INTERNATIONAL EXPLORATIONISTS GROUP EVENING MEETING—NOVEMBER 20, 1985

ARNOLD H. BOUMA—Biographical Sketch

Dr. Bouma received his education in the Netherlands under Drs. P. H. Kuenen and D. J. Doeglas. He received his B.S. from the University of Groningen and his M.S. and Ph.D. (1961) from the University of Utrecht. In 1962-63, he was at Scripps Institute of Oceanography under a Fullbright post-doctoral fellowship. After returning to the Netherlands to teach 3 years at Utrecht, he emigrated to the U.S. and taught geological oceanography at Texas A&M University. Here, he held the positions of Associate Professor and Full Professor. From 1976-79, he was a Research Geologist with the U.S. Geological Survey in Menlo Park, followed by a 2 year assignment as Geologist-in-Charge of the USGS Office of Marine Geology in Corpus Christi. In 1981, he joined Gulf Research & Development Company, as a Senior Scientist. He is currently a Sr. Research Associate with Chevron Oil Field Research Company.

Dr. Bouma received the Shepard Award for Excellence in Marine Geology from the SEPM in 1982. During the 1981-82 season, he was an AAPG Distinguished Lecturer. In 1983, he served as co-chief scientist of Leg 96 of DSDP. He is Editor-in-Chief of the international journal GEO-MARINE LETTERS. Dr. Bouma has worked on several scientific topics, however, his studies on turbidities, deep sea fans, interslope basins and other sedimentary facies are best known. He has presented numerous lectures and co-organized several short courses. He is the author of more than 100 papers published in scientific journals.

In addition to being a member of the American Association of Petroleum Geologists, Dr. Bouma is a member of the Society of Economic Paleontologists & Mineralogists, American Association of Advancement of Science, and International Association of Sedimentologists (Treasurer 1962-1966). He is a fellow of the Geological Society of America.

A POTENTIAL DEEP WATER EXPLORATION MODEL BASED ON DRILLING ON THE MISSISSIPPI FAN

The Mississippi Fan, located in the deeper eastern and central Gulf of Mexico, was constructed during the late Pliocene and the Pleistocene. Eight seismic reflectors can be correlated regionally, dividing the fan into eight fanlobes. These fanlobes are not stacked completely vertically, but show a general migration to the east and to deeper water with time. Each fanlobe basically is an elongated body, characterized by a channel-overbank system, and divisible into a submarine canyon, upper fan, middle fan, and lower fan, each with its own seismic and sediment characteristics. The youngest fanlobe, occasionally the underlying one, was drilled during Deep Sea Drilling Project Leg 96.

In a passive margin setting, in which the supply and sand/shale ratio of the continentally-derived sediment is strongly influenced by eustatic sea-level variations, the sediment normally is stored temporarily on the shelf and the upper slope. Slope failure, likely occurring during the initial rise in sea level, is considered to be the main agent for the movement of the material toward the deeper basin. The submarine canyon, thus formed, continues into the upper fan which is characterized by a major channel formed by the down moving sediment. It continues to act as a conduit and becomes filled passively with fine grained material once bottom transport ceases. At the base-of-slope, the upper fan changes into the aggradational middle fan, which is convex in cross section and has a migratory channel running along its apex. The bottom fill is coarse grained and the overbank areas basically lack sandy material. Seismically, this lag deposit can be seen as an acoustical high-amplitude zone.

The sinuosity and dimensions gradually decrease downfan. On the lower fan, we see frequent channel shifting, resulting in a band of small sandy channel fills imbedded in an abundance of overbank shales. Lower down the the fan, a channel may bifurcate before terminating. A confined desity flow suddenly becomes unconfined and depositional lobes or sand sheets result. The youngest fanlobe, and its underlying one, contain 47% and 65% net sand, respectively.

Although no other modern deep sea fans or ancient turbidite series have been drilled systematically and reported on in the open literature, we feel that the main characteristics of the Mississippi Fan are exemplary for all deep sea fans. Fan sizes and distribution of sands vary considerably although the influences of margin setting, basin shape and size, bottom gradients, shand/shale rations, sea level fluctuations, shelf dimensions, and other parameters, are not yet completely understood. It seems that the sinuous nature of the channel and its migratory aspects are common, and although these systems have a strong similarity to fluvial ones, there may be some sedimentological characteristics that differentiate them from fluvial deposits.

The Mississippi Fan will be discussed in the light of an exploration concept that should be applicable to worldwide occurrences of deep water sands. With the help of public data from a few foreign areas, this concept will be highlighted.