5.1 Heat Conduction Modeling Tools for Screening In Situ Oil Shale Conversion Processes

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Simulation methods for *in situ* oil shale conversion processes are immature compared to the tools available for conventional oil and gas reservoir management. And, while thermal reservoir simulators for heavy oil processes have existed for a number of years, no thermal simulation program is currently available that includes all the coupled physical processes necessary to model *in situ* oil shale conversion.

In the absence of a comprehensive *in situ* oil shale simulator, simple screening tools provide an effective approximate method for defining optimal process parameters such as heater geometry, heating program duration, and total heat input. Also, given the relatively immature development state of *in situ* conversion processes generally, such screening tools can help effectively focus further research on the most important process aspects.

This presentation will discuss screening tools used by the authors to design and evaluate *in situ* oil shale conversion processes. These computer-based tools apply superposition of conductive heat sources to create a 3D time-temperature model for the oil shale zone being targeted. Kinetic models, similar to those used in basin modeling for conventional oil and gas source rock analysis, are then applied to estimate the kerogen conversion. To consider large numbers of cases, the kinetic models can be used to create a translation table between maximum temperature achieved and fraction of kerogen converted.

The use of these screening tools will be illustrated with examples taken from the Green River oil shale in Colorado, and an oil shale deposit in Queensland, Australia.