HSE’s AGEING & LIFE EXTENSION KEY PROGRAMME (KP4)

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WHAT IS AGEING?

AGEING

• It’s about deterioration of work equipment which increases the likelihood of failure

• “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”

MANAGEMENT OF AGEING?

• It’s about condition management

• Understanding the factors causing degradation

• Developing mitigation strategies

• Implementing strategies
WHAT IS AGEING?

Across the European Union’s hazardous industries ageing is implicated in:

- 30% of incidents
- 28% of loss of containment
WHAT IS LIFE EXTENSION?

• Typical design life for production assets ~25 years
• When assets exceed design life = Life Extension
• Then refer to Cessation of Production (CoP)
• About half of the UKCS production platforms are in the life extension phase
• Some platforms now anticipate 50-70 years
• Plus 5-10 years until complete removal from the sea bed
WHAT IS KP4 / ALEP?

- Raising awareness of consequences of ALE
- Understanding & forecasting degradation mechanisms & rates of SCEs
- SCE obsolescence management
- Continuous health & safety improvement
- Reducing Hydrocarbon Releases
- HSE working with the Offshore Industry for a common goal
- Sharing ALE knowledge for the benefit of all
KP4 STATUS OVERVIEW

• 26 KP4 inspections undertaken
• 8 to do by October 2013
• Final report April 2014
• Interim report issued November 2012
• Phase 2 inspections are underway
• DHs undertaken ALE reviews
• DHs developing long term ALE AIM plans
• OGUK providing forum for the development of ALE guidance documents
• Workforce involvement through Step Change in Safety
• Industry has reacted positively to KP4/ALE initiative
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
- Technical work groups:
  - Marine
  - Electrical, Control & Instrumentation
  - Structures
ALE MANAGEMENT WORKS WELL WHEN:

- Senior management are fully engaged and supportive
- ALE policies are embedded into existing AIM policies and procedures
- AIM work is prioritised by risk
- Good communications
- KPI dashboards
- ALE audits
- Obsolescence is managed
- Succession planning

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

-MAHE system inhibits
- Static at 2 inhibits

- Maintenance backlog increased from zero to 6 tasks (48 Hrs)
- Temporary repairs reduced from 18 to 14 repairs. Permanent repairs carried out.
ALE MANAGEMENT WORKS WELL WHEN:

- Operating & Maintenance systems identify the Process Safety issues
- There are systems to identify SCEs which act collectively as barriers to prevent loss of containment
- SCEs and Safety Integrity Levels are mapped
- There are effective HAZOPS & HAZIDS
- Offshore red-line mark-ups are contemporaneous
- Equipment is maintained
- Hardware and software obsolescence is managed effectively
FIRE & EXPLOSION

ALE MANAGEMENT WORKS WELL WHEN:

- HAZOPS/HAZIDS/QRAs are aligned to the 5 yearly Thorough Review Summary
- Performance trending of SCEs
  - Go/no-go checks are insufficient
- Relationships between SCE failure and Major Accident Hazard risks are identified
- Effective Root Cause Analyses of (eg):
  - TR integrity, smoke & fume ingress, survivability demonstrations
- Long term integrity management of Temporary Refuges
- Reliability of obsolete gas detection systems is managed effectively
- Audits of Operational Risk Management systems
- Long term planning
STRUCTURES

ALE MANAGEMENT WORKS WELL WHEN:

• Structural analyses are up to date and identify ALE risks
• Failure and deterioration models address both Ageing and Life Extension
• Barriers to failure are re-assessed to ensure they are suitable for ageing structures, particularly for life extension
• Failure trends are analysed and extrapolated
• MoDU jack-up fatigue assessments are up to date and identify ALE risks
• The risks associated with un-inspectable components are considered and solutions identified
• Air gaps for the 10,000 year wave are re-assessed
Newly refurbished helideck
ALE MANAGEMENT WORKS WELL WHEN:

- ALE management is integrated into AIM programmes
- DHs take control of integrity and maintenance management
- Defined life (temporary) repairs are replaced with permanent solutions
- ALE gap analyses are undertaken
- Effective anomaly management tools
- ALE is included in HAZOPS
- ALE effects and consequences are understood
- There are effective inspection programmes for static parts of rotating equipment
- There are long term maintenance strategies
CORROSION

ALE MANAGEMENT WORKS WELL WHEN:

• There is good cross industry knowledge sharing, eg The Energy Institute’s corrosion management docs
• There are well designed Corrosion Management Strategies, which address ALE issues
  – Incorporating:
    • Corrosion Threats Assessments
    • Risk Based Inspection programmes
    • Written Schemes of Examination

Equipment lists are up to date
• There is long term planning
• Fabric maintenance is undertaken
• Audits on effectiveness of CMSs
• Inspection data is audited
• Experienced Offshore Inspection Engineer
• There are high reliability chemical injection systems
ELECTRICAL, CONTROL & INSTRUMENTATION

ALE MANAGEMENT WORKS WELL WHEN:

• Effective inspections
• Well planned maintenance
• Planning for timely spares purchasing
• Obsolescence is anticipated:
  – especially where vendor support may cease
  – sourcing spares
• Failure trend analysis is used to identify future repair or replacement needs
MARINE

ALE MANAGEMENT WORKS WELL WHEN:

• Effective policies for structural & marine integrity
• ALE KPIs and dashboards
• Up to date structural modelling
• Real time condition monitoring
• Five year Class Society inspections are undertaken
• Long term planning for equipment replacement
• Quantitative rejection criteria for SCEs
• Long term data trend analyses to plan for future maintenance
• Effective inspection programmes for secondary marine systems
ALE MANAGEMENT WORKS WELL WHEN:

• There are effective risk-based Pipeline Integrity Management Strategies
• ALE is included in AIM policies
• There is specific consideration of the effects and consequences of ALE elements into specific pipeline AIM policies and procedures
• Pipeline AIM is re-validated to ensure integrity to CoP
• ALE issues of flexible risers are considered
• Audits are undertaken in accordance with the KPIs
• Cleaning and IP frequencies match KPIs
• IP frequencies are regularly reviewed to match degradation threats
Haddon-Cave Review: RAF Nimrod MR2 fire, Afghanistan 2006, 14 died

- Immediate causation: leak during air-to-air refuelling – overfilling #1 fuel tank – ignition from exposed element of a hot air duct.

- Contributory factors:
  - Age of non-structural components
  - Unsuitable maintenance regime policy
  - Lack of fire detection and suppression system
  - Safety Case failed to identify the potential threat: ie co-location of fuel and hot air system
  - Safety Case process considered to be a “paper exercise” – worthless as a safety tool
  - Failure to identify implications of successive changes to the fuel system and associated procedures
  - Acceptance that fuel leaks were inevitable
  - No trending of leak frequencies
  - Overheat detection system in the wrong place
  - Did not learn lessons from previous incidents
• Management structure RAF Kinloss:
  – Engineering personnel come under non-specialist leadership - believed to have had a negative effect
• Training courses did not provide skills to maintain 40 year old aircraft
• Stretched engineering resource; loss of skilled personnel - dilution of engineering skills
• Lack of corporate memory
CONCLUSIONS

• HSE has seen good evidence Duty Holders are investing considerable time and money improving ALE management

• Forward planning / anticipating the challenges will reap rewards:
  – 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