Structural modelling and real time monitoring was in place
• Five year Class Society inspections are well defined and in keeping with the aims of managing ALE
• MoDUs - long term planning for equipment replacement
• Need quantitative rejection criteria for SCEs
• Need trend analyses for long term maintenance planning tools and systems
• Need improved inspection programmes for secondary marine systems
PIPECINES

• Well established risk-based pipeline integrity management systems
• Response to the KP4 - introducing ALE considerations into AIM policies
• Introducing detailed ALE elements into specific pipeline technical policies and procedures
• New pipeline validation projects to ensure integrity to CofP
• Reviewing ALE issues of flexible risers – high NDT development activity
• New ALE standards and guidelines,
• LE process becoming integrated into AIM review process

• More focus needed:
  – Audit frequencies should comply with MAPD
  – As pipelines approach nominal design life, need to re-assess basis for continued safe operation
  – Cleaning pig and IP frequencies should match the designated KPIs
  – IP frequencies need regular review to match degradation threats
  – New condition monitoring technologies
WORKFORCE INVOLVEMENT

• Encourage workforce to understand importance of ALE in AIM and offshore safety

• HSE/KP4 engaging with Step Change in Safety:
  – Step Change Safety Representatives Event, KP4 theme
  – KP4 presentations to be given to:
    • Technical Authorities sub-group
    • Leadership Team 2013 planning day

• DHs - ALE awareness workshops for the workforce

• OIAC - WIG
CONCLUSIONS

• A very good start
• Industry commitment
• A lot still to do
• HSE will be undertaking more inspections and Phase 2 inspections in 2013
• Potential prizes to be had:
  – improved long term H&S performance
  – extended production
• Need to continue effort to cessation of production

New KP4 website: www.hse.gov.uk/offshore/ageing.htm