شـركة أبـوظبي للعمليـات الـبترولية الـبرية (أدكـــو)
Abu Dhabi Company for Onshore Oil Operations (ADCO)

المؤتمر الدولي للمعدات المستخدمة في المناطق الخطرة القابلة للانفجار

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“Equipment and Services in Explosive Atmospheres”

Implementation of Integrated Quality System and Use of Criticality Assessment, Inspection Classification & Certification for Critical and Hazards Equipment.

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Presentation outlines

- Integrated Quality Approach
- Quality & Integrity assessment
- Material Specification & Selection
- Fitness-for-service concept (FFS)
- Defect Assessment
- Maintenance Mgmt System – MMS
- Criticality assessment
- Oil Gas Plant Live cycle Stages
- Quality & Integrity & Plans

Integrated Quality Approach

- Demands for quality has grown dramatically due to failure of plant and components in service.
- Historically, quality has been associated with things like checks and random inspections, i.e. the acceptance or rejection of finished products.
- It is now recognized that quality can not be inspected in; must be designed, built into the product and managed in systematic manner.
- The requirements to be defined from beginning.
- System is prevention, not a random detection.
- Performance standards is zero failure

Quality & Integrity assessment

- Process which includes inspection and characterizing the results by defect type and severity.
- Assurance processes to verify that materials meet specifications and standards.
- High-integrity pressure protection system.
- Predictive versus preventive.
- Operational & maintenance excellence.
- Performance improvement.
- Targeting Zero failure and avoid S/D.
- Improving safety and reducing risk.

Integrity helps in designing an strategy to minimize the risk resulting from breakdowns or failures:

- A fitness-for-service Approach.
- Defects evaluation and assessment.
- Leaks preventative approach.
- Identifying Hazards through risk assessment.
- Determining safe operating parameters.
- Inspection and maintenance planning.
- Managing Risks.

The above are part of total asset integrity processes.

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Material Specification & Selection

Material specification defines the performance requirements and physical/chemical properties.

Factors that influence materials selection are:

- design data
- corrosion resistance in the environment
- mechanical properties
- test data
- maintainability and reliability.
- life expectancy and appearance.

Fitness-for-service concept (FFS)

Determine whether equipment, is suitable for continued operation for a pre-determined period.

Evaluate the probability and modes of failures:

- Fracture
- Fatigue
- Creep
- Stress cracking
- Corrosion/Erosion
- Buckling
- Life prediction under creep and/or fatigue conditions.
- T*ypical fatigue crack growth.*

Defect Assessment

Defect assessment is used to underwrite many aspects of structural integrity, including but not limited to:

- Remaining or remnant life prediction.
- Fitness-for-purpose assessment.
- Life extension of ageing equipment.
- Assessment of inspection intervals.
- Compliance to regulatory requirements

Maintenance Management System - MMS

Process for management of maintenance program.

Target object of MMS includes:

- Maintaining the condition.
- Equipment functionality & Operability.
- Reducing failure incidence.
- Reducing downtime after failures.
- Ensure full compliance with plans and minimum reliability levels.
- Inspection to be designed for integrity monitoring.

Hazards, risks,

- A hazard is something that can cause harm.
- A risk is the probability that a particular outcome will occur and the severity of the harm involved.
- Risk calculation is based on probability of the harm being realized and severity of consequences.

Risk assessment

- Identify the hazards and evaluate the risk.
- Identify and prioritize appropriate control measures.
- Hazard and Operability (HAZOP) studies.
- Quantified Risk Assessment (QRA)
- Fire and explosion control, mitigation and detection.
- Emergency control, Escape and Evacuation.
- Gas detection system (hydrocarbon / H2S)

Examples of Safety precautions

- Do not just rely on pressure gauge indication to make sure zero pressure. Open all available drain or vent valves to release the remaining pressure. Beware of pressure that trapped in a dead zone.
- Bring any high temperature process to ambient. It is not only saving energy but also eliminate one hazard source. Except there is a strong requirement keeping that high temperature.
- There will be much flammable or combustible material spread around the plant. Do not dispose used absorbent materials that still contain flammable liquid into trash bin.

Criticality assessment

Technique for measuring the relative importance to be assigned to equipment based on risk factors:

- HSE
- Technical integrity
- Reliability
- Design maturity
- Manufacturing complexity
- Cost and schedule

Once set, the Criticality Rating is used to determine the QA/QC requirements to be applied during all stages of design, procurement and construction.

