

The Role of lake Levels in oil shale distribution

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The oil shale richness and distribution in the Piceance Creek basin is not uniform and is mostly developed at the central part of the basin. Toward the margins, there is a significant reduction of richness and thickness of the organic rich beds. This trend is controlled by several processes, some of which are also applicable in marine settings: rate of organic production, rate of consumption (oxidation and bacterial), and rate of dilution by the inorganic sedimentation.

However, lake systems have another control, which most often plays a most important role – lake levels. Lake levels control water depth, location of depositional environments, distribution of sediment volume, and lake salinity.

The depositional history of the Green River Formation illustrates the above model. Numerous lake level changes controlled the location of the lake shorelines. After an initial high-stand, the lake regressed, and deeper water was restricted to the central part of the basin. During periods of low lake level, the water depth was too shallow on the lake margins for long term stratification, which is required for the anoxic state in the lower part of the water column. Yet the algal bloom persisted as indicated by the rich oil shale deposits in the center of the basin. After the low lake level phase, water chemistry changed and salinity increased. Soon after, prominent oil shale beds were deposited throughout the basin. These beds are related to both the high lake levels and creation of brines in the lake, both enhancing long-term stratification of the lake's water column.