Produced Water Treatment and Reinjection: De-Oiling, Injection Water Quality and Injectivity

6 – 10 June 2027
Riyadh - KAFD district five-star



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Introduction:

Produced water treatment decides whether a maturing oil field keeps its injectors open: rising water cut overloads de-oiling vessels, oil-in-water creeps above target, suspended solids and bacteria plug the sandface and injection pressure climbs until wells are shut in or water is dumped at higher cost. This Core Concept course gives engineers the methods to characterise produced water, choose between reinjection, disposal and reuse, size de-oiling and filtration stages, set injection water specifications and trace injectivity loss. Participants produce a Produced Water Treatment and Reinjection Train Design for a case field.

Course Objectives:

- Quantify produced water volumes, water cut forecasts and composition, including dispersed oil, dissolved solids, heavy metals and NORM, for each source feeding the water system
- Select a water management route of reinjection for pressure support, disposal injection or reuse and discharge by comparing volume, quality and cost
- Size and operate skim tanks, deoiling hydrocyclones, gas flotation units and nutshell or media filters to meet oil-in-water and solids targets
- Set injection water quality specifications for oil-in-water, total suspended solids, particle size, dissolved oxygen and sulphate-reducing bacteria and prepare seawater by filtration, deaeration and sulphate removal
- Diagnose injectivity decline from water quality, compatibility and scaling data using Hall plots, core flood evidence and membrane filtration tests
- Design a produced water treatment and reinjection train with a sampling and measurement plan for a case field

Target Audience:

- Production engineering functions responsible for water cut, water handling capacity and injector availability
- Facilities and process engineering functions responsible for de-oiling, filtration and deaeration equipment performance
- Water treatment functions responsible for injection water quality, sampling and laboratory measurement
- Reservoir and injection surveillance functions responsible for voidage targets, injectivity and disposal well capacity
- Operations functions responsible for running water plants, injection pumps and disposal systems on shift

Course Outline:

Day 1: Produced Water Sources, Volumes and Management Strategy

- Formation, Condensed and Injected Water Breakthrough as Produced Water Sources
- Water Cut Forecast and Water-to-Oil Ratio Profiles over Field Life
- Produced Water Composition Sheet: Dispersed Oil, Dissolved Organics, TDS, Heavy Metals and NORM
- Management Route Screening: Reinjection for Pressure Support, Disposal Injection, Reuse and Discharge
- Water Balance Block Diagram from Separator Water Outlet to Injection Wellhead

Day 2: Primary and Secondary De-Oiling and Solids Removal

- Oil Droplet Size Distribution and Stokes Law Separation Basis
- Skim Tank and Gravity Settling Vessel Retention Time and Oil Recovery
- Deoiling Hydrocyclone Liner Selection, Pressure Drop Ratio and Reject Rate
- Induced and Dissolved Gas Flotation with Nitrogen or Fuel Gas Blanketing
- Desanding Hydrocyclones, Sand Jetting and Oily Solids Handling

Day 3: Injection Water Quality Specifications and Seawater Preparation

- Injection Water Specification Table: Oil-in-Water, TSS, Particle Size, Oxygen and SRB Counts
- Nutshell Filter Backwash Cycle and Dual Media Filter Operation for Tertiary Polishing
- Cartridge Filter Rating and Pore-Throat Bridging Rule for Formation Protection
- Seawater Intake Screening, Coarse Filtration and Hypochlorite Dosing
- Vacuum and Gas Stripping Deaeration Towers with Oxygen Scavenger Trim and Sulphate Removal Membranes at Overview

Day 4: Compatibility, Injectivity Decline and Disposal Well Performance

- Commingling Produced Water with Seawater: Barium Sulphate and Calcium Carbonate Tendency Checks
- Reservoir Souring Risk from Sulphate-Reducing Bacteria and Nitrate Treatment at Overview
- Injectivity Index Trend and Hall Plot Diagnosis of Plugging versus Fracture Injection
- Disposal Well Capacity: Target Zone Selection, Wellhead Pressure Limit and Well Integrity Checks
- Reuse and Discharge Polishing Options: Membranes, Evaporation and Outfall Quality Limits

Day 5: Case Study: Produced Water Treatment and Reinjection Train Design

- Case Field Data Pack: Water Forecast, Analyses and Existing Water Plant Constraints
- Sampling Point Map and Measurement Methods: Solvent Extraction, Online Oil-in-Water Analysers and Millipore Tests
- Treatment Train Selection Matrix with Stage Removal Efficiencies and Spare Capacity
- Injection Pump, Header and Water Quality KPI Dashboard for Daily Surveillance
- Produced Water Treatment and Reinjection Train Design Presentation and Peer Challenge

Skills You Will Gain:

- Produced Water Characterisation
- Water Management Route Screening
- De-Oiling Stage Sizing
- Injection Water Specification
- Seawater Deaeration Control
- Water Compatibility Assessment
- Injectivity Decline Diagnosis
- Oil-in-Water Measurement

Why Attend This Course:

- Return with a Produced Water Treatment and Reinjection Train Design built on a case field data pack with stage efficiencies and quality targets
- Keep injectors on line longer by linking rising injection pressure to the solids, oil or bacteria that caused it
- Defend water plant upgrade and disposal decisions with a water balance, route comparison and measured removal performance
- Compare water handling practice with production, facilities and reservoir peers from onshore and offshore oil fields

Conclusion:

Reliable water injection depends on knowing what is in the produced water, removing oil and solids stage by stage and holding every injected cubic metre to a clear specification. The course moves from produced water sources, volumes and management routes, through de-oiling and solids removal, to injection water specifications and seawater preparation, then to compatibility, souring, injectivity decline, disposal wells and reuse. The final day applies these methods to a case field and produces a treatment and reinjection train design ready for review.