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Comparing the depositional characteristics of the oil-shale-rich Mahogany and R-6 zones of the Uinta and Piceance Creek Basins

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The upper Green River Formation's oil-shale deposits located within the Uinta Basin of Utah and the Piceance Creek Basin of Colorado contain remarkably similar stratigraphic sequences despite being separated by the Douglas Creek arch. Individual horizons, as well as individual beds, can be traced for hundreds of miles within and between the two basins. However, changes in the topography-controlled runoff patterns between the basins, as well as changes in localized climate conditions throughout upper Green River time, created significant differences between basin-specific deposits. These variations affected the richness and thickness of each oil-shale zone, resulting in basin-specific preferred extraction techniques (i.e., in-situ in Colorado and mining/retort in Utah).

Colorado's oil-shale resource was mapped and quantified by the USGS in the late 1970s, whereas this study is the first attempt at quantifying Utah's overall resource by specific oil-shale horizon. This abstract focuses on the Mahogany zone (MZ) and the stratigraphically lower R-6 zone; subsequent work will define other important horizons.

The R-6 zone in Utah has a maximum thickness of about 320 ft, which is similar to Colorado's R-6 interval that reaches 300 ft thick. R-6 time marks the transition of the Piceance Creek as a terminal basin with evaporite deposition, to a large balanced-filled lake encompassing both the Piceance Creek and Uinta Basins. The maximum richness of Utah's R-6 zone is only about 15 gallons per ton (GPT), whereas Colorado's R-6 is up to 30 GPT, suggesting that the saline conditions in Colorado were more favorable to production and preservation of organic material. Colorado's R-6 resource of $\geq$ 10 GPT extends over 980 square miles, whereas a similar zone in Utah covers only about 390 square miles.

The MZ in Utah has a maximum thickness of about 150 ft, whereas Colorado's MZ reaches 240 ft. Our data suggest a much larger sediment influx into the Piceance Creek Basin side of the lake, resulting in a thicker deposit and possibly signaling the Uinta Basin's transition into the system's terminal lake. The maximum richness of each state's MZ equals about 30 GPT, as would be expected with a connected lake system; however, Colorado's 25-30 GPT MZ interval covers roughly 635 square miles compared to just 35 square miles in Utah.