

Drilling

1 Drilling

1.1 Well planning

- 1.1.1 Well site preparation
- 1.1.2 Authority for expenditures (AFE)
- 1.1.3 Trajectory design

1.2 Wellbore design

- 1.2.1 Wellbore integrity
- 1.2.2 Geomechanics
- 1.2.3 Rock properties

1.3 Wellhead design

- 1.3.1 Surface wellheads
- 1.3.2 Subsea wellheads
- 1.3.3 Wellhead integrity

1.4 Drillstring design

- 1.4.1 Bha design
- 1.4.2 Drill pipe selection
- 1.4.3 Torque and drag analysis
- 1.4.4 Drillstring dynamics
- 1.4.5 Hole openers and under reamers

1.5 Drill bits

- 1.5.1 Bit design
- 1.5.2 Bit rock interactions
- 1.5.3 Drill bit materials
- 1.5.4 Bit hydraulics

1.6 Drilling operations

- 1.6.1 Drilling operation management
- 1.6.2 Technical limit drilling
- 1.6.3 Drilling optimization
- 1.6.4 Equipment integrity, failure analysis
- 1.6.5 Drilling time analysis
- 1.6.6 Directional drilling
- 1.6.7 Geosteering /reservoir navigation
- 1.6.8 Through tubing rotary drilling
- 1.6.9 Coring, fishing
- 1.6.10 Running and setting casing
- 1.6.11 Plugging and abandonment
- 1.6.12 Coiled tubing drilling

1.7 Pressure management

- 1.7.1 Underbalanced drilling
- 1.7.2 Managed pressure drilling
- 1.7.3 Dual gradient drilling
- 1.7.4 Pressure effects in drilling
- 1.7.5 Well control

- 1.7.6 Wellbore pressure management
- 1.8 Formation damage
 - 1.8.1 Rock fluid incompatibility
 - 1.8.2 Fluid fluid incompatibility
 - 1.8.3 Fines invasion
 - 1.8.4 Biological activity
 - 1.8.5 Phase trapping
- 1.9 Wellbore positioning
 - 1.9.1 Surveying and survey programs
 - 1.9.2 Survey calculations and error models
 - 1.9.3 Anti collision analysis
 - 1.9.4 Survey tools
 - 1.9.5 Ranging tools and proximity calculation
- 1.10 Drilling equipment
 - 1.10.1 Drill string components and drilling tools (tubulars, jars, subs, stabilisers, reamers, etc)
 - 1.10.2 Directional drilling systems and equipment
 - 1.10.3 Well control equipment
 - 1.10.4 Onshore drilling units
 - 1.10.5 Offshore drilling units
- 1.11 Drilling fluids and materials
 - 1.11.1 Fluid mechanics for drilling
 - 1.11.2 Drilling fluid selection and formulation (chemistry, properties)
 - 1.11.3 Drilling fluid management and disposal
 - 1.11.4 Solids control
 - 1.11.5 Drilling hydraulics
 - 1.11.6 HPHT hydraulics
 - 1.11.7 Cuttings transport
 - 1.11.8 Drilling fluid property measurement
- 1.12 Drilling measurement, data acquisition, and automation
 - 1.12.1 Measurement while drilling
 - 1.12.2 Logging while drilling
 - 1.12.3 Mud logging and surface measurements
 - 1.12.4 Sensor Technology
 - 1.12.5 Real time data transmission
 - 1.12.6 Drilling data management and standards
- 1.13 Drilling automation
 - 1.13.1 Surface operations automation
 - 1.13.2 Downhole operations automation
 - 1.13.3 Autonomous downhole tools
- 1.14 Casing and cementing
 - 1.14.1 Casing design
 - 1.14.2 Casing material selection
 - 1.14.3 Cement formulation (chemistry, properties)
 - 1.14.4 Cement and bond evaluation

