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Geochemistry and mineralogy of the Eocene Green River Formation petroleum system, Uinta Basin, Utah

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An extensive dataset of major and trace element chemistry, mineralogy, and organic geochemistry has been assembled for core samples and drill cuttings from wells across the Uinta Basin through different lacustrine facies within the Eocene Green River Formation. This data was collected to examine trends within the Green River in the Uinta Basin and to compare with the more extensively studied and less deeply buried lacustrine intervals in the Piceance Basin in northwestern Colorado. Major element chemistry and X-ray diffraction results show the major mineralogical intervals in the Uinta Basin are generally consistent across the basin within the organic-rich offshore lacustrine facies. Total organic carbon (TOC) and programmed pyrolysis data show that hydrogen-rich kerogen is ubiquitous across the basin and dominates the organic-rich intervals defined previously using Fischer assay. Cuttings samples from the sedimentary depocenter of the Uinta Basin have a different mineralogical suite than samples from the Piceance Basin sedimentary depocenter, most notably lacking the saline carbonate minerals dawsonite and nahcolite, possibly due to thermal decomposition as this area is also the structurally deepest part of the basin. Organic richness, as indicated by TOC values and Fischer assay oil yields, is lower in the deepest part of the Uinta Basin relative to the Piceance Basin, possibly as a result of depletion of petroleum-generating potential due to thermal maturation; however, differences in organic productivity, organic matter preservation, or organic matter dilution by detrital inputs in the western Uinta Basin could also have played a role. Other trends examined include trace element redox and provenance indicators, which show some differences between marginal and offshore facies within the Uinta Basin and between the Piceance and Uinta Basins in general.