Facility Assessment for Improving Reliability and Profitability

What is New?

- Less technical depth in the workforce of operating companies
- Fewer project oversight personnel for new facilities
- Lack of corporate standards
- Fast…. Typically 2-3 months, start to finish, with specific recommendations documented
- Task formatted results to facilitate implementation and early capture of benefits
New Paradigm in Reliability

Structured Work Process

- Team approach
  - Multidisciplinary team works with all levels of refinery operations and management

- Scope
  - Operations and integrity standards
  - Operation procedures and practices
  - PSM & safety standards
  - Process design issues
  - Rotating Equipment Reliability and Maintenance programs
  - Inspection programs and practices for pressure vessels and piping
  - Incident analysis procedures and follow up actions
Breakdown of Findings

- 50-120 gaps which span all areas of operation and maintenance

- Detailed summary of each gap provided including:
  - Observation
  - Finding
  - Gap
  - Recommended Practice

Example 1 – Safety

Scalding Hazard

Solutions
No Cost
+ PPE Upgrade
+ Procedure Review

Low Cost
+ Relocation Chute Operator

More Cost
+ Remote Operator Station
+ Autodeheading

Falling Hazard

No Coke Fallout Protection
Example 2 - Safety

Solutions
No Cost
+ Procedure Review
Low Cost
+ Remote Piping
+ Operator Use of H2S monitors
+ Addition Block Valve
More Cost
+ Drum Modification
+ Autodeheading

Vent at Head Level
Small Bore Piping, Pluggage risk
Single Block to Atmosphere

Closure Plan

Gap Prioritization

Safety
- Level 1: Highest Priority
  - High Probability of Event with High Consequence
- Level 2: Medium Probability of Event with High Consequence
- Level 3: Medium Probability of Event with Lower Consequence
- Level 4: Lower Probability of Event with Lower Consequence

Reliability/Availability

Start of Run
Ideal
Actual

No. Open Gaps

Time (yrs)
+0 yrs +1 +2 +3
Results Take Time

- After 3 years
  - Additional 8% average throughput, +3 kbd

- After 2 year
  - Closed most level 1-2 gaps
  - No unplanned downtime

- After 1 year
  - Management driven structured gap closure plan

Start Reliability Early – Project Phase

- Review of Contractor Engineering Quality (RCEQ)
  - Act as owners QC representatives

  - In-depth review of critical portions of
    - Project and Equipment specifications
    - EPC’s detailed engineering

  - Spot check only

  - Reviewer does not have authority to initiate changes. All recommendations go through the proper project management channels
What has been found during RCEQ?

- Removed additional vacuum tower stiffening rings from work scope
- Nozzle loading exceeded maximum specifications
- During a DBM and P&ID review of a multi-unit FEED project, 48 comments were found.
- Hydrostatic pressure test for a vessel was not equivalent to the surrounding piping.

Effect of Delays and Specialist Costs on Project Economics

Base Case = 15% DCF, 33.7M$ NPV

Project Case
$100M Capital
10% Interest Rate
20 yr project life
Modular Construction Expertise

- Review and revision of modular construction plans for efficient use of onsite resources
- Record setting heavy lift planning and execution

Coke Drum Re-Leveling

- Performed on 16 drums
- Online
  - Complex lift plan
  - Oversight and coordination of bolting and concrete repair contractors
- Shutdown
  - Accelerated repairs during turnaround
  - Shortened a projected repair from 5 weeks to 6 days during a shutdown