Stimulation of Indigenous Microbes to Bioremediate Oil-Contaminated Soils

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The purpose of our study was to determine the effectiveness of bioremediation of two oil-contaminated soils by stimulating indigenous oil-degrading microbes. The soil treatment consisted of tilling, liming, and fertilizing, and bioremediation was monitored by changes in the microbial populations (MPs) and by changes in total petroleum hydrocarbons (TPHs) in the soils. Location one was a 12 × 12 ft plot that had been repeatedly contaminated with pressure pump oil for 8 years. After treatment, the MP increased 400-fold in 3 weeks and remained unchanged for 6 more weeks. The initial TPH was 18,500 ppm, and it declined steadily to 3,000 ppm by 7 weeks. Location two was a rectangular plot approximately 20 × 500 ft on a hillside where about 50 bbl of crude oil had been spilled. MPs and TPHs were made at the three sites: site 1, top of hill where spill occurred; site 2, midway uphill; and site 3, about 22 ft below site 1. The initial MPs at the three sites increased a thousandfold in 10 weeks after treatment. Initial TPHs at the three sites ranged from 15,000 to 20,000 ppm and remained unchanged for 26 weeks. At week 30, the TPHs of sites 1 and 2 were less than 10,000 ppm; site 3 required an extra treatment and 12 more weeks before the TPH was below 10,000 ppm. At locations one and two, the decreases in TPH were inversely proportional to the increases in MPs. Bioremediation by stimulating indigenous microbes was effective and, in terms of materials and labor, efficient.

The Tallahala Creek Complex, Smith County, Mississippi: The Crest Is Not Always the Best

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The Tallahala Creek complex, comprising both Tallahala Creek and East Tallahala Creek fields, is a salt-induced anticline transected by two down-to-the-north fault systems. Since 1967, the upper portion of the Jurassic Smackover Formation has yielded almost 15 million bbl of oil and 20 billion ft^3 of gas, or 75 percent and 64 percent of the total oil and gas, respectively, produced from the fields. Contemporaneous sediment accumulation and structural growth have created various lithofacies in the upper Smackover, thereby significantly affecting reservoir heterogeneity. These lithofacies can be delineated by their structural position on the anticline. On the most downdip and downthrown portions of the structure, the upper Smackover consists of a series of gray, fine- to medium-grained sandstones separated by limestones. These sandstones generally exhibit both high porosity and permeability and have thus contributed more than 95 percent of the total Smackover production. Updip the upper Smackover becomes increasingly calcareous, finally grading into a sandy, in some places dolomitic, limestone on the crest and southern upthrown flank of the anticline. This limestone lithofacies has been noncommercial as a reservoir rock, as evidenced by the less than 7,000 bbl of oil cumulatively produced from the Smackover in two of the structurally highest wells, the Shell 2 E. M. Lane and the Shell 1 F. James. Structural and stratigraphic relationships discovered through field development of the Tallahala Creek complex have significantly altered the conventional idea that "the crest is always the best."