tiary to Devonian) and have a wide range in gravity (45 to 65° API). The highest gravity oils typically are in Tertiary units. Geochemical analyses show systematic compositional trends in the C^5 to C^{10} molecular weight range of these oils. Isoparaffins and cycloparaffins tend to increase in relative abundance, whereas normal paraffins and aromatics tend to decrease with increasing gravity.

It is proposed that these compositional trends result from fractionation during migration by accommodation in water. This origin requires that normal paraffins essentially be excluded at the onset of the migration event while aromatics are "swept" through the reservoir site. The enhanced isoparaffin and cycloparaffin content of the most fractionated oils is attributed to their intermediate solubilities. Exsolution of these hydrocarbons is attributed to solubility reduction caused by temperature and pressure decreases and the probable presence of a gas cap. Processes such as thermal fractionation and biodegradation fail to account satisfactorily for observed compositional trends of these oils.

The wide range in reservoir ages and gravities of the oils in the Santa Cruz basin, coupled with the likelihood that the oils were derived from a single source, provide a natural laboratory in which the chemical effects of migration-fractionation can be studied.

ILLICH, H. A., F. R. HANEY, and T. J. JACKSON, Sunmark Exploration Co., Richardson, Tex.

Oil Geochemistry As Exploration Tool

Oils represent a final product of physical and chemical processes within a basin. As such, they contain compositional attributes that can be utilized to describe the conditions through which they evolved. Data obtained from high-resolution gas-liquid chromatographic and mass-spectrometric analyses of whole oils substantially reduce exploration risk by providing information concerning fluid characteristics. Some of the information that can be deduced from the analysis of oils is: the number of sources, alteration during migration or after accumulation, and mixing of oils derived from one or more sources. Oil geochemistry assists in evaluating the probable numbers of potential reservoir zones, the possibility of encountering "cross-stratigraphically" migrated oils, and the probable value of potentially exploitable reservoirs.

The effective use of oil geochemistry depends on the availability of accurate and precise analytic data. Some significant applications involve whole-oil, gas-liquid chromatography, distribution of sulfur-bearing organics, distillation curves, and mass-spectral data. The efficient treatment of data obtained from oil analyses is central to the problem of producing a succinct interpretive statement meaningful to management. Data reduction and manipulation techniques are also important.

The occurrence of oils within a region is the ultimate demonstration of the presence of source beds and the dynamics of migration and accumulation. Oils should be exploited to obtain a view of the potential of a region because, in nonfrontier areas, samples are often available before major exploration commitments are required.

INDEN, RICHARD F., and HENRY KOEHN, Superior Oil Research Lab., Houston, Tex.

Dolomitization of Offshore Carbonate Deposits in Hammett Shale, Lower Cretaceous, Texas

The Hammett Shale (Lower Cretaceous) represents the offshore marine equivalent of overlying carbonate beach (Cow Creek Limestone) and alluvial (Hensel Sandstone) deposits of Aptian age which prograded shelfward off the southeast margin of the Llano uplift in central Texas. Interbedded and intermixed dolomites and limestones compose most of the upper part of the Hammett Shale and, within this section, dolomites decrease in abundance upward. Dolomites are primarily echinoid-oyster wackestones with clay-rich, medium crystalline dolospar matrix. Limestones are mollusk packstones-wackestones with clay-poor microspar and pseudospar matrix. The dolomites were most likely deposited on a grass or algally stabilized seafloor, whereas the limestones represent units deposited in higher energy environments.

Dolomitization probably took place during shallow burial as the beach sequence prograded eastward, and the regional, fresh-groundwater flow system invaded the marine sediments. Carbonate packstones resisted dolomitization because of original differences in mineralogic composition, and because they were semilithified. They were fractured prior to dolomitization, and have sharp contacts with dolomite. Carbonate wackestones underwent dolomitization because they initially contained more magnesium (high-magnesian calcite, mixed-layer illites, and chlorite), and fine detrital dolomite which acted as seed crystals. Dolomites often display flow-aligned bioclasts parallel with their contacts with limestones, indicating that they were somewhat fluid at the time of limestone lithification, thus allowing the dolomitizing waters to pass through more effectively. Although the marine interstitial water, the fresh water draining Llano uplift Paleozoic dolomites, and the hydrodynamics of the zone of water-mixing provided the means of dolomitization, original sedimentologic differences were a key factor as well.

INGERSON, EARL, and S. VALASTRO, JR., Univ. Texas, Austin, Tex.

Geochemistry of South Texas Uranium Deposits

During the past several years attempts have been made to unravel the geochemistry of south Texas uranium deposits by analyzing core samples obtained from several localities within the mineralized province and from various prospective mines.

The core samples were taken from three different sections of the geochemical cell—the oxidation, ore, and protore zones. All samples selected for analysis belong to the same stratigraphic interval as the ore zone.

Measurements of pH and Eh taken in the field range as follows: oxidation zone, pH 7.2 to 5.6 and Eh −60 mv to +50 mv; ore zone, pH 4.1 to 3.6 and Eh +210 mv to +155 mv; protore zone, pH 2.6 to 4.2 and Eh +210 mv to +180 mv.

Analyses of total organic carbon, pyritic sulfur, and uranium have also been conducted. The total organic