GIBSON, A. BRYCE, Hudson's Bay Oil and Gas Co. Ltd., Calgary, Alta.

Development and Use of Formation-Tops File System

Over a period of 14 years, a formation-tops file has been developed to the present on-line interactive system which contains information on over 90,000 wells. The file is useful to explorationists and critical feedback from users has influenced evolution of the system.

GOLUBIC, S., E. J. HOFFMAN, and S. CAMPBELL, Boston Univ., Boston, Mass.

Study of Fossil Microbial Borings—New Approach

Resin casting of recent microbial borings with simultaneous embedding of the resident microorganisms was introduced in 1970. Scanning electron microscopy (SEM) of the cast permitted a three-dimensional perception and thus, detailed characterization of borehole morphologies. It also demonstrated the complexity, diversity, and biological specificity of boring patterns. Combined with light microscopy of sectioned, double-embedded resin preparations, SEM images have been identified in terms of their specific microbial origins. These studies constitute a solid basis from which to approach and understand the ancient endoliths.

A new technique for preparation of fossil microborings introduced in 1978 permits SEM resolution of a quality that had not been achieved previously. This technique permits a direct comparison of fossil to recent microborings. The new approach has been applied to Pliocene microborings in oyster shells, Upper Cretaceous borings in belemnite rostra, organically preserved Upper Silurian endolithic rhodophytes, and microborings in Ordovician brachiopod shells. Thus it opens 600 m.y. of microbial endolithic activity to detailed study and interpretation. Examples of microbial borings throughout the fossil record retain a structural fidelity comparable on a submicron level with recent microborings.

GOODELL, PHILIP C., and JOHN M. HILLS, Univ. Texas-El Paso, El Paso, Tex.

Preliminary Analyses of Brines from Permian Basin of West Texas

Samples of 18 oil field brines were collected from producing wells of Gulf Oil Corp. Most of the wells were small producers not under flood. One was a water well in the Capitan reef. Two of the samples were condensates from deep gas wells. Producing formations range in age from the Permian Capitan to Ordovician Ellenburger Formations at depths of 1,900 to over 17,000 ft (570 to 5,100 m). Geologic environments represented by the host rocks include shelf and reef dolomites, backreef sandstones of the Central Basin platform, and sandstones from the Delaware basin. Older rocks represent shelf limestones and dolomites, and reef dolomites.

Certain chemical properties were determined in the field. Other major and minor constituents were determined in the laboratory. The chemical data are considered preliminary because analyses were not made for certain constituents.

Most of the waters have total dissolved solids of 100,000 ppm or over. The Permian brines are substantially more saline than waters from Gulf Coast Tertiary reservoirs of comparable depths. The brines are in general sodium-calcium chloride waters, with a substantial sulfate content in some samples. Basinal facies rocks produce brines enriched in chlorine, whereas concentrated brines from shelf-facies rocks are lower in chlorine than normal evaporite-depositing brines.

Diagrams show the degrees of variability among samples, and statistical correlations have been attempted. High iodine concentrations appear to be confined to the Delaware basin. All chlorine to bromine ratios are less than 300, which probably indicates brinewater solution of preexisting marine evaporites. Certain samples are anomalously enriched in calcium, sulfate, strontium, and bromine, and in some potassium is notably depleted.

Copper content of most samples was less than 1.0 ppm. Such low values are in agreement with brine compositions from other basins. Lead content ranges from 0 to 2.25 ppm, and zinc from 0.55 to 6.12 ppm. These numbers fall within observed values for other basins. The persistent occurrence of zinc in the brines suggests that favorable rocks in the Permian basin may have been mineralized. Slightly higher zinc-bearing waters appear to come from the Delaware basin or at the shelf edge.

The geochemistry of oil field brines may be used to: (1) identify overpressured zones, (2) correlate lithologic units, (3) locate depositional facies favorable for petroleum generation, (4) estimate subsurface temperatures from silicon analysis, and (5) locate geologic provinces favorable for concentration of lead and zinc as well as barite and associated nonmetallic minerals.

GOTER, EDWIN R., Shell Oil Co., Houston, Tex. and GERALD M. FRIEDMAN, Rensselaer Polytechnic Inst., Troy, N.Y.

Pleistocene Meteoric-Vadose Diagenesis of Enewetak Atoll

Six cores from the northeast reef of Enewetak Atoll reveal that 25 to 50 ft (7.5 to 15 m) of Holocene deposits unconformably overlie at least 200 ft (60 m) of Pleistocene limestone. The Holocene-Pleistocene boundary and four other unconformities within the Pleistocene section are distinguished by paleosols. The unconformities record repeated periods of subaerial emergence and death of the Pleistocene reef associated with low sea-level stands. During emergent periods, meteoric-water diagenesis altered the Pleistocene section. The resulting mineralogy and diagenetic textures are characteristic of the meteoric-vadose diagenetic environment. Aragonite generally composes from 30 to 70% by weight of the Pleistocene limestone and is absent only locally; magnesium calcite is not present. Cementation by calcite is variable but generally increases with depth. Much of the section is poorly cemented and retains high primary and secondary porosity. Micrite and mixed micrite-microspar are the most abundant cements throughout the section. They occur as meniscus, uneven-style, and irregularly distributed ("patchy") pore-fill cement. In the