

Formation Damage (Evaluation, Prevention, and Treatment)



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1st floor, Incubator Building, Masdar
City, Abu Dhabi, UAE



00971-2-6452630



00971-50-6652671



info@btsconsultant.com




www.btsconsultant.com

Introduction:

This course provides a broad overview of the nature of formation damage problems, how they occur during various oilfield operations, and their effects on well productivity. It reviews basic rock properties affected by formation damage, discusses the types and mechanisms of formation damage, evaluates economic implications, and integrates field and laboratory methods for recognition of the damage. Also, it Provides geological and engineering techniques for proper evaluation of the problem and procedures to minimize / alleviate it.

Course Overview:

- Review of basic rock properties affected by formation damage
 - introduction to formation damage
 - scale and precipitate damage
 - organic deposition
 - bacteria
 - Perforation
 - Economic implecation of fromation damage
 - Method for recognition of formation damage
 - Formation damage prevention
 - Evaluation of formation damage caused by completion and workover fluid
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Objectives:

- Recognizing formation damage problem during any stage of well development and reservoir exploitation.
- Evaluating drilling and completion practices to establish procedures for selection of non-damaging systems.
- Developing procedures to assess and integrate laboratory and field techniques to recognize and treat formation damage.
- Quantify the annual revenue loss associated with formation damage.

Who should attend?

- Petroleum Engineers,
- Reservoir Engineers,
- Production Engineers,
- Drilling Engineers,
- Reservoir Geologists, and
- Petrophysists.

Daily Outline:

Introduction

Pretest

Review of basic rock properties affected by formation damage

- Course Introduction & Overview Formation Damage
- Class exercise
- Laboratory techniques

Day 2

Introduction to Formation Damage

- Basic definitions
- Potential formation damage problems during various well operation
 - ❖ Drilling
 - ❖ Casing and cementing
 - ❖ Completion
 - ❖ Well intervention
 - ❖ Well stimulation
 - ❖ Production
 - ❖ Secondary recovery operations- water injection
 - ❖ Enhanced oil recovery

Day 3

Scale and precipitate damage

- Scale deposition, removal and prevention
- Tendency of brines to deposit scales
- Prediction and identification of scales
- Paraffins

- Formation of paraffin deposits
- Paraffin removal
- Asphaltenes
- Oil sludge prevention
- Methods of acid sludge removal

Day 4

Bacteria

- Sulfate reducing bacteria
- Slime forming bacteria
- Iron bacteria
- Prevention of bacteria

Perforation


- Perforation theory & damage
- Perforation shot density
- Compacted zone
- Perforation plugging
- Role of under-balance in improved perforation flow

The economic implication of formation damage

- Class exercise
- Development of flow diagrams and process maps

Day 5

Method For Recognition Of Formation Damage

- Drill stem tests
 - Resistivity log
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- Production history review
- Comparison of production performance of offset wells (Class problem)
- Pressure transient well test analysis
- Nodal system analysis
- Production logging
- Laboratory core analysis method

Formation damage prevention

- Tests to perform on formation damage
 - ❖ Thin Section Petrography.
 - ❖ Scanning Electron Microscopy.
 - ❖ X-Ray Diffraction Analysis.
 - ❖ Formation Sensitivity Studies.
- Filtration
- Removal of formation damage

Evaluation of formation damage caused by completion and workover fluids

- Technical Problem.
- Objective.
- Evaluation of Lithology and Mineralogy.
- Evaluation of Permeability Loss.
- Conclusions and Recommendations.

Post Test

Closing