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High-Relief Bypass Surfaces- A New Perspective on The Architecture of A Diatomite/Clastic Reservoir in The Monterey Formation of California

A composite incision surface downcuts 70-200 m into the Brown Shale zone of the Miocene Monterey Formation at Lost Hills field in the San Joaquin basin of California. This surface represents four successive incision episodes. Deposition follows each episode, infilling the incision. Subsequent downcutting removes part of the earlier fill and adds another component to the composite incision surface. Also, each new incision laterally offsets previous incisions towards the south.

Incision fill consists of hemipelagic diatomite (containing varying amounts of clastics), interbedded with claystone and siltstone. Overall fine-grained character indicates low-energy conditions. Because high relief of the incision surfaces indicates higher energy conditions, deposition probably represents backfilling of abandoned incisions. Since clastics are found downdip at Lost Hills field, the incisions may represent bypass surfaces that acted as conduits for clastic transport. High-relief incisions have not been previously described in the Monterey Formation of the San Joaquin basin.

Although the incision fill is mainly diatomite, a significantly higher percentage of clastics than the rest of the Brown Shale facilitates diagenetic changes that improve reservoir quality dramatically. Identifying bypass surfaces and their highly productive fill is key to maximizing production in this mature reservoir.