# Application of Time-Lapse Geochemistry (TLG) for Reservoir Surveillance at the Horn Mountain Field in the Deepwater Gulf of Mexico

Milkov, Alexei V., Leon I. Dzou, Evelyn M. Goebel, Allen Kutch, and David A. Fisher, BP America, Houston, TX

Oil is produced at the Horn Mountain field (Mississippi Canyon 126/127) from M and J middle Miocene reservoirs deposited in sand-filled channels and associated levees environments. Several barriers and baffles were identified in both reservoirs prior to production through the integration of seismic, pressure, PVT, and geochemical data. During production, reservoir surveillance is a vital task aimed to understand how petroleum is swept in a reservoir. In addition to traditional surveillance technologies, we applied Time-Lapse Geochemistry (TLG) to visualize petroleum sweep by monitoring changes in fluid compositions across reservoirs. In this technology, pre-production fluid samples are first analyzed to map fluid types across a static reservoir. Then, a surveillance program in which fluids are taken from producing wells at regular time intervals is designed and executed. The obtained production samples are geochemically “fingerprinted” and compared with the pre-production fluids from the same well and surrounding wells. Interpretation of geochemical data allowed us to “see” how oil moves across the M reservoir and prompted the team to re-evaluate reservoir models and reduce risks in managing reservoir performance. In the J reservoir, an untapped compartment was identified, and an additional producer was justified. TLG results were consistent with and complimentary to other surveillance data available to date. Our study demonstrates that TLG is safe and cost-effective technology, which reduces uncertainties associated with other reservoir surveillance methods and appears to be valuable for reservoir management.