Completions

2 Completions

2.1 Completion selection and design

2.1.1 Completion selection

2.1.2 Production tubing design

2.1.3 Completion equipment

2.1.4 Completion load modelling

2.1.5 Completion materials

2.1.6 HPHT completions design

2.1.7 Deepwater completions design

2.2 Completion installation and operations

2.2.1 Well clean out

2.2.2 Perforating

2.2.3 Fluid loss control

2.2.4 HPHT completions installation

2.2.5 Deepwater completions installation

2.2.6 Coiled tubing operations

2.3 Completion monitoring systems/intelligent wells

2.3.1 Remote monitoring

2.3.2 Downhole sensors and control equipment

2.3.3 Flow control equipment

2.3.4 Real time optimization

2.3.5 Completion data management

2.3.6 Tubular optimization

2.3.7 Downhole tools and equipment

2.4 Sand control

2.4.1 Sand/solids control

2.4.4 Screen selection

2.4.5 Gravel pack design & evaluation

2.4.6 Frac and pack

2.5 Hydraulic fracturing

2.5.1 Fracture design and containment

2.5.2 Fracturing materials (fluids, proppant)

2.5.3 Fracturing equipment

2.5.4 Multistage fracturing

2.5.5 Re-fracturing

2.6 Acidizing

2.7 Completion fluids

2.7.1 Completion fluids

2.7.2 Formation damage during completion

2.8 Completions evaluation

2.9 Recompletion

2.10 Well Integrity

- 2.10.1 Design for well integrity
- 2.10.2 Well integrity logging and monitoring
- 2.10.3 Zonal isolation
- 2.10.4 Subsurface corrosion (tubing, casing, completion equipment, conductor)
- 2.10 Fundamental research in well completion

Production and operations

3 Production and well operations

3.1 Artificial lift systems

- 3.1.1 Beam and related pumping techniques
- 3.1.2 Electric submersible pumps
- 3.1.3 Hydraulic and jet pumps
- 3.1.4 Hybrid lift technologies
- 3.1.5 Plunger lift
- 3.1.6 Gas lift
- 3.1.7 Progressing cavity pumps
- 3.1.8 Gas well deliquification

3.2 Well operations and optimization

- 3.2.1 Well candidate recognition
- 3.2.2 Downhole intervention and remediation (including wireline and coiled tubing)
- 3.2.3 Produced sand/solids management and control
- 3.2.4 Produced water management and control
- 3.2.5 Downhole fluids separation management and disposal
- 3.2.6 Well performance modeling
- 3.2.7 Lifecycle management and planning

3.3 Well and reservoir surveillance and monitoring

- 3.3.1 Production logging
- 3.3.2 Borehole imaging and wellbore seismic
- 3.3.3 Downhole and wellsite flow metering
- 3.3.4 Downhole monitoring and control
- 3.3.5 Production data management
- 3.3.6 Integrated modeling

3.4 Production chemistry, metallurgy, and biology

- 3.4.1 Inhibition and remediation of hydrates, scale, paraffin or wax, and asphaltene
- 3.4.2 Well fluid analysis
- 3.4.3 Corrosion inhibition and management (including H₂S and CO₂)
- 3.4.4 Downhole chemical treatments and fluid compatibility
- 3.4.5 Bacterial contamination and control

3.5 Well intervention

- 3.5.1 Candidate selection
- 3.5.2 Intervention methods
- 3.5.3 Through tubing well intervention
- 3.5.4 Re-simulation (excluding re-fracking)

- 3.5.5 Water shut-off
- 3.5.6 Pump repairs
- 3.6 Well decommissioning
 - 3.6.1 Well plug and abandonment methods, design and selection
 - 3.6.2 Plugging materials
 - 3.6.3 Well plug and abandonment operations
 - 3.6.4 Rigless plug and abandonment
- 3.7 Fundamental research in production and operations

Projects, facilities, and construction

- 4 Projects, Facilities design and construction
 - 4.1 Processing systems and design
 - 4.1.1 Process simulation
 - 4.1.2 Separation and treating
 - 4.1.3 Dehydration
 - 4.1.4 Gas processing
 - 4.1.5 Processing equipment
 - 4.1.6 Compressors, engines, and turbines
 - 4.1.7 Electrical systems
 - 4.1.8 Heavy oil upgrading
 - 4.1.9 Tanks and storage systems
 - 4.1.10 Integrated reservoir surface systems
 - 4.1.11 Human factors engineering
 - 4.1.12 HSE considerations in facilities design
 - 4.2 Pipelines, flowlines, and risers
 - 4.2.1 Piping design and simulation
 - 4.2.2 Pipeline transient behavior
 - 4.2.3 Materials and corrosion
 - 4.2.4 Risers
 - 4.2.5 Offshore pipelines
 - 4.3 Flow assurance
 - 4.3.1 Hydrates
 - 4.3.2 Precipitates (paraffin, asphaltenes, etc.)
 - 4.3.3 Solids (scale, sand, etc.)
 - 4.4 Measurement and control
 - 4.4.1 Process control and automation
 - 4.4.2 SCADA
 - 4.4.3 Multiphase measurement
 - 4.4.4 Pipeline leak detection
 - 4.4.5 Facilities data management
 - 4.5 Offshore facilities and subsea systems
 - 4.5.1 Siting, assessment of hazards
 - 4.5.2 Platform design
 - 4.5.3 Floating production systems
 - 4.5.4 Mooring systems

