Formation, Cabin Creek field, Montana. The field is located on the Cedar Creek anticline in southeast Montana. The Red River Formation is a sequence of alternating limestones and dolostones. Lateral and vertical variations of dolomitization are mostly responsible for reservoir heterogeneity. Production is from the U2, U4, and U6 dolostones, whereas the interstratified U1, U3, and U5 limestone units are nonproductive. Cumulative Ordovician and Silurian production was 61,574,000 bbl of oil as of September 1979, with reserves of 13,426,000 bbl. Waterflood began in 1964, and the field is a good candidate for tertiary recovery by the carbon dixoide miscible process.

Studies of thin sections, mercury capillary pressure curves, and resin pore casts have shown that several different types of pore systems occur, each associated with a particular depositional environment and diagenetic regime. Pore-system geometry is a function of the size and shape of the dolomite crystals composing the reservoir rock matrix. The size, sorting, and shape of pore throats determine the reservoir characteristics of each pore system. In addition to dolomitization, post-depositional leaching of calcite and evaporitc sulfate minerals was important in reservoir porosity development.

Mean pore-throat size, a statistical measure of pore geometry, was found to increase as porosity increased. Using this relation and electric log porosity values, it is possible to predict pore geometry and, as a consequence, recovery efficiency, if lithofacies distribution, porosity type, and diagenetic history are known. Since residual oil saturation is strongly dependent on the pore-system characteristics of the reservoir rock, it is possible to identify parts of the reservoir which have potentially high residual oil saturation, thus establishing targets for enhanced recovery.

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Lithofacies and Depositional Environments of Coaledo Formation, Coos County, Oregon

The middle to upper Eocene (Narizian) Coaledo Formation, well exposed along the southwestern Oregon coast, includes seven basic lithofacies types which constitute a complex marine-deltaic sedimentary sequence. The lithofacies are defined by lithology, fossils, bedding characteristics and sedimentary structures.

Petrographic examination of Coaledo sandstones indicates a dominantly andesitic volcanic source with subordinate plutonic, metamorphic, and sedimentary sources. Paleocurrent indicators suggest that these source areas were located to the southeast, from the initial calc-alkaline vents in the southern ancestral Cascades and from the northern Klamath Mountains. Regional paleocurrent analysis also suggests open-ocean conditions to the west, offshore from a wide, swampy coastal plain.

The pre-Coaledo units exposed in the Cape Arago area are interpreted to be delta foreset deposits. Coarsening-upward sequences recognized within the lower Coaledo member are interpreted as delta topset deposits, including subaqueous distributary channel, interdistributary tidal flat, lagoonal, and barrier-bar facies. The lower part of the middle member is characterized by deeper marine facies. The upper part of the middle Coaledo member represents prodelta deposition during a second progradational phase. Coarsening-upward sequences are recognized in the upper Coaledo member, again representing delta topset deposits. Uppermost Coaledo sands and overlying units show a gradual return to deeper marine conditions.

Coaledo sediments unconformably ovelrie gently folded fore-arc sediments of the Tyee basin. Deposition of coal-bearing deltaic sediments far to the west of the axis of the basin suggests regional tectonic uplift along the flank of the basin, or progradational filling of the continental flank of the basin.

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Eustatic Control of Distribution of Lower Upper Cretaceous Coal Beds in Utah: Application in Coal Exploration

Upper Cretaceous rocks in the Western Interior of North America record a series of transgressions and regressions that reflect shifts in the balance between rates of tectonic subsidence and sediment input and rates of eustatic sea level fluctuation. One of the transgressive-regressive cycles spans latest Albian through middle Turonian time and appears to have been primarily controlled by the rise and fall of worldwide sea level. The distribution of coal-bearing strata in this part of the Upper Cretaceous section in Utah reflects, and is probably a direct function of, this eustatic cycle. Rocks deposited during the transgressive phase of the cycle generally contain only thin beds of high-ash and high-sulfur coal that are of little or no economic value. Likewise, rocks of the regressive phase contain little coal. The accumulation of thick deposits of peat was restricted to the transgressive and regressive maxima of the eustatic cycle. These peats formed the coals of the Alton, Harmony and Kolob, and the Emery and Vernal coalfields, respectively. The delicate balance between subsidence, sediment input, and eustatic sea level change that existed at times of maximum transgression and maximum regression allowed for the stacking of deltaic sequences, which then resulted in the accumulation of thick bodies of peat. This situation invites the development of a predictive model relating the distribution of economic deposits of coal to the various phases of the eustatic cycle. This model is applied to predict the areas most likely to contain thick beds of coal in the deep subsurface between the northern limit of the Emery coalfield and the southern edge of the Uinta basin in central Utah.

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Seismic Interpretation of Statvik Field, Norway—3-Dimensional Study of Subunconformity Trap

The Statvik field is located in Norwegian North Sea block 34/10. Initial exploration was based on the interpretation of a one-kilometer 2-D migrated seismic grid. In 1979, at a relatively early stage in the exploration phase, it was decided that better quality data were needed to adequately map the structurally complex, highly faulted area, and to guide further delineation drilling. A 3-D seismic survey was therefore shot, covering the whole structure.

It is obvious from a comparison of individual lines that the 3-D data is of significantly higher quality than the 2-D data. Furthermore, the extremely dense grid of lines makes it possible to develop a more accurate and complete structural and stratigraphic interpretation.

Specifically, the 3-D data made it possible to map more accurately the dip and the subcrop of the subunconformity strata. The early geologic model had the Jurassic reservoir sands dipping steeply westward over the whole of the structure. This implied extensive erosion of the main reservoir sands toward the east. With the 3-D seismic data, however, we were