ALKALINE FLOODING

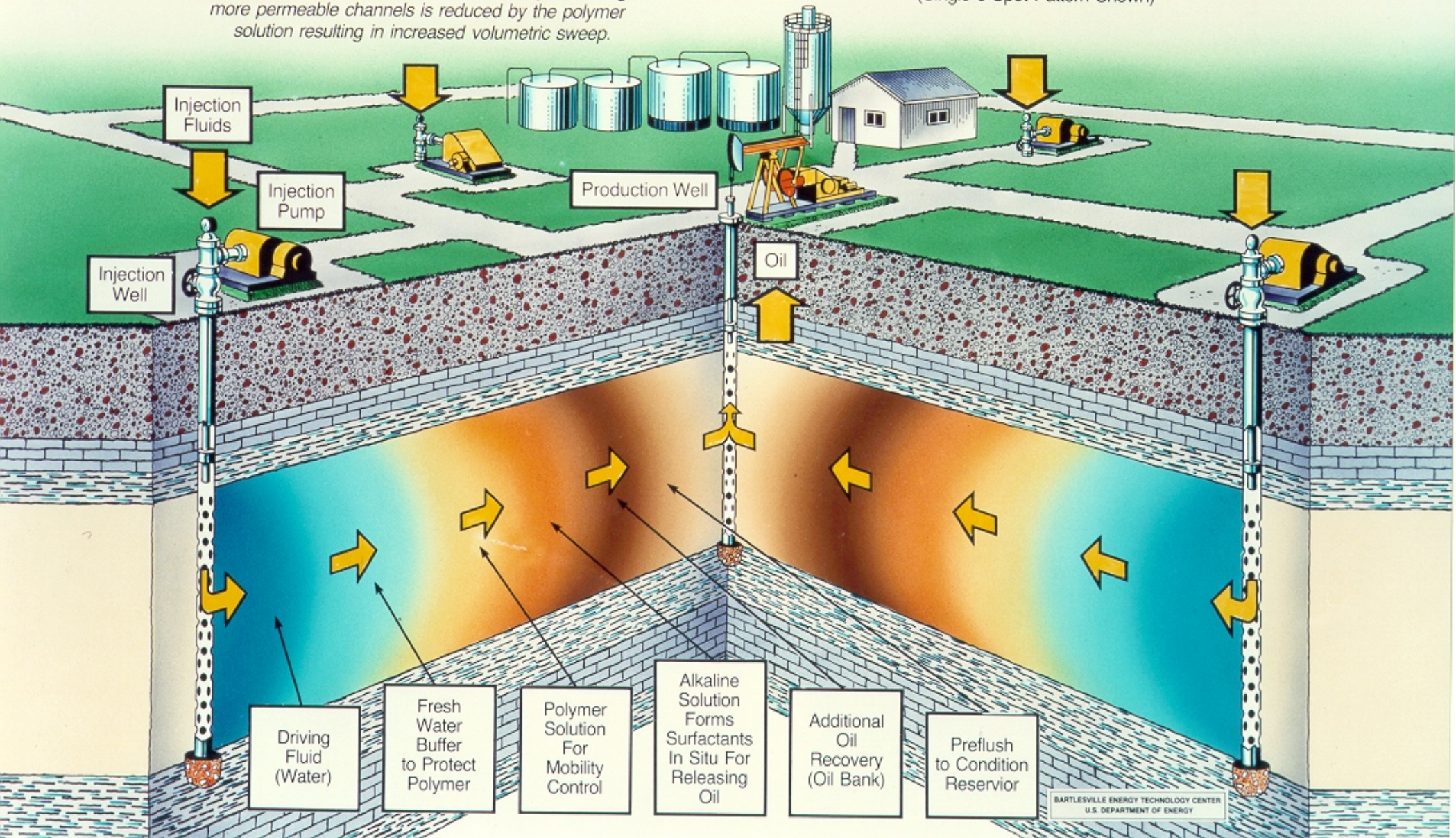
This method of EOR requires the injection of alkaline chemicals (lye or caustic solutions) into a reservoir. The reaction of these chemicals with petroleum acids in the reservoir rock results in the in situ formation of surfactants. The surfactants help release the oil from the rock by one or more of the following mechanisms: reduction of interfacial tension, spontaneous emulsification, and wettability changes. The oil can then be more easily moved through the reservoir to production wells.

As in the two preceding methods, a polymer-thickened water solution process is introduced after the chemicals are injected to help obtain a more uniform movement or "sweep" through the reservoir. Fresh water is then injected behind the polymer solution to prevent contamination from the final drive water which may be salty or otherwise incompatible with the chemicals.

Alkaline flooding is usually more efficient if the acid content of the reservoir oil is relatively high. A new modification to the process is the addition of surfactant and polymer to the alkali, giving rise to an alkaline-surfactant-polymer (ASP) EOR method. This method has shown to be an effective, less costly form of micellar-polymer flooding.

CHEMICAL FLOODING
(Alkaline)

The method shown requires a preflush to condition the reservoir and injection of an alkaline or alkaline/polymer solution that forms surfactants in situ for releasing oil. This is followed by a polymer solution for mobility control and a driving fluid (water) to move the chemicals and resulting oil bank to production wells.

Mobility ratio is improved, and the flow of liquids through more permeable channels is reduced by the polymer solution resulting in increased volumetric sweep.

(Single 5-Spot Pattern Shown)