- 4.5.5 Installation equipment and techniques
- 4.5.6 Subsea production equipment
- 4.5.7 Controls and umbilicals
- 4.5.8 Flow assurance in subsea systems
- 4.5.9 Subsea processing
- 4.5.10 Remotely operated vehicles
- 4.6 Natural gas conversion and storage
 - 4.6.1 Compressed natural gas (CNG)
 - 4.6.2 Liquified natural gas (LNG)
 - 4.6.3 Gas to liquids
 - 4.6.4 Gas storage facility design
 - 4.6.5 Gas storage facility operation
- 4.7 Unconventional production facilities
 - 4.7.1 Oil sand, shale, or bitumen
 - 4.7.2 Co₂ capture and management
- 4.8 Facilities and construction project management
 - 4.8.1 Onshore projects planning and execution
 - 4.8.2 Offshore projects planning and execution
 - 4.8.3 Onshore construction management
 - 4.8.4 Offshore construction management
 - 4.8.5 Cost estimation and control
 - 4.8.6 Contracting, procurement, and administration
 - 4.8.7 Project management performance
 - 4.8.8 HSE considerations in facilities construction
- 4.9 Facilities operations
 - 4.9.1 Operating procedures
 - 4.9.2 Commissioning and startup
 - 4.9.3 Pipeline pigging
 - 4.9.4 Facility integrity management
- 4.10 Facilities decommissioning and site remediation
 - 4.10.1 Land facility decommissioning
 - 4.10.2 Offshore facility decommissioning
- 4.11 Fundamental research in projects, facilities, and construction
 - 4.11.1 Corrosion research

Reservoir

- 5 Reservoir description and dynamics
 - 5.1 Reservoir characterization
 - 5.1.1 Exploration, development, and structural geology
 - 5.1.2 Faults and fracture characterization
 - 5.1.3 Sedimentology
 - 5.1.4 Petrology
 - 5.1.5 Geologic modeling
 - 5.1.6 Near well and vertical seismic profiles
 - 5.1.7 Seismic processing and interpretation

- 5.1.8 Seismic modeling
- 5.1.9 Four dimensional and four component seismic
- 5.1.10 Reservoir geomechanics
- 5.2 Fluid characterization
 - 5.2.1 Phase behavior and pvt measurements
 - 5.2.2 Fluid modeling, equations of state
 - 5.2.3 Geochemical characterization
- 5.3 Reservoir fluid dynamics
 - 5.3.1 Flow in porous media
 - 5.3.2 Multiphase flow
 - 5.3.3 Particle transportation
 - 5.3.4 Integration of geomechanics in models
- 5.4 Improved and enhanced recovery
 - 5.4.1 Waterflooding
 - 5.4.2 Gas injection methods
 - 5.4.3 Gas cycling
 - 5.4.4 Reduction of residual oil saturation
 - 5.4.5 Conformance improvement
 - 5.4.6 Thermal methods
 - 5.4.7 Chemical flooding methods
 - 5.4.8 Steam solvent combination methods
 - 5.4.9 Miscible methods
 - 5.4.10 Microbial methods
 - 5.4.11 Cold heavy oil production
- 5.5 Reservoir simulation
 - 5.5.1 Simulator development
 - 5.5.2 Construction of static models
 - 5.5.3 Scaling methods
 - 5.5.4 Visualization technologies
 - 5.5.5 Evaluation of uncertainties
 - 5.5.6 Dynamic model update algorithms
 - 5.5.7 Streamline simulation
 - 5.5.8 History matching
- 5.6 Formation evaluation and management
 - 5.6.1 Open hole or cased hole log analysis
 - 5.6.2 Core analysis
 - 5.6.3 Pressure transient analysis
 - 5.6.4 Drillstem or well testing
 - 5.6.5 Tracer test analysis
 - 5.6.6 Cross well tomography
 - 5.6.7 Formation test analysis (e.g., wireline, LWD)
 - 5.6.8 Well performance monitoring, inflow performance
 - 5.6.9 Production forecasting
 - 5.6.10 Seismic monitoring (four dimensional)

- 5.6.11 Reservoir monitoring with permanent sensors
- 5.7 Reserves evaluation
 - 5.7.1 Estimates of resource in place
 - 5.7.2 Recovery factors
 - 5.7.3 Deterministic methods
 - 5.7.4 Probabilistic methods
 - 5.7.5 Economic evaluations
 - 5.7.6 Reserves classification
- 5.8 Unconventional and complex reservoirs
 - 5.8.1 Tight gas
 - 5.8.2 Shale gas
 - 5.8.3 Coal seam gas
 - 5.8.4 Shale oil
 - 5.8.5 Oil sand, oil shale, or bitumen
 - 5.8.6 Naturally fractured reservoirs
 - 5.8.7 Carbonate reservoirs
 - 5.8.8 Gas condensate reservoirs
 - 5.8.9 Hp/ht reservoirs
- 5.9 Non traditional resources
 - 5.9.1 Gas hydrates
 - 5.9.2 Geothermal resources
- 5.10 Storage reservoir engineering
 - 5.10.1 CO₂ capture and sequestration
 - 5.10.2 Natural gas storage
- 5.11 Fundamental research in reservoir description and dynamics

