CONCEPT

Well Integrity Management: Barriers, Annulus Pressure and Integrity Assurance

31 October – 4 November 2027
Riyadh - KAFD district five-star



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Introduction:

Well integrity management failures in producing and injection wells rarely start as blowouts: they start as an unexplained annulus pressure trend, a safety valve that fails its leak test, or a wellhead seal nobody tracked after handover. This Core Concept course trains engineers to define barrier envelopes, draw well barrier schematics, set operating and annulus limits, diagnose sustained casing pressure, test trees and safety valves, categorise wells by risk and run the management system around them. Participants produce a Well Integrity Status Report and Annulus Management Plan for a portfolio of wells.

Course Objectives:

- Define primary and secondary well barrier envelopes and draw well barrier schematics for producing, injection and shut-in wells as NORSOK D-010 and ISO 16530 describe them
- Set well operating limits and maximum allowable annulus pressures from casing, tubing, wellhead and formation ratings
- Diagnose the source of annulus pressure through trend review, bleed-down and build-up tests and select the response for sustained casing pressure
- Plan leak and function testing of wellheads, trees and subsurface safety valves and judge results against acceptance criteria
- Categorise wells by barrier condition and rank integrity risk to prioritise surveillance, repair and shut-in decisions
- Structure a well integrity management system with handover records, roles, KPIs and audit routines across the well life cycle

Target Audience:

- Well integrity engineers who maintain barrier status, annulus records and integrity registers for well stock
- Production engineers who operate wells within pressure, rate and annulus limits
- Completion and well intervention engineers who specify tubing, packers, safety valves and wellhead equipment
- Well surveillance and operations engineers who monitor annulus pressures and schedule valve and wellhead tests
- Asset integrity engineers who connect downhole and wellhead condition to facility risk registers

Course Outline:

Day 1: Well Integrity Life Cycle, Definitions and Current-State Assessment

- Well Integrity Definitions in NORSOK D-010 and ISO TS 16530-2
- ISO 16530-1 Life Cycle Phases from Basis of Design to Operation
- Well Failure Modes: Tubing Leaks, Packer Leaks, Casing Collapse and Wellhead Seal Loss
- Well Stock Data Audit: Completion Diagrams, Pressure Ratings and Test History
- Current-State Integrity Gap Assessment Template

Day 2: Barrier Envelopes, Well Barrier Elements and Schematics

- Two-Barrier Principle and Primary and Secondary Barrier Envelopes
- Well Barrier Element Functions: Tubing, Packer, Casing, Cement, Wellhead and Tree
- Well Barrier Schematic Drafting for Producers, Gas Lift Wells and Water Injectors
- Barrier Element Acceptance Criteria and Verification Methods
- Barrier Status Diagram Update After Workover or Intervention

Day 3: Operating Limits, Annulus Pressure and Valve Testing

- Well Operating Envelope: Pressure, Temperature, Rate and Fluid Composition Limits
- Maximum Allowable Annulus Pressure Calculation per Annulus
- Annulus Pressure Sources: Applied, Thermally Induced and Sustained Casing Pressure
- Bleed-Down and Build-Up Test Procedure and Interpretation Plot
- Subsurface Safety Valve, Master Valve and Wing Valve Leak Test Routines

Day 4: Degradation Threats, Categorisation and Risk Ranking

- Downhole Corrosion and Erosion Threats to Tubing, Casing and Wellhead Components
- Integrity Logging Tools: Multi-Finger Caliper, Electromagnetic Thickness and Leak Detection Logs
- Well Integrity Categorisation Scheme by Barrier Condition
- Risk Ranking Matrix for Wells with Degraded or Lost Barriers
- Deviation Management: Dispensation, Mitigation and Shut-In Decision Criteria

Day 5: Case Work: Well Integrity Status Report and Annulus Management Plan

- Well Handover Package Review from Construction to Operations
- Well Integrity Management System Roles, Responsibilities and Competence Matrix
- Well Integrity KPIs, Surveillance Dashboard and Audit Checklist
- Portfolio Case: Categorising Twelve Wells with Annulus Pressure Anomalies
- Well Integrity Status Report and Annulus Management Plan Presentation

Skills You Will Gain:

- Barrier Envelope Definition
- Well Barrier Schematic Drafting
- Annulus Pressure Diagnostics
- Operating Limit Calculation
- Safety Valve Test Evaluation
- Integrity Log Interpretation
- Well Risk Categorisation
- Integrity KPI Reporting

Why Attend This Course:

- Return with a Well Integrity Status Report and Annulus Management Plan built on a multi-well portfolio case
- Replace ad hoc responses to annulus pressure with a defined limit, test and escalation routine
- Give operations and management a single categorisation that explains which wells need repair, restriction or shut-in
- Compare barrier and surveillance practice with engineers from operators and service companies working onshore and offshore

Conclusion:

Well integrity is kept or lost during the long operating phase, where barrier status changes with every intervention, pressure cycle and year of corrosion. The course moves from definitions and life cycle governance through barrier envelopes and schematics, operating limits, annulus pressure diagnosis and valve testing, to degradation threats, categorisation and risk ranking. The final day applies these methods to handover, the management system and a portfolio case, producing a Well Integrity Status Report and Annulus Management Plan.