

Oil shale grade distributions in the Eocene Green River Formation, Piceance, Uinta and Greater Green River Basins

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As part of the U.S. Geological Survey Energy Resources Program effort to estimate the recoverable oil shale resource in the Eocene Green River Formation, distribution plots of total oil resource as a function of oil shale grade (defined by Fischer Assay oil yield and averaged over specific stratigraphic intervals) have been generated for the three principal basins in Colorado, Utah, and Wyoming using data from the most recently completed total resource-in-place assessment of western U.S. oil shale deposits. Oil shale grade is an important consideration for resource development. Oil shale that can produce on average at least 15 gallons of retort oil per ton of rock (GPT) can be described as potentially viable, while the most prospective oil shale for development can generate at least 25 GPT on average within a particular interval. These cutoffs were applied to the basin-specific distributions of grade versus resource to generate first-order approximations of recoverable oil shale resources in the Green River Formation. The potential oil resource in the Piceance, Uinta, and Greater Green River Basins from oil shale with generating capacity of at least 15 and 25 GPT are: 920 and 351 Bbbl; 93 and 1.2 Bbbl; and 132 and 0 Bbbl, respectively. Based on these estimates, 27% of the total resource-in-place in the Green River Formation would be considered recoverable at a cutoff of 15 GPT and only 8% would be considered recoverable at a grade cutoff of 25 GPT. The distribution data shows that in order for 50% of the total resource in each basin to be recovered, the grade cutoff would have to be 17 GPT in the Piceance Basin, 6 GPT in the Uinta Basin, and 9 GPT in the Greater Green River Basin; only the Piceance Basin contains sufficient potentially viable and high-grade oil shale for this degree of overall development to be considered likely. Issues related to the refinement of these estimates to finer stratigraphic resolution and future work to incorporate experimentally estimated or industry reported recovery factors for utilization technologies likely to be applied to Green River Formation oil shale deposits will be discussed.