Health, safety, environment, and sustainability

- 6 Health, safety, environment, and sustainability
 - 6.1 HSES and management
 - 6.1.1 HSES management systems
 - 6.1.2 HSES reporting
 - 6.1.3 HSES audit and certification
 - 6.1.4 HSES standards, regulations, and codes
 - 6.1.5 Human resources, competence, and training
 - 6.1.6 Contingency planning and emergency response
 - 6.2 Health
 - 6.2.1 Strategic health management
 - 6.2.2 Health impact assessment
 - 6.2.3 Exposure assessment
 - 6.2.4 Industrial hygiene
 - 6.2.5 Community health outreach
 - 6.2.6 Infectious diseases (HIV/AIDS, malaria, tuberculosis)
 - 6.2.7 Noise, chemicals, and other workplace hazards
 - 6.2.8 Ergonomics
 - 6.3 Safety

- 6.3.1 Human factors (engineering and behavioral aspects)
- 6.3.2 Safety in design and engineering
- 6.3.3 Operational safety
- 6.3.4 Transportation safety
- 6.3.5 Process safety
- 6.3.6 Chemical use and storage
- 6.3.7 Safety risk management
- 6.4 Security
 - 6.4.1 Facility vulnerability assessment
 - 6.4.2 Security of operating facilities
 - 6.4.3 Data and communications security
- 6.5 Environment
 - 6.5.1 Air emissions
 - 6.5.2 Water use, produced water discharge and disposal
 - 6.5.3 Waste management
 - 6.5.4 Naturally occurring radioactive materials
 - 6.5.5 Oil and chemical spills
 - 6.5.6 Remediation and land reclamation
 - 6.5.7 Climate change
- 6.6 Sustainability/social responsibility
 - 6.6.1 Integrating HSES into the business
 - 6.6.2 Environmental and social impact assessments
 - 6.6.3 Social responsibility and development
 - 6.6.4 Sustainable development
 - 6.6.5 Community outreach
 - 6.6.6 Partnership and communication
- 6.7 Fundamental research in HSES

Management

7 Management

- 7.1 Asset and portfolio management
 - 7.1.1 Reserves replacement, booking, and auditing
 - 7.1.2 Reserves accounting for non traditional reservoirs
 - 7.1.3 Economic analysis guidelines
 - 7.1.4 Acquisition and divestiture
 - 7.1.5 Portfolio analysis, management, and optimization
 - 7.1.6 Field development optimization and planning
 - 7.1.7 Integrated asset modeling
 - 7.1.8 Asset integrity
 - 7.1.9 Project economics/ valuation
 - 7.1.10 Capital budgeting and project selection
- 7.2 Risk management and decision making
 - 7.2.1 Risk, uncertainty, and risk assessment
 - 7.2.2 Risk management systems
 - 7.2.3 Decision making processes

- 7.2.4 Statistical techniques for managing risk
- 7.2.5 Emergency preparedness and training
- 7.3 Strategic planning and management
 - 7.3.1 Exploration and appraisal strategies
 - 7.3.2 Benchmarking and performance indicators
 - 7.3.3 Project management
- 7.4 Energy economics
 - 7.4.1 Resource potential and evaluation
 - 7.4.2 Unconventional resource economics
 - 7.4.3 Market analysis or supply and demand forecasting or pricing
 - 7.4.4 Energy policy and regulation
 - 7.4.5 Future of energy, oil and gas
 - 7.4.6 Statistical techniques for energy economics
- 7.5 Professionalism, training, and education
 - 7.5.1 Ethics
 - 7.5.2 Personnel competence
 - 7.5.3 Professional registration or certification
 - 7.5.4 University curricula
 - 7.5.5 Communities of practice

Data science and engineering analytics

- 8 Data science and engineering analytics
 - 8.1 Information management and systems
 - 8.1.1 Knowledge management
 - 8.1.2 Data integration
 - 8.1.3 Data security
 - 8.1.4 Data mining
 - 8.1.5 Metadata management
 - 8.1.6 Artificial intelligence
 - 8.1.7 Neural networks
 - 8.2 Research and development and emerging technology programs
 - 8.2.1 New technology deployment
 - 8.2.2 New technology valuation
 - 8.2.3 New technology funding