Calculation of criticality rating's

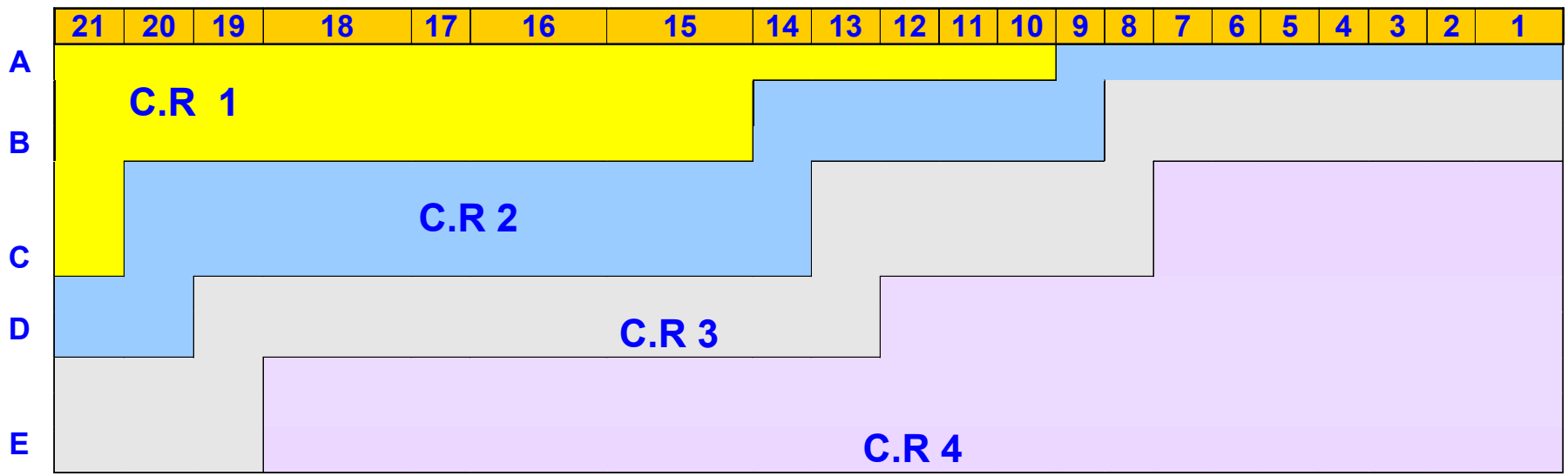
Effects on engineering:	
▪ Design criteria	0
▪ Review procedures	1
▪ Tests and inspection requirements	2
▪ Safety and reliability analysis	3
Fluid characteristics:	
▪ Harmless	0
▪ Low hazard (for toxicity/temp./pres.)	1
▪ Medium hazard (for toxicity/temp./pres.)	2
▪ High risks (for toxicity/temp./pres.)	3

Functional consequences:	
▪ Other units performing the same function, repairs or replacement are possible without problems.	0
▪ Cause problems without serious consequences.	1
▪ Bypasses, repairs or replacements are possible but with consequences to plant	2
▪ Operation of the plant impaired	3
Safety of operating personnel:	
▪ Negligible risks	0
▪ Modest risks	1
▪ Significant risks	2
▪ High risks	3

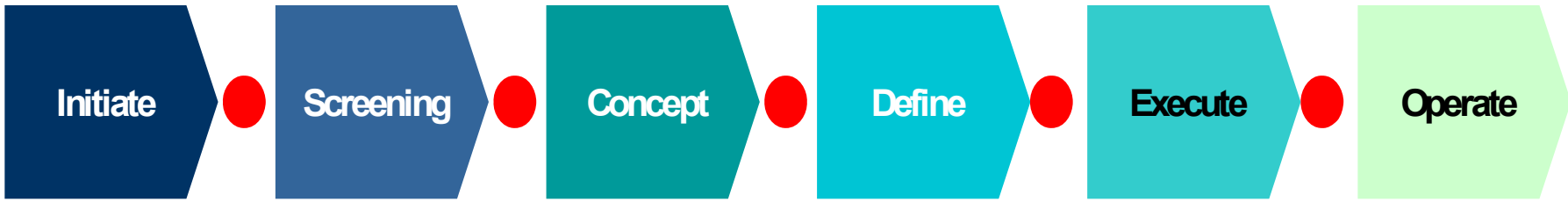
Category 1: Above 12 Category 2: 9 to 12
Category 3: Below 9

Parameter	Score
Personnel Safety/Environment Impact	
Standby Availability	
Design Maturity	
Manufacturing Complexity	
Importance, Cost, Size	
Criticality Impact Total Score	

CRITICALITY IMPACT TOTAL SCORE



Project Development Stages: VAP Stage Process



- Initiate – define the requirement.
- Screening – identify the options for achieving the requirement.
- Concept – assess the options, select the solution.
- Define – prepare the FEED, Scope for Execute Stage.
- Execute – engineering, procure, construct, commission and transfer the project.
- Operate – facilities ramp-up, lessons learned.

