Comprehensive Course In Water Flooding Design, Management and Monitoring

30 November – 11 December 2026
Barcelona (Spain)

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Introduction

Water flooding is one of the most widely used secondary oil recovery methods and remains essential for maintaining reservoir pressure and improving hydrocarbon recovery. This training course, Water Flooding Design, Management and Monitoring, provides engineers and petroleum professionals with the practical knowledge and technical tools needed to design, manage, and monitor successful water flooding projects.

The course focuses on practical application, field experience, and proven industry practices that help improve reservoir performance and maximize recovery efficiency. Participants will gain a clear understanding of the technical and operational aspects of water flooding, from early screening and design through monitoring, optimization, and troubleshooting.

Course Objectives

By the end of this course, participants will be able to:

- Understand the principles and mechanisms of water flooding and its role in enhanced oil recovery.
- Design effective water flooding schemes based on reservoir characteristics.
- Manage and monitor water injection operations to improve project performance.
- Evaluate reservoir behavior and identify ways to enhance sweep efficiency.
- Address operational challenges such as water breakthrough, injectivity decline, and conformance issues.

Course Outlines

Day 1: Fundamentals of Water Flooding

- Introduction to water flooding as a secondary recovery technique
- Reservoir drive mechanisms and displacement concepts
- Historical development and field applications
- Rock and fluid properties affecting water flood performance
- Recovery efficiency factors including mobility ratio, areal sweep, and vertical conformance



Day 2: Screening and Feasibility Analysis

- Reservoir screening criteria for water flooding
- Technical and economic feasibility assessment
- Water source selection and quality evaluation
- Review of field case studies
- Environmental and operational considerations

Day 3: Water Flooding Pattern Design

- Injection well patterns such as five-spot, nine-spot, line drive, and peripheral injection
- Well spacing and pattern efficiency evaluation
- Volumetric calculations and sweep efficiency estimation
- Effect of reservoir heterogeneity on design
- Pattern selection in fractured and homogeneous reservoirs

Day 4: Injection System Design

- Surface and subsurface injection system components
- Water treatment and filtration methods
- Corrosion and scale control in injection systems
- Injection pressure and flow rate management
- Use of simulation tools in injection system design

Day 5: Reservoir Simulation for Water Flooding

- Introduction to dynamic reservoir simulation
- History matching and model calibration
- Forecasting performance through predictive models
- Sensitivity analysis for injection variables
- Overview of simulation platforms used in water flooding studies

Day 6: Monitoring and Surveillance Techniques

- Key performance indicators for water flooding operations
- Pressure monitoring and flow behavior analysis
- Tracer studies and interwell communication testing
- Monitoring technologies such as logging and time-lapse seismic methods
- Building effective surveillance plans



Day 7: Production Performance Analysis

- Production response evaluation during water injection
- Water cut behavior and breakthrough analysis
- Material balance and fractional flow interpretation
- Identification of channeling and unswept zones
- Performance analysis using decline curves and water-oil ratio trends

Day 8: Conformance Control and Optimization

- Causes and effects of poor sweep efficiency
- Mechanical methods for zonal isolation and control
- Chemical treatment options including polymers, gels, and surfactants
- Optimization of injection rates and patterns
- Practical examples of conformance improvement

Day 9: Troubleshooting and Risk Management

- Common operational issues such as injectivity loss, scaling, and souring
- Root cause analysis and corrective actions
- Well integrity and injection system reliability
- Safety considerations and emergency response planning
- Lessons learned from unsuccessful projects

Day 10: Project Integration and Course Wrap-Up

- Developing a full life-cycle plan for water flooding projects
- Integrating water flooding with other recovery methods
- Group exercise on complete project design
- Review of major tools, techniques, and practical takeaways
- Final discussion and course summary

Why Attend this Course: Wins & Losses!

- Build a solid understanding of water flooding principles and field applications
- Learn how to design and optimize injection strategies effectively
- Strengthen monitoring and surveillance capabilities for better field control
- Improve the ability to solve operational problems using practical methods
- Use simulation and performance analysis tools to support better technical decisions
- Benefit from real case studies and field-based learning
- Develop stronger expertise in water flooding and enhanced oil recovery practices



Conclusion

Water flooding continues to be one of the most effective methods for improving oil recovery and supporting long-term reservoir management. This course gives participants the practical knowledge and technical confidence needed to design, manage, and monitor water flooding projects successfully.

Whether working in reservoir engineering, production, or field operations, participants will leave with applicable skills that support stronger decision-making and improved project outcomes in secondary recovery operations

