
Waterflood Performance Surveillance and Optimisation Training Course

7 – 11 March 2027
Doha





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Programme Summary

Waterflood performance surveillance and optimisation is the subject of this one-week training course for reservoir, production and asset leaders, ending in a waterflood performance review pack for one field or pattern group. Mature fields depend on injected water to hold pressure and sweep oil, yet injection, production and water treatment are often reviewed by separate teams with separate data. The programme moves from the injection balance to surveillance plots, conformance, injection water quality and optimisation decisions, applied to a field the participant selects. Mars Training Centre UK delivers this programme on waterflood performance surveillance and optimisation to mixed-organisation cohorts.

The Business Case

Waterflooding often supports the largest share of production in a mature asset, so small losses in sweep, injectivity or water handling accumulate into large volumes of unrecovered oil. Teams that read the same surveillance plots, share one voidage balance and agree one action list can act early on poor patterns, rising watercut and plugging injectors instead of explaining them after the quarter closes.

- Unrecovered Oil: Falls as poorly swept patterns are found and rebalanced earlier.
- Water Handling Cost: Falls as recycled water and unproductive injection are brought under review.
- Injector Downtime: Falls as injection water quality is linked to plugging and scaling signs.

Principles and Evidence Base

- Voidage Replacement Ratio: Provides the injection and production balance reviewed in Session 1.
- Hall Plot and Injectivity Diagnostics: Supply the injector health reading applied in Session 2.
- Water-Oil Ratio and Watercut Diagnostics: Guide the breakthrough and conformance checks made in Session 3.
- Fractional Flow and Sweep Efficiency Concepts: Frame the optimisation options ranked in Session 4.

Intended Participants

- Reservoir leaders who set the depletion plan and approve changes to injection rates.
- Production leaders who answer for wells, facilities and water handling performance.
- Asset managers who weigh intervention cost against recovery benefit.
- Surveillance team leaders who must brief management on field performance.

Typical functions include national and international operators, mature onshore fields, offshore platforms and field development consultancies.



Learning Outcomes

1. Participants will be able to construct a voidage balance that links injection volumes to production by pattern.
2. Participants will be able to diagnose injector health from rate, pressure and surveillance plot behaviour.
3. Participants will be able to evaluate watercut and water-oil ratio trends to locate breakthrough and poor conformance.
4. Participants will be able to prioritise conformance and injection water quality actions by cost and recovery benefit.
5. Participants will be able to justify changes to rates and patterns to a technical committee.
6. Participants will be able to prepare a review pack that supports the next waterflood decision.

Programme Structure

Day 1: Waterflood Performance Surveillance Foundations

Is the field injecting and producing in balance, and where does it fall short?

- Injection and Production Balance Sheet
- Voidage Replacement Ratio Calculation
- Injector Producer Pattern Map
- Rate and Pressure Trend Dashboard
- Surveillance Indicator Set

Day 2: Reading Injector and Pattern Behaviour

What do rate, pressure and plot behaviour say about each injector?

- Hall Plot Injectivity Review
- Injection Profile Interpretation
- Pattern Balancing Check
- Pressure Fall-Off Summary
- Injector Health Ranking

Day 3: Breakthrough and Conformance Control

Where is water moving too fast, and which actions would redirect it?

- Water-Oil Ratio Diagnostic Plot
- Watercut Trend Classification
- Breakthrough Pathway Assessment
- Conformance Control Options Table
- Well Shut-In and Rate Adjustment Screen



Day 4: Injection Water Quality and Optimisation

Which changes to water quality and injection plan raise recovery at acceptable cost?

- Injection Water Quality Specification Review
- Plugging and Scaling Risk Screen
- Fractional Flow Sweep Assessment
- Optimisation Option Ranking
- Cost and Recovery Benefit Table

Day 5: Waterflood Review Pack for One Field

Do the balance, injector readings, conformance findings and options point to the same plan?

- Applying the Session 1 Voidage Replacement Ratio Calculation
- Testing the Session 2 Injector Health Ranking
- Checking the Session 3 Conformance Control Options Table
- Reviewing the Session 4 Optimisation Option Ranking
- Completing the Waterflood Review Pack

Methodology

The programme uses a data workshop method built on a shared case of a mature field with several injection patterns, rising watercut and a water treatment plant near capacity. Participants build each artefact on the case, then on their own field data, with written facilitator feedback after each session.

- Suggested activity: Building a voidage balance for six patterns and flagging the weakest.
- Suggested activity: Classifying injector plots as healthy, plugging or fracturing.
- Suggested activity: Presenting a ranked action list to a mock asset committee.

Capstone Output

Each participant completes a waterflood review pack for one field or pattern group. It holds a voidage balance, an injector health ranking, a breakthrough assessment, a ranked option table and a short decision note. The pack is used at work to brief management, plan surveillance priorities and support the next injection programme discussion.

Frequently Asked Questions

Is waterflood performance surveillance suitable for leaders who are not reservoir engineers?

Yes. Waterflood performance surveillance is taught through field cases and templates, assuming experience in production, asset or reservoir management but no simulation modelling skills.



Which methods does waterflood performance surveillance rest on?

Waterflood performance surveillance rests on the voidage replacement ratio, Hall plot diagnostics, water-oil ratio and watercut diagnostics, and fractional flow and sweep efficiency concepts.

How is the pack from waterflood performance surveillance used at work?

You use the waterflood review pack to brief management, set surveillance priorities and support rate, pattern and water quality decisions.

How does waterflood performance surveillance differ from enhanced oil recovery training?

Waterflood performance surveillance centres on managing existing water injection, while enhanced oil recovery training covers chemical, gas and thermal methods applied after waterflooding.