pyrolysis analyses of shaly parts of the debris complexes suggest a good hydrocarbon source potential.

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New Applications of Electrical Methods in Hydrocarbon Exploration

Although electrical techniques have been used in the search for hydrocarbons since the pioneering work of the Schlumberger organization in the early 1920s, advances in seismic exploration quickly surpassed the structural mapping capabilities of surface electrical methods. Since that time, a variety of electrical techniques have remained in use, but impressive claims, even including direct detection of hydrocarbons, have remained largely unsubstantiated.

Certain basic electrical methods continued to be used successfully in minerals exploration during the past 3 decades, however, and recent advances (both theoretical and technological) in these well-substantiated methods have generated new interest in electrical methods as a useful tool in oil exploration.

Extensive research since 1977, including more than 350 line-mi (525 line-km) across 36 fields and prospects in a variety of both structural and stratigraphic traps has yielded several interesting results, some of which are inconsistent with past research. It does appear, however, that geochemical alterations above hydrocarbon accumulations are frequently detectable by conventional electrical techniques, and recent advances in these techniques are proving to be even more successful. In a parallel to seismic techniques, proper processing of the data appears to be the key to successfully detecting alterations associated with oil and gas reservoirs.

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Effect of Economic Recovery Tax Act of 1981 on Oil and Gas Industry

The Economic Recovery Tax Act of 1981 provides many new concepts affecting taxpayers in the oil and gas industry. Of primary importance is the reduction in the windfall profit tax on newly discovered oil. The law also modifies the royalty credit, replacing the dollar exemption with a more liberal barrel exemption. It also provides for an exemption of windfall profit tax on independent stripper oil.

The new law also provides for a new concept in recovering capital cost in fixed assets. Depreciation is replaced with the new "accelerated cost recovery system."

Many other changes were made in reduction in tax rates and the addition of saving incentives. The law is very complex and its provisions have various effective dates. Also, many of the changes are phased in over a period of time.

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Geochemical Exploration for Hydrocarbons—No New Tricks, but an Old Dog

This study considers the significance of geochemical exploration for hydrocarbons as used by Geochemical Surveys of Dallas, Texas, for over 40 years.

The search for petroleum has evolved into a highly sophisticated technology where today practically every scientific discipline known is being employed with many attendant new tricks. However, with geochemical hydrocarbon exploration, we have an "old dog that employs no new tricks."

Very simply, all geochemical hydrocarbon exploration methods are based on the much debated premise that the lighter hydrocarbon components flow vertically from a trap through the overlying sedimentary pile by differences in concentration (diffusion) or partly by differences in pressure (effusion). Upon reaching the near-surface sediments, they leave their signatures in one form or another that can be detected by physicochemical methods. These two mechanisms—diffusion and effusion—are aided by the discharge of waters in a vertical direction through reservoir seals that function as membranes much as a wick would do in a kerosene lamp. These chemically imprinted leaking waters create what is called the "geochemical halo" as the lighter hydrocarbon components become oxidized in the near-surface environment in accordance with $CH_4 + CO_2 \rightarrow H_2O + CO_2$ to create the ΔC anomaly.

Four case histories of producing fields, from California, Texas, North Dakota, and Kentucky, illustrate the significance of the ΔC geochemical method as a hydrocarbon exploration tool.

The theoretical basis for hydrocarbon geochemistry is complex and, as with all exploration tools, the problems and difficulties of interpretating the data will never be completely eliminated.

Is it too much to ask of explorationists to view geochemical hydrocarbon exploration from an "aposteriori" viewpoint as the many unheralded geochemical discoveries warrant? If so, then this method has to be reckoned with.

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Origin of Structures in Permian Basin

The Permian basin-type upthrust or tilted fault-block structures have long been an enigma to the structural geologist. These have been variously ascribed to compressive, shear, or vertical stresses. None of these stress systems will suffice as an explanation. The structures have been formed by a fourth structural style that has not been fully described.

The upthrust structures were created by thermal events that caused the earth's crust to bulge, dilate, and pull apart. The bounding faults reflect preexisting fracture systems and are not the direct result of shear failure. Vertical fractures predominate in the basement, where the crust has pulled apart along preexisting fractures. The thermal events are the result of high heat flow within the asthenosphere that causes the lithosphere to dome. Batholiths, stocks, and dikes related to this high heat-flow regime form the discrete anticlinoria. As the thermal event wanes, the dome or anticlinorium founders. Gravity takes over and movement is downward on the faults in response to the cooling cycle. Moderate extension occurs when the dome is being elevated and moderate compression follows during the subsidence phase.

Both the first-order and second-order domal structures are present in the Permian basin. The thermal event that culminated in Late Pennsylvanian time created the Delaware-Val Verde-Marfa rift-rift-rift triple junction, and the producing anticlinoria were formed over the intracrustal intrusives.

Having a viable structural model greatly assists exploration in the Permian basin.