Title:

Geomechanics of Oil Shale In-situ Conversion Process

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Application of the patented In-situ Conversion Process (ICP) to convert kerogen to hydrocarbon products in the oil shale formations involves heating the oil shale rock in-situ to temperatures greater than 300 °C (570 °F). At these temperatures, the kerogen in the oil shale pyrolyzes and is converted to hydrocarbons that can be produced via dedicated production wells. This process is carried out in-situ and at depths below the ground water table. To keep the products of pyrolysis from migrating into the groundwater, a subsurface containment system is constructed around the area to be heated prior to heating so that water is kept out of the heated zone and the hydrocarbons are contained for production. Ground-freezing technology is under assessment to establish an effective peripheral containment barrier (i.e., a freeze wall).

Oil shale is a hard rock with high compressive strength and the kerogen is an integral component of the load bearing rock fabric. Both thermal and mechanical properties vary with the amount of kerogen present in these formations. As the ICP proceeds, the rock is subjected to high temperature resulting in thermal expansion and thermal stresses. The subsequent production of converted hydrocarbon causes the rock formation to deform under the overburden load. These geomechanical impacts must be considered in the design of the containment system.

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