Paper Preview

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Title **A Preliminary Study of In-Situ Combustion in Diatomites**

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Preview

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Abstract

Diatomaceous sediments of California host large reserves of oil and gas tut are incompletely exploited. The matrix of these sediments is comprised largely of the frustules of diatoms (microscopic marine plants). Punctae in the frustules are responsible for the high porosities Punctae in the frustules are responsible for the high porosities characteristic of diatomites (up to 70 vol.%), but because of the very small size of the pores, permeabilities are low (commonly around 1 md). Furthermore, the oil contained in the reservoirs is often either immature or heavily biodegraded, hence viscous.

In order to test the feasibility of applying in-situ combustion techniques to diatomaceous reservoirs, a laboratory test was conducted for a section fo core taken in the south plunge of the anticline in the Lest Hills field of the San Joaquin Valley in California.

During the experiment, a fast stream plateau, good oxygen utilization, and an unusual front were observed. Fingering caused formation of a second front downstream. This finger stabilized and later became very hot (1600F). Velocity of front movement through the core almost doubled after the two fronts joined. API gravity of the oil extracted from the core ranged between 28 and 45, compared to the original value of 28 API.

Tests were conducted to compare the cores before and after combustion, using-scanning microscopy, powder x-ray diffraction, and extraction techniques. After burning, the sediments changed from dark brown to red in color as a result of oxidation of organic and iron phases. Small numbers of diatom frustules were transformed from amorphuos opol to quartz, with accompanying occlusion of Tore spaces. With the exception of the color change, however, the sediments remained largely unaltered.

It is especially interesting to note that the kerogen within the sediments appears to supply a portion of the fuel required for combustion. Kerogen is detrital organic matter than can be burned but cannot be extracted easily from a core in the laboratory. Kerogen's presence could make in-situ combustion more economical and efficient than other EOR methods in diatomites.