dolomitized oolite and calcarenite deposits and dolomitized shallow-water shelf limestones. In Late Jurassic time, oolite and calcarenite accumulations, together with minor occurrences of reefoid facies, predominated in forming important petroleum reservoirs in the Vera Cruz region, Mexico, in the Smackover trend, and in the Arab D limestone of Saudi Arabia, Kuwait, and in its time equivalent in Israel. In the Cretaceous, reef facies are dominant. In the Tertiary, coral reefs and calcarenite deposits (Asmari Limestone, Iran) form the most important carbonate reservoirs. Such a generalized categorization by lithofacies refers strictly to major producing lithologies and does not exclude simultaneous production from minor carbonate reservoirs on a local basis.

A comparative evaluation of the reservoir potentialities of carbonate lithologies likely to be found in prospective new oil provinces should form a basis for more realistic profitability analyses.

QUIGLEY, M. D., and R. P. JACOBSON, Hiroca Corp., Tulsa, Okla.

APPLICATION OF AIRBORNE SURVEYS TO SUBSURFACE GEOLOGY

No abstract.

REEDER, L. R., Consulting Geologist, Tulsa, Okla.

LIQUID INDUSTRIAL WASTE STORAGE BY UNDERGROUND INJECTION

With a yearly discharge of liquid industrial waste of more than 14 trillion gallons before treatment, underground injection is a valuable tool to aid industry with the problems of storing and treating its generated waste.

Disregarding mechanical factors, reservoir characteristics exert the greatest influence on operating safety and economics of injection systems. Ideally, a host reservoir should be a uniform salaquifer of large areal extent, substantial thickness, high porosity and permeability, and low pressure with adequate overlying and underlying aquicludes containing fluids compatible with injected wastes. There should be a minimum of faulting and abandoned wells near the injection site.

Compressibility of water, rock, and gas in solution, in addition to any previously removed fluids, provide the space necessary for injection into the host reservoirs. The pressure effect at various distances from the wellbore, for given times and volumes of injected fluids, is important in predicting long-range reservoir performance, effect on inadequately plugged wells in the vicinity, effect of injection near potentially valuable mineral deposits, and unintentional formation fracturing. Potentiometric levels and gradients should be determined for host reservoirs to help analyze and anticipate fluid movement and monitoring methods needed.

With over 300 waste-injection wells in operation today, the vast majority are injecting into reservoirs at depths of less than 6,000 ft. Approximately 70% are injecting into sandstone and unconsolidated sand and about 25% are injecting into limestone and dolomite, with the remaining percentage injecting into crystalline or evaporite sequences. Porosities in these wells range from under 10% to over 30%; permeabilities range from under 1 md to over 5 Darcys, giving a wide range of potential injection volumes and pressures and associated operating conditions.

SHELTON, J. W., R. L. NOBLE, and H. R. BURMAN, JR., Oklahoma State Univ., Stillwater, Okla.

DEPOSITIONAL AND DIRECTIONAL FEATURES OF BRAIDED-MEANDERING STREAM

The Cimarron River in north-central Oklahoma shows characteristics intermediate between typical braided and meandering streams. The gradient is 1.8 ft/mi. at Perkins; the sinuosity is 1.5; the monthly average discharge ranges from 2 to 17,800 cu ft/second; and average channel depth at bankful stage is 15 ft.

The deposits are generally fine- to medium-grained, well-sorted sand, with scattered quartz and intraformational pebbles and thin beds of coarse-grained sand. Several clay drapes are present as thin discontinuous layers. Medium-scale crossbedding, horizontal bedding, and small-scale crossbedding are the dominant sedimentary structures. Compositionally the sand is an arkose, which suggests the Wichita uplift and the southern Rocky Mountains as ultimate source areas.

Irregularities and discontinuities in the sand deposits are due primarily to channel shifts during times of major floods and secondarily to deposition of clay during recession of high-water stages. The irregularities resulting from dissection of transverse dunes and superposition of ripples on dunes are thought to be of minor significance in causing reservoir variations.

Crossbedding, parting lineation, and grain orientation all define the sand trend very well and indicate that directional features in this type of sand deposit are useful in estimating reservoir trend. Directional imbibition parallels the dip of the crossbeds and grain orientation (and parting lineation) in horizontal beds.

Compared with typical meandering-stream deposits, the Cimarron River sand is thinner and contains less fine-grained clastics in the upper part of the sequence and as clay interbeds. It is finer grained than typical braided-stream sands, and current indicators show a wider directional range. The type of deposit represented by the Cimarron River sand may be similar to certain Pennsylvanian alluvial sandstones which were deposited as the gradient was reduced during the initial stages of eustatic rise in sea level.

STONE, D. G., Seismograph Service Corp., Tulsa, Okla.

SPECTRUM EXTRAPOLATION TO INCREASE RESOLUTION

Stratigraphic traps have been receiving increasing attention in the search for hydrocarbons. Greater resolution of detailed features are required for stratigraphic interpretation. Three weapons—continuous average velocity, interval velocity, and amplitude—have been widely studied. The extraction of higher frequencies has been less studied except in the framework of Wiener filtering. An alternate method is possible using Fourier theorems to extrapolate the spectrum to higher frequencies achieving greater pulse compression.

This new approach can increase the resolution of velocity analyses, migration, and automatic statics. Certain reflective sequences obscured by loss of higher frequencies such as pinch-outs, structural flanks, and closely spaced reflectors commonly are resolved by the method. Application examples show this as a possibly effective weapon in stratigraphic trap analysis.

TAYLOR, J. A., Consultant, Okla. City, Okla.

HUNTON FIELDS, ANADARKO BASIN, OKLAHOMA AND TEXAS

No abstract.