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To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.

Pre-registration without payment will not be accepted.

You may still walk up and pay at the door, if extra seats are available.

Steve Schutter
Murphy International E&P

Eustasy and Shale Predictability

In the last few years interest in hydrocarbon-bearing shales has exploded, particularly in North American Paleozoic basinal shales. Since this interest has been driven by technological improvements in drilling and completion, most of the new knowledge has focused on the engineering characteristics of the shales. Much less attention has been given to geological models of shale deposition that could be applied to exploration and development. Better geologic models could provide a context for understanding the engineering parameters of the shales.

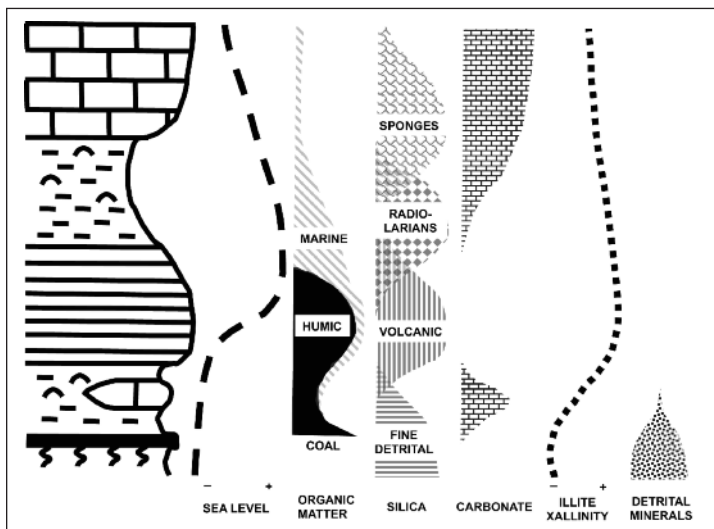
Where some basinal shales may grade laterally into deltaic siliciclastics, these shales are commonly related to carbonates. In both cases, eustasy strongly influences the distribution and characteristics of the shales. For instance, eustasy may affect the nature and quantity of organic material. The most condensed sections may have the highest overall organic content, but the organic material is more likely to be refractory. Changes in sea level can also affect other shale components such as phosphate and silica (both organic and inorganic). Clay mineralogy may also be strongly influenced both by changing sources of detrital material and by the quality and quantity of "mixed-layer" clays.

Lowstands may permit more porous facies to be deposited with-

in the basinal facies; conversely, extreme condensation may lead to the appearance of "unconformities." All of these characteristics may impact the source rock quality of the shales as well as their hydrocarbon content and production capacities. A good eustatic model, coupled with an understanding of shale deposition, should permit the development of valid exploratory concepts.

Fortunately, shales provide a wealth of information, provided they are studied in an integrated manner. Petrographic and paleoecologic information can be gathered not only from the shales themselves but also from the contiguous coarser siliciclastics and carbonates. Depositional patterns on adjacent shelves can be extrapolated into the basins, resulting in a more well defined recognition of facies within the shales. However, within basinal shales, the critical units for interpretation may be well below the resolution of well cuttings or even electric logs. Calibration of facies from cores or outcrops may be essential to understanding the shales. Highly-fractured zones or zones with higher hydrocarbon capacity may be relatively thin, but like high-flow zones in carbonates and coarser siliciclastics, these can dominate the production characteristics of the unit.

Most of the examples presented in this talk will apply directly to Paleozoic black shales that are the focus of much current exploration effort. Application of the same interpretation principles to Mesozoic and Cenozoic black shales needs to be investigated. ■



Distribution of significant inputs during sea-level rise and early highstand, based on a platform-to-basin section distant from large-scale siliciclastic influx. The ruled lithology is fissile black shale.

Biographical Sketch

STEVE SCHUTTER received his graduate degrees in geology from the University of Iowa where his studies involved the depositional environments of Ordovician and Pennsylvanian shales. At Exxon Production Research, Mr. Schutter worked on Paleozoic eustasy and the stratigraphic expression of salt tectonics and on several regional studies. This was followed by work for Subsurface Consultants; he is now at Murphy International E&P. Mr. Schutter has published papers on Paleozoic eustasy and the depositional environments of shales and on hydrocarbons associated with igneous rocks.

