9.1 **Models for thermal transport properties of oil shale**

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Models for estimating the heat capacity and thermal conductivity of Green River oil shale as a function of temperature and grade are presented. Oil shale heat capacity is based on the weighted sum of the temperature-dependent heat capacities of the components of formation (mineral, kerogen, coke) and their expected transformations. The mineralogical component is based on published heat capacities of the individual minerals. The heat capacity of kerogen is an adaptation of a model for the heat capacity of coal. Oil shale pyrobitumen and coke heat capacities are based on thermal studies of coke. This model is compared to approximately 200 laboratory heat capacity measurements on oil shale. The thermal conductivity of low-grade oil shale is constrained by measurements of limestone while the thermal conductivity of high-grade oil shale is constrained by the reported thermal conductivities of coal. The thermal conductivity varies inversely with temperature as expected for insulating materials above their Debye temperature. The thermal conductivity perpendicular to bedding is lower than conductivity parallel to bedding; however the results for the conductivity perpendicular to bedding do not follow the classical harmonic mean model of an ideally layered system. Alternative models for anisotropy are discussed. Finally, the models for oil shale heat capacity and thermal conductivity are used to calculate the temperature and grade dependence of the thermal diffusivity. These results are compared with reported laboratory thermal diffusivity measurements.