

# Advanced Water Flooding for Improved Oil Recovery: Monitoring, Optimization & Troubleshooting

UK Training

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## Introduction

Water flooding is one of the most widely used secondary oil recovery methods, playing a vital role in maintaining reservoir pressure, improving sweep efficiency, and increasing hydrocarbon recovery. However, the success of water flooding projects depends on more than injection system design. It requires continuous monitoring, accurate production analysis, effective conformance control, and the ability to diagnose and resolve operational and reservoir-related challenges throughout the field life.

This intensive 5-day course is designed to provide participants with practical knowledge and applied techniques for monitoring, optimizing, and managing water flooding operations effectively. Through technical discussions, field-based examples, and practical exercises, participants will develop the skills needed to improve injection efficiency, identify performance issues, and enhance overall reservoir performance.

## Course Objectives

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

- Understand key monitoring and surveillance techniques used in water flooding operations.
- Analyze production and injection performance using practical engineering tools.
- Evaluate sweep efficiency and apply conformance improvement methods.
- Optimize injection strategies and water flood patterns to improve oil recovery.
- Identify and troubleshoot common operational and reservoir-related issues.
- Apply performance analysis methods to support technical decision-making.
- Integrate water flooding optimization into long-term reservoir management strategies.
- Develop practical solutions through case studies and project-based exercises.

## Course Outlines

### Day 1: 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, including production logging and time-lapse seismic methods.
- Developing effective surveillance and reservoir monitoring plans.
- Practical examples of surveillance-driven optimization.

### Day 2: Production Performance Analysis

- Evaluating production response during water injection.
- Water cut behavior and breakthrough analysis.
- Material balance and fractional flow interpretation.
- Identifying channeling and unswept zones.
- Decline curve analysis and water-oil ratio performance trends.
- Using production data to support optimization decisions.

### Day 3: Conformance Control and Performance Optimization



- Causes and impacts of poor sweep efficiency.
- Mechanical methods for zonal isolation and water control.
- Chemical treatment options, including polymers, gels, and surfactants.
- Optimizing injection rates and water flood pattern performance.
- Practical applications and case studies in conformance improvement.
- Strategies for maximizing reservoir sweep efficiency.

#### Day 4: Troubleshooting and Risk Management

- Common operational issues, including injectivity loss, scaling, corrosion, and reservoir souring.
- Root cause analysis and corrective action techniques.
- Well integrity and injection system reliability management.
- Safety considerations and emergency response planning.
- Lessons learned from unsuccessful water-flooding projects.
- Risk mitigation strategies for sustained water flood performance.

#### Day 5: Project Integration and Water Flood Optimization Workshop

- Developing a full life-cycle plan for water-flooding projects.
- Integrating water flooding with enhanced oil recovery methods.
- Group exercise on complete water flood project design.
- Review of key tools, techniques, and practical takeaways.
- Optimization workshop using field scenarios and case studies.
- Final discussion and course summary.

#### Why Attend this Course: Wins & Losses!

- Build a strong practical understanding of water-flooding applications.
- Learn how to design and optimize injection strategies effectively.
- Strengthen monitoring and surveillance capabilities for better field control.
- Improve problem-solving skills for operational and reservoir challenges.
- Use simulation and performance analysis tools to support technical decisions.
- Benefit from real case studies and lessons learned from both successful and unsuccessful projects.
- Develop stronger expertise in secondary recovery and water flood optimization.

#### Conclusion

Water flooding remains one of the most effective methods for improving oil recovery and supporting long-term reservoir management. This course equips participants with the practical knowledge and technical confidence needed to monitor, optimize, troubleshoot, and manage water flooding projects successfully.

By the end of the course, participants will be able to apply practical skills that support stronger decision-making, improve project outcomes, and enhance the efficiency of secondary recovery operations.



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