***An evaluation of porosity and permeability changes in oil shale due to thermal stresses***

Jacob Bauman[1], Ravindra Bhide[2,1], Milind Deo[1]

[1]*University of Utah, USA,* [2]*Energy & Geoscience Institute, USA*

The viability of in situ shale oil production from oil shale is highly dependent on rock porosity and permeability. Oil shale resources are typically characterized by low initial permeability. Evidence suggests that fluid porosity increases as solid kerogen is converted to fluid when oil shale is sufficiently heated. Permeability increases are also evident due to fracturing and connectivity between the growing fluid volumes in pore spaces, especially when the rock is unconfined. Some experiments have been reviewed examining the extent of fracturing in unconfined and confined oil shale, with implications on permeability changes. Other rock mechanics studies involving thermal stresses were also reviewed. A preliminary oil shale mechanics model with thermal stresses was developed using a material point method in the Uintah Computational Framework developed at the University of Utah. The model shows the effects of heat conduction, thermal stresses, and failure criteria on a heated oil shale sample. This modeling provides a qualitative understanding of fracturing in oil shale samples under stress and fracturing in unconfined samples. This model does not include fluid flow and kerogen decomposition kinetics because of widely varying time and length scales associated with interacting physical phenomena, and mathematical limitations with representative constitutive laws. The implications of these limitations were evaluated.