Pyrolysis of oil shale from the Garden Gulch Member of the Green River Formation

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The Garden Gulch member of Colorado's Green River Formation is an oil shale source that has not been seriously considered in the past. However, its separation from protected aquifers makes it an attractive commercial target. This paper reports pyrolysis characteristics of this clay-rich oil shale, including experimental and modeling results for oil and gas generation from a self-purging reactor, which is more similar to in-situ recovery conditions than either closed autoclave pyrolysis or rapidly heated open system experiments that are commonly performed. The results are similar to those obtained by Burnham and coworkers at Lawrence Livermore National Laboratory in the 1980s for the carbonate-rich oil shale from the Mahogany zone. Volumetric yields of 70-90% of Fischer Assay were obtained, and the oil has very low olefin, metals, and nitrogen content compared to oil previously obtained in other laboratory experiments and demonstration projects. The results were successfully modeled using an adaptation of the pyrolysis models developed at LLNL in the 1980s.