tification of traps difficult.

The sandbars are composed of fine to medium-grained, cross-bedded, clean, well-sorted quartz arenites. The Aux Vases typically possesses preserved, primary, interparticle porosities of 15-25%, and permeabilities of 40-250 md. Reduction of porosity and permeability in the tidal bars is caused by quartz overgrowths, pressure solution at quartz grain contacts, and authigenic chlorite cement.

The sandbars grade laterally and vertically into interbar and tidal flat sediments composed of fine-grained, bioturbated or ripple-bedded quartz wackes and arenites that typically have 15-20% porosity but are impermeable. The clay matrix of the interbar wacke sediments causes a reduction in permeability, as does the authigenic chlorite and illite cement in the fine-grained arenites associated with the wackes.

Exploration has been hampered because (1) bars of reservoir quality are not easily distinguished from interbar sediments on electric logs; (2) resistivity logs usually show excessively high water saturation; and (3) sandbar trends are difficult to predict. Study of electric logs has shown that a spontaneous potential (SP) of 75 mV or greater is a good indicator of relatively clean, well-sorted, sandbar sediments. An SP less than 75 is an indication of interbar sediments. SEM and x-ray analyses suggest that water adsorbed on mixed layer clays is interpreted on electric logs as free water, accounting for the high water saturation readings. Prediction of sandbar trends is difficult because there are two trend directions: the dominant trend is northwest-southeast, parallel to the shoreline; however, many bars trend east-west, or roughly normal to shoreline. The two trend directions are commonly juxtaposed, thereby adding to the complexity.

SHANKS, KATHERINE N.*, AAPG Headquarters, Tulsa, OK, and MARY S. WOODS*, Valero Energy Corp., San Antonio, TX

Online Data Base Searching with Microcomputer

More than 500 geologic journals are currently published worldwide. Staying abreast of the outpour of professional information seems insurmountable for any one person. Online data base searching provides rapid access to most of this material; it has better precision and recall than manual searching and can be performed with a microcomputer.

Consumer guidelines exist for selection of microcomputer hardware and software to enable manipulation of search results. A suitable communications interface, appropriate software, and a telephone modem are necessary peripheral equipment; a printer and storage media are useful additions.

Data bases vary in subject coverage, file format, and document coverage. Bibliographic data bases specialize in scientific and technical information, and nonbibliographic data bases are strongest in the area of business, finance, and economics.

Two of the most powerful bibliographic exploration files are GeoRef (online version of the American Geological Institute's *Bibliography and Index of Geology*) and TULSA (online version of the University of Tulsa's *Petroleum Abstracts*). However, problems exist in searching these data bases: complex search protocol, a multiplicity of command languages, and expensive online time. Search expertise can be developed through several alternatives, including formal training, printed search guides, and local online user groups. A petroleum independent or consultant who will devote time to learn the systems will find the effort to be cost-effective. Such a geologist is rewarded with immediate access to a sophisticated research library.

SHIER, DANIEL E., Consulting Geologist, Golden, CO

Microcomputer-Assisted Subsurface Mapping

In subsurface mapping, the productivity of the geologist is a function of the time spent on geologic work and the time spent on purely clerical work such as sorting well logs, and plotting values on maps. In my one-man consulting office, the clerical part of subsurface mapping is largely handled by a microcomputer and peripheral equipment costing $1,900. This same system doubles as a word processor, eliminating the need for secretarial help. Overall productivity is enhanced by 20-30%, paying out the hardware in less than 2 months.

The BASIC software consists of 3 modules. One builds a file of subsurface data elevations, formation tops, net sandstone, etc. A second rearranges data or deletes it from the data base. The third, a mapping module, plots one township at a time, at either 1 in. = 4,000 ft (1:48,000) or 1 in. = 2,000 ft (1:24,000) on a dot-matrix printer. Township plots are taped together and roughly contoured to find errors and possible prospects. After editing, the data is replotted and these new maps are used by the drafter as an underlay for spotting data on a mylar base map.

SHINN, EUGENE A., DANIEL M. ROBBIN, and BARBARA H. LIDZ, U.S. Geol. Survey, Miami Beach, FL

Fire and Limestone: Origin of Black Pebbles

The origin and meaning of blackened limestone grains and lithoclasts that occur throughout the geologic record have long been a mystery. The Pleistocene-Holocene unconformity and those within the Pleistocene throughout the Caribbean are often characterized by the presence of blackened limestone lithoclasts. Thoroughly blackened fragments may consist of laminated soilstone crusts (i.e., caliche or calcrete), coral, or oolitic, pelletal and skeletal grainstone derived from the underlying limestone. Blackened fragments occur sporadically or in pockets comingled with nonblackened but otherwise identical fragments. Simple cooking experiments with typical Pleistocene and Holocene limestone fragments showed that only laminated soilstone crusts, poorly cemented pelletal and oolitic grainstone, and aragonitic coral fragments are selectively blackened, whereas well-cemented, nonaragonitic fragments retained their light color. Blackening is caused by charring of organic matter within the rock. Heat from forest fires and smoldering humus accumulations is interpreted to cause the naturally occurring blackened lithoclasts.

Fire-blackened limestone lithoclasts differ from the more well-known salt-and-pepper sands, which typically result from selective blackening of individual Foraminifera, mollusk fragments and other fossils under subtidal conditions. Subtidal blackened grains are associated usually with unconformities and tidal channel deposits where they become mixed with unstained grains. Correct identification of the 2 differing types, when detected in ancient limestone, offers important environmental information, not only to distinguish marine and subaerial unconformities, but for clues to paleoclimate, vegetation, and soil development.

SHUSTER, MARK W., and JAMES R. STEIDTMANN, Univ. Wyoming, Laramie, WY

Origin and Development of Northern Green River Basin: A Stratigraphic and Flexural Study

Two-dimensional profiling of the northern Green River basin using topographic, stratigraphic, and structural information shows that the basin can be modeled effectively as a flexural depression resulting from extrabasinal and intrabasinal loading on an elastically behaving lithosphere. Two distinct approaches were used: present basin geometry profiling and sediment thickness profiling. Present basin geometry profiling involves analysis of predicted present-day basin configuration compared with the observed configuration. Sediment thickness profiling, a procedure based on isostatic compensation for flexural responses to loading, relates stratigraphic thicknesses of basinal rocks to coeval tectonic loading. Results of both methods suggest the lower Tertiary and perhaps some uppermost Cretaceous sediments accumulated as a result of flexure due to loading by the Darby and Prospect thrusts to the west and the Wind River foreland thrust to the east. Moreover, results of the sediment thickness profiling are of predictive value resolving stratigraphic problems and timing structural events. Tentative results imply that (1) the northern Green River basin was essentially full by the end of the early Eocene and subsequent erosion has been negligible, and (2) the first movement on the Wind River thrust in the latest Cretaceous was significant in controlling basin configuration.

SILVERMAN, MATTHEW R., Texas Gas Exploration, Denver, CO

Petroleum Geology and Exploration of Scotts Bluff Trend, Northeastern Denver Basin, Nebraska

Ten J Sandstone oil fields form a long, narrow, northeast-southwest trend in western Nebraska. Except for these fields, this area is nonpro-