Introduction

In this course, participants will learn the causes of sand production and formation damage and how they can reduce production. Methods and procedures will be presented to guide participants in decision making with regard to completing a well with optimum control of formation sand while incurring minimal damage to the well or production zone.

Participants will also learn why certain practices should either be employed or strictly avoided. Finally the very latest in the use of forecasting methods, tools, techniques and personal experiences will be presented. The course will use lecture and class discussion. Video clips and PowerPoint slides will serve as visual aids and as the lecture outline. Hands-on participation will be included in the form of problem solving exercises and learning helps.

Here are the benefits of attending this course:

- Understand the nature of sandface and its behavior
- Know the causes of sand production and formation damage
- Learn the techniques and practices of formation damage treatment
- Know how to predict formation behavior
- Able to choose the best sandface completion that maximizes flow
- Learn the well completion practices that give you the highest productivity
- Understand the various sand control techniques

Course Outline

Day One

Causes and effect of sand production
- The geology of sedimentary formations
- The nature of cohesive failure, and contributing issues
- Terms that describe sanding formations

Prediction of formation behavior
- Formation properties logs to predict sand propensity to produce
- Understanding each element of Darcy’s Law
- Drawdown issues, predictions and calculations
- Time dependence and multiphase flow

Productivity and flow efficiency
- The concept of radial vs. linear flow
- Issues related to near wellbore restrictions
Formation damage issues
- Drilling the well
- Cementing operations
- Damage due to perforating
- Chemistry of formation clays
- Damage due to mishandling of clays
- Treatments to minimize clay damage

Day Two

Continuation of formation damage issues:
- Well treatment chemicals: surfactants
- In-situ damage compounds: scales, paraffin and asphaltene
- Use and misuse of HCl and HF acids

Evolution of Sand Management Techniques

Cased - Hole Sandface Completions
- Drill-in and completion fluids
  - Chemistry and application of specialty brines
  - Filtration and viscosifying brines
  - Safety video on ZnBr₂ brines
  - Fluid loss tests and what the numbers mean
- Mechanical devices
  - Methods used to manufacture screens & liners
  - Special purpose screens
- Planning a Gravel pack
  - Formation sand sizing
  - Types of proppant materials and their use
  - Pack Sand or gravel sizing

Day Three

Cased-hole sandface completions
- Fluid filtration techniques
- Cartridge vs. D.E. filtration
- Quantifying filtration results
- Beta ratings

Perforating
- Gun design and deployment
- Perforation sizing and shapes
- Perforation cleaning methods

Types of Gravel packs
- Water packs
- Slurry packs
- Polymers used to viscosify gravel pack fluids
- Carrier fluid selection
- Chemical breakers

Gravel placement techniques
- Over-the-top method
- Through-tubing gravel packs
- Inside pressure pack
- Perforation packing
- How fluids selection relates to tool design
Tool designs to achieve void-free packing
- Gravel packing tool string
- Multi-position gravel pack packers
- One-trip perf. & pack system

Day Four

Frac Packing in cased completions
- Comparing Frac-packs with other methods
- Dusterhoft Application Selection Chart
- Hydraulic fracturing concepts
  - Rock mechanics concepts
  - Hard rock vs. soft rock (high permeability) strategies
  - Fracture length, width, height & conductivity
  - Tip screen-out designs
  - Modern proppant design theories
- Measuring In-situ stresses
  - Use of mini-fracs
  - Estimation by sonic log tools

Fracturing Fluid Systems
- Water packs
- HEC
- HP guars
- Crosslinkers and breakers
- Oil gels
- Foams

Sand Control in Open-hole Completions
- Fluids related to drill-in (fluid loss control)
  - Problems related to long deviated intervals
  - View videos
- Sand exclusion devices
  - Screens & Liners
  - Expandable screens
  - Specialty screens
    (a) CAPS
    (b) Shunt screens
- Vertical open-hole completions
  - Over-the-top tools and procedures
  - Cup packer- tubing placement
  - Use of “Tell-Tale Screens”

Day 5

Chemical Consolidation Methods
- Consolidation resins used in pre-pack screens
- Epoxy resin consolidation systems
- Furan resin consolidation systems

Combination packing/consolidation systems

Their Applications in frac packing

Surface Operations & Equipment
Who Should Attend

- Production supervisors and engineers
- Completion supervisors and engineers
- Reservoir engineers
- Geologists
- Drilling supervisors and engineers
- Workover and well service supervisors

Your Course Instructor

William K. (Bill) Ott is a co-author of World Oil Modern Sandface Completion Practices Handbook and an expert on sand control techniques.

He is a petroleum consultant based in Houston, Texas and the founder of Well Completion Technology, an international engineering consulting and petroleum industry training firm that was established in 1986. Before consulting Mr. Ott was division engineer for Halliburton’s Far East region based in Singapore and a research field coordinator for Halliburton in Duncan, Oklahoma, USA.

Mr. Ott received his BS Degree in Chemical Engineering from the University of Missouri (1972), is registered professional engineer in Texas, and a 25-year member of SPE. He works regularly with and on wells requiring sand control in East Asia, has conducted technical petroleum industry courses worldwide and written numerous technical papers relating to well completion and workover operations.

Enrollment Information

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