Fundamentals of Asset Integrity Implementation

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MODULE 3: OVERCOMING PROCESS CHALLENGES IN INTEGRITY IMPLEMENTATION
Process Challenges

- Effective hazard identification & awareness
- Risk based planning
- Regulatory requirements
- Industry and company standards
- Operating and maintenance procedures

- Management of change
- Incident investigations
- Emergency response
- Performance management
Major Accident Hazards

- “Hydrocarbon” hazards...........LOSS OF CONTAINMENT

- “Logistics” hazards...........SHIP AND RIG COLLISIONS, VEHICLES AND HELICOPTER ACCIDENTS, BIG LIFTS...

- “Natural” hazards...........EARTHQUAKES, HURRICANES, FLOODS, LIGHTNING, SANDSTORMS, EXTREME LOW TEMPERATURES, FOREST FIRES, LANDSLIPS...

- “Security” hazards......WAR, TERRORISM, SABOTAGE, THEFT UNEXPLODED ORDNANCE
What Are We Trying to Avoid?

HAZARD

BARRIERS

ESCALATION CONTROLS

MAH EVENT

CONSEQUENCE
Risk Assessment Techniques

• Critical to prioritization of integrity related plant, people and process activities
Practices & Procedures

- Statutory requirements
- Industry standards
- Company standards
- Procedures
  - Operations
  - Maintenance
  - Safety related
Features of Operating Procedures

- Thorough
- Easily understood
- Up to date
- Accessible
- Followed

- Start-up
- Normal operations
- Abnormal operations
- Emergency
- Shut-down
- Isolation (for maintenance)
Maintenance Procedures

- Personnel qualifications
- Thorough
- Easily understood
- Up to date
- Accessible
- Followed

Particularly important for equipment deemed Safety or Integrity Critical
Safety Procedures

- SIMOPS
- Hot-work
- Hot / Odd-bolting
- Dispensations
- Emergency response
Management of Change

- Process conditions beyond established limits
- Set-points for alarms, trips, ESD
- Equipment (especially Safety/Integrity Critical)
- Process chemicals
- Operating and maintenance procedures
- Staffing and organisation
Don’t Forget

**Temporary Change**
- Limited time period
- Not to be permanent
- Define time limit
- Include pilot or operational experiments

**Emergency Change**
- Immediate threat
- MUST be done before forms / approvals
- Approvals obtained ASAP afterwards
Integrity Incidents and Learning Pyramid

1 Major Incident

10 High Potential Incidents

300 In-service failures (not currently captured)

600 Incidents – no visible damage (not currently captured)
Learning from Near Misses

Learning opportunities

- Plant upsets and trips
- Operations beyond normal limits
- Lifting of relief valves
- Discovery of unexpected damage mechanism
- Discovery of unexpected damage rates
- etc., etc.
Emergency Response (ER) Contingency Planning (CP)

ER – generally concerned with personnel safety and asset protection

CP – generally concerned with business continuity, i.e., recovery of production
Emergency Response (ER)

• Provide ER plans for all major hazards / risks
• Socialize ER plans widely
• Drill, drill, drill

• Drill all scenarios, not just the simple ones
• Build a plan for retrieving survivors from the sea, especially at night
• Be sure remote sites are centrally well supported
Integrity Performance Metrics (KPIs)

Tier III
- Locally Specific IM Data
  - Engineer/Ops Review Level

Tier II
- Operations Important IM Data
  - Middle Management Review Level
- Business Critical IM Data
  - Senior Management Review Level

Tier I
- Integrity Performance Metrics (KPIs)
Typical Tier III KPIs

- High priority well strings with double barrier wellhead annulus pressure
- % progress Xmas tree and wellhead maintenance
- Planned vs actual inspections
- Planned vs measured corrosion inhibitor rates
- Planned vs actual corrosion inhibitor pump run-time
- Online corrosion coupon monitoring with target < 2.5 mpy
- % pressure vessels with valid certification status
- % platforms with valid certification
- % implementation of required pigging programs
- Planned vs actual completion of intelligent pigging plan
- % completion of planned NDE inspection programs
- % SCE contractors covered by Competency Card System

- % safely operating isolation valves (no passing)
- % relief valve “pop” test conformance (future)
- % complete alarm and trip setting documentation review
- % PSVs with valid certification status
- % lifting personnel assessed by Competency Card System
- % crane certification compliance
- # excursions out of normal operating envelopes (P, T, flow, etc.)
- # of process safety system activations
- # of failed process safety system activations
- # discovered unlogged safety system over-rides
- # in service structural failures with potential for personnel injury
- # lifting equipment failures
- # ER equipment outages
- Planned vs actual routine NUI visits
What Velosi Can Assist With

Asset Integrity Implementation: Process

• Risk Assessments
• Hazids, Hazops*, QRA
• Engineering verification
• Engineering drawings, inspection isometrics, P&IDs*
• 3D laser scanning and modeling*
• 3D CAD design and modeling*
• Dimensional control, PDMS design modeling and interface with CMMS systems*

* Software enabled