Review & Assessments Plan

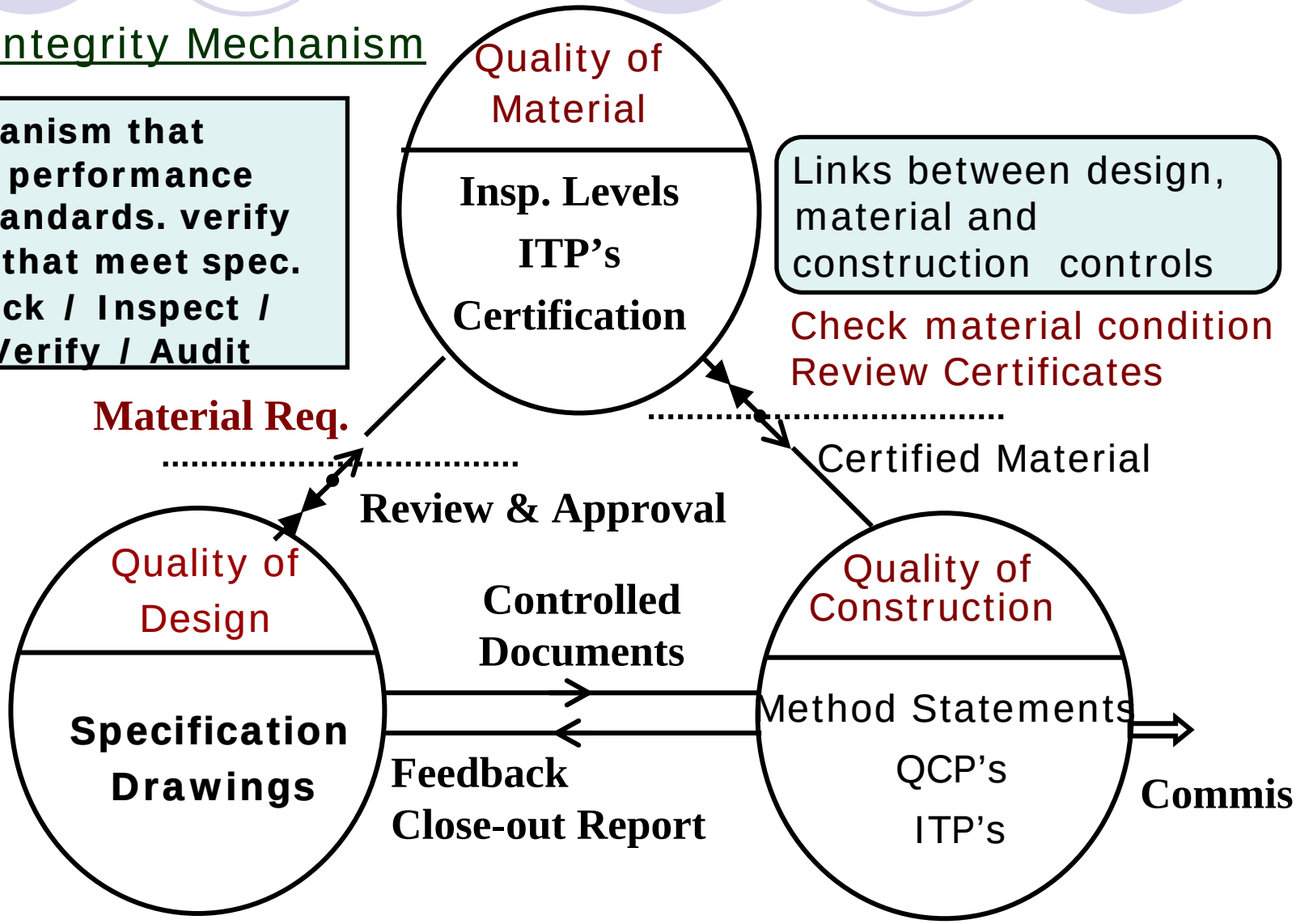
Review	Project Stage		
	Concept	Define	Execute
HSE /PHSER	✓	✓	✓
HAZID /HAZOP	✓		
Value Engineering	✓	✓	
Constructability / Maintainability		✓	✓
Project Risk	✓	✓	✓
Energy Optimization	✓	✓	
Cost & Schedule Risk	✓	✓	
Independent Project Analysis (IPA)	✓	✓	
Peer Technical Review	✓	✓	
Quality System Audit	✓	✓	✓
Project Close Out Lessons Learned	✓	✓	✓
Post Project Review	After Commissioning & Start Up		

Quality, Integrity Plan

- Document specifying which procedures and resources shall be applied by whom and when to a specific project.
- Setting out the specific practices, resources' and activities relevant to a particular process.
- Identify the elements of work.
- Assign responsibility and authority.
- Procedure, methods and Inspection plans.
- Audit program at appropriate stags.
- Lesson Learned.
- Close out and acceptance certificates.

Quality & Integrity Mechanism

QC: **Mechanism that measures performance against standards. verify products that meet spec.**
Tools : **Check / Inspect / Assess / Verify / Audit**



Thanks for the attention

Q & A