

Stratigraphic Sections for Oil and Tar Sand Deposits in the Uinta Basin, Utah

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ABSTRACT

In order to better understand oil and bitumen generation and migration in the Paleogene lacustrine source rocks in the Uinta Basin, Utah, the productive intervals were assigned to a well-established stratigraphic framework. This includes transgressive and regressive sequences represented in the early freshwater lacustrine section of Lake Uinta as well as the overlying organic-rich and organic-lean zone oil shale framework which defines the sections deposited during the later brackish to hypersaline conditions in the lake. Most oil fields and tar sand deposits occur in marginal lacustrine facies and the goal here was to correlate these intervals to sources within the various lacustrine sections. The early freshwater stage is subdivided into three intervals in ascending order: (1) the Flagstaff Member, containing the earliest lake deposits in the basin; (2) the Uteland Butte member, representing a period of lake expansion; and (3) the Castle Peak interval (also known as the Wasatch/Colton tongue) representing a major lake regression. Detailed stratigraphic studies of marginal lacustrine areas and isopach maps of oil shale zones generated for the recently published oil shale assessment of the Uinta Basin facilitated correlation of the marginal sections into the 18 organic-rich and organic-lean zones previously identified in the upper brackish to hypersaline section based on Fischer assay oil-yield data. Samples from one hundred and eighty-two oil wells and tar-impregnated sections from 82 core holes at the Sunnyside and PR Spring-Hill Creek tar sands deposits were examined for this study. The Sunnyside tar sands deposit extends from above the Mahogany bed to just below the base of the freshwater Uteland Butte member. Tar-impregnated sandstones in the PR Spring-Hill Creek tar sand deposit are more restrictive stratigraphically, varying from above the Mahogany bed to approximately the R-4 through L-5 oil shale zones. Stratigraphically, most oil samples are from the freshwater stages to the early brackish-saline stages (R-0 through L-1 oil shale zone) of Lake Uinta. A limited number of samples are from the later saline to hypersaline lake stages. Oil typing based on bulk and molecular geochemistry will be compared to the stratigraphic interpretation and possible migration pathways will be discussed.