

3.4 **Influence of Water Vapor Pressure on Oil Shale Product Recovery**

Earl Mattson, Carl Palmer

Idaho National Laboratory, Idaho Falls, ID, United States

The development of western oil shale is likely to be done under conditions ranging from very dry to water saturated. Because water has been identified as an important reactant in the generation of hydrocarbons from oil shale, we have evaluated the effect of water vapor pressure on quantity and quality of generated oil. Experiments were conducted in high pressure stainless steel pressure vessels using crushed oil shale samples, which were exposed only to steam and not to liquid water. The first set of experiments on oil shale samples from the Piceance Basin were heated to 350°C for 72 hours under a constant pressure of approximately 2,900 psi. Results for this set of experiments indicate that as the vapor pressure of the water decreases, the quantity of the oil and gas produced also decreases. The amount of oil and gas generated under steam saturated conditions was significantly less than that generated in a hydrous retort conducted under the same temperature and pressure regime but where the oil shale is submerged beneath liquid water. A second set of experiments was conducted to examine if there was a kinetic effect responsible for this result. Anhydrous experiments and 50% water saturation experiments were conducted for up to 20 days. The quantity of the recovered product from this second set of experiments did not increase; however, preliminary chemical analysis indicates there may be an improvement in the product quality. These experimental results suggest that water availability during the retort may be a key parameter in the quantity and quality of energy products recovered from oil shale resources.