

## ***Use of well logging methods in oil shale assessment***

*Robert Kleinberg, Schlumberger, USA*

Planning and executing an oil shale production project requires (1) quantification of recoverable resources, (2) estimation of environmental impacts, (3) inputs to the reservoir simulation used to optimize production processes, and (4) baseline data to support geophysical monitoring. Measurements of drill core are useful, especially at the initial stages of a project, but routinely taking core while drilling is time-consuming and expensive. Moreover, standard laboratory tests do not measure the properties of rocks in their *in situ* condition. Well logging is an efficient, economical, and depth-continuous way of acquiring the information needed to assess a prospect and to develop production strategies. The organic richness of production targets can be found from any of several well log methods. Logs are essential in defining subsurface geology, and therefore the geometrical character and volume of productive formations. The quantity of energy needed to heat the formation to pyrolysis temperature can be determined from quantitative mineralogy. The amount of carbon dioxide that will be produced as a result of inorganic decomposition is also found from mineralogy. The hydraulic isolation of fresh water aquifers from oil production zones can be verified by well log salinity measurements. Sonic logs can be used to determine *in situ* stress, and to estimate the mechanical properties of the formation. Pre-heat sonic and electrical logs are required to make sense of cross-well monitoring during production.