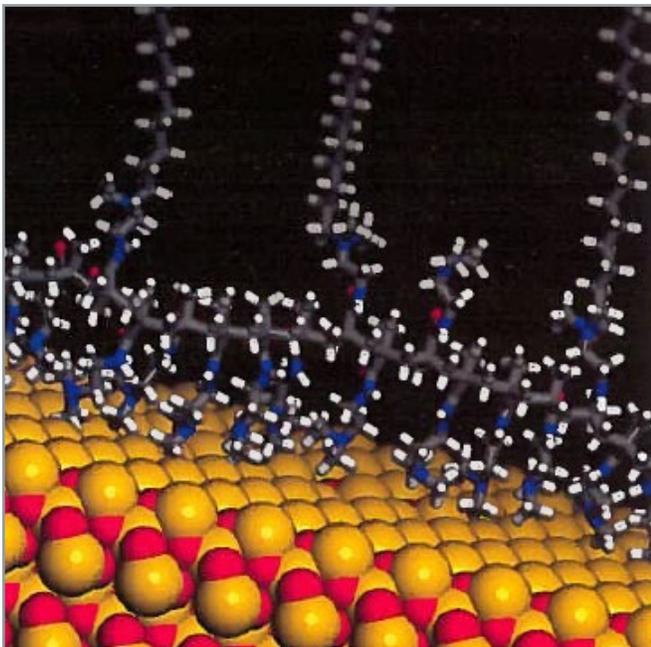


WaterWebSM Service

Selectively Reducing Water Production for Improved Production Profiles and Well Life Extension

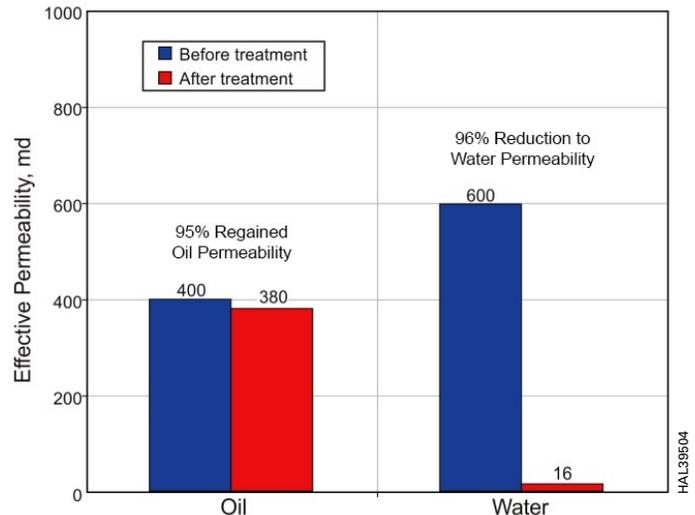
Halliburton's WaterWebSM service uses unique polymer chemistry to selectively reduce water effective permeability in the reservoir, helping impede water flow and enhancing hydrocarbon flow to the wellbore. With the WaterWebSM service, the resulting improved oil/gas recovery potential stems from a reduced water column giving improved natural lift for the residual oil and/or gas. In addition, it helps prolong and sustain production by enhancing reservoir drainage.

The WaterWebSM service works by adsorbing onto the rock surface, reducing effectively permeability to water by more than 90% with little to no damage to hydrocarbon permeability. In effect, WaterWebSM service creates resistance that holds back water while allowing oil and gas to pass freely.



WaterWebSM polymer adsorbs to the rock surface, selectively decreasing water effective permeability with little to no damage to hydrocarbon flow.

The graph on the right shows the response of an oil saturated core and a water saturated core before and after treatment with WaterWebSM service. In this case, the water effective permeability of the water saturated core was significantly decreased while the oil effective permeability in the oil saturated core was minimally impacted. Both permeabilities were measured at residual oil and water saturations, respectively.



Typical WaterWebSM service results seen in the laboratory over a broad permeability and temperature range.

These unique properties make it your best option when selective placement is not feasible. Count on Halliburton's WaterWeb service to help:

- Reduce water production
- Increase hydrocarbon production
- Reduce costs associated with produced water
- Extend the economic producing life of the well
- Increase recoverable reserves

Polymer Chemistry Tailored to your Reservoir

The WaterWeb service offers different relative permeability modifier (RPM) polymers depending on the permeability range of the reservoir. A low-molecular weight RPM has been developed for reservoirs with permeability less than 25 mD. WaterWeb service is ideal for use in wells that have:

- Permeability greater than 0.1 mD and less than 6000 mD
- Bottomhole temperatures of up to 325°F (163°C)
- Multi-layered formation without crossflow within the reservoir
- Viable production if gross production is reduced, but watercut is effectively decreased

Easy To Use and Field Proven

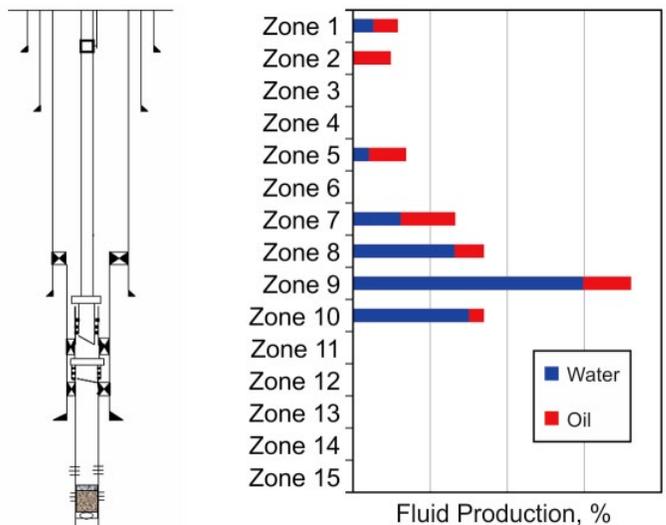
The WaterWeb service requires no special placement techniques. It is unaffected by multivalent cations, oxygen, and acids. It does not require rig time or zonal isolation. WaterWeb service works by immediately adsorbing to the rock matrix as it is being pumped (it does not gel or “set up”), therefore the wellbore can immediately be brought back to production after the treatment. No shut-in time is required.

To date, Halliburton’s RPM chemistry has been used in more than 3000 wells around the world with excellent results.

Case History

Well A is a cased-hole and perforated wellbore producing from an onshore laminated sandstone oil reservoir. This well was completed in 15 different zones (681 ft gross interval, 155 ft of net perforations) with the following properties: 20°API oil, average permeability ~195-md, average porosity ~13%, and BHT~280°F. Water production had been a major challenge in this reservoir, limiting the economic life of many wellbores. Production rates for Well A before the WaterWebSM service were reported as 1200-BFPD, 260-BOPD, 960-BWPD, and 80% water cut. Figure to the right shows the wellbore schematic and the results of a production logging tool (PLT) run performed before the RPM treatment. Although the PLT clearly identified the intervals contributing to most of the water production, the same intervals were also producing a significant amount of oil.

The treatment consisted of pumping 180-bbl of the WaterWebSM service. After the treatment, Well A began producing at 2400-BFPD, 1560-BOPD, 840-BWPD, and 35% water cut. Production had stabilized to 850-BFPD, 510-BOPD, 340-BWPD, and 60% water cut.



Well A - Wellbore schematic and PLT before the WaterWebSM service treatment.



Winner – Hart’s Meritorious Engineering Innovation Award

For more information about how Halliburton’s WaterWebSM Service can reduce water permeability, increase hydrocarbon production, and extend the economic life of your wellbore, please call your local Halliburton representative or email us at stimulation@halliburton.com.

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