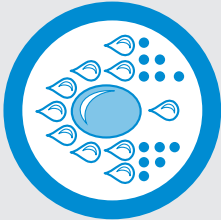


# CONFORMANCE IMPROVEMENT SOLUTIONS



## CONFORMANCE IMPROVEMENT



## INDEPTH CONFORMANCE IMPROVEMENT



## WATER SHUTOFF



## MOBILITY AND SWEEP IMPROVEMENT



## RESIDUAL OIL RECOVERY



## PRODUCTION ENHANCEMENT



## REFRAC DIVERSION

### APPLICATION

Poor conformance is a problem that plagues most operators of water and enhanced oil recovery (EOR) floods. TIORCO's conformance improvement solutions focus on correcting reservoir dominated features that limit sweep efficiency. TIORCO's conformance improvement solutions are applied on the injection side and are designed to correct the following issues:

- Communication between injector and producers through a high permeability streak, natural or induced fractures
- Out of zone injection
- Direct communication from wormholes or matrix bypass events connecting producers to injectors in un-consolidated reservoirs
- Non-uniform injection profile in layered reservoirs

### PRODUCT DESCRIPTION

TIORCO's conformance improvement solutions are polymer gels consisting of a polymer and crosslinker, which are mixed on the surface during injection. As compared to mechanical or other chemical solutions, the delayed reaction between the two components allows placement of the polymer gel deep into the formation, preventing water from rapidly bypassing the solution. The polymer gels are placed based on the well's pressure response, allowing TIORCO's experienced engineers to change the designs based on each well's specific characteristics. TIORCO offers the following polymer gel technologies that are customized to fit your specific reservoir problem:

1. **MARCIT:** work-horse polymer gel used for applications in reservoirs with temperatures less than 212°F (100°C)
2. **UNOGEL:** high temperature gel technology for use in reservoirs with temperatures higher than 200°F (95°C)
3. **Wormhole Remediation:** accelerated gel technology used to shut off rapid inter-well communication in unconsolidated reservoirs
4. **CAPIT:** typically combined with other gel technologies, this high strength gel is placed at the end of treatments to withstand high differential pressures in wells with large void space features

### VALUE

- Payback typically less than six months with incremental costs of less than \$5 per barrel of oil
- In most situations, limited well interventions are necessary during placement as polymer gel's affinity for water and high molecular weight allows the gel to follow the path of least resistance
- Robust Technology: Polymer gels can form in waters with TDS of up to 300,000 ppm and temperatures up to 300°F (150°C)
- Full service solution includes candidate selection, engineering design, laboratory evaluation, and pumping services

## CRITICAL DESIGN FACTORS

- Proper diagnosis of the conformance problem is critical to design the right solution
- Clear signs of communication between the candidate and the offset producers
- Sufficient injection pressure margin to allow for placement of the designed gel volume
- When utilizing produced water, laboratory testing is necessary to ensure stable and strong gel formation
- Onshore and offshore applications

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## GOALZERO

SAFETY MATTERS

The safety of our associates, customers and communities is vitally important. From the way we operate, to the products we develop, to how we partner with customers, our goal is zero: zero accidents, zero incidents and zero environmental releases.

At Nalco Champion, safety is more than a metric, it's a mindset. It's how we conduct ourselves, every day, everywhere it matters.

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