preventer, and better station-keeping abilities. Plans also include an extensive science program for regional and site specific surveys and sample analysis. Primarily the drilling will be used on passive margins, especially those of the continental United States. Where feasible, the drill holes and their site surveys will be used to extend seaward land sea transects that might include continental drilling, CORCORP profiles, and continental drilling by U.S. Geological Survey or petroleum companies.

HELWIG, JAMES, ARCO Oil and Gas Co., Dallas, TX

Stratigraphy and Structure of Early Tertiary Orca Group, Prince William Sound, Alaska

The late Paleocene-early Eocene Orca Group records much of the depositional and deformational history of the Tertiary accretionary prism found in the subduction zone of the Pacific plate in south Alaska. The thick (?5,000+ m) quartzo-feldspathic sandstones and interbedded shales were deposited as a submarine fan complex. Paleocurrents show derivation of detritus from a northeastern source. Three facies belts are distinguished. A northwestern belt characterized by massive sandstones and strong deformation is thrust southeasterly over a central melange belt containing originally interbedded basalt and turbidites deposited on an ophiolite basement. To the southeast, the third belt comprises a classic turbidite sequence which may have been deposited upon imbricated offscrapings of pelagic Upper Cretaceous sedimentary rocks now exposed only in one faulted outcrop on southeast Montague Island.

The predominant structures of the Orca Group are steeply northwest-dipping thrusts and folds overturned to the southeast in harmony with northwesterly subduction of the Pacific plate. However, on Montague Island the neotectonic southeasterly overturned structures overprint early major northwesterly overturned folds. Along strike to the northeast, northwest-trending cross structures overprint the early folds. Structural analysis indicates that the structure of the late Tertiary offshore basin is complex.

HENRY, CHRISTOPHER D., WILLIAM E. GALLOWAY, GARY E. SMITH, et al, Bur. Econ. Geology, Univ. Texas at Austin, Austin, TX

Oxidation-Reduction in Oakville Sandstone of South Texas—Implications for Uranium Mineralization

Three distinct oxidation-reduction zones have been identified within the uranium-bearing Oakville aquifer. An oxidizing zone with Eh values greater than 300 mv and with measurable dissolved oxygen occurs in areas of recharge and extends to depths as great as 800 ft (244 m). An intermediate zone with Eh values between 110 and 10 mv occurs downdip from the oxidizing zone. Eh in these waters may be controlled by ferrous-ferric mineral reactions. About half of the intermediate Eh waters contain low but detectable concentrations of hydrogen sulfide. In east Texas the deepest wells sampled (1,600 ft; 488 m) penetrate this intermediate zone. A reducing zone with Eh less than −40 mv and dissolved H_2S occurs in deepest parts of the Oakville in south Texas and also at shallow depths (300 ft; 91 m) associated with faults, which apparently provided conduits for the discharge of reducing, sulfide-rich waters from deeper formations. Present-day Eh is controlled by either the continued discharge of reducing water or the presence of pyrite formed by previous reduction.

Thermodynamic calculations show that uranium and selenium phases may precipitate within the intermediate zone, but that molybdenum and arsenic require more reducing conditions for precipitation. All four elements should occur together only where the oxidizing and reducing zones are adjacent without an intervening intermediate zone. Such areas can occur (1) where fault discharge has superimposed reducing, sulfidic conditions on an otherwise normal Eh gradient or (2) where a sharp Eh gradient separates highly permeable oxidized sediment from less permeable reduced sediment. Where oxidizing and reducing zones are not adjacent, uranium and selenium only should accumulate within the intermediate zone, and mineralization may be diffuse.

HENRY, MITCHELL E., U.S. Geol. Survey, Flagstaff, AZ

Marine Petroleum Prospecting with Airborne Fraunhofer Line Discriminator

Natural oil slicks from the Santa Barbara Channel, California, have been imaged using an airborne Fraunhofer Line Discriminator (FLD). The imaged distribution correlates well with aerial photographs, visual observations, and simultaneous television monitoring. However, the areal extent of the surface film mapped by the FLD is larger than that determined by the other methods, suggesting that the FLD is more sensitive to exceptionally thin films. Digital image-enhancement techniques applied to multispectral FLD data may provide general compositional information. The FLD may be useful to explorationists looking for evidence of hydrocarbons in frontier marine areas.

HESS, GORDON R., and WILLIAM R. NORMARK, U.S. Geol. Survey, Menlo Park, CA

Possible Geometries of Sandstone Bodies as Reflected by Geomorphic Features on Modern Submarine Fans

Understanding the growth processes and geomorphic features of modern submarine fans will aid in the exploitation of potential hydrocarbon resources in deep-water turbidites. Surveys on four fans in the northeast Pacific using the deep-tow instrument package show a wide variety and size range of relief features. At least three types of channels can be recognized; (1) leveed valleys, common on the upper fan; (2) distributary channels that branch from the active valley; and (3) "headless" channels found at the basin slope and fan margin or along the edges of depositional lobes. All the channel types are associated with areas of active sand deposition. An abandoned distributary channel would likely become the site of deposition of pelagic and hemipelagic muds and occasional thin-bedded turbidites. A connection to the main channel may be maintained by