sequences. The procedure is used in conjunction with standard methods of environmental and diagenetic analysis, both in petrographic description and reservoir-map construction.

The first step in the procedure is largely petrographic in nature. The pore network is examined to determine the critical rock properties that influence hydrocarbon volume and productivity, pore type, pore arrangement, pore abundance, and pore size. Samples with similar pore networks are grouped together for use in the next step.

In the second step, representative samples are selected from each pore network group for porosity, permeability, and capillary-pressure measurements. The 3-dimensional and quantitative characteristics of the pore network are established in this way and basic data are obtained for reserves calculations.

The petrophysical data are interpreted in the third step by means of porosity-permeability cross plots and capillary-pressure graphs. The use of well logs at this point is recommended as an additional reference base. The output from this step is the identification of the reservoir facies and the determination of its range of quality. The development of a set of reference samples at this time aids cuttings description later on.

Finally, the reservoir and nonreservoir rock groups just identified are linked with their environmental facies counterparts (step 4). When this is accomplished for cored wells, the relations are extended to uncored wells by means of the reference set established previously. Cuttings samples, and even additional cores, can usually be described adequately with a low-power microscope once the reference set is available.

Because the procedure is based on experimental pore-size studies as well as on subsurface and surface studies of several areas and rock types, the system of description should have general application. Studies of fine-grained carbonate sequences are aided particularly with this approach, and helpful information commonly is obtained for evaluating well-test and pressure-production history data.

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AEROMAGNETIC SURVEYS IN LABRADOR BASIN

The combined study of a detailed aeromagnetic survey and available geologic, seismic and other geomagnetic data has indicated the presence of grabens, perhaps of late Paleozoic or early Mesozoic age. The study suggests the presence of salt, defines 3 important trends associated with Appalachian or post-Appalachian orogeny, and appears to support the present concepts of plate tectonics, although this latter point has not yet been studied in detail. Much of the information has been interpreted from detailed aeromagnetic data.

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UNDERWATER IMAGERY BY MAPPING SONAR

The unique long range of the mapping sonar now allows sea-bottom imagery to be obtained which is comparable to air photography or radar imagery on land. The sonar scans out to a 0.5 mi on each side of a towed fish, making the instrument practical for regional geologic sea-floor mapping. When the sonar is used in conjunction with a vertical-profile sparker, submarine geologic interpretations can be made that are superior to photogeologic interpretations on land. There are 2 modes of operation of the sonar. (1) With proper placement of ship traverses, continuous imagery can be obtained comparable to a stapled air-photo mosaic. (2) The sonar fish can be pulled behind a seismic vessel, producing mile-wide strip-type control. For use in this fashion, the increase in cost per mile is small. There are many geologic and geophysical benefits in this use of the sonar. Practical development of the wide-scan-mapping sonar heralds the beginning of sea-floor mapping comparable to aerial photographic land mapping.

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TRANSPOSITION—A SOMEWHAT NEGLECTED MECHANISM OF SEDIMENTARY EMPLACEMENT

Transposition is the mechanism of postdepositional or syndepositional intrastratal sediment movement caused either by gravitationally unstable stratification or by liquefaction. Movement may be upward, downward, or lateral. Transposition structures include sand dikes, sand sills, and sand plugs (formed by injection), sand and mud volcanoes and water-expulsion pipes (formed by ejection), and some convolute stratification and load structures. Slump structures or structures formed by fluid-drag action on the sediment surface are not included.

All of the above structures previously have been described as separate phenomena. They are, however, genetically interrelated; they commonly are found together and form a spectrum of secondary inorganic sedimentary structures. Rapidly deposited, alternate water-rich muds and fine sands in alluvial, lacustrine, deltaic, and turbidite sequences seem to be most suitable for their occurrence.

The similarity of some transposition structures to common primary sedimentary structures is striking. However, they may easily be confused. For example, polygonal patterns of sand dikes may resemble sand-filled mudcracks; cross-stratification caused by ejection may resemble current-formed cross-stratification; some sand dikes may resemble vertically walled channels; downward collapse structures may resemble wave-excavated scoops.

Well-exposed examples of transposition structures are present in the Mississippian Horton Group of Nova Scotia and in the late Precambrian Cabot Group of eastern Newfoundland.

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EFFECTS OF POSTDEPOSITIONAL SUBAERIAL WEATHERING AND INTRASTRATAL SOLUTION ON PALEOCLIMATIC AND PALEOTECTONIC INTERPRETATION

In the nonlithified Cretaceous and Tertiary sediments of eastern and southeastern United States, two different, readily recognizable mineral assemblages are nearly ubiquitous. One, termed a "full" suite, generally contains the following minerals: (1) epidote, garnet, staurolite, zircon, kyanite, hornblende, sillimanite, tourmaline, rutile, and monazite among the heavy nonopaque minerals; (2) quartz, muscovite, and feldspar among the light minerals; and (3) the clay minerals montmorillonite and kaolinite. The other mineral suite contains an impoverished or "limited" assemblage: (1) the heavy, nonopaque minerals zircon, tourmaline, staurolite, kyanite, rutile, sillimanite, and monazite; (2) the light minerals quartz and muscovite; and (3) the clay mineral kaolinite.

The full assemblage is characteristic of sediments of distinctly marine origin, whereas the limited suite commonly is associated with sediments interpreted as originating in a fluvial or littoral environment.

Analysis of outcropping sediments demonstrates that, upward in a section, a full assemblage may change to a limited assemblage where the strata are porous, permeable, and stand topographically high. Fluvial or littoral sands in outcrop or in the shallow subsurface contain limited assemblages, whereas their downdip marine equivalents contain a full suite. These two distinctly different mineral suites are not necessarily the result of changes in provenance, source-area climate, or tectonic stability. Instead, they should be attributed in large part to postdepositional subaerial weathering and intrastratal solution.

Reevaluation of mineral analyses of Cretaceous and Tertiary sediments in the eastern and southeastern United States to include consideration of postdepositional subaerial weathering