CARRASCO V., BALDOMERO, Inst. Mexicano Petróleo, Mexico, D.F., Mexico

Lower Cretaceous Volcanic Rocks Close to Gulf Coast (Sierra Madre Oriental) Southwest of Veracruz Port

Outcrops in two areas in the east and west fronts of the Sierra Madre Oriental allow the study of Lower Cretaceous sedimentary and volcanic rocks. In the Fortin-Zongolica area Berriasian-Valanginian sedimentary rocks composed mainly of sandstone, siltstone, and limestone are associated with penecontemporaneous dacitic and andesitic volcanic rocks which were deposited in a shallow marine environment. In the Tehuacan area a section of sedimentary rocks formed by sandstone, shale, and limestone is associated with andesitic pillow lavas and volcaniclastics; the terrigenous fraction contains scattered primitive rudist shells. Correlation of the volcanic rocks is not certain but they may be in part equivalent with the rocks exposed in the Fortin-Zongolica area.

Elsewhere in central Mexico there are other evidences of Upper Jurassic–Lower Cretaceous andesitic volcanic rocks. These, together with the Tehuacan-Fortin-Zongolica volcanic rocks, could form an east-west volcanic arc extending across central Mexico.

CARROLL, W. KIPP, Gulf Oil Exploration and Production Co., Casper, Wyo., and LEE C. GERHARD, North Dakota Geol. Survey and Univ. North Dakota, Grand Forks, N.D.

Dolomitization in Upper Red River Formation (Upper Ordovician), North Dakota

The upper Red River Formation (Upper Ordovician) in North Dakota contains four porosity zones which are divided into two different styles of syndepositional dolomitization.

The "D" zone is the base of the upper Red River and comprises two regularly interbedded, primary facies: mottled, partially dolomitized, porous mudstone and wackestone overlain by impermeable, organic wackestone and packstone. The burrowed wackestone represents very shallow-subtidal to low-intertidal deposition. The organic packstone is a product of an intertidal to supratidal pond or an evaporite flat.

Overlying the "D" zone are three repetitive depositional sequences, each consisting of basal wackestone-packstone, overlain by dolomitized mudstone (porosity zones "A," "B," and "C") and capped by nodular anhydrite. Each sequence represents a sabkha environment, progressing from subtidal wackestone-packstone through supratidal dolomite to anhydrite. Intercrystalline porosity resulting from syndepositional dolomitization is common to both the "D"-zone burrowed wackestone and the laminated dolomitic mudstone of the other three zones. Sedimentary structures and dolomite petrography indicate syndepositional origin of the dolomite. In all four porosity zones, limited post-burial dolomitization has resulted in porosity occlusion.

Dolomitization of the "D" burrowed facies occurred within the sediment body without subaerial exposure; the burrows are preferentially dolomitized, and the pervasiveness of the dolomitization was controlled by proximity of an underlying impermeable bed, resulting in a mottled texture in the burrowed facies. In contrast, dolomite in the sabkha sequences results from supratidal exposure, and the duration of exposure controlled the amount of dolomitization. Little preferential dolomitization is present in the supratidal dolomite.

CARSTENS, HALFDAN, and K. G. FINSTAD, Saga Petroleum a.s. & co., Oslo, Norway

Geothermal Investigation of Northern North Sea

A regional study of geothermal gradients in the northern North Sea (59 to 62°N) has been carried out. True formation temperatures (T_f) are estimated by extrapolation of maximum temperatures (BHT) recorded during logging. The method also requires data about mud circulation time (t) and the time since cessation of circulation (Δt). The estimation of T_f is made difficult because of the following factors: the frequent use of only one thermometer (tool failure happens); the recording of BHT on one log run only while more logs have been run to the same depth; inaccurate or lack of Δt values; and the circumstantial work which is necessary to find t values in old well data. Because of the latter factor, an average value of t is sometimes used. No great errors normally result. If extrapolation of BHT's is precluded (only one value exists), T_f may be estimated from a mean correction line based on nearby wells.

Both total and interval geothermal gradients are calculated. The magnitude of the total gradients is largely dependent on the formation in which the wells have terminated. Differences of more than 5°C/km (0.3°F/100 ft) due to varying interval gradients have been observed. A general pattern of interval geothermal gradients is recognized: high Tertiary gradients (30 to 40°C/km = 1.7 to 2.2°F/100 ft); low Cretaceous gradients (10 to 30°C/km = 0.5 to 1.6°F/100 ft); and high Jurassic gradients (40 to 100°C/km = 2.2 to 5.5°F/100 ft).

CASSELL, J. K., Chevron U.S.A. Inc., San Francisco, Calif.

Making Public Lands Private

Most earth scientists are fully aware of the vital role development of our public lands and waters plays in building and sustaining our nation's economy and security. Since homesteading and gold-rush days our country has relied heavily on development of natural resources from the public domain to provide the energy, minerals, and timber essential to the industrial base, and to the comfort and well-being of our citizens.

Unfortunately, the public and their elected representatives do not seem to have this awareness. This is evident from the fact that more than 20 federal laws enacted in the last 10 years limit, impede, delay, or prohibit development of natural resources from federal lands. The principal victim of this legislative and regulatory onslaught is the oil and gas industry, although mining and timber industries have not escaped.

The currently accelerating implementation of the RARE II program, the Wilderness Act, the Coastal